6-2014

COAL, GLOBAL WARMING, AND THE CLEAN AIR ACT

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COAL, GLOBAL WARMING, AND THE CLEAN AIR ACT

A Thesis

Presented to the

Faculty of

California State University,

San Bernardino

In Partial Fulfillment

of the Requirements for the Degree

Master of Arts

in

Social Sciences

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ABSTRACT

In the early 1990s many scientists claimed that there was a scientific consensus that the anthropogenic production of greenhouse gases was causing global warming. Carbon dioxide is produced in far greater quantities than other greenhouse gases. Over 80 percent of the carbon dioxide produced in the United States comes from coal-fired power plants. If global warming is a threat to the welfare and survival of future generations, the United States, as one of the greatest producers of greenhouse gases, has an obligation to reduce its production of these gases.

In order to determine the most effective way to reduce the production of greenhouse gases in the United States, this study examines recent efforts by the Clinton and Obama administrations to reduce greenhouse gas emissions from coal-fired power plants. The Clinton and Obama administrations were selected for this study because both administrations were Democratic, and both had avowed political agendas to reduce greenhouse gas emissions. For the first two years each administration enjoyed the support of Democratic majorities in both Houses of Congress, and they had similar political support for the remainder of their time in office.

This study will show that President Obama's executive approach to reducing carbon dioxide emissions from coal-fired power plants has been more effective than the legislative approach of the Clinton administration. The study will indicate that a scientific consensus about anthropogenic global warming and the political will to reduce greenhouse gas emissions from coal-fired power plants did

not exist during the 1990s. The study also shows that, despite the effectiveness of the Obama administration in reducing carbon dioxide emissions, there are many problems with the executive approach to the problem. The study suggests that the Clean Air Act has ceded to much legislative power to the Executive branch of government, and that success in reducing carbon dioxide emissions from coal-fired power plants is too dependent on the will of the Executive.

ACKNOWLEDGEMENTS

I would like to acknowledge the leadership and support of the Graduate Coordinator of the Masters of Social Sciences Program, Dr. Timothy Pytell. I would also like to thank Dr. Brian Janiskee for his direction and advice throughout the process of writing this thesis. Without their experience and knowledge, it would not have been possible to complete this endeavor.

DEDICATION

To Kathleen Stewart. Thank you for her patience and encouragement.

TABLE OF CONTENTS

CHAPTER ONE

BACKGROUND

Introduction

In the fall of 1991, Donald Crane et al., wrote that, “Virtual unanimity exists among scientists that anthropogenic releases of greenhouse gases are forcing greenhouse warming even though there are uncertainties on magnitude and rate of increase.”[1] From the beginning of the 1990’s until the present day, most environmental scientists have agreed that manmade greenhouse gas emissions released into the atmosphere are causing global warming.[2] If it is true that the anthropogenic production of greenhouse gas emissions is harming the environment and putting the survival of current and future generations at risk, the United States has an obligation to reduce its prolific production of such emissions.[3] On June 12, 1992, the George H. W. Bush administration signed the United Nations Framework Convention on Climate Change (UNFCCC), which the United States Senate ratified on October 15th of that same year.[4] In an Earth Day speech on April 21, 1993, President William Clinton committed the United States to reducing anthropogenic greenhouse gas emissions to their 1990 levels.[5] Thus, the United States established an international obligation to reduce its production of greenhouse gases when the UNFCCC was entered into force on March 21, 1994.[6] Since this commitment was

established, the United States has struggled to achieve this goal.

In order to determine the most efficient method to reduce greenhouse gas emissions from the United States, this study will examine two recent efforts to reduce carbon dioxide emissions from coal-fired electric power plants. The first effort to be examined is the Clinton administration's legislative approach. The second effort to be examined is President Barack Obama's executive order approach.

Carbon Dioxide Emissions

The regulation of carbon dioxide emissions from coal-fired power plants should be examined for a number of reasons. According to the United States Environmental Protection Agency's (EPA) executive summary of the "Inventory of U. S. Greenhouse Gas Emissions and Sinks: 1990-2011," total greenhouse gas emissions rose from 6183.3 million metric tons of CO_2 equivalent (Tg CO_2 Eq.) in the year 1990 to 6702.3 Tg CO_2 Eq. in 2011.[7] This is an increase of 519.0 Tg CO2 Eq., or 8.4 percent, in total greenhouse gas emissions over the twenty-one year period. Of the 6702.3 Tg CO_2 Eq. of greenhouse gas emissions that occurred in 2011, 5612.9 Tg CO_2 Eq., or 83.7 percent, of those emissions were carbon dioxide.[8] Of the total carbon dioxide emitted in 2011, 5277.2 Tg CO_2 Eq., or 94 percent, came from the combustion of fossil fuels, and 2158.2 Tg CO_2 Eq., or 38 percent, came from electricity generation.[9] Carbon dioxide emissions from coal-fired power

plants were 1820.8 Tg CO_2 Eq. in 1990. Therefore, carbon dioxide emissions from the generation of electricity have increased 18.5 percent over the same twenty-one year time span.[10] This increase in carbon dioxide emissions from electricity generators powered by fossil fuels constitutes 65 percent of the total increase in greenhouse gas emissions from 1990 to 2011. In 2013, the EPA's "Sources of Greenhouse Gas Emissions" reports that coal combustion is responsible for 80 percent of the carbon dioxide produced by electricity generation.[11] Hence, coal-fired power plants produced 1726.6 million metric tons of carbon dioxide in 2011, and coal-fired power plants produced 52 percent of the total increase in greenhouse gas emissions from 1990 to 2011. If the United States plans to reduce its total emissions of greenhouse gases, it must reduce its total emissions of carbon dioxide. If the U. S. is to reduce total carbon dioxide emissions, it must stop the increase in carbon dioxide emissions from coal-fired power plants. While carbon dioxide at 83.7 percent of total greenhouse gas emissions is the most ubiquitous of the greenhouse gas emissions, Methane at 8.76 percent, nitrous oxide at 5.32 percent, hydroflourocarbons at 1.92 percent, perflourohydrocarbons at 1.00 percent, and sulfur hexafluoride at .14 percent comprise 16.24 percent or 1089 Tg CO_2 Eq. of all greenhouse gas emissions produced in the United States.[12] The EPA reported that stationary sources of greenhouse gas emissions produced 6.3 Tg CO_2 Eq., or 1.0 percent, of CH_4 emissions and 22.0 Tg CO_2 Eq., or 6.0 percent, of nitrous

oxide emissions in 2011.[13] Coal-fired power plants contribute only a fraction of the methane and nitrous oxide emissions produced by stationary sources. Therefore, carbon dioxide emissions are the most compelling reason to regulate coal-fired power plants for greenhouse gas emissions.

Control Methodology

The Clinton and Obama administrations were chosen for this study because both administrations had proposed political agendas to reduce the emissions of greenhouse gases. Each had similar political party support, congressional control, and both entered office during an economic recovery. According to the American Presidency Project (APP), in the 1992 presidential campaign, Clinton's Democratic Party Platform stated that, "The United States must become a leader, not an impediment, in the fight against global warming."[14] In the 2008 presidential campaign, Obama's Democratic Party Platform declared that, "Global climate change is the planet's greatest threat and our response will determine the very future of life on this earth."[15] The research design for this study controls for political partisanship in that President Clinton and President Obama are members of the Democratic Party. Both the Clinton and the Obama administrations entered into their first terms of office with Democratic majorities in the United States House of Representatives and the United States Senate. From January 1993 to January 1995, the Democratic Party enjoyed an advantage in the 103rd U.S.

House of Representatives of 258 Democratic representatives to 176 Republicans representatives. In the 103rd United States Senate, the party enjoyed a majority of 57 Democratic senators to 46 Republican senators.[16] From January 2009 to January 2011, the Obama administration was supported in the 111th House by a majority of 256 Democratic representatives to 178 Republican representatives, and the Democrats led the 111th Senate with 51 senators compared to 47 Republican senators.[17] In the 104th U. S. Congress, the Clinton administration lost support of Democratic majorities in both the House of Representatives and the Senate, and the Republicans retained these majorities in both houses of the 105th and 106th Congresses of Clinton's second term.[18] The Obama administration lost the support of a Democratic majority in the House of Representatives of the 112th Congress, but he was supported by a Democratic majority in the Senate.[19] The Republicans retained a majority in the 113th House of Representatives while Democrats controlled the 113th Senate. [20]

An examination of the Clinton administration will reveal that little will existed among the people of the United States or the U. S. Congress to make the economic sacrifices required to reduce man-made greenhouse gas emissions. It will show that at the beginning of his first term, President Clinton proposed an energy tax to reduce the

production of anthropogenic greenhouse gases that was later defeated in Congress. Further attempts to reduce greenhouse gas emissions were modest, voluntary, and not legislative. Thus, man-made greenhouse gas emissions increased over the eight years that Clinton was in office. Therefore, Clinton's minimal legislative efforts to reduce anthropogenic greenhouse gas emissions were unsuccessful. Global warming theory and the dangers of man-made greenhouse gases had been studied from the end of World War II until the time President Clinton took office. Scientific research organizations, funded by the United States government, publicized these dangers at the national and international and levels. Hence, the dangers were known to the general public. Why was there no commitment by the American people, the Congress, and the Clinton administration to reduce greenhouse gases from sources such as coal-fired power plants? It seems that there are two major reasons why the greenhouse gas emissions from coal-fired power plants problem was not addressed in the 1990s.

First, despite Donald Crane's claim that there was "virtual unanimity among scientists"[21] that man-made greenhouse gas emissions caused global warming, no such unanimity of scientific opinion existed at that time. There was a political consensus among many scientists in government funded research programs that advanced global warming research in

support of government environmental policy. However, reputable scientists on both sides disputed most aspects of global warming science. The government funding of global warming research politicized the science of global warming. The government tended to fund research that supported policy decisions. Thus, the science of anthropogenic global warming became a political issue and the scientific consensus became one political position among many.

Second, the dangers of coal-fired power plant emissions were known since the late 1960s. It was also known that coal-fired power plants produced enormous amounts of carbon dioxide. Provisions of the Clean Air Act Amendment of 1970 were designed to reduce emissions from coal-fired power plants and other large stationary sources. Yet, from the enactment of the Clean Air Act Amendment of 1970 until the Clinton presidency, the use of coal in power plants increased steadily. The Clean Air Act Amendment of 1970 provided for the regulation and reduction of dangerous emissions from coal-fired power plants, but the emissions of air pollutants from stationary sources was secondary to energy policy. The Clinton administration's failure to reduce such emissions was a continuance of the policies of the previous twenty years. An examination of the development of anthropogenic global warming theory and the use of coal in the latter part of the twentieth century will illustrate that no consensus among scientists existed at the beginning of the Clinton administration and that the reduction of coal emissions was

secondary to national energy policy.

CHAPTER TWO

A LEGISLATIVE APPROACH

The Clinton Administration

In his State of the Union Address on February 17, 1993 President Clinton proposed a broad based tax that would tax the heat produced by all forms of energy.[22] Robert Paarlburg writes that:

> Clinton had decided that Congress would never enact a pure carbon tax because it would hit the coal producing and the coal using states, especially in the Mid-West, too hard. Consequently, he decided to propose a tax (based on British thermal units or Btus) on all forms of energy production including nuclear power, hydroelectric power, and even windmills, whether these industries produced greenhouse gases or not. By placing surcharges on energy generated by fossil fuel sources such as coal and petroleum, Clinton included some environmental content to appease committed environmentalists.[23]

In an Earth Day speech on April 21, 1993 President Clinton committed the United States to reducing greenhouse gas emissions to 1990 levels by the year 2000.[24] In June of 1993, President Clinton's Btu tax was killed in the Senate Finance Committee by Democratic Senator David Boren of Oklahoma.[25] Eleven Democrats and nine Republicans served on the committee.[26] As all the Republicans on the committee opposed the Btu tax, any Democrat on the committee had the power to stop the proposed tax.[27] Senator Boren wanted the Btu Tax out because he wanted more spending

cuts than tax increases; therefore, he used his position on the committee to eliminate the tax from the budget.[28] Even with a Democratic majority in both houses of Congress, President Clinton's first attempt at environmental legislation failed, and his commitment to meet 1990 greenhouse gas emissions levels was severely undermined. According to Paarlburg, "Technically the modest reduction Clinton committed the country to would have been easy to achieve had he managed to secure congressional support for a broad based energy tax in 1993."[29] At this point President Clinton did not move to increase regulatory control. When he released his Climate Change Action Plan in October of 1993 he stated, "The package of mostly voluntary initiatives aims to avert the threat of global warming through 'American ingenuity' … not more bureaucracy or regulation."[30] Some reviewers of the plan indicated that its emphasis on flexibility and cooperation, rather than control and mandates, attended to the economy as much as the environment.[31] The plan called for voluntary initiatives that would reduce U.S. emissions by 109 million tons by the year 2000.[32] The plan would cost 1.9 billion dollars in government spending and 60 billion dollars in voluntary spending from business and industry.[33] It consisted of three partnerships between government, business, and industry and was designed to increase energy efficiency and reduce greenhouse emissions. The Climate Challenge partnership was arranged between the Department of Energy (DOE) and major electric utilities. Eighty investor owned utilities

and hundreds of public utilities expressed an interest in reducing greenhouse gas emissions.[34] Climate Wise was an effort between the DOE, the EPA, and industry that pledged to restrict emissions in cost effective ways.[35] The Motor Challenge was an agreement between the DOE, motor-systems manufactures, industry motor users, and utilities to install efficient motors in industrial applications.[36] These voluntary programs would apply to electric utilities to a greater or lesser degree and would impact coal-fired power plants. However, by 1995, the political community recognized that the Clinton administration was not going to reduce greenhouse gas emissions to 1990 levels by the year 2000.

