How Should Existing Coal-Fired Electric Plants be Environmentally Regulated?

By

John Lafferty

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Executive Summary

Coal-fired electricity plants provide low-cost reliable electrical services. These plants also release significant amounts of nitrogen oxide and sulfur dioxide emissions that deplete clean air, contribute to rising levels of ozone, and acidify precipitation. An exemption from the 1970 Clean Air Act levied by Congress is responsible for allowing coal-fired plants to operate without meeting stringent environmental requirements. This exemption allows plants to perform "modification" activities necessary to maintain efficient and reliable electricity generation. Coal-fired plants have applied these activities to restore lost generation capability that lengthens operational life without having to meet current regulatory requirements. This has barred market entry of efficient, cleaner electric plants that are required to meet stringent environmental standards lowering total emissions of pollutants. However, to require coal-fired plants to be compliant with these standards would result in temporary and permanent plant shutdowns. These shutdowns would create a disruption of electrical service and cause serious outages. Therefore, the challenge to regulators is how to implement an environmental policy to reduce coal-fired plant emissions without interrupting national electricity supply. The examination of three policy options indicates that an emissions cap-and-trade program administered by Title IV of the Clean Air Act best addresses this regulatory issue. This policy action is the most appropriate as determined from its broad-based industry support and participation, level of environmental benefit, timeliness of implementation, and cost- effectiveness.

Introduction

The enactment of the 1970 Clean Air Act (CAA) introduced regulatory requirements for polluting sources to protect the health and welfare of the public and enhance air quality. In 1977, Congress passed stringent regulatory standards requiring sources to install pollution control technology to reduce emission levels. Congress also designated coal-fired electric plants exempt from these regulations with the expectation that these plants would be retired as new technology made them obsolete. As a result, stringent regulatory requirements for new sources, mandated by the CAA would apply to newly constructed plants and reduce pollution. For up until the 1960s, electricity companies willingly shut down old plants, as new plants became more efficient and cheaper to build and operate.

This has not happened and today the generation of electricity from these coal-fired plants provides 56 percent of all the power consumed within the United States. The increasing electricity demand depends on coal as a reliable energy source. It is assured that coal-fired electricity will remain in demand as evident from the serious energy shortages during peak-use times as apparent in California, New York, and other states where brownouts are becoming common during the summer. Even with the aggressive development of new gas-fired plants, these will not replace coal-fired plants in the near future. Furthermore, the recent deregulation of the electricity market provides an incentive to generate electricity at the lowest cost, currently accomplished from coal-fired plants. However, the high level of pollution emanating from coal-fired plants has captured most of the attention from many interests. Coal plants release mass quantities of sulfur dioxide (SO_2), a contributor to acid rain and nitrogen oxide (NOx), a precursor to ozone formation. Both are responsible for a host of human health and environmental problems throughout the Eastern half of the United States. These issues continue

to challenge regulators on how to regulate coal plant operations to reduce levels of environmental pollution without interrupting electrical service.

The operation of these plants absent the installation of current pollution control technology is the result of a broadly defined CAA requirement involving plant modifications. A modification is any physical or operational change that results in an increase of emissions or the dispersal of an air pollutant not previously emitted at that plant.[1] Plant modifications are characterized as routine maintenance activities, which include the replacement and installation of new parts to ensure uninterrupted electricity output. Stringent New Source Review (NSR) standards apply if these types of modifications are determined to transform a plant into a new source. A new source is defined as either being recently constructed or an existing operating source that has undergone a modification or upgrade. Congress provides that if an existing source were "modified" then that source would become subject to NSR requirements. A plant modification that triggers NSR means a company faces the expensive task of retrofitting plants with advanced pollution control technology, increasing the price of electricity for consumers. Plants unable to meet these regulatory requirements will be shut down and forced to retire, possibly threatening the reliability of the nation's electricity supply.

A debate has waged for many years between the electricity industry, environmental stakeholders and Environmental Protection Agency (EPA) regarding the proper definition of the type of modification activity that triggers NSR. The contention is whether after a number of "modifications" a plant can become completely overhauled and operate as new without meeting NSR requirements. The EPA concurs that NSR allows a modification, repair or replacement of equipment. The electricity industry recognizes these activities as routine commonly known as "life extension" modifications, since they restore electricity generation capacity to original

design capability extending plant operation.[2] Industry has interpreted the NSR exemption to rely on the cheaper alternative of modifying or replacing old equipment to extend the useful life of a plant.

