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CLEAN COAL: PROSPECTS AND CHALLENGES IN THE TWENTY-FIRST CENTURY

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Abstract

Coal is the primary fuel for economic and industrial activities in the United States. Coal-fired power plants are a major source of emissions of carbon dioxide, sulfur dioxide, nitrogen oxide, mercury and waste causing great harm to health, safety, the environment and ecosystem. The United States is strongly committed to improving energy efficiencies and producing clean coal through development of clean coal technologies and enforcement of laws and regulations. Abundance of coal poses both the challenges and opportunities for America in order to meet the demand of energy and sustain a healthy and safe environment in the twenty-first century.

1. Introduction

Clean coal, whether a reality or myth, poses one of the major challenges for the twenty-first century. As of today, coal energy is vitally important for sustaining and promoting economic and industrial development in both the industrialized and developing world. Clean coal problems are deeply rooted in national economies and will require a high and steady level of commitment by governments and other international, national, and local actors. It is both timely and critical to understand the nature of the problems posed by coal energy to health, safety and environment. This essay attempts to dwell upon the current state of clean coal technology, legal framework and regulatory process, institutional enforcement, litigation and remedies in the United States.

Coal is America's most abundant fossil fuel. Coal accounts for more than 50 percent of U.S. electricity generation in the United States.[1] Over 1 billion tons of coal was produced in 25 states in 2000.[2] About 99.7 percent of U.S. coal production is consumed

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* This article was written as research scholar when I was Ph.D. candidate in U.S.A. Presently, it is submitted for the benefit of our law students for Bluebook style of citation and thesis writing.

[1] National Energy Policy Development Group (NEPDG) Report, RELIABLE, AFFORDABLE, AND ENVIRONMENTALLY SOUND ENERGY FOR AMERICA'S FUTURE, 1-6 (2001). Nuclear energy account 20%, natural gas 16%, hydropower 7%, oil 3% and renewable (wind, solar) 2%.

[2] *Id.*

domestically. [3] In addition to the western and interior regions, the Appalachian region is rich in coal deposits; coal mining is still important to these regions' economy. The coal mining has been a major part of the Appalachian economy since the mid-1880s.[4] United States coal resources are estimated at 488 billion short tons, with recoverable reserves of 268 billion short tons in 2009 that is about equivalent to a 175-year supply.[5] United States coal reserves account for 27 percent of the world's total 911 billion short tons recoverable reserves, followed by Russia, China and Australia.[6]

Growth in electricity demand is unprecedented around the world. Increase in coal use has been, and is, necessitated by demand of growth in economic and industrial activities. Coal is used for electricity generation and other industrial purposes. The utility industry finds coal easily accessible compared with other fuel sources such as oil, natural gas and nuclear power. [7]

While growth in coal-fired power generation will account for 39 percent in the United States from 2006 to 2030, world coal consumption is projected to increase by 49 percent for the same period. Coal is, therefore, expected to remain the dominant fossil fuel source in meeting increasing U.S. electricity demand[8] until the first quarter of the twenty-first century.

It is a well-known fact that coal is not a perfect fuel, because its contents are harmful to health and the environment. Coal like all other fossil fuels is formed out of carbon. When coal burns its carbon combines with oxygen and form carbon dioxide (CO_2). Sulfur and nitrogen are trapped inside coal, and when coal burns these impurities are released into the air. Scientific study shows that CO_2 is causing earth's temperature to rise impacting the earth's climate which is known as the greenhouse effect.

With a view to increasing energy efficiency and controlling emissions, the concept of clean coal was developed in consideration of the technologies that would help remove impurities from coal causing air pollution. The question arises whether it is possible to produce clean coal, based on the current scientific and technological developments in the United States and around the world. Since the mid-1980s, the United States government has been making its efforts for developing clean coal technologies under public-private partnership. However, public opinion on the success of making clean coal is divided. Some see clean coal can be produced, while some perceive that clean coal technology means expansion of coal mine operations that will have far more damages than today to

[3] *Id.*

[4] Robert E. Beck, *Water and Coal Mining in Appalachia: Applying the Surface Mining Control and Reclamation Act of 1977 and the Clean Water Act*, 106 W. VA. L. REV. 629 (Spring 2004).

[5] http://www.eia.doe.gov/cneaf/coal/reserves/reserves.html (visited 3/27/2010). 468 billion short tons as of 1 January 2025 (Retrieved on 7/23/2026)

[6] https://www.americanenergyalliance.org/facts/ (Retrieved on 7/23/2026)

[7] Donald A. Crane *et al*, *Coal and Emerging Energy and Environment Policy*, 6 FALL NAT. RESOURCES & ENV'T 26 (1991)

[8] NEPDG Report, *Supra* note 1, at 1-6.

the environment in future. Nonetheless, the United States government is strongly committed to developing clean coal technologies.

2. **Development of Clean Coal Technology**

Both public and private sectors are engaged in the efforts toward substantial reductions in the cost of controlling sulfur dioxide and nitrogen oxide emissions. In some cases, effectiveness of control systems has increased significantly.[9] The Department of Energy (DOE), through its Clean Coal Technology (CCT) program, provides effective control technologies. Regulatory compliances with these technologies are enforced in utility markets.[10]

The DOE established the CCT Demonstration Program under cooperative partnership between government and industry,[11] with a view to reducing air pollution and increasing energy efficiency. The purpose of CCT is to allow the use of coal to generate electricity while meeting environmental regulations at low cost. The CCT has short, mid and long-term goals. In the short term, its goal is to meet existing and emerging environmental regulations, which will dramatically reduce compliance costs for controlled mercury, NOx, SO_2 , and fine particulate at new and existing coal power plants. The mid-term goal is to develop low-cost, super-clean coal power plants, with efficiencies 50 percent higher than present average. The higher efficiencies will reduce emissions at minimal costs. In the long-term, the goal of the program is to develop low-cost, zero-emission power plants with efficiencies close to double that of today's fleet.[12]

The CCT program began as a response to concerns over acid rain, caused by sulfur and nitrogen pollutants emitted by coal-burning power plants. The program is recognized for many successes, such as the low nitrogen oxide (NOx) burner technology developed under CCT program, which is now found on 75% of United States coal-fired power plants. The modern scrubber technology has also been developed that has reduced capital and operating costs for sulfur removal to about half of the previous level.[13] The CCT encompasses technologies for coal preparation, coal gasification, pollutant removal, and carbon capture and storage. Despite improvements to coal-fired plant efficiency, carbon emissions still remain a problem for using coal to produce electricity because clean coal combustion technologies are still in early stages of development.

Carbon Capture and Storage/Sequestration ("CCS") technology is in the process of development. The CCS technology captures CO_2 and stores it deep underground, preventing the gas from entering the atmosphere. CO_2 could be pumped into and stored in underground aquifers, or pumped into oil fields to maintain pressure and facilitate oil

[9] *Id.*
[10] *Id.*, at 5-14.
[11] Patricia Fry Goodley and Larry M. Joseph, *Clean Coal Technology Program: Model for Government/Industry Cooperation*, 15 ENERGY L. J. 439 (1994).
[12] NEPDG Report, *Supra* note 1, at 5-14.
[13] Kevin J. McIntyre *et al* (eds.), ENERGY POLICY ACT OF 2005, 91 (2006)

extraction.[14] The CCS is cost intensive. It increases the costs of power generation by 40 to 80 percent compared with conventional power plants, depending on the location of the plant and the storage site, and the transport and capture technology used.[15]

Technologies like fluidized-bed combustion and integrated gasification combined cycle have been developed to further reduce emissions. Fluidized-bed combustion is a low-emitting nitrogen oxide combustion technology that allows the use of fuels, such as coal pile washer waste, that were not formerly usable.[16]

The initiatives of more than two decades for developing CCTs show that some 40 percent energy efficiencies have been achieved by the utility industry. Scientists have forecast improvement to 50 percent in the next 100 years. Thus, the current state of development of the CCT remains far from being realized in a near future.