In March of 1995, Under Secretary of State Timothy Wirth announced that the United States remained 30 percent short of reducing greenhouse gas emissions to 1990 levels.[37] Brad Knickerbocker quotes World Watch Institute senior researcher, Hillary French, "Independent evaluations indicate that most of the climate plans issued so far (by the U.S. and other nations) will do relatively little to slow greenhouse gas emissions … This is because they consist mainly of modest voluntary policies."[38] Others blamed Congress as Knickerbocker suggests, writing that, "Shortly after he was elected, President Clinton pushed for a special tax on carbon-based energy sources like coal and oil in order to reduce their use. But congress nixed that idea, and some lawmakers are pushing to cut federal programs for renewable energy and climate research. The House cut NOAA's climate change

research budget by 40 percent."[39] In 1997, a draft appraisal by the National Resources Defense Council asserted that the 189 MMTCE shortfall in emissions reductions was due to a combination of a 40 percent reduction by Congress of funds requested by the President, greater than expected economic growth, and lower energy prices.[40] President Clinton's initial attempt at a legislative reduction of greenhouse gas emissions by taxing coal and oil failed. In 1994, ten out of eleven environmental bills failed to pass.[41] According to Los Angeles Times columnists William Eaton and Michael Ross, the economy was the number one issue for the Democratic majority of the 103rd Congress. There was no will in Congress or among the American people to fund the reduction of greenhouse gases. As the *Los Angeles Times* reported on the opening day of the 103rd Congress, "Legislators plan to address a spectrum of issues that includes jobs, health care, ethics and fetal tissue research. Topping the list, however, is the economy— the issue a majority of voters identified as the most important as they cast their votes two months ago."[42] The reduction of greenhouse gas emissions took a subordinate position to the economy, and Congress was cutting funding for environmental projects. The Clinton administration turned to the voluntary programs that failed to meet the acknowledged goals of reducing greenhouse gas emissions. If there was "virtual unanimity among scientists" that the anthropogenic release of greenhouse gases was causing global warming and that global warming was a threat to mankind, why did a

Democratic administration and a Democratic majority in Congress fail to make the commitment to reduce man-made greenhouse gases?[43]

The failure to reduce greenhouse gas emissions during the Clinton Administration likely resulted from a change in the relationship between government and the scientific research community after World War II. From the early 1950s, government funding was used to force the development of scientific research into anthropogenic global warming. In an effort to fill the information and technology gap about air pollution and control technology, the government institutionalized the change between government and the research community by appropriating vast sums of money through the Clean Air Act and subsequent amendments. During the development of its air pollution and anthropogenic global warming control policies, the U.S. government adopted a policy of using the best available scientific information and technology. It was at this point that government policy changed from funding scientific research to provide information on which to base environmental policy, to funding that would provide the best available scientific information and technology to carry out government environmental policy. For the most part, the use of best available information was an inadequate foundation on which to base policy. This created a situation in which scientist competed for government funding based on their ability to provide research that supported current policy.

As the scientific community and government policymakers became more closely linked, government policy and scientific research became more politicized. The politicization of anthropogenic global warming science resulted in a political consensus about global warming science and government policy by government funded scientists. While a political consensus existed among many scientists with regard to anthropogenic global warming, many reputable scientists with valid objections contested these theories. Because the government supported the political consensus among scientists, the valid objections raised by other scientists were ignored. Hence, the science of anthropogenic global warming became a political issue rather than a scientific issue. By the beginning of the Clinton administration this political issue divided policymakers, the American people, and the scientific community. Thus, establishing the political will to regulate CO_2 from coal-fired power plants lacked support from both the scientific and political communities. As a practical matter, there was nothing new in the failure of the Clinton administration to reduce greenhouse gas emissions from coal-fired electric utilities. From the height of the environmental movement in 1970, to 1990, the effort to reduce emissions of air pollutants from coal-fired power plants took a back seat to the energy needs of the United States. The following sections will address the politicization of anthropogenic global warming science and U.S. energy policy that made the reduction of CO_2 emissions from coal-fired power

plants politically problematic during the Clinton administration.

Anthropogenic Global Warming Theory

The modern theory of global warming had its origins in the scientific advances of scientific research during World War II. According to Corfee-Morlot et al.:

> In large part, the advances came in the pursuit of military interest – either in the use of weather modification as a strategic weapon of geopolitical warfare or the need to understand the diffusion of potentially destructive agents – e.g. chemicals and nuclear radiation – in the atmosphere and marine environments. Likewise, scientific advances in understanding the radiative properties of CO_2 in the atmosphere and the oceans role in the removal of atmospheric CO_2 were developed by the military during World War II.[44]

The writers also note that in utilizing these wartime advances, "Three scientists were notable in their efforts: Swiss scientist Hans Suess and two American scientists Roger Revelle and Charles Keeling, with Revelle becoming a main research entrepreneur out of Scripps Institute in La Jolla, California."[45] The emergence of the contemporary theory began when Hans Suess demonstrated that the oceans were acting as a vast sink for atmospheric carbon dioxide and that the concentration of carbon dioxide in the atmosphere was increasing.[46] In 1955, Dr. Suess joined with Dr. Roger Revelle to show that the exchange of carbon dioxide between the atmosphere and the ocean was limited, and this caused concern about the

possibility of “never-before-seen amounts” of carbon dioxide in the atmosphere.[47] In the late 1950s, Revelle hired Charles Keeling to measure carbon dioxide concentrations in Antarctica and Mauna Loa, Hawaii.[48] These measurements documented an increasing trend in atmospheric carbon dioxide concentration, and they have been one of the major focal points of the global warming debate since 1958.[49] Theories that an increased carbon dioxide concentration in the atmosphere was causing climate change were rejuvenated in 1956 when Gilbert Plass published a paper indicating that global mean temperature could increase by 1.1º C per century. In 1959, he updated his calculations to 3º C per century, and concluded that increasing the concentration of carbon dioxide in the atmosphere would absorb more infrared radiation causing the atmosphere to warm.[50] The newly developed science of anthropogenic global warming was accompanied and supported by the new technology of computer science.

From its inception the science of global warming was linked with the use of computers and climate modeling. Corfee-Morlot et al. state that, “Research originally focused on war-time possibilities for weather modification and John von Newman, at Geophysical Fluid Dynamics Laboratory (GFDL) in Chicago was the main research entrepreneur in this area.”[51] With the development of computers in the 1950s and in the 1960s, a community of scientists began to model the circulation of the atmosphere which supported the theory of global warming.[52] Allen Hammond reported

that, “Numerical modeling of the weather has always been intimately involved with electronic computers. Among the earliest applications of the modern computer built at the Princeton Institute for Advanced Study and completed in the early 1950s—was the problem of weather prediction.”[53] Although many problems existed with computer modeling, the success of early numerical experiments led to an early linkage between computer modeling and weather forecasting. Hammond explained that, “Despite the use of a very simplified atmospheric model, these early attempts—John von Neumann and Jule Charney—proved so successful that operational use of the technique for weather forecasting began in early 1954.”[54] Advances in computer science cemented the link between global warming science and climate modeling. Corfee-Morlot et al. explain that:

> Atmospheric modeling was built upon the rapid increases in computing power in this period, which increased several thousand fold from the1950s into the mid-1970s. Emerging ‘general circulation modeling (GCM) tools provided initial results relevant to climate change published in the mid-1960s. Although the models ignored many important factors, the crude general circulation modeling exercise corroborated Plass’ conclusion that global warming would accompany human induced increases in CO_2; and by the end of the 1960s, this modeling community had confirmed the usefulness of this tool for global warming research.[55]

Government funding began to politicize anthropogenic global warming theory as the contemporary theory was published in Suess’ and

Revelle's 1957 work. Corfee-Morlot et al. state that:

> In a period dominated by policy for science the World Meteorological Organization (WMO) was created in 1950. In 1957/1958 with the leadership of Roger Revelle, the World Meteorological Organization worked with other governmental organizations to support the International Geophysical Year; this significantly boosted funding and attention to climate change science, even prior to official recognition of climate change as a political or social issue, within a broader programme focused on meteorological issues.[56]

In the early 1960s, the theory of global warming continued to develop as a science and a political issue. Corfee-Morlot et al. asserted that, "The 1960s ushered in a range of scientific results to confirm the greenhouse effect or global warming theory as well as the beginning of broad-scale interaction between scientific and policy communities on this issue."[57] On the subject of anthropogenic global warming, Sheldon Ungar reported that, "In 1963 the Conservation Foundation sponsored a meeting on the topic, while in 1965 a report of the President's Science Advisory Committee contained the first recognition in a government document that human activities could produce climatic change."[58] Though carbon dioxide was not considered a pollutant at the time, the Air Quality Act of 1967 did recognize the problem by asserting the need for research regarding carbon dioxide emissions. The Senate Committee on Public Works held hearings on the Air Quality Act of 1967 and "the immediate need' to develop methods to control emissions of sulfur compounds, oxides

of nitrogen, carbon monoxide, and carbon dioxide."[59] The science of global warming became more of a political concern for the international community as the international role of the WMO expanded in 1967. Corfee-Morlot et al. declared that, "Shortly after, in 1967, the International Council of Science (ICSU) and WMO created a collaborative international research programme on global atmosphere, which included climate change along with weather prediction."[60] The authors proclaimed, "Finally, government-sponsored analysis of the science began to emerge, linking the rise in CO_2 and global warming to fossil fuel use and receiving separate attention in government budgets."[61] Thus, by the end of the 1960s the politicization of global warming science through government funding was pervasive, and the empirical evidence and scientific conclusions of scientific research were interpreted in terms of social and political objectives. As Corfee-Morlot et al. stated, "From the end of the 1960s, the fundamental nature of the scientific endeavor on climate change issues become more intertwined with the public sphere. Agrawala explains this transition as a shift away from policy for science to science for policy. In this transition, the science and the politics of the issue become closely intertwined and affect one another."[62] Government funding was not the only policy that was to have a political effect on the environmental sciences.

In 1968, the Senate Committee on Public Works held hearings on the 1967 Clean Air Act. In these hearings, a policy was put forward that

appears to have created much of the scientific and political disagreement that has surrounded the science of air pollution control and the science of global warming. Prior to hearings in 1968, a Senate subcommittee issued a report which proposed a solution to the problem of inadequate scientific information and technology respecting the creation air pollution control policy. Martin & Symington reported that, “A subcommittee staff report on air quality criteria issued in July 1968 in advance of the hearings, while anticipating this problem, also pointed out that regulation should not await the development of adequate scientific data, but must proceed on the best evidence available.”[63] In July of 1968, the Subcommittee on Air and Water Pollution of the Senate Committee on Public Works began a series of hearings about expert testimony regarding the use of best evidence available. The authors stated that, “The one certain thing established by the expert testimony is that even the best available evidence may be totally insufficient to form the basis for the kind of scientific conclusion on which one would expect broad regulation in this field to rest.”[64] While this prehearing recommendation was eventually implemented, it was not without its critics. The authors write of the above recommendation, “While that conclusion is the subject of considerable dispute, since there are those who believe that absent adequate scientific data, the effort may move in erroneous directions, and while the issuance of the various criteria is uncertain, undoubtedly some criteria will be issued in early 1969.”[65] As

the information of global warming science became more widely dispersed many scientists began to evaluate the science of global warming.

In 1970 Helmut Landsberg asked the question, "How much has CO_2 increased as a result of burning fossil fuels?"[66] He responded to the question by stating that, "It is quite difficult to ascertain even the mean amount of CO_2 in the surface layers of the atmosphere, especially near vegetation. Various agriculturist have reported concentrations ranging from 210 to 500 parts per million."[67] Daily amplitudes of carbon dioxide concentrations during growing season are about 70 parts per million.[68] Thus, as Landsberg stated, "Nearly all early measurements were made in environments where fluctuations took place. This, together with the lack of precision of measurements, means our baseline—atmospheric CO_2 concentrations prior to the spectacular rise in fossil fuel consumption of this century—is very shaky."[69] The author advised that the ocean further complicated the estimation of atmospheric CO_2, writing that:

> The oceans are a major sink for CO_2. The equilibrium with the bicarbonates dissolved in seawater determines the amount of CO_2 in the atmosphere. In the exchange between atmosphere and ocean, the temperature of surface water enters as a factor. More CO_2 is absorbed at lower surface water temperatures than at higher temperatures. I have already pointed out the fact that surface-water temperatures fluctuate over long or short intervals; most of these ups and downs are governed by wind conditions. The interchange of the cold deep water and the warm surface water through downward mixing and upwelling, in itself an exceedingly irregular process, controls therefore, much of the CO_2 exchange. … Hence, it is

> quite difficult to make long-range estimates of how much atmospheric CO_2 will disappear in the Oceanic sink.[70]

Landsberg also suggested that, "Even the remaining question of how much the earth's temperature will change with a sharp increase of the CO_2 content of the atmosphere cannot be unambiguously answered."[71] This is because, "The answer depends on other variables such as atmospheric humidity and cloudiness."[72] According to Landsberg, a remaining difficulty in determining CO_2 concentrations in the atmosphere is that, ". . . our estimates of CO_2 production by natural causes, such as volcanic exhalations and organic decay, are very inaccurate; hence the ratio of these natural effects to anthropogenic effects remains to be established.[73] Landsberg's article indicates that this lack of credible observational data will complicate the development of computer generated atmospheric models, and the expanding role of general circulation modeling in global warming research for decades to come. Not only is the science of global warming questioned, but so is the science of computer modeling of the climate.