Typically, coal plants would operate at about 60 percent capacity or lower, depending on demand and the condition of electricity generating turbines. The increase in consumer demand for electricity, which currently outpaces supply, provides an incentive to modify coal plants to run at 80 or 90 percent capacity. The modification interpretation of the CAA enabled plants to perform activities that restored lost capacity without triggering NSR. This allows a company to increase generation output quicker and less costly without meeting expensive regulatory requirements associated with building a new plant. In essence, companies are increasing electricity generation without working through the lengthy process of building an entirely new plant. According to David Hawkins, a former high-ranking EPA official during the Carter administration, the CAA created an incentive to avoid new rules by never replacing old plants with new ones. This allows a company to avoid the high cost of building a new plant when it can routinely perform maintenance and upgrade activities on an existing plant. This is evident from the number of plants in operation today that include nearly 70 percent of the coal-fired utility boilers built before 1975 with approximately one-fifth of those built before 1955.[3]

These types of modification activities occurred until 1988 when EPA filed an enforcement action against Wisconsin Electric Power Co. (WEPCO) in an effort to specifically define a modification. The EPA issued this ruling with the intention to end "life extension" modifications that permit a coal plant to operate in continual immunity from NSR requirements. WEPCO was proposing to renovate a 40-year old coal-fired plant through modifications to restore plant generation to original design capacity and extend its useful life.[4] EPA alleged that

these modifications trigger NSR and require the installation of pollution controls to reduce emission levels. This is mandated under the CAA since emission levels would increase after the modification. WEPCO challenged EPA's ruling in court. In 1990, the Seventh Circuit U.S. Court of Appeals accepted claims that original design capacity should define the boundary for the "routine" exemption. Furthermore, the court objected to EPA's refusal to consider past plant operating conditions when evaluating the likely post-change emissions. The court stated that this was not a reasonable interpretation of regulation.[5] In response, EPA established a procedure to determine whether a change in plant emissions from a modification triggers NSR.

Coal plants now use a past-actual-to-future-actual methodology for determining whether a proposed modification will result in a significant emissions increase.[6] This approach evaluates past emission levels (past actual) released by the plant when it was newer, to future emissions (future actual) that occur after a modification. If a change does not increase actual emissions, then NSR is not applicable and a plant is not required to install Best Available Control Technology (BACT) to lower emission levels. However, if an increase in actual emissions does occur, it still may not trigger NSR if it is in accordance with the "demand growth" provision from the WEPCO court decision. The provision allows for an emissions increase if additional electricity generating capacity is necessary to meet consumer demand.

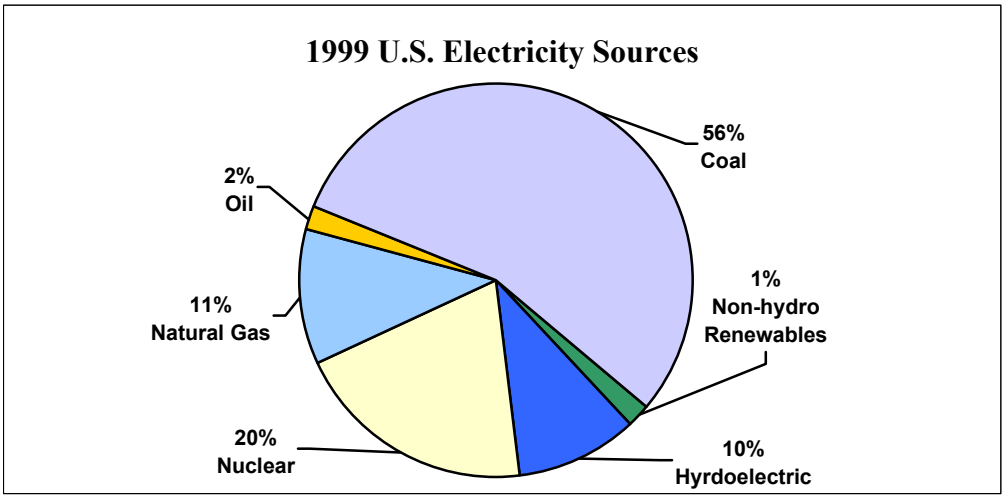
These provisions are known as the WEPCO rule and apply to coal plant modifications. In 1992, a Federal Register notice published by the EPA stated that the NSR modification rule was not intended to *discourage physical or operational changes that increase efficiency or improve other operational characteristics of the unit.* Since then industry has applied the modification rule interpretation to maintain coal-fired plants to provide a reliable supply of electricity.[7]

The examination of this industry and three policy options will help determine how to effectively apply NSR to the federally exempt coal plants. The first option examines how NSR is currently applied coupled with Title IV of the CAA to reduce SO_2 and NOx emissions from coal-fired plants. A second option is an analysis of reform efforts designed to simplify and provide clarity on the NSR process to improve environmental performance. The third alternative discusses the feasibility of issuing an enforcement action to require all older existing coal-fired plants to install advanced pollution control technology.