2.1 Technologies for Improved Efficiency

Waste of energy in the course of production of electricity is one of the major considerations in order to improve energy efficiency. Two-thirds of the energy used in a conventional coal-fired power plant is wasted in the production of electricity. Measures for minimizing these losses include installing high efficiency steam turbines, reducing steam leaks, and using software to optimize combustion efficiency. Existing technologies are being used by new coal-burning power plants to improve efficiency. Wasted energy can also be recycled for use in industrial processes or heating buildings.[17] Energy efficiency would reduce pollutants to air and water which have direct impact on improvement in health and environment as well.

A promising development is the integrated gasification combined-cycle (IGCC) power system that has been successfully demonstrated at the 100 megawatt Cool Water plant in California. IGCC power plants convert coal to a gaseous fuel, from which most of the impurities are removed prior to combustion, and then use the gaseous fuel in a combustion turbine to produce electricity. Waste heat from the turbine is used to generate steam and drive a steam turbine, to produce more electricity.

Coal gasification burns petroleum coke and make other products in addition to electricity, such as chemical feedstocks and transportation fuels. Hydrogen, produced directly in the coal gasifier, can be used in fuel cell equipped vehicles. Methane, hydrogen, and other gasified coal products can be recombined into more traditional fuels, such as methane, gasoline, or diesel fuel. Because these fuels would contain no sulfur, they would easily meet EPA's sulfur standards for transportation fuels, and they would be usable in fuel cell-equipped vehicles designed for these fuels.[18]

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[14] Jennifer Rohleder, *The Buzz About the Clean Coal*, 7 SUSTAINABLE DEV. L. & POL'Y 21 (2007).
[15] http://www.greenpeace.org/seasia/en/asia-energy-revolution/dirty-energy/clean-coal-myth/clean-coal-myths-and-facts (visited 3/30/2010) This page is missing on 7/23/2026.
[16] NEPDG Report, *Supra* note 1, at 5-14.
[17]NEPDG Report, *Supra* note 1, at 3-5.
[18] NEPDG Report, *Supra* note 1, at 3-6.

A modern gas-fired power plant has virtually no SO_2 or mercury emissions and emits 97 percent less NOx and 50 percent less carbon dioxide (CO_2) than a traditional coal-fired plant. Natural gas as a source of electricity generation is on the rise, in part because it can help generators meet increasingly stringent clean air requirements.

The gasification process also allows many of the impurities in the coal to be removed before it is combined to generate electricity. At the Wabash River project, over 99 percent of the sulfur is removed from the coal and marketed to industrial users of sulfur. Slag is also removed and is marketed to the construction industry. The plant's design allows it to burn other fuels, such as petroleum coke.[19]

The public and private partnership of two decades has produced some positive results in the control of air pollution. However, the coal-fired power plants are still a major source of air pollution. Thus, Congress looked for the ways of clean coal power initiatives by passing the 2005 Energy Policy Act at the beginning of the twenty-first century.

2.2 **Clean Coal Power Initiative (CCPI)**

The Energy Policy Act of 2005, §401, establishes a Clean Coal Power Initiative (CCPI), providing funding and loan guarantees for CCT that promotes efficient, environment-friendly, and cost-competitive coal technologies. The Secretary of Energy administers the CCPI program which the Act authorizes $200 million annually, for fiscal years 2006-2015.[20] The CCPI was built upon the DOE's preexisting CCT program, which began in 1986 and had a number of successes.[21]

The Energy Policy Act of 2005 sets a high standard for project to qualify for CCPI funding. The project must "advance efficiency, environmental performance, and cost competitiveness."[22] The CCPI lays emphasis on coal gasification, a process that converts coal from a solid to a gaseous state. Gas produced through coal gasification can be used to make chemicals or fertilizer or electric power. The Act requires such technologies to include gasification combined cycle, gasification fuel cells and turbine combustion, and other advanced coal based technologies capable of producing a concentrated stream of carbon dioxide.[23] Setting a high standard for CCPI means cost-intensive and time-consuming projects. The utility industry may not be encouraged by it. Thus, the implementation process will be slower than expected and public skepticism will increase about the viability of these projects.

2.3 Clean coal technology regulatory incentives

[19] NEPDG Report, *Supra* note 1, at 3-6.
[20] McIntyre *et al*, *Supra* note 13.
[21] *Id*.
[22] Energy Policy Act § 420(a).
[23] McIntyre *et al*, *Supra* note 12, at 92.

The Clean Air Act, §415, provides incentives for clean technology demonstration projects funded through the DOE or EPA.[24] Existing facilities that undertake physical or operational changes for the sole purpose of installing, operating or removing equipment associated with a clean coal demonstration project and receive at least 20 percent of their funding from the EPA or DOE are exempt from certain regulatory requirements.[25]

The CAA provides for two types of clean coal technology demonstration projects: temporary and permanent. A temporary demonstration project is one that lasts five years or less and complies with the state implementation plan for the state in which the project is located and the national ambient air quality standards during and after project termination. Temporary demonstration projects are exempt from New Source Performance Standards (NSPS) under 42 U.S.C.A. §7411, and from the Prevention of Significant Deterioration (PSD) and nonattainment New Source Review (NSR) provisions of the Act. Permanent projects that constitute repowering as defined in Title IV of the Act are exempt from the NSPS standards and from the review and permitting requirements of the PSD program for "any pollutant the potential emissions of which will not increase as a result of the demonstration project."[26] The temporary and permanent demonstration projects provide some exemptions as incentives to existing facilities.

The CAA contains special provisions addressing "repowered sources"—sources that replace an existing coal-fired boiler with one of several clean coal technologies, including atmospheric or pressurized fluidized bed fuel cells, among others.[27] Units repowering technologies were provided a four-year extension of the Phase II deadline from January 1, 2000 to December 31, 2003. During this extension, such units were allocated allowances equal to the affected unit's baseline (average 1985 to 1987 fuel consumption) multiplied by the lesser of the unit's state implementation plan (SIP) limitation or its actual emission rate in 1995. After completion of the repowering, the unit received allowances according to the formula provided for Phase I units, potentially resulting in the acquisition of a large number of extra allowances. In addition, repowered units were exempt from NSPS requirements, provided the repowered unit did not increase its hourly emissions of SO_2 or NOx.[28]

Units interested in availing themselves of the repowering extension were required to notify the permitting authority of their intent by December 31, 1997 and submit by January 1, 2000 "satisfactory documentation of a preliminary design and engineering effort" and an executed and binding contract for the majority of the equipment needed to repower the unit.[29]

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[24] 42 U.S.C.A. § 7651n.

[25] David R Wooley and Elizabeth M. Morss, CLEAN AIR ACT HANDBOOK: A PRACTICAL GUIDE TO COMPLIANCE, 361 (2009).

[26] *Id.*, at 362. CAA §415(b)(3), 42 U.S.C.A. §7651n(b)(3).

[27] CAA §409, 42 U.S.C.A. §7651h.

[28] *Id.* CAA § 409(d), 42 U.S.C.A. § 7651h(d).

[29] *Id.* CAA §409(a), 42 U.S.C.A. §7651h(a).