Allen Hammond reported that, by 1971, the complexity of atmospheric models used by the National Meteorological Center for the U. S. National Weather Service, the Navy, and the Air Force had greatly increased, but the most elaborate models were those developed at the Geophysical Fluid Dynamics Laboratory (GFDL) in Princeton, New Jersey and the

National Center for Atmospheric Research (NCAR) in Boulder, Colorado.[74] Hammond noted the scale of the models, writing "The enormous scale of these models is indicated by the time required to process them with the current computers—from a few hours to most of a day, with the largest models to calculate a 24-hour forecast."[75] Regardless of the increased complexity of computational atmospheric models and their broad use by meteorologists and climatologists, there were many problems involved with their use. Hammond stated that, "The consensus among most meteorologists seems to be that present research models provide some information about the weather for at least five days in advance, but that accurate long-range forecast for even this period are still not possible."[76] He indicated that the limited ability of computer models to accurately forecast the weather was due to factors in addition to the inadequate observational data that Landsberg indicated. Hammond declared that it was unclear why computer models did not more accurately forecast future weather patterns, stating:

> Nor is it clear whether the limiting factor is (i) the quantity and quality of observational data needed as input to the model (ii) the computational grid that is used (and that could be made still smaller when faster computers are available) or (iii) the representation of physical processes in the models. Numerical experiments are being conducted to examine each of these possibilities, but meteorologists agree that much more extensive observational data will be necessary to adequately test the models. Meteorologists are planning a global experiment with a target date of 1976 to obtain this data on a

> worldwide basis and to test the requirements for future international observing networks as part of the Global Atmospheric Research Program (GARP).[77]

Some of the problems with the collection of a sufficient amount of credible observational data could only be solved through investment in observational research and the development of a reliable database over time. The problem of reducing the computational grid depended on the steadily increasing capacity of computers to perform more calculations in less time. However, the remaining problem was different. The problem of accurately representing natural events in computational models was inherent to numerical experimentation. Hammond explained the problem as follows:

> But a crucial feature in climatic simulation is the way in which the various physical processes that control the addition of energy to the atmosphere are modeled. Knowledge of these processes is still incomplete—the research details of heat and moisture transport at the air-sea interface, for example, are subject to ongoing research. Other important climatic influences, such as the extent of ice and snow cover at each pole, are poorly understood; for these reasons meteorologists believe that it is not possible to do definitive numerical experiments.[78]

The author indicated that the representation of natural physical processes in computer models was even more complicated when he asserted that, "Smagarinsky believes that the development of still better atmospheric

models for both weather prediction and climate simulation depends on finding more accurate methods of representing the cumulative effects of physical processes too small to include explicitly in the models; 'progress' as he put it, means dealing more cleverly with small scale processes."[79] Hammond informed his readers that, "In numerical experiments designed to simulate the climatic conditions, models are integrated until they reach equilibrium—a process that takes about a year (on the simulated time scale) for models that include the stratosphere."[80]

There was also an inherent problem with the integration of computational climatic models, as Hammond indicated:

> Meteorologists believe that the atmosphere is, in principle, a deterministic system. But because of the nonlinear character of atmospheric dynamics and the instabilities inherent in atmospheric processes, small errors— whether introduced by observational limitations or by finite difference approximations that are used in numerical models—are known to grow as integration of the model proceeds. Hence, the effects of even small errors will eventually influence the large-scale features of any model atmosphere.[81]

The fact that the ocean and the atmosphere are so closely intertwined presents a further problem with the integration of numerical models. Hammond explained:

> But owing to greater heat capacity and the resultant thermal inertia of

> the oceans, the oceanic model requires several hundred years to come to equilibrium, compared with about 1 year for the atmospheric model. The atmospheric model, on the other hand, is much more complicated and requires approximately 40 times more computation than does the oceanic model for an equivalent time step. And in the experiments, the joint model did not attain equilibrium.[82]

Despite the quantity and complexity of the problems that limit the forecasting ability of computational atmospheric models, Hammond asserted that they have an advantage in that, "Observational experiments in the atmosphere are costly and logistically complicated. By comparison numerical experiments with computers are much easier to carry out."[83]

The problems put forward by Helmut Landsberg and Allen Hammond with regard to anthropogenic global warming and the use of computer generated climate models were problems that persisted throughout the rest of the 1970s, 1980s, and into the 1990s. With regard to general circulation models, Hammond reported in 1974, "Other efforts are directed to constructing general circulation models of the oceans—a problem that is still far from resolution—which could then be coupled with the atmospheric models."[84] Of other modeling problems, he stated that, "Still other researchers have focused on finding better ways to model the effects of phenomena, such as cumulus clouds, which are too small to appear explicitly in a general circulation model."[85] In a 1976 article published by the American Association for the Advancement of Science, a group of

scientists (including J. E. Hansen whose congressional testimony in 1988 elevated the anthropogenic global warming issue to one of national urgency) evaluated the state of computerized climate modeling. Its authors asserted that, "Climate modeling is at a primitive stage and is not capable of reproducing inter annual and long term climate variations."[86] According to the authors, this "primary difficulty" arises because, "The processes, involving the atmosphere, ocean, cryosphere, and land surface, are particularly complex because of the significant interactions and feedback effects that occur among them over climatic time scales."[87] In the late 1970s, J. T. Houghton expressed the concerns of many scientists about computer modeling and the state of environmental research. He wrote in 1979, "However, it must be pointed out that although these models include many relevant physical processes, there are some very fundamental feedback mechanisms … which are not included and for which there are, as yet, no adequate means available for their inclusion."[88]

The problems of anthropogenic global warming and climate modeling science were complicated by other scientific revelations in the 1970s. In the January/February edition of *Environment*, deforestation was added to the list of problems affecting CO_2 concentrations and climate change. The author explained that the Director of the Eco-systems Center of the Marine Biological Laboratory at Woods Hole, Dr. Woodwell, believed that worldwide deforestation is contributing as much carbon dioxide to the

atmosphere as the combustion of fossil fuels. If the oxidation of humus is included, Dr. Woodwell believes that the carbon dioxide contribution of deforestation is greater than that of fossil fuel combustion.[89] The author qualifies this statement by adding that, "The issue is not a clear cut one, however, since the amount of CO_2 accumulating in the atmosphere is, according to Dr. Woodwell, substantially less than would be expected given the amount released from the burning of fossil fuels and from the destruction of forest and other elements of biomass."[90]

Another issue that complicated global warming theory in the 1970s was global cooling. Corfee-Morlot et al. write that, "Given the decline in GMT from 1940 to 1970, some scientists believed a cooling effect of particles was outweighing the warming effect of CO_2 and there was on going disagreement between cooling and warming advocates."[91] They explained that, "Even as late as 1980, in part due to the cooling trend shown in GMT data over the period 1940-1970, conventional wisdom as reported in government science-based reports was that cooling would be as likely as warming.[92] As climate change research continued the theory of global cooling gave way to the theory of global warming. The authors state that, "The intense drive to understand past climate change eventually, led to developments in the 1980s that began to dispel theories about global cooling in favor of warming."[93] Regardless of this lack of agreement among scientists, government funded groups continued to push for policies to

counter global warming.

Research on the greenhouse effect and global warming continued through the 1970s, and scientists and scientific organizations funded by the United States government incorporated political agendas into their scientific programs. In February of 1978, *Science News* reported that:

> When in Washington, do as the politicians do. And, that's just what a good many scientist did last week when 5000 of them gathered for the annual meeting of the American Association for the Advancement of Science. Even though the theme of the meeting was 'Science and Technology: New Tools, New Dimensions,' many of those present seemed more interested in arguing social-political questions than presenting and listening to hard science.[94]

The author wrote of the American Association for the Advancement of Science's (AAAS) political agenda, stating, "As in previous years, the AAAS showed its willingness to take a stand. This year the association stood up for the Equal Rights Amendment."[95] The AAAS also released a twenty-five year forecast based on a consensus derived from a government study introduced at the group's annual meeting. *Science News* reported that, "Few climatologists agree on the weather for the next six months, let alone the next 25 years. But according to a study by the National Defense University in Washington D.C., released at the AAAS meeting, the likelihood of a catastrophic climate change is small. Most likely, the climate until the

year 2000 will be very similar to that of the last 30 years, with more possibility of global warming than cooling.[96] *Science News* stated that:

> William R. Gasser of the U.S. Department of Agriculture presented the first part of the study that will attempt to quantify and estimate the likelihood of various climatic changes, estimate their effect on crop yields, and evaluate policy implications. 'We're not forecasting, but putting quantitative bounds on climate,' Gasser said, 'It is a survey of opinion to allow decisions to be made on the best judgments available at the time."[97]

The study was an international opinion survey of scientists from various parts of the world. It was reported that:

> The findings of the study, called 'Climate Change to the Year 2000' are based on a survey of 24 climatologist in seven countries. From their answers to questions about perceived global temperature changes, five climate scenarios, ranging from large cooling (0.3° to 1.2° C cooler than the early 1970s) to large warming (0.6° to 1.8° warmer), were defined and assigned a probability of occurrence. Depending on their perceptions of global temperature trends, each respondent was associated with a particular climate scenario, such as latitudinal distribution of temperature changes, length and variability of the growing season, amount of precipitation and frequency of droughts and monsoon failures, were drawn and assigned probabilities.[98]

Gasser's report on the study was ambiguous. While he reported that there was no consensus on any issue, he explained that the warming effect of carbon dioxide appears well established.[99]

In the latter part of the 1970s other scientific research organizations predicted the dire consequences that would result from human activities that cause global warming. Lamb and Morth wrote of a statement that was issued in response to concerns about Man's effect on the climate that said:

> In 1976 the World Meteorological Organization issued a statement that suggested that a drastic warming of world climates from this cause (especially Man's production of carbon dioxide) must be expected to set in before the end of the century, and might already have begun, leading ultimately to disappearance of the Arctic ice, melting of ice caps, rise of sea level and great shifts in natural vegetation and crop belts.[100]

Barrie Pittock reported that, "Within the United States, DOE has been the lead agency in coordinating and financing a research program on the greenhouse effect following a major scientific conference held at Miami Beach, Florida, in 1977."[101] Despite the deficiencies of scientific data and the inadequacies of computer generated climate models, Sheldon Ungar declared that, "The issue reached a new stage in 1979: A report to the Council on Environmental Quality cast the greenhouse effect as a policy issue, the Department of Energy set up an interdisciplinary CO_2 research program, the National Academy of Sciences studied the problem, and the first World Climate Conference urged all nations to address the threat."[102] In 1980, Dennis Hayes stated that, "A 1979 report by the National Academy

of Sciences states: 'We now have incontrovertible evidence that the atmosphere is changing and we ourselves are contributing to that change ...."[103]

In 1980, Madden and Ramanathan wrote, "The inherent variability of climate will make detection of changes due to increasing CO_2 difficult."[104] They indicated that the reason for this problem was:

> The observed interannual variability of temperature at 60° N has been investigated. The results indicate that the surface warming due to increased carbon dioxide which is predicted by three-dimensional climate models should be detectable now. It is not, possibly because the predicted warming is being delayed more than a decade by ocean thermal inertia, or because there is a compensating cooling due to other factors. Further consideration of the uncertainties in model predictions and of likely delays introduced by ocean thermal inertia extends the range of time for the detection of warming, if it occurs, to the year 2000.[105]

James Hansen et al. wrote of the status of computer modeling in the 1980s, stating, "Models do not accurately simulate many parts of the climate system, especially the oceans, clouds, polar sea ice, and ice sheets."[106] The writers asserted that, "The main uncertainties in the climate model—that is, its tuning knobs—are (i) the equilibrium sensibility and (ii) the rate of heat exchange with the ocean below the mixed layer."[107] Hansen et al. explained that the way to correct the climate model is by adjusting the tuning knobs (the equilibrium sensibility and the heat exchange with the ocean below the

mixed layer) to agree with the observed temperature. They claimed that, "The general correlation of radiative forcing with global temperatures suggests that model uncertainties be constrained by requiring agreement with the observed temperature trend."[108] It is difficult to understand how forcing uncertain data to agree with observed data that may be problematic (in a numerical simulation based on statistical correlation rather than causality) can be predictive of real world phenomenon.