It is my intention to determine which option is politically effective, environmentally beneficial and economically feasible that can be timely implemented. This analysis will assist in providing a clear recommendation on how to environmentally regulate coal-fired plants to reduce human health and environmental impact while ensuring that electrical service remains uninterrupted.

The growing energy needs within the United States is sustained from the utilization of various natural resources such as coal, oil, natural gas, and refined petroleum. In addition to these fuel sources, we harness sunlight, water and air currents to generate renewable energy in the form of solar, hydro and wind power which all seem to be in unlimited supply. Power plants fueled by coal supply 56 percent of the total electricity within the United States and the remainder from nuclear (20%), natural gas (11%), hydropower (10%), and oil and renewables (3%) respectively (Figure 1).[8] This source of electricity is efficiently generated from the abundant natural coal feed stocks available throughout the Eastern, Midwestern and Western portions of the nation. Coal is our most abundant domestic energy resource and the coal reserves within the United States account for nearly 25 percent of all the World's known coal resources.

Figure 1



Coal remains the cheapest fossil fuel available to this country. It is anticipated that its cost will continue to decline as mine productivity increases and extraction efficiency improves. For example, between 1988 and 1997, mine coal prices (in real 1992 dollars) declined by $9.40 per ton, or 37 percent; between 1998 and 2020, prices could decline by another $5 per ton (1998), or about 1.5 percent a year. The mining industry also anchors local economies throughout the East, Midwest, and West with 81,000 miners working in 25 states. Miners annually extract approximately 1 billion tons of coal–with roughly 950 million tons burned in power plants and the remainder consumed for other industrial purposes or exported.[9] The coal industry remains a significant contributor to our nation's economy from domestic use to an export commodity. Coal also allows the United States to maintain a diverse energy source portfolio, which is essential considering our dependence on foreign oil as well as the recent price increases on natural gas and petroleum.

A booming economy and growing population have resulted in an increase in energy demand. Today, more than 90 percent of electricity development involves the construction of natural gas power plants to offset growing demands. These types of plants are a cleaner method

of generation that easily meets stringent environmental regulations when compared to coal-fired plants. However, even the increased electricity output from these sources has not been enough to bridge the widening gap between production and consumption. Furthermore, at the projected natural gas consumption rate this fuel supply reaches depletion in about 55 years. In contrast, the amount of coal in U.S. reserves is projected to last at least another 275 years at present consumption rates.[10]

Since the 1960s, there has not been any construction of additional coal-fired electricity plants. A main deterrent is the steep planning and building costs within the current regulated energy market that requires the installation of expensive pollution control technology. To date, it has been more economical to maintain the operation of existing plants through modifications to restore or increase capacity of a plant. The increasing energy demands and recent deregulation of the electric utilities has encouraged competition that rewards those who generate electricity at the lowest price. The unit of measure used to identify the amount of energy produced from a fuel source is referred to as the megawatt (MW) e.g., 500 MW powers 70,000 residences. The electric industry measures the cost of producing electricity according to rate – megawatt hour (MWh). Thus far, coal plants have been able to produce the greatest amount of electricity at a competitive price (Table 1.).[11] According to the Energy Information Administration, domestic coal demand could increase by 20 percent by 2020, growing to 1,320 million tons, primarily from an increase in coal for electricity generation. The substantial growth in power consumption means that the United States will depend on coal as a cheap source of energy far into the future.

The level of human health and environmental impact from coal combustion emissions offsets the number of benefits attributed to coal.