2.4 **National Acid Precipitation Assessment Program (NAPAP)**

In 1980, Congress created the National Acid Precipitation Assessment Program (NAPAP) for a period of ten-years to coordinate the efforts of federal agencies related to acid deposition research.[30] Finally, private and public sectors have co-funded the Clean Coal Technology Program in an effort to advance the state of the art in pollution controls with a view to making these advanced technologies available for market under the CAA or to provide techniques for compliance with any additional control requirements.[31]

The 2005 report of NAPAP to Congress concluded that implementation of Title IV had "successfully and substantially" reduced emissions of SO_2 and NOx from the power generation sector at a significantly lower cost than expected, and that these emission reductions had resulted in reduced concentrations of SO_2 and sulfate in the atmosphere. The report also suggested that additional SO_2 and NOx reductions from power plants and other sources are needed to improve air quality, reduce deposition, and further reduce the number of acidic lakes and streams.[32]

The current state of CCTs used in modern coal-fired power plants shows the capability of achieving significant reductions in emissions of SO_2 or NOx associated with burning coal. However, CCTs are not in widespread use and a large number of power plants are very old. Emissions of sulfur dioxide, nitrogen oxide, mercury and carbon dioxide have continued effect on health and the environment. Nonetheless, the United States is moving ahead with various measures including funding, exemptions, regulatory incentives, etc. under the public-private partnership. Enforcement of laws and regulations are carried out by various federal and state agencies.

3. **Legal Instruments affecting the Coal Industry**

3.1 **Clean Air Act Amendments of 1970, 1977 and 1990**

Coal is formed out of carbon and inside coal sulfur and nitrogen are trapped. When coal burns, sulfur and nitrogen are released into the air. Coal-fired power plants contribute 96 percent of SO_2 emissions, 93 percent of NOx, 88 percent of CO_2 , and 99 percent of mercury emissions. Coal-fired plants are the single largest source of mercury pollution in the U.S.[33] Thus, the emissions produced by the coal industry pose challenges to the protection of public health, safety and the environment. Thus, Congress seeks to set air quality standards in the use of energy sources through the Clean Air Act.

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[30] National Acid Precipitation Act of 1980, Pub. L. No. 96-294, 94 Stat. 770 (codified as amended at 42 U.S.C. § 8901 (1982).

[31] Michael L. Teague *et al*, *The Debate Over the Adequacy of the Unites States Approach to Acid Deposition: The Electricity Utility Industry Perspective*, 91 W. VA. L. REV. 845, 848 (Spring 1989).

[32] Wooley and Morss, *Supra* note 25, at 371.

[33] http://www.greenpeace.org/seasia/en/asia-energy-revolution/dirty-energy/facts-about-coal (visited 3/30/2010) This page is missing on 7/23/2026.

Congress originally enacted the CAA in 1963, expanded the statute substantially in 1970, and has amended it several times since.[34] The 1970 Amendments to the CAA set up primary and secondary National Ambient Air Quality Standards ("NAAQS") to protect health and public welfare. The NAAQS fixed the maximum allowable concentrations for six pollutants in the air: carbon monoxide, photochemical oxidants, particulate matter, nitrogen dioxide, lead and sulfur dioxide.[35] Individual states were required to achieve these standards through the implementation of their state implementation plans (SIPs).[36] States imposed emissions limitations on existing sources to meet the federal standards. In view of sulfur content of many U.S. coals, the sulfur dioxide standards would have the most dramatic and significant effect on coal-fired utility power plants. [37]

The 1977 Amendments[38] required both new and existing sources to meet more stringent federal standards. The new sources performance standards (NSPS) required installation of scrubbers at coal burning facilities. These amendments: (i) imposed new federal requirements to be incorporated into SIPs for NAAQS non-attainment areas; (ii) imposed specific statutory requirements for prevention of significant deterioration (PSD) of air quality; (iii) established specific visibility requirements; (iv) imposed noncompliance penalties, in addition to the preexisting civil and criminal penalties; (v) prohibited the use of coal if such coal is causing "local or regional disruption or unemployment."[39]

3.2 **State Implementation Plans (SIPs)**

The CAA provisions are implemented by the states in their SIPs. SIPs cover PSD and nonattainment permit programs, including a preconstruction review of permit, periodic state review of their program and adoption of additional necessary controls. SIPs require continuing to prevent deterioration in attainment areas and providing for "state emission permits," and adopt a full-line up of state ambient air quality standards and emission limitations. Existing coal-fired utility boilers must also meet state emission limits, and new or modified coal-fired plants must comply with NSPS and the preconstruction review permit program.[40]

A coal-fired power plant would need to control the emissions of air pollutants such as SO_2 or NOx and particulate under a state implementation plan in which the power plant is located, and the SIP is approved by the EPA. New coal-burning power plants would achieve efficiencies over 40 percent using existing technologies, such as combined heat and power (CHP) and integrated gasification combined-cycle (IGCC).[41]

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[34] Charles F. Mills, *Clearing the Air: Use of Chevron's Step One to Invalidate EPA's Equipment Provision*, 33 FLA. ST. U. L. REV. 259, 262-263 (2005).
[35] William E. Hynan, *Chapter 55: Coal* in ENERGY LAW AND TRANSACTIONS, Vol. 3, at 55-90 (2009).
[36] *Id.*Clean Air Act, 42 U.S.C. §§ 7408-7410 (1982).
[37] *Id.*
[38] 42 U.S.C. § 7411 (Supp. V) (1982).
[39] 42 U.S.C. §§ 7407-7411.
[40] Hynan, *Supra* note 35, at 55-92.
[41] NEPDG Report, *Supra* note 1, at 3-5.

New Source Review (NSR) programs are designed to maintain the NAAQS by preventing significant degradation of air quality and implemented through the SIP. NSR is the most complex of all CAA programs. Numerous administrative and judicial decisions have been made on the issues of definition of modification, the relationship between federal and state enforcement, statutes of limitation, and citizen suit authority.[42] CAA creates a two-tier regulatory regime based on new sources and old sources. Older sources are not subject to the same standards as newer sources.[43] The old plants are not closed or replaced by new plants because the permit regime under CAA applies only to "new" sources of air pollution and coal-fired plants existing at the time permitting requirements took effect fall outside the scope of the Act's coverage. It is said that Congress' intent might be that pollution controls can be installed more efficiently when plants are constructed rather than later through retrofitting.[44]

3.3 **EPA's Interstate Rule**

In 2005, EPA adopted a cap-and-trade program for emissions of SO_2 and NOx from power plants in 28 eastern states and the District of Columbia. The Clean Air Interstate Rule (CAIR) requires regulated states to revise their state implementation plans (SIPs) to reduce emissions of SO_2 and NOx under CAA §110(a)(1), 42 U.S.C.A. §7410(a)(1), which authorizes EPA to compel states to implement changes to their SIPs where evidence suggests that emissions from the states are contributing significantly to nonattainment problems in downwind states.[45]

3.3.1 **National Ambient Air Quality Standards**

The EPA administrator identifies air pollutants which "may reasonably be anticipated to endanger public health or welfare"[46]and promulgates National Ambient Air Quality Standards ("NAAQS").[47]These standards establish permissible levels of specific air pollutants. If the level of air pollutants in a particular geographic area meets the standard, the area is known as an attainment area. [48] Areas that do not meet the NAAQS are known as non-attainment areas. [49] The NAAQS provide a benchmark that determines