A 1986 article in the periodical *Environment* Jill Jager stated that, "observed increase in the concentration of atmospheric carbon dioxide in the past century has been caused by carbon dioxide emissions from fossil fuel combustion …."[109] She wrote of the climate changes resulting from increased greenhouse gas emissions, stating, ". . . since reliable estimates of regional-scale climatic changes as a result of greenhouse gas increases are presently unavailable, it is not possible to predict the direction, magnitude, or rate of future change in ecosystems with a degree of confidence sufficient for policy formation or strategy choice."[110] William Nitze confirmed Jager's statement when he asserted that, "There are many uncertainties about the magnitude, timing, and regional distribution of future climate change, but we do know that atmospheric concentrations of greenhouse gases are increasing."[111] Even with the uncertainties about climate change, Nitze explained that, "To focus attention on these

questions, in 1987, the U. S. government urged the governing bodies of the World Meteorological Organization and the United Nations Environment Programme to establish an Intergovernmental Panel on Climate Change (IPCC) to consider climate change at the policy level."[112] When the IPCC met in November of 1988, a policy reminiscent of the U.S.'s 1968 Clean Air Act policy was instituted. The author stated that:

> In his remarks to the IPCC in November, Fred Berenthal, U. S. Assistant Secretary of State for Oceans and International Environmental and Scientific Affairs, explained that a detailed and complete scientific assessment of global climate change 'will take years perhaps decades, to develop.' He went on to argue, however, that the panel should begin to study potential response strategies before the science assessment is completed. Some may argue that no analysis of possible response strategies should be initiated until we fully understand the dynamics of climate change, and we respect that opinion,' he concluded, 'but prudence dictates that we begin now to consider the practicality and potential effectiveness of various response options.'[113]

Dale Jamison wrote that in that same year, "The emerging consensus about climate change was brought home to the American public on June 23, 1988, a sweltering day in Washington D. C., in the middle of a severe national drought, when James Hansen testified to the U.S. Committee on Energy and Natural Resources that it was 99% probable that global warming had begun."[114] A number of scientists responded to Hansen's congressional testimony as Joel Scheraga indicated, writing, "Results of statistical test

done by Andrew Solow of Woods Hole Oceanographic contradict Hansen's claim that an anthropogenically induced global warming trend has been detected. And Tim P. Barnett, an oceanographer at Scripps Institution of Oceanography, has stated, 'The variability of climate from decade to decade is monstrous. To say that we've seen the greenhouse signal is ridiculous."[115] Eric Barron asserted that, "After studying the air and water dynamics of the tropical Pacific, Kevin E. Trenberth and Grant W. Branstator of the National Center for Atmospheric Research, in Boulder, Colorado, and Phillip A. Arkin, of the National Ocean and Atmospheric Administration blamed the weather of 1988 on 'natural variations' in circulation patterns."[116] William Nitze explained of atmospheric CO_2 that, "We also know that such increases, in theory, lead to global and worldwide changes in climate. However, we do not yet have a clear signal of a warming trend because the variations we have observed so far could be within the range of natural and historic variability."[117]

In 1992, author S. Fred Singer wrote of a 1990 plan by the International Panel on Climate Change to avert a temperature rise of 5° C in the next century:

> An Intergovernmental Panel on Climate Change (IPCC), sponsored by the United Nations, has been laying the groundwork for an international convention aimed at averting such a climate catastrophe. Its scientific base is a 'Policymakers Summary' on greenhouse warming, released in June 1990, said to represent a

> ‘scientific consensus.’ Far from it. The summary ignores valid scientific objections to theoretical calculations that predict global warming. It is silent about other human activities, notably the emission of sulfur dioxide in industrial processes that are thought to promote climate cooling. It plays fast and loose with historical data that clearly disagree with the standard greenhouse warming theory. It also puts a ‘spin’ on its major conclusions that can only serve to mislead the nonscientific decision makers who are earnestly seeking answers to global problems.[118]

Singer also asserted that, “The IPCC report is based on faith in existing mathematical models that have not been able to ‘hind cast’ the temperature changes experienced in the last century, and furthermore have been in a state of flux.”[119] He declared that the reason for this was that, “Many scientists do not accept IPCC conclusions and call attention to the fact that the strongest temperature increase occurred before the major rise in greenhouse gas concentration.”[120] Singer also asserted that, “Serious discrepancies also exist between model results and actual experience from the detailed climate record of the past century.”[121]

Just as the IPCC was releasing its “Policymakers Summary” representing the scientific consensus on global warming, Christopher J. Ecsedy and Charles G. Murphy published an article explaining that, “A consensus that the causes of climate warming observed during the past century remain unclear was reached at a session of the Intergovernmental Committee on Climate Change Working Group I held in February 1990 in Great Britain.”[122] They further supported Singer’s assertions, writing:

> On the basis of computer models clear signs of the greenhouse effect should have appeared as a consequence of increases of greenhouse gases in the last 100 years. However, model predictions were contradicted by the climate record in nearly every important aspect, including that the Northern Hemisphere has not warmed more than the Southern Hemisphere, high latitudes have not warmed more than low latitudes, and the U. S. has not shown a predicted warming trend.[123]

A consensus about global warming and the greenhouse effect did not truly exist in the early 1990s. While the political consensus among scientists may present a powerful argument for government policies to prevent anthropogenic global warming, the contrary arguments suggests just as powerfully that the United States and the international community were forcing the use of inadequate scientific information to solve the problem. Writer Sheldon Ungar stated of the political realities of the anthropogenic global warming issue, "So much uncertainty surrounds the scientific climatological facts that political inaction and counter claims suggesting warming will be trivial enjoy plenty of scope."[124] The lack of scientific consensus about global warming science and mathematical climate models have created a political issue rather than scientific agreement about solutions to global warming problems. Since the very beginnings of the modern theories of global warming and the greenhouse effect, government forced global warming research has politicized the issue and made scientific research subject to political division rather than scientific

cooperation. Thus, scientists became political activists for, or against, the government's global warming policy, and global warming theory became the subject of political debate rather than of scientific agreement.

In order to reduce manmade emissions of CO2 in the United States, the Clinton administration needed to get the electric utilities to reduce their emissions of CO_2. Though coal-fired power plants were recognized as a major source of numerous air pollutants, compliance to the Clean Air Act took a back seat to government energy policy. Thus, it would seem that the production of energy, as a political issue, outweighed fears of environmental disaster proposed by government funded scientific organizations.

Energy Policy and Coal-Fired Power Plants

As the U.S. Government established standards for the reduction of sulfur oxides and other pollutants emitted from coal-fired electric utilities, it continued to support the use of coal to generate electricity. According to writer Harry Perry, the overall use of coal to meet the energy requirements of the United States ". . . declined steadily until by 1972 it provided 17.3 percent, with oil and gas providing most of the balance."[125] Although the Clean Air Act Amendment of 1970 had been instituted with provisions to reduce emissions from stationary sources, they were not the primary focus of the law. John Graham explained that, "The most prominent issues at the time were emissions-control deadlines for the automobile industry and, to a

lesser extent, new source performance standards for stationary sources of air pollution."[126] Within two years of the enactment of the Clean Air Act Amendment of 1970, the government opted to increase the use of coal to produce electricity. This resulted from the increased prices of natural gas and oil caused by the 1973 oil embargo initiated by the Organization of Petroleum Exporting Countries (OPEC). Perry explained that:

> The quadrupling of oil prices in 1973-1974 and the fear of even further sharp price rises (which actually occurred in 1979) raised additional concerns about the long term implications of higher energy cost. Thus, for both security and cost considerations, energy policy-makers turned to the reserve of domestic coal, which could be supplied at low cost, as a possible means of providing solutions to those newly developed energy problems."[127]

The increased use of coal to generate electricity was the major change that resulted from the oil embargo. Perry claimed that, "There are several reasons for this change. Government initiatives were designed to increase coal use and price induced switching to coal occurred whenever possible."[128] The Energy Supply and Environmental Coordination Act (ESECA) of 1974 was just one of the initiatives used to increase the use of coal to generate electricity. Author John Christie reported that in January of 1975, President Ford called for, ". . . amending the Clean Air Act and the Energy Supply and Environmental Coordination Act of 1974 in order to promote the increased use of domestic coal."[129] The ESECA also extended the authority of the Federal Energy Administration to convert oil and gas

fired power plants to coal.[130] Gregory Elmes and Trevor Harris explained that, "The National Coal Policy Act of 1978, the Power Plant and Industrial Fuels Act of 1978, and the Energy Tax Act of 1978 increased coal's share in the energy market …."[131] Hans Landsberg informed his readers that the Fuel Use Act of 1978 prohibited the construction of power plants and large-scale industrial facilities that would burn oil and natural gas, and this Act was not repealed until 1987.[132] These policies encouraged the use of coal to produce electricity, as Perry asserted, writing, "In the United States a number of policy initiatives were undertaken to increase coal use and by 1982 coal's share of the U.S. energy supply was 22.1 percent having risen slightly from a low in 1972 of 17.3 percent." [133] This modest increase in the percentage of the energy supply was accompanied by an increase in the overall energy supply of approximately 5000 quadrillion Btus during the same time period; approximately 3000 quadrillion Btus of this increase was from coal combustion.[134]

Policies that encouraged the use of coal were not the only problem that affected the control of emissions from coal-fired power plants as Perry asserted, stating, "The unanswered technical questions, the complexity of chemical processes occurring after emission and before disposition, and the lack of a good data base from which to assess reliably the magnitude of the problem, including the health problem, have left considerable doubt about the rationale of regulatory standards."[135] Inadequate science is not the only

problem with controlling emissions as Perry wrote, explaining, “In addition to uncertainties in the scientific information, the formulation of air pollution regulations has been erratic and based on policy approaches that have not solved the problem and have required frequent modification in time tables established to achieve stated emission level.”[136] Standards for the regulation of carbon dioxide emissions were not established under the Clean Air Act Amendment of 1970 or subsequent amendments. The major emphasis at that time was the control of sulfur emissions and other pollutants. Writer Harry Perry declared that, “In the direct combustion of coal, air pollution standards must be met for sulfur oxides, nitrogen oxides, and particulates. Other pollutants are receiving attention, but standards do not yet exist.”[137] Coal fired power plants were recognized as the major source of sulfur in the atmosphere. Alan Schlottman wrote, “In the United States coal-fired power plants generate the major portion of sulfur emissions, accounting for most, of the 57 percent of emissions attributable to electric utilities.”[138] While the regulation of carbon dioxide did not come under the authority of the Clean Air Act until 2009, many of the same problems that affected the regulation of other pollutants would affect the regulation of carbon dioxide. Although the need to reduce emissions from coal-fired power plants was apparent, the use of coal to generate electricity continued to increase into the 1980s.

In 1979 the Iranian Revolution interrupted oil and gas supplies from the Middle East, and the nuclear accident at Three Mile Island caused

public opinion in the United States to question the safety of nuclear power. These events solidified the electric utilities choice of coal as the preferred fuel for electricity generation. Scientist Bruce Allar stated:

> In recent years coal has returned to the front burner as the future fuel source considered most promising by the electric power industry. This has happened for two reasons, first, the other fossil fuels traditionally used in utility boilers---oil and natural gas---are less plentiful in the United States and are therefore subject to the same vagaries of foreign domination that led to the 1970s Arab oil embargo, second, in the aftermath of Three Mile Island concern over the safety and economics of nuclear power weakened the prospects that it will be the principle source of energy in the coming decades.[139]

An economic recession in 1980 slowed the increase in electricity production from 1979 to 1981; however, this strengthened coals position with respect to its status as the chosen fuel for electricity generation.[140] Perry wrote, "Since electric power generation, which is heavily coal based, was less effected than other fuel uses by the economic recession and conservation effort, coals share of the market was less effected than other fuels."[141] Therefore, he explained, "Although electricity production grew an average of only 1 percent between 1979 and 1981, coal use by the electric utility industry grew by about 6 percent a year during that period" [142] According to Hans Landsberg, coal's share of the nation's energy supply reached 23.5 percent in 1986 and, had ". . . virtually become a satellite of electric

power."[143] Authors Donald Strait and Richard Ayers wrote in 1987 that, "Despite the 17-year history of the Clean Air Act, certain chemical operations, oil refinery processes, and other important industrial sources of smog-causing pollution remain unregulated in most states."[144] The increased use of coal to generate electricity continued to the end of the 1980s and into the 1990s.

Writers Elmes and Harris asserted that, "In 1990, the electric utility-industry accounted for 86 percent of domestic coal consumption while industrial plants accounted for less the 14 percent."[145] From the passage of the Clean Air Act Amendment of 1970 to the passage of the Clean Air Act Amendment of 1990, electricity generation increased by approximately 1,368,000 million kilowatt hours or by approximately 89 percent.[146] During the same time period electricity generated from coal increased by 889,617 million kilowatt hours or by approximately 126 percent.[147] Thus, approximately 65 percent of the increase in net electrical generation from 1970 to 1990 was fueled by coal combustion. In 1970 the electric power sector consumed 61 percent of the coal consumed in the United States.[148] In 1990 it was responsible for the consumption of approximately 86.5 percent of coal used in the United States. There were 462,400 thousand short tons more coal consumed by the electric power sector in 1990 than in 1970.[149] This was an increase of approximately 145 percent in the consumption of coal by the electric power utilities over the twenty year period. The overall

consumption of coal in the United States increased by 381,300 thousand short tons. This was an approximate increase of 73 percent more coal consumed by the United States in 1990 than in 1970. Thus, the consumption of coal by the electric power companies accounted for 121 percent of the total increase in coal consumption from 1970 to 1990. This indicates that coal use by the electric power companies drove the increase coal consumption, while other industries diminished their use of coal. The steady increase of coal use from 1970 to 1990 represents a steady increase of carbon dioxide emissions over that time period. If the Clinton Administration was to meet its 1993 commitment to reduce greenhouse gas emissions to 1990 levels, it would have to secure the reduction of CO_2 emissions from the electric utilities.

Although the groundwork for the reduction of greenhouse gas emissions had been laid by the Clean Air Act Amendments of 1990, the regulation of carbon dioxide emissions was not yet under the authority of the Clean Air Act. Donald Crane et al. explained that, “Other portions of the Clean Air Act Amendments of 1990 address toxic emissions from coal-fired plants and set the stage for considering CO_2 emissions by initiating data collection.”[150] Therefore, at the beginning of the Clinton administration, no provisions in the law existed to regulate CO_2 emissions. Clinton’s legislative attempt to control emissions of CO_2 took the form of a tax on the production of energy. Clinton’s energy tax was defeated in committee by a single

Democratic senator aligned with a solidified Republican opposition that favored spending cuts to increasing taxes. However, given the history of energy use over the preceding twenty years and the fact that the economy was the primary concern at the time, it is unlikely that the Btu tax would have ever received the required support to become law. Clinton's response to this defeat was a somewhat lackluster attempt to persuade polluting industries to voluntarily spend 60 billion dollars to reduce greenhouse gas emission. It seems unlikely that the utility companies (who had been converting to coal because it was the cheapest fuel available) would have voluntarily spent billions of dollars to reduce emissions. Robert Paarlburg wrote of Clinton's Climate Change Action Plan that, "His official composite climate change policy, the Climate Change Action Plan (CCAP) produced in October, 1993, did not revive the energy tax proposal and included no new international negotiation initiatives. It did not even tighten corporate average fuel economy standards for automobiles, despite Clinton's earlier campaign pledge to try to do so."[151] Despite the Democratic majorities, in both houses of Congress, the 1994 Congress failed to pass ten out eleven environmental initiatives. After 1994, Republican majorities controlled Congress throughout the remainder of Clinton's time in office. Rather than making the commitment to reduce greenhouse gas emissions, both Democratic and Republican majorities in Congress preferred to nurture the economy. It seems obvious that the scientific consensus about urgency of anthropogenic global warming

failed to convince either Democrats or Republicans to act to reduce greenhouse gases. Congress cut environmental programs and funding, and the Clinton administration seemed to except the early defeat of its environmental policies with little resolve to revive them.