Table 1

Largest Coal-fired Plants

Operator	Plant Name	Net Generation (MWh)	Total Production Cost ($/MWh)
Georgia Power Co.	Scherer	21,200,000	20.60
Georgia Power Co.	Bowen	20,400,000	16.40
Reliant Energy HL&P	Parish	20,100,000	21.60
PSI Energy, Inc.	Gibson	20,000,000	13.20
Alabama Power Co.	Miller	18,900,000	15.70
Detroit Edison Co.	Monroe	18,000,000	13.80
Appalachian Power Co.	Amos	17,700,000	14.80
Salt River Project	Navajo	16,900,000	15.20
Texas Utilities Electric Co.	Martin Lake	16,800,000	13.20

Largest Gas-fired Plants

Operator	Plant Name	Net Generation (MWh)	Total Production Cost ($/MWh)
Entergy Gulf States	Sabine	9,600,000	25.10
Midland Cogeneration, L.P.	Midland Cogeneration	9,300,000	33.90
Reliant Energy HL&P	P.H. Robinson	8,800,000	26.90
Sithe Energies Power Services	Independence Station	8,400,000	15.20
Entergy Louisiana	Ninenile Point	7,300,000	29.20
Reliant Energy HL&P	Cedar Bayou	7,200,000	25.80
Florida Power & Light Co.	Lauderdale	6,900,000	22.50
Dow Chemical Co.	Dow Chemical Texas	6,900,000	44.10
Florida Power & Light Co.	Martin (FLPL)	6,800,000	20.40

The EPA reports that coal-fired plants are responsible for 66 percent of all SO_2 emissions, 29 percent of all NOx releases, 21 percent of airborne mercury, and 36 percent of all carbon-dioxide emissions in the United States.[12] The 1970 CAA did little to decrease the levels of pollutants emanating from coal-fired plants. A Congressional approval to federally exempt existing plants at the time of the CAA enactment is the main culprit that allows these plants to operate. Plant operations are only required to install BACT to largely reduce emissions if determined that a modification or maintenance activity at a plant result in an increase in emission levels. Since 1970, the installation of pollution control equipment at coal-fired plants has been merely strict

enough to resolve local pollution problems. The high levels of SO_2 and NOx emissions from coal-fired plants continue to persist causing significant environmental impact.

The burning of coal to generate electricity releases sulfur dioxide emissions that react with nitrogen oxides and water to form acid rain (and snow, sleet and hail). Acid rain is responsible for contaminating forest and aquatic ecosystems while accelerating the decay of buildings and monuments. The acidification of lakes and streams results in a wide range of negative impacts to amphibians, fish, birds, animals, plants, and other organisms. In 1980, a broad-based study on the affects of acid rain identified approximately 200 lakes in the Adirondack Mountains where all fish including lake trout, walleye, and smallmouth bass had disappeared from the acidification of habitat. Furthermore, acid rain has acidified soils and severely affected trees by interfering with photosynthesis and altering their response to fluctuations in temperature leaving them vulnerable to stresses. Most of the acid deposition over the Eastern United States is attributed to coal plants that reside in the West and Midwest. Sulfur dioxide emissions released from these plants are carried by prevailing winds, which distribute their toxic loads over the Northeast. However, the destruction of habitat has not been strictly limited to the Northeast and New England. In Midwestern states such as Wisconsin, Minnesota and Michigan recent research indicates that acid rain has affected small lakes and tributaries that feed into the Great Lakes.[13] The affect of SO_2 emissions, as demonstrated, has a significant regional impact on heavily populated and environmentally sensitive areas.

The 1970 CAA required a cap on SO_2 emissions from new and existing coal-fired plants. However, a large number of plants are exempt from these requirements because they were built before 1970. In 1990, the CAA Amendments introduced Title IV that is designed to reduce SO_2 and NOx emissions from all coal plants. Title IV is divided into two parts (Phase I and Phase II)

specifying emissions limits while establishing a cap-and-trade program. This program administered by EPA creates a market for emissions trading. The EPA issues an allowance that authorizes a power plant to emit one ton of a pollutant. At the end of each year, a source must hold the same number of allowances as the amount of pollution emitted. If the allowance is not used it can be banked for future use, sold or traded on the emissions market. This is known as emissions trading which is designed to encourage plant efficiency by minimizing the cost of reducing SO_2 emissions. Title IV set the goal to reduce SO_2 emissions by 10 million tons below 1980 levels.[14]

Phase I began in 1995, affecting approximately 450 units located throughout 21 Eastern and Midwestern states most of which were coal-fired plants. In 1999 at the end Phase I, emissions data reports a 40 percent reduction of SO_2 emissions (approximately 5 tons). The beginning of Phase II on January 1, 2000 imposes a more stringent emission level than Phase I. The result will be a 40 percent reduction (8.5 tons) from 1993 SO_2 emissions and affect more than 2,000 units including large, higher emitting coal-fired plants.[15]