[42] Wooley and Morss, *Supra* note 25, at 140.
[43] Benjamin Edwards, *Case Comments: Environmental Defense v. Duke Energy Corporation*, 33 COLUM. J. ENVTL. L. 197, 202 (2008).
[44] David B. Spence, *Coal-Fired Power In a Restricted Electricity Market*, 15 DUKE ENVTL. L. & POL'Y F. 187, at 195 (Spring 2005).
[45] Wooley and Morss, *Supra* note 25, at 370. [FN3: EPA proposed the CAIR in January 2004, 69 Fed. Reg. 4566 (Jan. 30, 2004) and followed up with a supplemental notice of proposed rulemaking containing proposed rule language as well as supplemental information supporting the January 30, 2004 proposal. 69 Fed. Reg. 32684 (June 10, 2004). 70 Fed. Reg.25162 (May 12, 2005). More information on EPA's web site at: www.epa.gov/interstateairquality.
[46] 42 U.S.C. §7408(a)(1)(A).
[47] 42 U.S.C. §§ 7408, 7409, 7410.
[48] 42 U.S.C. § 7409.
[49] 42 U.S.C. §7501(2).

the level of EPA involvement, since non-attainment areas face more stringent EPA oversight.[50]

The CAA Amendments of 1990[51] primarily emphasizes to improve the nation's air quality and establishes the first air quality requirements to control acid deposition. These Amendments fundamentally changed EPA and state enforcement programs and increased both civil and criminal penalties for non-compliance with the CAA. The 1990 Amendments also significantly increased the amount of publicly available information on the compliance status of facilities, simplifying both government and citizen enforcement.[52] The 1990 CAA Amendments dramatically increased the number of regulated toxic air pollutants to 189 as compared to fewer than twenty under the 1970 law. The EPA is authorized to add or delete chemicals subject to regulation. [53] The acid deposition control provision of CAA imposes "drastic limitations on the emissions of sulfur and nitrogen oxides from coal burning utility plants."[54]

In compliance with the requirements of the CAA, many power plants use flue-gas desulfurization, or scrubbers, to reduce SO_2 emissions from burning coal. The most common wet scrubber, the limestone forced-oxidation (LSFO) process, removes SO_2 from the flue gas. The limestone captures sulfur and pulls it out of the gases. The limestone and sulfur combine each other to form either a wet paste or in newer scrubbers, a dry powder. In either condition, sulfur is prevented from being released into the air. The LFSO technologies can remove up to 98 percent of SO_2 and significant amounts of mercury. By recapturing sorbent at the bottom of the spray dryer removed in a particulate control device, dry scrubbers can remove up to 96 percent of SO_2 .[55]

3.4 **Title IV of the 1990 CAA Amendments**

In 1990, the acid rain title (Title IV) was passed as part of the 1990 Amendments. This title aims at achieving two goals: First, it aimed to reduce SO_2 emissions by 10 million tons from 1980 levels (which were about 19 million tons) and to lower NOx emissions by 2 million tons from 1980 levels. Second, the Title IV sought to encourage, through various mechanisms, energy conservation, pollution prevention, and the use of renewable and clean alternative technologies.[56] The emission reductions from the utility industry were the primary target. [57] The utilities wanted to avoid being required to install

[50] 42 U.S.C. §7502(c), 7506(c)(5).
[51] John R. Rhorer, Jr. and Penny R. Warren, *Force Majeure Implications of Acid Rain Legislation: The Litigation Battle of the 1990s*, 8 J. NAT. RESOURCES & ENVTL. L. 23 (1992/1993). Clean Air Act Amendments of 1990, Pub. L. No. 101-549, Title I § 108(k), 104 Stat.2468, (codified at 42 U.S.C.A. §§ 7401-7601 (1983 and supp. 1992)
[52] Wooley and Morss, *Supra* note 25, at 508.
[53] Minturn T. Wright, III, in Rhorer, Jr. and Warren, *Supra* note 51.
[54] Rhorer and Warren, *Supra* note 51, at 26.
[55] NEPDG Report, *Supra* note 1, at 3-4.
[56] Roy S. Belden, CLEAN AIR ACT: BASIC PRACTICE SERIES, 84 (2001).
[57] *Id. See*, Footnote 1. Other industries with fossil-fuel-fired boilers and combined cycle combustion turbines generating electricity may be subject to Title IV. Fossil fuels include coal, oil and natural gas.

add-on controls- namely, a flue gas desulfurization system or "scrubber" that typically removes more than 95 percent of the SO_2 from the flue gas stream before it exits the stack. Scrubbers are extremely large pieces of equipment that may cost $80 to $120 million to install on a large utility boiler. Ongoing operation and maintenance of a scrubber can also be costly.[58]

The Title IV requires all "affected units"—that is, fossil-fuel-fired electric generating units that produce electricity for sale—to obtain acid rain permits; to hold sufficient "allowances" to cover their SO_2 emissions (starting in 1995 for Phase I units and the year 2000 for Phase II units); to install continuous emissions monitoring systems (CEMS); and comply with other monitoring and record-keeping provisions.

A number of cases were brought by environmentalists with a view to making efforts towards improving air quality that has been badly affected by the coal industry. Even though emissions of pollutants such as sulfur and nitrogen oxides and particulate matter were reduced, the acid deposition issue has continuing effects caused by residual emissions of these pollutants. Concerns have been raised about the need for accelerating the reductions of the emissions of these pollutants under the existing Clean Air Act. [59]

Deposition of acidic aerosol acidifies the environment and causes damage to fisheries in aquatic ecosystems. Reduction of these effects calls for acceleration of the reductions of acid deposition precursors in accordance with the existing legislation. Environmentalists[60] demand acceleration of pollution reduction requirements on electric utility companies.[61] The electric utility industry counters by saying that the expense of granting the relief requested by the environmentalists is not justified by the environmental benefits that accelerating additional controls would produce in light of the continuing success of the Clean Air Act to control the precursors of acid deposition.[62]

With a view to reducing SO_2 and NOx emissions, the utility industry sector became the primary target of Title IV of the CAA 1990 Amendments whereas the utilities had wanted to avoid the requirement to install add-on controls—a flue gas desulfurization system or scrubber due to heavy cost on its installation, maintenance and operation. Title IV-A, entitled *Acid Deposition Control* provision regulates the emissions of sulfur dioxide (SO_2) and NOx, in part by establishing a cap of 8.90 million tons per year on electric utility SO_2 emissions beginning January 1, 2000. In order to monitor the emissions of SO_2 and NOx with the accuracy needed to have a viable emissions trading program,

[58] *Id.*
[59] Teague *et al, Supra* note 31.. Clean Air Act, 42 U.S.C. §§ 7401 et.seq. (1982).
[60] Referred generally to those individuals and institutions that are active proponents of acid deposition legislation. *Id., at 847*.
[61] Referred to companies that are engaged in the conversion of natural resources into electricity for public consumption and that request a balancing of environmental, energy, economic, and social factors before acid deposition legislation is adopted. *Id.*
[62] *Id.*

Subchapter VI-A requires that each source subject to the subchapter install continuing emissions monitoring systems (CEMS) and opacity monitoring systems.[63]

Compliance with the provisions is scheduled in two phases. Phase I requires 110 major coal burning utility plants with more than 100 megawatt capacity to reduce sulfur emissions to a level no greater than 2.5 lbs/mmBtu of the baseline fuel consumption by 1995. These utilities must identify their selected method of compliance in a permit application to be filed by February 15, 1993. While regulations governing the permitting mechanism were to be filed by May 15, 1992, they were still awaiting final approval. The statutory methods for compliance include substituting control obligations among commonly owned units, installing scrubbers, using energy conservation or renewable energy sources, requesting alternative emission limits or emission averaging for nitrogen oxide, employing clean coal technology in Phase II, or opting into the application must include a compliance plan and a description of the schedule and means to accomplish the emission limits.[64]

In Phase II, all other existing coal-burning utility plants must obtain emission allowances and a permit to operate. Generally, allowances will be based on a sulfur dioxide emission standard of 1.2 lbs/mmBtu. Permits for Phase II compliance must be obtained by 1998.[65]

After 1990, new utility plants beginning operations must obtain allowances for emissions and an operating permit. Plants beginning their operations after the year 2000 must obtain all allowances needed to operate from elsewhere, and availability of allowances is expected to be limited.