According to the EPA's Inventory of U. S. Greenhouse Gas Emissions and Sinks: 1990-2011, CO_2 emissions in 1992 totaled 4962.5 million metric tons. By the end of the Clinton's second term, CO_2 emissions totaled 5,678.0 million metric tons, an increase of 715.5 million metric tons or an approximate increase of 14 percent over President Clinton's term. The Clinton administration's legislative approach to reducing greenhouse gas emissions from coal-fired power plants was minimal and unsuccessful. It demonstrated either a lack of commitment to address the problem or a lack of understanding about how to address the problem. Although President Clinton issued 364 executive orders during his time in office, he refused to use bureaucracy and regulation to reduce greenhouse gas emissions from coal fired power plants. This indicates that President Clinton was not convinced of the necessity to reduce greenhouse gas emissions during his administration. Ronald Brunner and Robert Klein wrote of Clinton's Action Plan that, "First, the Action Plan is not expected to achieve its goal of returning U. S. greenhouse gas emissions to 1990 levels by the year 2000, or even coming close. It could turn out to be little more than a symbolic substitute for effective action."[152]

CHAPTER THREE

THE EXECUTIVE APPROACH

The Obama Administration

President Obama pursued legislation to control greenhouse gas emissions as both a Senator and as a President. Jonathan Adler recalled that, "Specifically, then-Senator Obama called for reducing by 2050 greenhouse gas emissions in the United States by 80% through the imposition of a cap and trade regime."[153] Cap and trade is a market-based program that progressively limits emissions overtime. Allowances totaling the limitation cap may be traded or purchased to enable businesses to meet goals established under the cap. This provides an incentive and means for polluters to bring their emissions within established limits.[154] On May 5, 2009, Representative Henry Waxman introduced House Resolution 2454, the American Clean Energy and Security Act of 2009, which included the President's proposed cap and trade policy.[155] On June 26, 2009, the House of Representatives passed House Resolution 2454 by a 219 to 212 vote. The Senate then received the bill on July 6, 2009.[156] Prominent Senators such as Barbara Boxer, John Kerry, Joe Lieberman, Lindsey Graham, and others, began working on proposals for a Senate environmental bill. Yet, House Resolution 2454 remained in the Senate until the summer of 2010. Despite overwhelming Democratic majorities in both houses of the 111th

Congress, H. R. 2454 barely passed in the House. The Senate never brought the bill to a vote.[157] Just as the Democratic majority in the 103rd Senate did not deliver on President Clinton's legislative agenda to reduce greenhouse gas emissions with a Btu tax, the Democratic majority in the 111th Senate did not approve President Obama's cap and trade proposal to reduce carbon dioxide emissions. Like President Clinton, President Obama faced a Republican controlled House of Representatives after the midterm election. However, President Obama was not threatened with budget cuts to his administrative departments and agencies. He was able to fund much of his environmental program through the American Recovery and Reinvestment Act of 2009.

Unlike the Clinton administration, the Obama administration engaged in an aggressive regulatory program to reduce greenhouse gas emissions from coal- burning power plants. These regulations make new coal-fired power plants more expensive to construct and operate while existing plants face expensive new standards. As one expert observed, ". . . the U.S Environmental Protection Agency (EPA; Washington, D.C.) is moving to regulate coal-fired power plants even more, not only with respect to greenhouse gas, but also with respect to cooling water, and the disposal of coal-combustion residuals."[158] Some projects to construct new coal fired power plants and modernize older plants have been cancelled since 2008.[159] New coal fired power plants, and older plants undergoing

modifications are regulated under the Clean Air Act (CAA) as stationary sources of greenhouse gas emissions. The regulation of greenhouse gas emissions under the CAA came about as a result of a 1999 coalition between a number of state governments and environmental interest groups. They joined forces to petition the EPA to control greenhouse gas emissions from motor vehicles under Section 202 of the CAA.[160] In 2003, the EPA denied the petition on the grounds that it lacked the authority to regulate greenhouse gases as pollutants under the CAA.[161] The EPA's reasoning was that the CAA was written to control more conventional pollutants such as particulates and smog, not globally dispersed emissions such as carbon dioxide.[162] In the 2007 Supreme Court case, *Massachusetts* v. *EPA*, the Court decided, in a five to four vote, that the EPA had the authority to regulate greenhouse gas as pollutants under the CAA.[163] Once the Supreme Court decided that greenhouse gas emissions from motor vehicles were pollutants, the CAA allowed for their regulation if the EPA Administrator determined that these pollutants posed a danger to the public.[164]

On December 15, 2009, the EPA made a formal finding that new motor vehicles produced greenhouse gas emissions that caused or contributed to air pollution that posed a danger to public health and welfare.[165] Once a finding of endangerment was made, the CAA requires that standards to regulate such pollutants be established by the EPA.[166]

Other provisions of the Act contain the same endangerment language.[167] The determination that greenhouse gases were dangerous under Section 202 of the CAA triggered their regulation from new and modified stationary sources under Section 111.[168] Thus, the regulation of greenhouse gas emissions from coal-fired power plants was recognized as a danger to public health and welfare, and carbon dioxide was officially recognized as a harmful pollutant. Another significant effect of the endangerment finding was the CAA requirement for New Source Review and Title V permitting.[169] The regulation of coal-fired powered plants and other stationary sources of greenhouse gas pollutants is separated into technologically-based standards and emissions-based standards. Technologically-based standards require certain kinds of emission control technology, and emission-based standards designate the maximum concentrations of pollutants in the atmosphere that protect public health. These standards are provided under Sections 108 and 109 of the CAA and are known as the National Ambient Air Quality Standards (NAAQS).[170]

Section 111 of the CAA is the primary provision for the technological standards known as the New Source Performance Standards (NSPS).[171] NSPS require that “new or modified” major sources of greenhouse gases obtain permits that mandate technological standards.[172] A source is considered major if it emits 100 tons per year (tpy) or 250 tpy depending on the source category.[173] Prevention of Significant Deterioration (PSD) permits

impose site-specific technology-based requirements that call for the case-by-case application of the best available control technology (BACT).[174] Title V permits are general operating permits where one can find all control requirements such as PSD and BACT. They also contain monitoring and reporting requirements, fee payments, and annual certification by a responsible official. For the purposes of Title V, a "major" source is one that emits 100 tpy.[175] The CAA was designed to protect against pollutants that are produced in smaller quantities than greenhouse gases like carbon dioxide; which presents a problem for PSD and Title V permitting. According to the EPA, if PSD and Title V permitting requirements are applicable to major sources as defined by the CAA, many small sources of carbon dioxide such as residential and commercial buildings will be unduly burdened with the cost of site-specific PSD control technology requirements and permit applications.[176] For instance, processing one permit for a new or modified individual source can require 300 man-hours for the agency to process and can cost the facility obtaining the permit several hundred thousand dollars.[177] Issuing permits to residential and commercial buildings is not as difficult but may require 60 man-hours. Requiring permits for small sources of greenhouse gas emissions would increase PSD applications from 280 a year to 40,000 and cost the permitting agency 250 million dollars a year.[178] Title V permitting at the 100 tpy threshold would increase the applicable number of permits from 15,000 to 6,000,000 and require 340

million hours to process, costing 15 billion dollars per year.[179] Jonathan Adler explains that:

> According to the EPA, applying the Clean Air Act as written to greenhouse gas emissions would extensively disrupt existing regulatory programs, and perhaps make them impossible to administer… In this specific case, however, the CAA's text is explicit, and the Supreme Court in *Massachusetts* v*. EPA* expressly rejected the EPA's claims that applying the Act to greenhouse gases would be impossible or inadministrable.[180]

In order to avoid these regulatory problems, the EPA issued the Prevention of Significant Deterioration and Title V Greenhouse Gas Tailoring Rule that established new thresholds for the permitting of stationary sources of greenhouse gas emissions.[181] This appears to put the EPA in the position of violating the law it is tasked to enforce. Author Meredith Wilensky writes that, "The EPA asserts that it has the authority to exercise the discretion found in the Tailoring Rule based on statutory interpretation doctrine which provides a highly differentiated standard of review for agency interpretations of their governing statutes."[182] The first phase of the Tailoring Rule went into effect on January 2, 2011. This phase stated that PSD and Title V permit requirements apply only to sources already subject to permitting for non-greenhouse gas pollutants. These sources will need a PSD permit if they emit or are capable of emitting 75,000 tpy of carbon dioxide equivalent. They will require Title V permits regardless of emissions levels or related requirements.[183] The second phase of the Tailoring Rule went into effect on

July 1, 2011. In this phase all new stationary sources with the capacity to emit at least 100,000 tpy of carbon dioxide equivalent are subject to PSD permitting as are phase one sources. In addition, all phase one sources subject to permitting and the new sources capable of emitting at least 100,000 tpy of carbon dioxide equivalent are also subject to Title V Permitting.[184] Phase three of the Tailoring Rule went into effect in July 2013. It did not extend permitting requirements to new stationary sources; it merely retained phase one and two permitting requirements.[185] All phases of the Tailoring Rule apply to coal-fired power plants as they typically emit millions of tons of carbon dioxide a year.

Under the Obama administration, the EPA is using provisions of the Clean Air Act to tighten restrictions on coal-fired power plants. On January 1, 2012, Phase I of the Cross-State Air Pollution Rule began the SO_2 and NO_x trading programs, and sources were to demonstrate compliance with the rule by March 1, 2013.[186] The trading programs set caps on the production of SO_2 and NO_x to reduce the levels of these pollutants in adjoining states. On May 1, 2012, the Cross-State Air Pollution Rule ozone NO_x trading program began, and sources must demonstrate compliance by December 1, 2012.[187] Phase II of both programs will go into effect in 2014, and sources are required to comply with the SO_2 and NO_x trading program by March 1, 2015 and the ozone NO_x trading program by December 1, 2014.[188] The Mercury and Toxic Air Rule was finalized on February 16, 2012, and it

directly targets toward coal-fired power plants, as they are the greatest producers of toxic heavy metals released into the atmosphere.[189] New power plants will soon be subject to greenhouse gas standards established by the EPA on April 24, 2013. As a result of its five year review of ozone national ambient air quality standards, the EPA proposes to reduce that standard from 75 parts per billion (ppb) to between 60 and 70 ppb. The EPA also regulates coal-fired power plants under the Clean Water Act. However, this aggressive regulation of coal-fired power plants does appear to be reducing CO_2 emissions from them.

From 2008 to 2012, the Obama administration reduced overall CO_2 emissions by 560.0 million metric tons (MMT). Of this reduction, 473.7 MMT were from fossil fuels and 447.2 MMT were from coal used in electric power generation.[190] Therefore, 80 percent of the total reduction in CO_2 emissions and 94 percent of the CO_2 emissions reductions from fossil fuels resulted from a decline in the use of coal to fuel electrical power generators. Electric utilities reduced their consumption of coal from 1,042,335 thousand tons (TT) in 2008 to 860,790 TT in 2013.[191] This is a reduction of 181,545 TT, or 17.4 percent, over the five year period of the Obama administration. The electric utilities net generation of electricity from coal went from 1,466,395 megawatt hours (MGH) in 2008 to 1,190,669 MGH in 2013.[192] This is a reduction of 275,726 MWH, or 18.8 percent, over the same five year period. These reductions were accompanied by the retirement of 145 coal-fired

power units from 2010 to 2012, with many more projected to be retired by 2016.[193] This clearly demonstrates that President Obama's executive approach to reducing CO_2 emissions from coal-fired power plants is much more effective than was President Clinton's legislative approach. Yet, the Obama administration's executive approach is problematic, despite its success.

The effective execution of a regulatory agenda is dependent on the ability and commitment of the executive. It is obvious that President Obama has the ability and commitment to effectively regulate the reduction of CO_2 from coal-fired power plants. It seems just as obvious that President Clinton had the ability but not the commitment to drive his environmental agenda forward. This points to a problem that is inherent in the use of executive action by a U. S. President. The President of the United States is limited to two four years terms in office. Once his term ends, a new executive takes his place. Even if the new president has no objection to the previous executive's agenda, due to differing priorities he may not devote the time and resources required to move that agenda forward. The Clinton administration's effort to reduce greenhouse gases is an example of an executive focused on priorities other than the reduction of greenhouse gases from coal-fired power plants. Ronald Brunner and Roberta Klein write, ". . . improvements in the Action Plan have been obstructed by its relatively low priority. More resources, including attention, have been invested in projecting aggregate

emissions reductions, developing predictive understanding of global change under the U. S. Global Change Research Program (USGCRP), and negotiating a legally-binding international agreement under the Framework Convention."[194] The problem of executive action is more evident if the new Executive is opposed to the previous president's political policies. Elmes and Harris explain this, writing of the Reagan administration's environmental policy, that, "A second phase of government policy began during the 1980s when a conservative Republican administration effectively disabled the major regulatory agencies (EPA, DOE, DOC) and unleashed a period of unrestrained laissez-faire economic policy."[195] Thus, any effective gains toward the reduction of CO_2 from coal-fired power plants may be undone by the next executive. A well-crafted law, however, has the advantages of longevity, of not being reversible by a single executive, and of keeping the executive focused on enforcing regulations rather than researching, promulgating, and implementing regulations.