3.4.1 **Three-pronged federal approach to the acid deposition issue**

In 1977, Congress adopted major amendments to the Clean Air Act to reinforce the comprehensive federal regulatory program for air quality. The CAA provides for the regulation of existing sources of air pollution, including the precursors to acid deposition. The Act seeks to ensure protection of the public health and welfare, including the effects of acid deposition, and state-of-the-art controls on new sources to improve air quality even further. Under federal-state partnership program, the Environmental Protection Agency (EPA or the Agency) makes the rules to implement the CAA and the states apply those rules to specific sources.[66]

Environmentalists consider the CAA, NAPAP, and the CCT program as inadequate by themselves.[67] However, the utility industry argues that there is no environmental crisis that requires new law and future emission regulations will achieve goals under the current CAA's mandate. The industry concerns about the acceleration of the timing of the

[63] Arnold W. Reitze, Jr., STATIONARY SOURCE AIR POLLUTION LAW, 265 (2005).
[64] Rhorer and Warren, *Supra* note 51, at 27.
[65] *Id*.
[66] Teague, *Supra* note 31, at 848.
[67] *Id.*, at 849.

emission reduction through new legislation that would be very expensive compared to adequate environmental benefit. The electric utility industry has reduced emissions and has expressed its commitment to emission reductions as deployment of advanced technology is encouraged by market forces or as is ordered under the current CAA.[68]

3.5 **Enforcement Provisions under the 1990 CAA Amendments[69]**

The 1990 CAA Amendments modernized the CAA by adding provisions similar to those found in amendments to the Clean Water Act, the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), Resource Conservation and Recovery Act (RCRA), and the Toxic Substances Control Act (TSCA). The 1990 CAA Amendments enhance EPA's enforcement power by increasing its ability to obtain information. CAA §114 was amended to clarify EPA's right to require information to be generated and submitted on a regular basis. Under §114(a) (3), owners and operators of sources may be required to identify the standards to which they are subject and to provide certification that they are complying with the standards.[70]

The amended §307(a) makes compliance information subject to the subpoena power. The basic enforcement provision, §113, expanded EPA's enforcement options by providing a range of responses from field citations to criminal prosecution. It provided new sanctions, increased stringency in existing sanctions, and more clarity in the applicable standards.[71]

Under the pre-1990 CAA the use of compliance orders was limited because compliance has to be obtained in 30 days. The 1990 CAA Amendments allow compliance schedules of up to one year, which enhances their value as an enforcement tool. The penalties, using §113, can be applied from the date of the violation. EPA is provided authority to levy administrative penalties of up to $25,000 per day, but generally with a cap of $200,000. Prior to penalties being imposed, there must be an opportunity for a hearing on the record that meets the requirements of the Administrative Procedure Act (APA).[72] To deal with minor violations, EPA may issue field citations with penalties up to $5,000 per violation, and it needs only to provide an opportunity for an informal hearing. This field citation program, the CAA equivalent of a traffic ticket, provides EPA with an enforcement tool that could be easy to use.[73]

Sanctions are more stringent than in 1990, and fines are now based on U.S.C. Title 18, which allows increases in the maximum fines. The 1990 CAA Amendments authorize felony sanctions, typically up to five years, rather than one year misdemeanor approach used under prior law, and it authorizes the doubling the sanctions for repeat offenders. The 1990 law makes negligent endangerment a misdemeanor and knowing endangerment a

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[68] *Id*.

[69] Enforcement provisions in other major statutes are found at: CWA §309, 33 U.S.C. §1319; CERCLA §106, 42 U.S.C. §9606; and RCRA §3008, 42 U.S.C. §6928.

[70] Reitze, *Supra* note 63, at 269. CAA §115(a)(3), 42 U.S.C. §7414(a)(3).

[71] *Id.*, at 270.

[72] 5 U.S.C. §§554, 556.

[73] Reitze, *Supra* note 63, at 270.

felony. Penalties can be applied to all violations including those that predate the notice of violations. Basically, everything that needs to be enforced in the CAA, except mobile sources, is subject to §113.[74] Mobile sources are exempt from §113 because they are regulated by §205.

3.6 **Stratospheric Ozone Protection**

In 1990, Subchapter VI of the CAA created an enforceable stratospheric ozone protection program. The provisions codify and expand the Montreal Protocol[75] which aims to phase out the use of chemicals with stratospheric ozone-depleting potential.[76] Other sections provide for the recycling of ozone-depleting chemicals, bands on nonessential uses, labeling requirements, and rules on substituting safe alternative chemicals for those with ozone-depleting potential.[77]

3.7 **CAA Operating Permit program**

The 1990 CAA Amendments added the operating a permit program that identifies most of the federal and states standards, work practice requirements, emission limitations, monitoring requirements, test methods, and record-keeping and reporting requirements applicable to each source and places them in one document.[78] It makes easier for citizens to know the requirements applicable to sources and to bring citizen suits against violators.[79] Such suits also can be used to pressure government agencies to enforce environmental laws.[80]

The CAA permit program requires operating permits for major sources, sources subject to hazardous air pollution requirements, sources subject to new source performance standards (NSPS), "affected sources" under the Subchapter IV acid rain provisions, and sources subject to new source review (NSR) permitting requirements.[81] The states usually have the primary responsibility for enforcing permit requirements; however, EPA's regulations in a permit are enforceable by the Administrator and citizens.[82]

As discussed above, the enforcement provisions of the 1990 CAA Amendments for protecting health and the environment through setting standards of air pollution control are multi-dimensional. The policy direction of the CAA includes "carrot and stick" approach in terms of incentives for energy efficiencies and development of clean coal

[74] *Id.* at 270 (2005)
[75] Montreal Protocol on Substances That Deplete the Ozone Layer, Sept. 16, 1987, 26 I.L.M. 1550 (entered into force Jan. 1, 1989) (as amended).
[76] CAA §§601-607, 42 U.S.C. §§7671-7671f.
[77] Reitze, *Supra* note 63, at 267.
[78] *Id.*, at 257.
[79] *Id*. CAA §304, 42 U.S.C. §7604; Fed. Reg. at 32263.
[80] *Id*.
[81] *Id.* CAA §502(a), 42 U.S.C. §7661a(a); 57 Fed. Reg. at 32250.
[82] *Id*.

technologies which seem potential for producing "cleaner" coal than before, rather than "pure clean" coal, that free from emissions.

The major challenge faced by the process of development of CCT is financial viability and practicality of making clean coal which forms itself of carbon, a major source of emission. The provisions are not adequate to address violations of the CAA due to the controversial nature of some provisions and differing interpretations by different layer of authorities. Nevertheless, the framework provided by the CAA does advance the goal of preventing degradation of health and the environment. The current level of economic and industrial activities continues to further deteriorate ozone layer. The current state of technologies is inadequate to meet the environmental requirements of sustainable development.