An examination of the recent reduction of greenhouse gases, reveals that much of the reduction in CO_2 emissions from coal-fired power plants resulted from a reduction in the use of coal rather than compliance with the technological provisions of the Clean Air Act and its amendments. The CO_2 emissions reductions from coal-fired power plants were achieved by regulating the electric utilities to the point that it was more economically viable to shut down older coal-fired plants and to cancel the construction of

new power plants than to comply with the EPA regulations. As noted above, the reduction in CO_2 emissions from coal fired power plants was not an actual reduction of CO_2 in the emissions from coal-fired power plants; it was a reduction in the amount of coal used to generate electricity. These reductions resulted from the closure of over 145 coal-fired electric generating units that have were forced out of the market by EPA regulation and competition from natural gas. The Department of Energy predicts that closures of coal-fired power plants will continue up to the year 2016.[196]

When President Obama leaves office, will the next executive keep this economic pressure on the politically powerful coal and electric utility industries? This depends on the new executive's administrative priorities. Emissions from coal-fired power plants increased from the time that the CAAA of 1970 was passed until 2008. The reduction of emissions from coal fired power plants were delayed by the energy needs of the 1970s and 1980s, by the politics of the Reagan administration, and by a lack of commitment during the Clinton administration. The reduction of greenhouse gas emissions became a political goal in the early 1990s and began in 2009. Why, after over forty years of research, did it take twenty years to bring about a reduction of greenhouse gas emissions from coal-fired power plants?

An examination of the Clean Air Act should provide some insight into

the difficulties of reducing greenhouse gas emissions from coal-fired power plants. This examination will show that the Clean Air Act was a new kind of administrative law that rejected the state regulatory agencies of the New Deal. The Clean Air Act Amendments of 1970 did not insulate the EPA from national politics, judicial intervention or interference from the legislature. It will show that the Act was agency forcing, in that it established deadlines for implementation of standards and for attaining those standards. The Act also tried to force how those standards were to be achieved. It controlled the States and the EPA Administrator in every aspect of the development, approval, and implementation of air quality standards and State Implementation Plans (SIP). The Clean Air Act was designed to place the responsibility of the complex problem of controlling atmospheric pollution on the EPA Administrator while controlling the executive's actions. The law forced technological solutions on stationary air pollution sources that were not economically feasible for coal-fired power plants to adopt. It controlled judicial review of the promulgation of air quality standards and the approval of SIPs. Yet, the Act's requirement to avoid technological and economic considerations encouraged litigation by the electric utilities against the EPA. This examination will show that Congressional intervention was the greatest factor in preventing coal-fired power companies from complying with the law. This study will begin with the early development of environmental law and congressional trends in law making that began during the 1940s.

The Clean Air Act

In the late 1940's and early 1950's, photo-chemical smog covered a number of metropolitan areas and towns causing thousands of deaths. Doug Haydel proclaimed that, "Smog is a killer. In October 1948 the town of Donora, Pennsylvania was blanketed by heavy smog. When rain washed the smog away, six thousand of the town's fourteen thousand residents had become ill, and eighteen eventually died. In December 1952, a deadly smog struck London, causing four thousand deaths . . . and New York was attacked by a killer smog in 1953."[197] These events caused the Democratic majorities in the House of Representatives and Senate of the 84th U.S. Congress to pass the Air Pollution Control Act of 1955.[198] The bill was signed by Republican President Dwight Eisenhower. This was the federal government's first legislative action to address the problem of air pollution.[199] The law provided funds to study air pollution and research possible solutions to the problem. Author Keith Castro writes that, "The first attempt at federal legislation was the Air Pollution Control Act of 1955. It authorized the Surgeon General of the United States to study the basic problem of air pollution; to financially support research, training and demonstration projects; and to provide technical assistance to state and local government upon request."[200]

In 1963, Democratic majorities in both houses of the 88th Congress

presented the Clean Air Act to President Lyndon Johnson and it became the first federal law to implement corrective action in order to solve the problem of controlling air pollution.[201] Castro declared that, "The federal role was significantly enhanced in 1963 with the passage of the Clean Air Act, which authorized the federal government to conduct additional research on air pollution, to make grants to state air pollution control agencies, and to intervene legally to abate interstate pollution."[202] The pollution control policies of the 1963 Act failed to obtain favorable results, and members of the public and the federal government pushed for reform. Jonathan Foster explained that, "By 1967 many in the federal government realized that the Clean Air Act of 1963 had failed. Air pollution continued unabated and public sentiment in polluted areas shifted in favor of meaningful reform."[203] The Air Quality Act of 1967, enacted by a Democratic majority in the 90th Congress and President Johnson, began to shape the future of environmental law in the United States by expanding the federal government's regulatory approach to controlling air pollution. Castro wrote that, "The 1967 Air Quality Act deviated from its predecessors by taking a distinctly regulatory approach for the first time…. The Act required the states to establish, adopt, and submit to HEW 'ambient air quality standards' for 'air quality control regions' within those states…. And the concept of state ambient air quality standards is the forerunner of the present national ambient air quality standards."[204]

It is relevant to note a tendency in congressional law-making that involved the extension of congressional power into the area of executive responsibility, which accelerated in the 1940s and early 1950s. This extension of power is accomplished by the use of statutes with provisions that allowed Congress to perform or compel executive action, repeal statutes, or to subject executive action to the approval or disapproval of congressional committees.[205] This was accomplished by congressional use of concurrent resolutions.[206] Robert Ginnane stated that, "In recent years Congress has made a number of experiments in vesting certain governmental powers in boards and commissions composed at least in part of members of Congress, and in subjecting specified types of executive or administrative action to the approval or disapproval of congressional committees."[207] Ginnane cites twenty-eight acts passed by Congress from 1939 to 1953 that contain statutory provisions extending the administrative control of Congress by the use of concurrent resolutions or committee authorization of executive action.[208] Twenty-seven of the acts were passed in this fourteen year period by congresses with Democratic majorities in both houses (except for a Republican majority in the Senate of the 80th Congress) and with a Democratic president in office.[209] This indicates that these provisions were not motivated by party affiliation, but by institutional affiliation. As environmental law developed in the 1950s and 1960s, so did the congressional intrusion in to the executive responsibility. The Clean Air

Act Amendments of 1970 reflect an extensive regulatory intrusion into the administrative responsibilities of the executive branch of government.

This intrusion by Congress into the realm of executive administration is in part a response to the expansion of executive power that came about as a result of the New Deal. The New Deal had created regulatory agencies based on what Bruce Ackerman and William Hassler call the New Deal Ideal.[210] The authors quoted James Landis about the advantages of the New Deal agency, writing:

> In the words of James Landis, the most thoughtful of the New Deal theorist, those with experience in legislative matters … recognize that it is easier to plot a way through a labyrinth of detail when it is done in the comparative quiet of a[n agency] (sic) conference room than when it is attempted amid the turmoil of a legislative chamber or committee room. Rather than tying the agency's hands with a host of particular rules and detailed instructions, Congress should content itself with the most general kind of policy guidance.[211]

According to the authors, the New Deal agency should be insulated from national politics. They explained that, "By making the agency 'independent' from the executive, and endowing it with multiple commissioners, the New Deal makes it difficult for a momentary national impulse to place its mark on the course of agency policy."[212] Ackerman and Hassler also wrote, "But the New Deal agency is not only to be insulated from national politics; it is also to be insulated from judicial oversight. The overriding aim of administrative law is to discourage the courts from displacing expert policy judgments by

their own legalistic readings of the statute."[213] The most rigorous form of insulation of the New Deal agency from national politics is cooperative federalism. The authors asserted that, "An even more extreme form of insulation is provided by 'cooperative federalism.' Here, the states, operating under loose federal supervision, are asked to design a program responsive to the peculiarities of local conditions."[214] It is the performance of these New Deal agencies in the states that Congress was trying to move beyond in the 1970 CAAA.

Environmental regulation, according to New Deal standards, was rejected because of growing skepticism based on past experiences with New Deal agencies. Ackerman and Hassler explained that, "When legal activist tried to give their environmental hopes statutory expression in the early seventies, their concrete experiences gave added point to the growing suspicion of New Deal models among the American establishment."[215] This experience came from state efforts to protect the environment. The authors state that, "Before 1970, environmental protection was principally a matter for the states, rather than the federal government; and when environmentalist surveyed the state scene, the agencies they observed seemed a parody of New Deal hopes."[216] Ackerman and Hassler wrote of the new generation's lack of confidence in the New Deal agency's policy-making expertise, stating:

> They had relapsed instead into the old lawyer-ridden ways of case-by-case adjudication, laboring mightily through procedural labyrinths, without successfully defining basic directions for future regulation. Rather than becoming a home for dedicated experts, the independent commission seemed a revolving door for lawyers hoping to gain inside experience that could later be cashed out in lucrative private practice. Rather than encouraging an impartial search for public interest the collegial structure of the independent agency mired would-be policymakers in collective indecision.[217]

These observations of New Deal agencies in the states hardened into a more general criticism of the New Deal itself as the authors explained, asserting, “These criticisms of agency performance merged, sometime imperceptibly, into a more radical critique of the New Deal ideal itself. This line of attack saw expertise as a myth concealing the inevitability of hard value choices, political insulation as a screen concealing the capture of the agency by special interest.”[218]

The experiences that Congress had with the implementation of the Clean Air Act of 1963 and its amendment the Air Quality Act of 1967 led Congress to amend the Clean Air Act again in 1970. However, Democratic majorities in both houses of the 91st Congress had goals other than the efficient regulation of air pollution.[219] Ackerman and Hassler wrote of the CAAA of 1970, that, “Statutes passed in the 1970s did more than commit hundreds of billions of dollars to the cause of environmental protection in the years ahead. They also represent part of a complex effort by which the present generation is revising the system of administrative law inherited

from the New Deal."[220] At the height of the Environmental Movement Congress acted to clean up the environment and to correct the deficiencies of the New Deal agencies. The authors explained that, "When Congress reacted to Earth Day, it set about to do more than clean the water and purify the air; it also sought a new shape for the administrative process—one that would avoid the use of 'expertise' as an excuse for inaction and that would protect agencies from capture by special interest."[221] Congress wanted the New Deal agencies to be efficient regulators, but they were no longer willing refrain from correcting the problems with ideal New Deal agencies. Ackerman and Hassler explained that:

> On the one hand, there was an increasing impatient demand that the agencies finally redeem their New Deal promise by generating clear standards through creative rule making. On the other hand, there was a temptation to tinker with the institutional corollaries associated with the New Deal Ideal. If existing agencies did not redeem New Deal ideals, perhaps some creative legislature or judicial responses would make a difference.[222]

In the 1970 CAAA, Congress attempted to correct the ideals of the New Deal agencies in a number of ways.

When Congress established the Environmental Protection Agency in 1970, it began its efforts to correct what it saw as the problems with regulatory agencies.[223] Ackerman and Hassler asserted that, "Instead of

permitting a group of 'independent' commissioners to run off indifferent directions, the Act places primary responsibility on a single Administrator squarely situated within the executive branch."[224] Thus, the EPA was not insulated from national politics and was dependent on the executive branch to administer the Clean Air Act. The act did not insulate the EPA from judicial intervention as Samuel Bleicher indicated when he wrote, "Moreover in presenting section 304, which provides for citizen suits against source operators for violation of 'an emission standard or limitation' and against the Administrator for '. . . failure to perform any act or duty … which is not discretionary with the Administrator." [225] While the CAAA of 1970 left the major responsibility for the regulation of local environments in state hands, the states were dominated by federal control. Edward Dunkelberger wrote that, "EPA sought to provide guidance and direction to the states in its fairly detailed regulations relating to ambient air quality standards, requirements for preparation, adaptation, and submission of state implementations, and conditions for approval of implementation plans by the EPA."[226] Dunkelberger explained the reason for EPA dominance of the state's environmental regulation, stating, "The plain fact is, however, that most state agencies found that they did not have the necessary expertise to formulate an implementation plan that would assure attainment of the primary and secondary standards for each of six primary and secondary air quality standards in each region of the state."[227] As noted above, Congress was

aware of the deficiencies of state resources. Thus, EPA dominance over the states was achieved by detailed regulation and the fact that states lacked the resources to regulate the environment. It appears that the congressional attempt to make New Deal agencies more efficient by correcting the corollaries on which they were based was a mistake.

New Deal agencies were created based the corollaries of the New Deal Ideal. These corollaries stipulated that experts in the uncontentious atmosphere of an agency board room would find it easier to sift through the vast amounts of scientific information. Hence, they would be more efficient regulators of the environment than congress. However, this could only be achieved if the agency was insulated from national politics. Thus, the agency should be insulated from congressional intervention and independent of the Executive branch. Judicial intervention was to be minimalized, and the primary responsibility of rule-making was to be carried out by the states under loose federal supervision. The problem with the New Deal Ideal is that it was an ideal. New Deal agencies and the commissioners who ran them were not accountable to Congress, the executive branch, or the courts. They had closer ties to the interests of their local communities than they had to the national interests that were attempting regulate environmental pollutants. As thoughtful as James Landis was, it does not appear to have occurred to him that many persons placed in positions of authority and power without accountability will act in their own interest, especially, if one's interest

coincides with the interest of the rich and powerful in one's local community. When Congress placed the EPA under the Executive branch and legislated judicial intervention, it promoted the political and legislative intervention that limited the successful enforcement of the Clean Air Act. The new administrative approach did not solve the regulatory problems that would plagued the Clean Air Act. It merely departed from the ideal corollaries of a failed administrative regime.