The CAA 1990 Amendments provide for the goal of standards for decades ahead and for regulatory administrative and institutional structures and mandates of different authorities in achieving the set standards for clean air in general and controls of emissions from coal businesses.

4. **Regulatory Structure**

The U.S. Congress has adopted many regulatory protections to limit the environmental damages and public health consequences of the exploration, extraction, production, and use of energy, including coal. State or federal permitting or review systems, with public participation, implement most environmental standards. Facilities may need several different permits or reviews from different agencies, and they may also need to meet local licensing or zoning laws. Businesses have interest in moving expeditiously to respond to consumers' needs. The public also has an interest in participating in the system to ensure that appropriate health and environmental precautions will be taken.[83]

4.1 **Role of EPA in Federal enforcement**

The 1990 Amendments substantially revised and expanded EPA's enforcement authority. Specifically, the Amendments provide clear authority for the Agency to assess civil and administrative penalties for both past and current violations[84] of Title I (SIPs, NSPS, NESHAPs, PSD/NSR), Title IV (acid rain program), Title V (operating permits), and Title VI (stratospheric ozone protection).[85]

If the Administrator finds widespread violations of either an applicable SIP or an approved permit program under Subchapter V, notice to the state must be given. Thirty days after the notice of SIP violations or 90 days after notice of permit program violations, EPA may take over the state program.[86] Until the state satisfies EPA that it will enforce the SIP or permit program, the Administrator will enforce the requirements of the CAA. [87]

[83] NEPDG Report, *Supra* note 1, at 3-12.
[84] CAA §502(a), 42 U.S.C. §7661a(a); 57 Fed. Reg. at 32250.
[85] CAA §113(a)(3), (b), (d); 42 U.S.C. §7413(a)(3), (b), (d).
[86] Reitze, *Supra* note 63, at 270. CAA §113(a)(2), 42 U.S.C. §7413(a)(2).
[87] *Id.*

The National Energy Policy Development Group's report [88] describes that regulatory requirements are not static. It highlights the need for certainty over national energy policy and standards as follows:

"New scientific information and new control technologies result in new regulations and modifications to existing regulations over time. However, some level of certainty in the regulatory environment is important for all parties. Businesses can plan more effectively in such an environment, and regulators can focus on ensuring that the desired outcomes are in fact achieved consistently. For example, studies have shown that if electricity generators knew today what their emission requirements for several emissions would be for a defined time period, they would most likely control emissions more cost effectively and sooner than if their emission requirements were decided upon one gas at time. Market-based incentives offer advantages over traditional forms of regulation because they set high performance standards and then allow market-forces to determine the most effective way to meet them. While not appropriate for every situation, market-based incentives can control pollution at a lower cost to society than traditional regulation, stimulate technological improvements, and be structured to achieve larger reductions in pollution than would result from traditional regulations."[89]

The Acid Rain Program is a market-based program, which has reduced SO_2 air emissions from utilities at a fraction of the initial cost estimates. Other emerging market-based environmental protection mechanisms include effluent trading, wetland mitigation banks, tradable development rights, easement purchases, off-site mitigation, and leasing or purchasing of water rights. These programs can reduce mitigation or pollution control costs, increase business flexibility, and provide transparency and environmental protection for the public.[90]

The environmental review process can also be made more open, understandable, predictable, and coordinated among federal agencies and with state and local agencies. It can be improved by providing greater information to clarify expectations for energy developers, facilitating concurrent reviews by federal agencies by standardizing certain information needs, sharing information received by project applicants, and seeking opportunities to integrate required environmental processes and reviews.[91]

4.1.1 **Goals of Enforcement**

Enforcement has two aspects: civil enforcement of the CAA and criminal enforcement of air pollution control laws.[92] The purposes of litigation and liability of damages cab be drawn from the goals of enforcement.

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[88] The Group was headed by the then U.S. Vice President Dick Cheney and the Group presented its report in May 2001, The recommendations of the NEPDG report form the basis for the passage of the Energy Policy Act of 2005.

[89] NEPDG Report, *Supra* note 1, at 3-12.

[90] *Id.*, at 3-12.

[91] *Id.*, at 3-13.

[92] Reitze, *Supra* note 63, at Chapter 7 and 8.

The first goal of enforcement strategy is to use available resources wisely in order to maximize compliance with environmental laws. Second, it is to develop an enforcement strategy to achieve full compliance with environmental laws. The third goal is to punish violators. This may be accomplished by sanctions imposed by the enforcement agency, or it may involve the use of more serious sanctions imposed by the judicial system. The fourth goal of environmental law enforcement is to achieve equitable treatment for all sources of pollution to prevent violators from gaining an economic advantage due to their noncompliance. The fifth goal is to use the enforcement process to achieve compliance as quickly as possible in order to protect public health or the environment.[93]

There are 13, 66,634 facilities in the United States. Stationary sources of air pollutants number about 39,961, which is about 3 percent of the core sources. An environmental enforcement program is related to and dependent upon how well drafted is the statute used to control pollution. For example, the pre-1990 CAA was difficult to enforce because a polluter's obligations were based on a state implementation plan (SIP) that may have been modified many times. The 1990 CAA Amendments make enforcement easier because requirements for self-monitoring, reporting and compliance certification by sources shift some of the enforcement-related obligations to the regulated sources.[94]

4.1.2 **Enforcement Organizations and Policies**

A statute may be enforceable by federal, state, and local pollution control authorities. The Department of Justice (DOJ) and/or a state's Attorney General office also may be involved in an enforcement action. EPA administers 12 major environmental protection laws, both directly and via oversight of state, local and Indian tribe programs. In addition to the headquarters located in the Washington, D.C., EPA has 10 regional offices.[95]

4.1.3 **Inspection and Evidence Gathering**

Under §114 of CAA, EPA is authorized to seek any information it may reasonably require for the purpose of (1) developing emission standards, (2) determining whether any person is in violation of a SIP requirement or a standard under the CAA, or (3)carrying out any provision of the CAA except Title II regarding mobile sources.[96] For mobile sources, CAA sets out a separate information collection and enforcement regime.[97]

Under §114, EPA may require a source to sample emissions and report the results, submit compliance certifications, install and use monitoring equipment, and provide any other information that the agency deems reasonably necessary. EPA's new "credible

[93] Reitze, *Supra* note 63, at 255-256.
[94] *Id.*
[95] *Id. at* 257.
[96] Belden, *Supra* note 56, at 130. §114(a); 42 U.S.C. §7414(a).
[97] *Id.* §§206(c), 208; 42 U.S.C. §§7525(c),7542.

evidence" rule dramatically increases the potential use of such monitoring data and records in enforcement actions.[98] The credible evidence rule will particularly affect compliance with NSPS, NESHAPs, SIP rules, PSD/NSR permits, and Title V operating permits.[99]

EPA is authorized to issue an administrative compliance order if a person has violated or is in violation of any requirement or prohibition of Title I, §303 emergency orders, Title IV, Title V, and Title VI contained in any "rule, plan, order, waiver, or permit" or for any non-payment of a required fee.[100]

5. **Litigation and Remedies**

5.1 **Citizen Suits**

All major environmental statutes contain citizen suit provisions, and the CAA is no exception. §304 authorizes citizens to file a civil complaint in a federal district court against persons alleged to have violated (if there is evidence that the alleged violations have been repeated) or persons currently violating a federally enforceable emission standard or limitation or order.[101]