In order to prevent the bureaucratic inertia that that affected the New Deal agencies, Congress used the CAAA to control the EPA Administrator. It imposed deadlines for setting and meeting air quality standards and specified how those standards were to be met. Writers Ackerman and Hassler asserted that:

> First, the Act requires the Administrator to set qualitative clean air targets that would 'protect the public's health' while allowing for an 'adequate margin of safety' and to reach targets by 1977 at the latest. In taking this step, Congress forced the agency to specify its ends more clearly than required by the new deal model. … At the same time it energetically pursued this *ends-forcing* strategy. Congress treated a second form of agency forcing in a more ambivalent way. Once having set air quality targets, the next step was to define the best *means* of achieving clean air targets by 1977.[228]

Setting air quality targets, compliance deadlines, and the means of reaching such targets was highly problematic in the early days of the CAAA of 1970. Scientific and technological information was not sufficiently adequate to

perform these tasks. Martin and Symington reported that in Congressional discussions of the Air Quality Act of 1967, congressional leaders stated their awareness that this lack of knowledge would be a barrier to solving the problems of air pollution and environmental control. The authors wrote that, "The context of the legislation thus was one not only of urgent need but also, as both Chairman Harley Staggers of the House Committee and Chairman Muskie had pointed out, of recognition that here was no immediate panacea to the nation's air pollution problems, in large part because of the gap in knowledge and technology."[229]

Ackerman and Hassler believed that the control of emissions from coal- fired electric utilities was a significant problem at the time and would continue to be in the future. They explained that, their study, ". . . also focuses upon a crucial substantive policy issue: the future of the coal-burning power plant. At present, such plants contribute forty-eight percent of all electric power produced in the United States. This share will grow over the next half century. With oil scarce, nuclear risky, and hydro limited, the nation's rich and cheap coal reserves call for exploitation."[230] With the enactment of the CAAA of 1970, the federal government exerted dominant control over environmental regulation. The Act was also technology forcing as Keith Castro wrote, "The 1970 Amendments reflect a full-fledged effort to establish a comprehensive, technology-forcing, enforcement-oriented regulatory scheme with strong sanctions and an overriding if not

predominant federal presence."[231] Section 111 of the CAAA of 1970 authorizes the EPA Administrator to set New Source Performance Standards for new or modified stationary sources such as coal-fired power plants. It also calls for the EPA to base NSPS on the best system of emissions reduction.[232] It appears that Congress did not intend for the EPA to consider the economic and technological feasibility of meeting the National Ambient Air Quality Standards (NAAQS) or NSPS. Samuel Bleicher asserted that, ". . . the Act neither grants EPA the authority nor provides a procedure to suspend implementation of the SIP or postpone required attainments of NAAQS for economic or technological reasons."[233] This statement was supported by a quote from the opening statement of a Senate Committee report on stationary sources that said, "Therefore the Committee determined that existing sources of pollutants either should meet the standard of the law or be closed down, and in addition that new sources should be controlled to the maximum extent possible to prevent atmospheric emissions."[234] It appears that the EPA understood the intent of Congress with regard to the regulation of coal-fired power plants.

Ackerman and Hassler wrote of the EPA's approach to regulating coal-fired power plants that, "It treated the power plant problem as if it were an engineering exercise insulated from critical ecological and economic issues."[235]

In considering the best systems of emissions reduction for state air quality

control regions, the EPA failed to consider many factors such as wind, proximity to population, and stack height that effect regional air quality standards. Instead, it focused on the technological aspects of controlling air pollution. The authors asserted that, “Unless the EPA defined the ‘best system of emissions reduction’ to take account of these complexities, however, section 111 could read to authorize a narrow inquiry into the technological design of the plant rather than a canvass of the ecological stakes involved in new construction.”[236] Because of the deficiencies in scientific and technological knowledge, “Those methods of control that are technologically and economically feasible today may not may not be sufficiently effective to achieve the desired ambient air quality. Therefore, where this is true, as technology advances, the states should prescribe new requirements, on a continually more restrictive basis until a satisfactory standard is achieved.”[237] The EPA’s technological interpretation of section 111 and the lack of consideration of the technological and economic feasibility in setting and meeting air quality standards forced the operators of coal-fired power plants to invest large sums of money in pollution control technologies that would have to be replaced or modified as scientific information developed. The electric utility companies took these issues of economic and technologic feasibility in meeting air quality standards to the courts. Thus, judicial intervention into the regulation of the environment began in a big way.

Samuel Bleicher wrote that, “The time schedules established by the Clean Air Act Amendments made intercircuit controversy almost unavoidable. Since all SIPs were approved at the same time, the thirty-day period for filing section 307 challenges produced simultaneous litigation on similar if not identical issues in most of the courts of appeals.”[238] The initial result of this judicial intervention was that:

> Four courts of appeals, under the tutelage of the electric utilities, concluded that the Administrator must consider economic and technological factors either at the SIP approval stage, at the enforcement stage, or both. Meanwhile, the Supreme Court and five other courts of appeals, at the urging of the National Resources Defense Council (NRDC), announced rulings founded on the proposition that achievement of NAAQS by the tree-year statutory deadline is an unequivocal mandate of the Act that cannot be avoided because of economic or technical feasibility.[239]

According to Bleicher, the result of this judicial intervention was that, “By mid-1975, however, neither NAAQS nor compliance with SIP emissions limitations have been achieved, and the most important stationary source polluters, the electric utilities, had largely succeeded in avoiding even the initiation of compliance programs.”[240] This initial intervention of the courts was unexpected because Congress had attempted to control judicial intervention into the EPA Administrators actions with regard to setting NAAQS and approving SIPs. One of the requirements of Section 307 (b) (1) of the CAAA with regard to petitions that challenged the promulgation of

NAAQS and the approval of SIPs was that, “Any such petition shall be filed within 30 days from the date of such promulgation or approval, or after such date if such petition is based solely on grounds arising after such 30th day.”[241] Many electric utilities wanted to challenge NAAQS and SIP approvals because they believed they were too restrictive. Dunkelberger explained that, “More than one company or industry seeking to challenge a state implementation plan designed to carry out primary and secondary standards has concluded that a large part of its difficulty resided in the fact that the standard in question was unduly restrictive.”[242] However, most of these companies failed to meet the requirements of Section 307 (b) (1) because, “In most instances these objections to the standard itself were not apparent at the time of promulgation of the standard, for it was by no means clear how the standard would be implemented for particular industries and sources.”[243] It was at the approval stage of SIPs that the effected industries and sources became aware of the consequences of the EPA’s standard. Dunkelberger wrote that:

> Only with the adaptation of an implementation plan, applicable to particular industries and sources, did the effect of an unduly restrictive standard become clear, but by that time judicial review was no longer available. The provisions of Section 307 (b) (1) were consistently upheld despite the numerous petitions filed against the EPA approval of SIPs. The author states that, “The courts have repeatedly emphasized that unless a petition for review is filed within the 30-day period as specified in Section 307 (b) (1) there can be no review of standards as promulgated, either in a subsequent suit challenging an implementation plan provision, or in enforcement

> action seeking to carry out the provisions of an implementation plan.[244]

Thus, as Dunkelberger commented, “At the early stage EPA promulgated primary and secondary air quality standards for six major pollutants and in each case the standard is final and no longer subject to review.”[245] Therefore, Congress was able to control judicial review of the establishment of NAAQS by the EPA Administrator. Congress instituted other provisions of the CAAA that used judicial review to take away the agency’s discretion and to force the EPA to act to regulate the environment.

Although Congress had attempted to control the initial instances of judicial intervention, it mandated such intervention in two other sections of the CAAA. The enforcement provisions of Section 113 of the CAAA provides civil and criminal penalties for violations of the Act, but these penalties can only be imposed on violators through federal lawsuits. Ronald Rosenburg noted that, “Environmental law authorizes a range of enforcement techniques that impose both civil remedies—injunctive and financial—and criminal penalties. However, both of these enforcement methods require a federal enforcement lawsuit.”[246] While there is nothing unusual in court action to proscribe penalties for violations of the law, this speaks to the great expense that numerous of federal lawsuits incur. This expense is greatly increased by one of the most agency forcing sections of the CAAA. Section 304, authorizes citizen lawsuits to force the EPA Administrator to act in

areas where he has no discretion. In instances where the EPA Administrator is required to act, he only has the discretion to set the priorities for actions to be taken. Section 304 expands judicial intervention and effectively allows citizens to set the priorities for administrative action.

During the 1980s, the Reagan administration's laissez faire economic policies effectively disabled regulatory agencies such as the EPA, but many lawsuits were initiated to force the agency to act. Donald Strait and Richard Ayers wrote that, "While the EPA flounders the National Resources Defense Council, the American Lung Association, and other public health, and environmental organizations are turning to the courts to enforce the Clean Air Act."[247] Many of these lawsuit were directed toward a particular end with regard to the EPA Administrator's enforcement of the law. Strait and Ayers wrote that, "Lawsuits have been filed in New York and New Jersey to require that significant ozone reduction strategies be carried out."[248] The authors also noted that judicial intervention with regard to ozone reduction was being initiated in Massachusetts, Philadelphia, Chicago, and other places.[249] The limited success of these lawsuits in reducing ozone emissions and the sometime debilitating results of court decisions (as in the 2007 *Massachusetts* v. *EPA*) make the expense of this agency forcing strategy questionable. The lack of political insulation from the executive control and from judicial intervention was not as detrimental to the enforcement of the CAAA as

congressional intervention.

The original Clean Air Act was passed in 1963 and the first Congressional intervention was its amendment by the Air Quality Act of 1967. Author Keith Castro explained that, “The 1967 Air Quality Act deviated from its predecessors by taking a distinctly regulatory approach for the first time. The Act required the states to establish, adopt, and submit to HEW ‘ambient air quality standards’ for air quality control regions within those states.”[250] The second Congressional intervention into the Clean Air Act were the previously discussed amendments of 1970. The 1977 Clean Air Act Amendments were primarily concerned with maintaining NAAQS in geographical regions in which the standard had been met, and it placed new requirements on sources in regions that had not met NAAQS.[251] Prevention of significant deterioration (PSD) provisions placed permit requirements on new or modified stationary sources that required that best available control technology (BACT) to be used in air control regions that had attained NAAQS; it placed BACT requirements on new and modified stationary sources in air quality regions that had not attained NAAQS.[252] The amendments of 1977 suspended compliance to NAAQS for up eight months in a national or regional energy emergency that resulted from a shortage of energy supplies or high levels of unemployment. (NIH 2014) [253] The 1977 amendments extended the operation of any stationary source that did not comply with NAAQS if an

economic emergency arose as a result of unemployment caused by the closure. The last direct Congressional intervention into Clean Air Act occurred with the Clean Air Act Amendments of 1990. The 1990 amendments expanded judicial intervention by providing monetary awards for citizen cases brought against pollution sources and the EPA. It granted new enforcement powers to the EPA by allowing it to issue penalty orders up to $200,000.00 and citations up to $5,000.00 for lesser violations. It also increased penalties for both civil and criminal violations of the Act. Thus, under the CAAA of 1977 and 1990 Congress expanded the technology and agency forcing provisions of the Clean Air Act, and it gave the EPA the power to penalize violators of the regulations that it promulgates.

CHAPTER FOUR

DISCUSSION AND CONCLUSIONS

Conclusions

Which approach to reducing greenhouse gas emissions from coal-fired power plants is the most effective, the legislative approach of the Clinton administration or the executive approach of the Obama administration? The short answer to this question is that the Obama administration has been more effective in reducing the emission greenhouse gases from coal-fired power plants. Yet, it appears that the efficiency of the Obama administration in reducing greenhouse gases from coal fired power plants may have more to do with the commitment of the executive, rather than the approach taken. Under the Constitution of the United States, both the legislative and executive approaches are required to carry out the law. The Congress enacts law through the legislative power granted solely to it by the Constitution. The Executive may propose law and veto law, but it is not empowered to make law. While Congress may enact law, it requires the Executive power to enforce it.

President Clinton's attempt to reduce greenhouse gas emissions was not supported by the provisions of the Clean Air Act. Thus, any executive action to reduce greenhouse gases would have been unconstitutional. President Clinton's primary response was to propose an energy tax that

would have reduced the use of fossil fuels from all sources. When Congress failed to pass his energy tax, President Clinton pursued a modest voluntary plan to reduce greenhouse emissions from industrial sources of greenhouse gases. In the remaining seven years of his presidency, he showed little or no interest in reviving his legislative approach to control greenhouse gases. When President Obama came to office, he proposed a cap and trade bill to reduce carbon emissions. When Congress failed to pass his proposal, he was able to pursue the reduction of greenhouse gases by executive regulation. This was because the Supreme Court had expanded the authority of the Clean Air Act to regulate greenhouse gas emissions. Thus, President Obama has been able to use his executive power to reduce greenhouse gas emissions under the Clean Air Act. However, the Clean Air Act has proven to be very difficult to enforce and is subject to the political views of the Executive.