5.2 **Judicial Review**

The EPA administers the CAA, which provides a nationwide framework for reducing airborne pollution.[102] EPA has broad authority under the CAA to pursue alleged violators of the act. Under the CAA, EPA has sweeping investigative powers and is authorized to seek both injunctive relief and civil penalties. Moreover, the federal government is empowered to seek criminal penalties and jail time for knowing violations of the CAA. The 1990 Amendments expanded the scope of criminal liability to almost all key substantive requirements of the CAA. In addition, under the act, citizens are granted authority to act as private attorneys general and may file citizen suits seeking to enforce CAA provisions when EPA or a state is not diligently prosecuting a civil action in a court.[103]

EPA Clean Air Act enforcement actions in 1997 resulted in the assessment of more than $54 million in criminal penalties, along with approximately $13.7 million in civil judicial penalties and another $3 million in administrative penalties. [104] EPA has, in the past, reached several multi-million dollar enforcement settlements with companies accused of alleged PSD/NSR permitting violations at several facilities. One settlement that was reached involves the installation of pollution controls costing over $1 billion, a civil

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[98] *Id.*, at 132. 62 Fed. Reg. 8,314 (Feb. 13, 1997).
[99] *Id.*
[100] CAA §113(a); 42 U.S.C. §7413(a).
[101] Belden, *Supra* note 56, at 139. *See, Id.* FN .43 also.
[102] 42 U.S.C. §§7401-671q (2004).
[103] Belden, *Supra* note 56, at 129.
[104] *Id., at* 129. *See,* footnote 3. United States EPA, Enforcement and Compliance Assurance Accomplishments Report FY 1997, table A-2.

penalty of over $8 million, supplemental environmental projects of over $20 million, and the surrender of SO_2 allowances with a value of over §7 million. This shows that the agency pursues a significant number of alleged CAA violators and that the resulting penalties are often substantial.[105]

CAA §307 provides for judicial review of administrative compliance and penalty orders. This section also authorizes any person to request review of an EPA rule, federal permit, NAAQS, NSPS, NESHAP, or any other final agency action.[106]

5.3 **Civil and Criminal Penalties**

EPA is allowed to bring a suit in a U.S. district court seeking injunctive relief and/or civil penalties against any person who owns or operates a stationary source. Before it can file suit in federal court, the EPA must explain the issues arising in the case to the Department of Justice and the local U.S. attorney and must convince them to pursue the case.[107] §113© sets criminal penalties for a variety of CAA violations for a person who: (1) knowingly makes a false material statement, representation, or certification, or falsifies any monitoring device or test method; (2) knowingly fails to pay a fee; or (3) negligently or knowingly releases a HAP listed under § 112 or an extremely hazardous pollutant under Superfund that places another person in imminent danger of death or serious bodily injury.[108]

5.4 **Remedies**

Injunctions are available in citizen suits at the discretion of the court. An injunction will not be issued if there is no threat that the violation will be repeated. A plaintiff seeking an injunction must show irreparable harm that can be prevented by an injunction.[109]

5.4.1 **Attorney's Fees**

The general rule in the United States is that each party to a lawsuit is responsible for its own costs, which include attorney fees. CAA §304(d) provides the court with the authority to award "costs of litigation (including reasonable attorney and expert witness fees) to any party, whenever the court determines such award is appropriate." Similar language also exists in CAA §307 providing for judicial review of the actions of the Administrator and is found in other statutes authorizing citizen suits.[110] In addition, the Equal Access to Justice Act (EAJA)[111] authorizes awards of attorney's fees when an eligible party prevails in a suit against the federal government. Implementation of EAJA

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[105] *Id., at* 130.
[106] *Id*.
[107] R. Shep Melnik, REGULATION AND THE COURTS: THE CASE OF THE CLEAN AIR ACT, 201 (1983).
[108] Belden, *Supra* note 56, at 137.
[109] *Natural Resources Defense Council v. Texaco Ref. & Mktg*., 906 F.2d 934 (3d Cir. 1990).
[110] Reitze, Supra note 108, at 611 (2001).
[111] 28 U.S.C. § 1214(d).

in proceedings involving EPA is found in regulations at 40 C.F.R. part 17.[112] Attorney's fees are available only to parties bringing a citizen suit; interveners are usually not allowed attorney fees. There are no attorney's fees for enforcing a consent decree entered under CAA §113 by the government.[113] Obtaining attorney's fees is not easy. Fees are reduced if the attorney did not prevail on all claims, if the court considers the attorney's records inadequate, or if the court believes excessive time was spent on the work. Even if payment is received, it can come years after the work was performed. It is not unusual to have a second, time consuming legal battle over the issue of attorney's fees. No attorney's fees will be paid unless both cases are won.[114]

6. **Future Challenges**

As stated above, the enforcement of the CAA provision for New Source Review (NSR) generated controversies regarding definition of "modification" under the Act. In *Environmental Defenses v. Duke Energy Corporation,*[115] the U.S. Supreme Court resolved the dispute concerning the proper definition of "modification" and provided the guidance on the following aspects:

6.1 Jurisdictional Limitations

The CAA limits the authority of regional circuit courts to review administrative regulations promulgated under traditional notice and comments procedures. National regulations promulgated under the CAA must be challenged in the Court of Appeals for the D.C. Circuit within sixty days from the time new national regulations appear in the federal registrar.[116]

6.2 **Shifting from Rules to Goals**

The *Duke* decision shows that the Supreme Court is more inclined to construe environmental statutes in line with the goals of the legislation rather than following the dictates of narrow rules of statutory construction. The issue in the case was the interpretation of the term "modification" in the Prevention of Significant Deterioration (PSD) section of the CAA and its regulations governing New Source Performance Standards (NSPS). The Supreme Court ruled that the EPA was not required to interpret the term "modification" similarly under the PSD and NSPS statutes. The court noted that a given term in the same statute may take on different meanings under different programs. The court noted that the PSD regulations do not define major modification in terms of an increase in the hourly emission rate and that when the regulations mention a rate, it is

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[112] 48 Fed. Reg. 39934 (Sept. 2, 1983).
[113] *United States v. National Steel Corp.*,782 F.2d 62 (6th Cir. 1986).
[114] Reitze, *Supra* note 108, at 612 (2001).
[115] 127 S. Ct.1423 (2007)
[116] 42 U.S.C. §7607(b)(1)

Any petition for review under this subsection shall be filed within sixty days from the date of notice of such promulgation, approval, or action appears in the Federal Register, except that if such petition is based solely on grounds arising after such sixtieth day, then any petition for review under this subsection shall be filed within sixty days after such grounds arise. *I*d.

annual, not hourly. Generally, administrative distinctions and interpretive regulations seek to achieve the overarching goals of their authorizing statute.[117] In the 1970s, Congress added two air pollution control schemes to the Clean Air Act: NSPS, and PSD, each of them covering modified, as well as new, stationary sources of air pollution. The NSPS provisions define the term "modification," while the PSD provisions use that word "as defined in" NSPS. The United States sued in 2000 that Duke violated the PSD provisions by doing the work without permit.

Nevertheless, enforcement actions are filed in federal district courts. District courts lack the authority to strike down national regulations under the CAA, but they may decide which regulation applies and they can determine the scope of validly promulgated regulations.[118] In *Duke*, the district court did not address the validity of the regulation, but tried a factual issue of whether the modifications fell within the routine repair and maintenance exception provided in the CAA regulations. On appeal, geographic circuit courts still lack the jurisdiction to strike down national administrative regulations under the CAA. [119]

A citizen suit may be brought against a federal agency for a reason other than its polluting activities. For example, a coalition of environmental groups filed suit against EPA, alleging the Agency violated the Federal Advisory Committee Act (FACA) when it met with groups representing the cement industry.[120]

6.3 Separating Old and New Sources of Air Pollutants

Much of the litigation under the CAA concerns whether or not a source of pollution has been "modified."[121] The CAA defines modification as "any physical change in, or change in the method of operation of, a stationary source which increases the amount of any air pollutant emitted by such source or which results in the emission of any air pollutant not previously emitted."[122]

6.4 **Relevant Precedent: Rowan and Robinson**

6.4.1 ***Rowan Companies Inc. v. United States***[123]

[117] David Schoenbrod, *Goals Statutes or Rules Statutes: The Case of the Clean Air Act, 30 U.C.L.A. L. REV. 740 (1983) (arguing that the EPA fails to enact enough substantive rules under the CAA while articulating lofty goals).*
[118] *Id.*
[119] Edwards, *Supra* note 43, at 200.
[120] *Huron Envtl. Activist League v. EPA*, 917 F. Supp. 34 (D. D.C. 1966) quoted in Reitze, p. 609 (2001)
[121] Representative cases include *Wis. Elec. Power Co. v. Reilly*,893 F.2d 901 (7th Cir. 1990) (holding that replacement of steam drums and air heaters at an electric power plant constituted a "modification" which would subject the plant to new source performance standards) and *United States v. Ohio Edison Co.*, 276 F. Supp. 2d 829 (S.D. Ohio 2003) (holding that construction at a power plant constituted "physical changes," within the definition of "modification" under the Clean Air Act).
[122] 42 U.S.C. §7411(a)(4).
[123] 452 U.S. 247(1981).

This case is somewhat similar to *Duke*. *Rowan* also involves two different regulatory interpretations of a single statutory term. In *Rowan*, the Internal Revenue Service ("IRS") interpreted the term "wages" differently in two tax provisions.[124] The Supreme Court disallowed the divergent interpretations because they were inconsistent, unexplained, unreasonable, and contradicted by the legislative history of the implementing statute.[125]

The Supreme Court found that the IRS lacked the ability to interpret the term "wages" differently. Although *Rowan* predated the *Chevron* decision, the Supreme Court engaged in a similar inquiry into the reasonableness of the agency's interpretation of its governing statute. [126] This case also validates the general maxim of statutory construction that "the same words, when repeated, carry the same meaning."[127]

6.4.2 ***Robinson v. Shell Oil Co.***[128]

This case was another unanimous decision. Justice Thomas wrote the brief opinion, applying the *Chevron* framework to evaluate differing regulatory constructions of a term defined by the statute and used in different context. [129] Under a reasonable inquiry, the Supreme Court decided that the term "employee" may or may not include former employees depending on the context in which the term was used within the statute.[130]

6.5 **Regulatory uncertainty**

Uncertainty about future environmental controls is of particular concern for companies that operate existing coal power plants. Regulations under development include a variety of measures requiring reductions in emissions of nitrogen oxide, sulfur dioxide, and mercury. In addition, rules related to discharges to streams and cooling-water intake structures, possible regulation of large-volume wastes as hazardous wastes, uncertainty over rules requiring air permits for certain modifications to power plants, i.e. *Duke*, and uncertainty over global and domestic efforts to reduce carbon dioxide emissions also play a role. This regulatory uncertainty discourages power producers from building coal power plants and is one reason the United States is relying so heavily on natural gas power generation to meet growing electricity demand. [131]

Much of the current uncertainty has resulted because regulators do not weigh the cumulative impacts of their proposals. Compliance decisions by businesses concerning each new regulation must often be made without the benefit of clear information regarding additional requirements that may be imposed. More effective and economical compliance

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[124] *Rowan v. United States*, at 250.
[125] *Id.*, at 263.
[126] *Id.*, at 252 (stating that Treasury Regulations are valid if they "implement the congressional mandate in some reasonable manner").
[127] *Envtl. Def. v. Duke Energy Corp.*,127 S. Ct. 1423, 1438(2007) (Thomas, J., dissenting).
[128] 519 U.S. 337 (1997).
[129] *Robinson v. Shell Oil Co.*, at 340 and 345.
[130] *Id.*,, at 346.
[131] NEPDG Report, *Supra* note 1, at 5-14.

strategies are possible if companies know the full range of requirements with which they must comply. [132]

Placed alongside *Massachusetts v. Environmental Protection Agency*,[133] the *Duke* decision shows that the Supreme Court will likely consider environmental policy in future cases. Although drafting regulatory policy remains firmly within the domain of the other branches, the court may consider environmental concerns in deciding close cases. Decreasing skepticism about global warming may improve the EPA's prospects for defending its air quality regulations in court and may also drive Congress to enact tougher legislation. However, the Supreme Court also handed environmentalists a loss in the same term. [134] It remains to be seen how much environmental consequences may influence the Supreme Court in future decisions.

6.6 **Mercury Emissions**

Future coal electricity generation will need to meet new challenges to reduce emissions even further, especially mercury emissions. The DOE is supporting efforts to develop more cost effective control technology. Indeed, the goal of these research, development, and demonstration programs is to develop and demonstrate coal power systems with near zero environmental emissions, while maintaining low production costs. The NEPD Group recommended that the DOE continue to develop advanced clean coal technology by investing $2 billion over 10 years to fund research in clean coal technologies, supporting a permanent extension of the existing R & D tax credit, and encouraging agencies to explore regulatory approaches for advancements in environmental technology.[135]

6.7 Pending Bill on Acid Rain and Mercury Control

As of July 2009, only one bill had been introduced in Congress to expand the existing acid rain cap-and-trade program for power plants. Congressman John McHugh had proposed the Acid Rain and Mercury Control Act (H.R. 1841), which would require new coal-fired power plants to meet mercury emission limits at the time they commence operation, with existing units subject to the same limits by January 1, 2013. The bill also called for significant reductions in emissions of SO_2 or NOx power plants to be implemented via regulations that may include a cap-and-trade program. Finally, the bill requires all power plants to comply with applicable NSPS and with standards for modified sources established under PSD or nonattainment NSR within 30 years after they commence operation or five years after the Act's enactment, whichever is later. [136] However, the H.R. 1841 was not enacted into law.[137]

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[132] NEPDG Report, *Supra* note 1, at 5-14.
[133] 127 S. Ct. 1438 (2007).
[134] *National Association of Home Builders v. Defenders of Wildlife*, 127 S. Ct. 2518(2007).
[135] NEPDG Report, *Supra* note 1, at 5-15.
[136] Wooley and Morss, *Supra* note 25, at 370.
[137] https://www.govtrack.us/congress/bills/111/hr1841/text/ih (Accessed on 7/23/2026)

7. **Conclusion**

Coal is the most significant energy source of electricity generation in the United States. At the same time, coal is major source of air emissions as well. Clean coal is not yet prevalent in the market, although some power plants have used clean coal technologies to reduce air pollution by removing pollutants such as sulfur dioxide and nitrogen oxide in some circumstances. The great challenges lying ahead include the risks posed by two byproducts of coal combustion, i.e., mercury and carbon dioxide. The purpose of the 1990 CAA to prevent air pollution and protect environment is to yet to be achieved. Moreover, the EPA has declined to use its regulatory authority under the CAA to regulate greenhouse gas emissions that are significantly contributing to the global warming. Enforcement of the Act by federal agencies and the states have provided for citizen suits and judicial review for remedying the harms caused by coal power plant operators. While technologies present an opportunity to produce clean coal, the great challenge is to make those technologies commercial viable and available to the coal industry for use.