The reason that President Obama has succeeded in reducing greenhouse gas emissions from coal-fired power plants is that he is personally committed to this goal. President Clinton could have reduced greenhouse gas emissions from coal-fired power plants in the same way as President Obama, promulgating rules and regulations to reduce SO_2, NO_x, and other pollutants that would have forced the closure of older coal-fired power plants and prevented the construction of newer plants. This would have also reduced greenhouse gas emissions. Clinton's priority was the

maintenance of the economy, not the reduction of greenhouse gases from coal-fired power plants. President Clinton does not appear to have opposed reducing greenhouse gas emissions, he simply placed a higher priority on maintaining the economy. As effective as President Obama's administration is in reducing CO_2 emissions from coal-fired power plants, President Reagan's administration was just as effective in disabling the regulatory abilities of the EPA. Thus, the regulation of the environment and the reduction of greenhouse gas emissions seems to depend more on the Executive's commitment, rather than the CAAA's provisions.

This developed because Congress attempted to write the detailed provisions of the CAAA in a way that controlled the environment through executive action, while controlling the Executive at the same time. As a result, environmental law became a political issue between Congress and the Executive branch. Another result of placing the EPA under the Executive branch was that environmental science and the science of anthropogenic global warming became political issues rather than scientific solutions. The Department of Energy funded early global warming research. However, it was subject to the same science for policy influences as the EPA. The rejection of the New Deal Ideal by Congress in the early 1970s was not accompanied by an effort to salvage what worked in the New Deal agencies; it was accomplished by a reversal of the corollaries that were supposed to make New Deal agencies superior regulators.

Congress placed the EPA under control of the Executive branch and at the same time intruded into the executive's responsibility to enforce the law. This made environmental law subject to the political views of the President and opposing political forces in Congress. Congress left the responsibility of the environmental control of air pollution to the states, but placed the states under the detailed regulation of the EPA. This made CAAA's enforcement a political issue between the states and the federal government and between local and national interests. In effect, Congress removed the advantages of political insulation through state control by submitting that control to close federal supervision. It also retained the disadvantages of state control by subjecting environmental regulation to the influence of local interests. Congress encouraged judicial intervention through inflexible policies with regard to the economic and technological feasibility of meeting air quality standards. It also encouraged the courts to intervene through Section 304 and the enforcement provisions of the act. This caused delays in the implementation of environmental programs as the courts sorted through the complex legalities of the act. This greatly increased the expense of implementing and enforcing the Clean Air Act. In some cases, the court interpreted the CAAA in ways that were contrary to the intent of those who framed the law. It also hampered the EPA Administrator by allowing the courts to set implementation and enforcement priorities favored by special interest groups rather than the Administrator.

Thus, the CAAA, as enacted by Congress, created political division between all the component organizations responsible for controlling air pollution.

When Congress placed the EPA under the control of the Executive branch, it transferred the responsibility of cleaning up the environment to the Executive. Its goal was to control the agency and its administrator in a way that would solve the problem of "bureaucratic inertia" through the detailed requirements of the act.[254] Congress made the EPA responsible for setting air quality standards, approving state implementation plans, and conducting enormous research programs to fill the scientific and technological information gap. This transfer of responsibility to control environmental air pollution was accompanied by a transfer of legislative authority to the Executive branch of government. The Executive branch was no longer responsible for merely enforcing the law. Congress delegated to the Executive the legislative responsibility to set standards, to enforce them, and later, to penalize their violation. Hence, Congress complemented the enforcement power of the Executive branch with the legislative and judicial power to set the standards of the law and to adjudicate and punish the violators. It is little wonder that the reduction of greenhouse gas emissions from coal-fired power plants has come to depend on the political agenda of the Executive. Just as President Obama has set the standards and enforced them on the coal industry and the electric utilities, President Reagan refused to set the standards or to enforce the regulations of the Clean Air Act. In

each case, the political opponents of the President were unable change the political agenda of the Executive. Even the Democratic majorities in both houses of Congress during the Reagan administration's two terms were unable to affect a change in his political agenda.[255] By assigning the responsibility of scientific and technical research to the Executive branch, Congress made the Executive more independent and the science more political.

The development of scientific research to set air quality standards and develop technical solutions to air pollution was relegated to the Executive branch of government by the Congress. Congress also pushed the direction of this research by the agency-forcing and technology-forcing provisions of the CAAA. The act forced the EPA to set air quality standards based on inadequate scientific information. Under Section 111, it forced technological solutions to emission controls for new stationary sources. Once the EPA set air quality standards and committed to particular technical solutions for controlling emissions from stationary sources, it was committed to a particular policy of pollution control. It became necessary for the EPA to promote scientific findings that supported the policies to which it was committed. Thus, the vast amounts of money devoted to scientific research were directed toward the scientific programs that supported the EPA's regulatory agenda. Congress relinquished much of its ability to oversee the environmental program because it depended on the EPA and the Executive

branch research programs for its policy information. Thus, the amendments that Congress subsequently passed continued to expand the agency and technology-forcing provisions already in place. Those in the scientific community who disputed the science that supported the EPA were not recognized as having valid scientific objections. Because environmental research, including global warming research, had political goals rather than merely scientific objectives, those persons who were politically opposed to environmental policy based their objections on the opposing scientific views. Hence, the science of air pollution control and global warming from man-made greenhouse gas emissions became political rhetoric for or against the government's environmental policy. The fact that Congress left responsibility for air pollution control in the states created other problems for the control of emissions from coal-fired power plants.

In 1987, Donald Strait and Richard Ayers wrote that, "Despite the 17-year history of the Clean Air Act, certain chemical operations, oil refinery processes, and other important industrial sources of smog causing pollution remain unregulated in most states. Somehow, EPA has avoided formally evaluating what kinds of controls are practiced for those sources, and this bureaucratic inertia has become an excuse for states to avoid clamping down on local interest."[256] This assessment of EPA and state performance in the regulation of stationary sources seems accurate. In 1987, Ronald Reagan was in the third year of his second term, and the EPA and other

regulatory agencies were inactive under the laissez faire economics of the Reagan administration. The states were free of federal control just as they were under the New Deal state agencies of the late 1960s. State and local interests were aligned with the economic interest of the administration. Hence, many stationary sources of carbon dioxide, such as coal- fired power plants, were allowed to operate with minimal control. This was not a new situation because from 1973 to the late 1980s, the local interests of coal-fired power plants aligned with national energy policy. During these years, the Congress and the presidential administrations of Gerald Ford and Jimmy Carter called for power plants to convert to coal. Congress and both presidents called for and passed legislation to exempt coal-fired power plants from compliance to environmental laws and to convert from less polluting fuels to coal. Thus, the electric utilities were able to resist compliance to environmental legislation. This antagonized environmentalist and led to greater political division between supporters and opponents of environmental regulation. The problems caused by not insulating the EPA from the Executive and leaving responsibility of air pollution control to the states under tight federal control were exacerbated by the act's encouragement of judicial intervention.

The inflexibility of the policy that would not allow consideration of the economic and technological feasibility of the application of the technological solutions under Section 111 of the CAAA caused numerous

lawsuits between pollution sources and the EPA. These lawsuits caused delays in the setting of standards and the implementation of control policies while the issues were resolved by the courts. However, the continuous litigation caused by Section 304 of the CAAA resulted in untold expense. It has also pushed the agency into regulating greenhouse gas emissions under a law that was designed to regulate pollutants which are produced in smaller quantities than greenhouse gases. In the 2007 Supreme Court decision in *Massachusetts* v. *EPA*, the Court declared that the EPA could regulate greenhouse gases under the CAAA. In 2009, when EPA Administrator found that greenhouse gases from automobiles were air pollutants that posed a threat to public health and welfare, the agency-forcing provisions of the CAAA required that coal-fired power plants be regulated to reduce the emission of CO_2. Because the quantities of emissions required for PSD and Title V permitting were designed for pollutants that were emitted at much lower rates, the regulation of greenhouse gases under the CAAA required new thresholds for major stationary sources. If greenhouse gases were regulated under the old thresholds, it would greatly increase the number of sources requiring PSD and Title V permitting. This would create onerous financial burdens for these smaller sources and an administrative nightmare for the EPA. The EPA could not avoid this problem because the decision in *Massachusetts* v. *EPA* specifically rejected the idea that greenhouse gases

were not administrable under the CAAA. Thus, the EPA reinterpreted the law and established new thresholds for major sources of greenhouse gases. This judicial intervention by the Supreme Court has weakened a seriously flawed law and is detrimental to the rule of law in general.

The reduction of greenhouse gases depends on the President's intent. This is because Congress has ceded legislative power to the President to finish writing the law by establishing air quality standards. This weakens the law because the scope of any president's actions under the CAAA is limited by his time in office. Hence, whatever environmental gains are achieved under a particular president may be, but often are not, maintained by the new Executive. Thus, while executive action is effective, decisive, and flexible; it lacks longevity. If a president or an EPA administrator under the direction of a president can change the requirements of the law, the law itself becomes subject not only to national politics, but to the President's preferences. The advantage of law is that it is an established guideline that will last until it is repealed by the Congress. Those that are subject to the law know what the law is and what they must do to obey it. However, if the executive is allowed to change those guidelines without authorization from Congress, those subject to the law will not know whether their future actions will be within the law. It is not economically feasible for a power plant to invest in scrubbers and carbon capture equipment if they cannot depend on the standards and

requirements of the law to remain the same. A person would not buy a home if he thought that the executive of the bank could change the interest rates or the payment schedule to suit his particular ends. Thus, the Supreme Court's decision in *Massachusetts* v. *EPA* weakened the law by placing the executive in a position in which he either changed the law or he enforced the law under the absurd consequences that resulted from the Court's decision.

The CAAA is a poorly designed law. For the first twenty years of its existence, Congress and a number of presidents were committed to energy policy rather than environmental policy. The experts at the EPA have shown little imagination or creativity in solving the problems of air pollution. They have pushed the use of scrubbers for over forty years. President Reagan opposed environmental regulation and President Clinton ignored it. President Obama has produced some reductions in the emission of greenhouse gases from coal-fired power plants. However, it is uncertain how much of these reductions have resulted from his environmental policy and how much have resulted from the slow economy and competition from natural gas to fuel electric utilities. In over fifty years of global warming research, the science does not appear to have convinced politicians or the American people that the threat of anthropogenic global warming requires an all-out commitment to reduce carbon dioxide emissions from coal-fired power plants. The pervasiveness of the uncertainties in all aspects of global

warming science and air pollution control does not convince one that current scientific knowledge is adequate for the formulation of government policy to control the environment. The much vaunted scientific consensus with regard man-made global warming and government environmental policy, is not convincing. This is not to deny that climate change is real or that outlandish amounts of CO_2 are being pumped into the atmosphere. However, the inadequacies of observational data and the computer models on which we base environmental policy may do more harm than good. Computer generated climate models have many problems and most of global warming science has been based on them since the 1950s.

Many, if not most, of these models are based on correlations resulting from incidents of past climate warming. These correlations are estimated from concentrations of different isotopes of oxygen formed in the ocean during warming and cooling periods. These are compared to CO_2 concentrations in Arctic and Antarctic ice-core samples. The resulting correlations are used as the basis for many computer generated climate models. Global warming theory indicates that CO_2 concentrations are responsible for the rise in global temperatures. However, author Roy Spencer writes that, “First, most if not all of the studies of those ice-core based relationships between temperature and CO_2 suggests that temperature changes preceded CO_2 changes by at least several hundred years. This indicates the possibility that temperature changes caused carbon

dioxide changes, rather than the other way around as is the claim of global warming."[257] Correlations are not evidence; they do not speak to causality. In other words, just because temperatures rise does not mean that it is causing a rise CO_2 concentration as well. Both could rise as the result of a third factor or a combination of other factors. Again, this is not to deny the possibility of man-made climate change, but there are valid reasons to be skeptical of the cause and the effect of climate change. Although there are possible solutions to correct some of the problems associated with the CAAA, the possibility and practicality of making such changes is doubtful. If the law could be reenacted, it might be constructed in the following way.

First, the law would be repealed and rewritten. Congress would take the responsibility for setting the environmental standards of the new law. Hence, any change in the standards or the requirements of the law would be corrected by the appropriate legal authority. Congress would also take responsibility for the scientific and technological research. It would form commissions that represent both the scientific community and industries to be regulated. This would provide expert information from a combination of the applied knowledge of industry experts and the more theoretical scientific knowledge of scientists. These commissions would report their findings directly to Congress, and Congress would then use the information to establish standards and formulate solutions for pollution control. This would depoliticize the science and produce solutions that would be more

acceptable to the power industry. The political issues would be worked out in Congress by the representatives of the nation's interests. The EPA would remain under the Executive branch, but the only duty that it would perform would be the enforcement of the environmental standards provided by the law. It would not set standards, conduct research, or adjudicate and punish violators of the law. The EPA would confine its duties to citing violators and providing evidence of wrongdoing to the Justice Department. The EPA Administrator would be free to organize the enforcement regime of the agency as he or she thinks is most appropriate. This would maintain the separation of powers between the Executive and Congress and reduce political tensions between these two branches of government. If local interests are represented in the legislative process and the sole responsibility of the EPA is to enforce the law, states could then focus on their local environmental programs and help local interests in meeting the environmental standards of the federal law. This would reduce political tension between the state and federal governments and between local and national interests. Finally, the law would neither encourage nor try to restrict judicial intervention. There would be no need for agency-forcing provisions or to protect the law from judicial intervention. If the Court intervenes and makes a finding that affects the application of the law, Congress has the authority and the means to correct it as it sees fit. The subject of environmental law is complicated and controversial in many ways. This

study has barely scratched the surface of the issues involved. However, it is an area of study that can provide many insights into the law, governance, and science. It can also provide great insight into relationship between these areas of study.

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