The nitrogen oxide emissions from coal-fired plants result in a number of bio-chemical reactions that effect human health and the environment. The formation of ground-level ozone (smog), occurs when NOx react with sunlight and volatile organic compounds (aerosols released from automobiles, industry and consumer products). Throughout the Northeast, ozone is the most prevalent due to westerly prevailing winds, temperature conditions, and densely populated urban areas that have high volumes of automobile traffic. It is reported that a substantial amount of the NOx emissions necessary for ozone formation are released from coal-fired plants located in the West and Midwest. Ozone levels are the most severe during the summer months otherwise known as the ozone season, which extends from May until October. High levels of

ozone degrade local and regional air quality. As a respiratory irritant, ozone poses a health hazard to those with asthma and others highly susceptible to respiratory ailments such as the elderly and children. A recent study has found that ozone-related health problems annually send approximately 160,000 people to the emergency room and is responsible for triggering more than 6 million asthma attacks throughout the Eastern United States.[16] In addition to being a precursor to ozone formation, NOx emissions disperse nitrogen throughout environmental ecosystems. Even though nitrogen is a naturally occurring element, too much degrades plant and animal life within streams, rivers, and lakes through eutrophication. This is when bodies of water become overloaded with nitrogen providing an ideal habitat for nitrogen loving organisms and plants. These grow and consume all of the essential nutrients used by fish, plants and other organisms and leads to deadening a body of water.

The 1970 CAA also mandated a reduction of NOx emissions from polluting sources. However, since its enactment NOx emissions have increased by 11 percent with coal plant emissions contributing to 44 percent of this increase.[17] The CAA exemption as applied to coal-fired plants is largely responsible for these higher emissions. In 1990, the Amendments to the CAA required cities and states to implement NOx emissions reduction programs. This legislation primary directive was to reduce automobile emissions, however it also affected all coal-fired plants. To address regional ozone problems, the EPA created the Ozone Transport Assessment Group (OTAG). OTAG's objective was to identify measures necessary to reduce ozone levels resulting from the transport of NOx from coal-fired plants located in Western and Midwestern states.

In 1998, EPA proposed to require 22 states and the District of Columbia to submit plans to address the regional transport of ground-level ozone. This proposal is called the Finding of

Significant Contribution and Rulemaking for Certain States in the OTAG Region for Purposes of Reducing the Regional Transport of Ozone or otherwise known as the NOx SIP Call. This plan assigns an emissions cap to each affected State specifying the allowable amount of NOx emission releases from power plants during the ozone season. The objective of this program is to reduce NOx emissions from power plants through a cost-effective emission-trading program.[18] In essence, a specified number of emission allowances that permit an equivalent amount of NOx emission releases are assigned to a coal plant. This approach is modeled after the SO_2 cap-and-trade program that allows a plant to utilize the most cost-effective method to reduce emissions.

The federal government does not presently regulate carbon dioxide and mercury emission releases from coal-fired power plants. A recent study on mercury and the continuous research conducted on global warming has identified serious potential human health and environmental impact from these pollutants. Once these issues attract more attention, it is possible that a regulatory standard will be established to reduce emission rates. Until now, there has been a limited voluntary effort from industry to address carbon and mercury emissions.

Methylmercury (mercury) is a potent neurotoxin that at low levels can cause subtle but permanent harm to the human brain and wildlife. Coal-fired plants release the largest amount of mercury emissions than any other industry. Coal contains traces of mercury that is released during the combustion process. For example, a medium to high capacity coal plant emits approximately 250 pounds of mercury from its smokestack. It has been determined that the annual addition of .002 pounds of mercury – $1/70^{th}$ of a teaspoon – is enough to contaminate a 25 acre lake to the level where fish become unsafe to eat.[19]

In July 2000, the National Academy of Sciences released a report, as directed by Congress. This report was to review the human health effects of mercury in an effort to

determine whether EPA's "safe" mercury exposure level was sufficient. The report concluded that EPA's safe exposure level was adequate.[20] However, a recent study by EPA estimates that as many as 85,000 U.S. women of childbearing age in a given year have been exposed to elevated mercury levels high enough to affect the brain development of their babies.[21] Thus, adding to the uncertainty of the level of risk posed to human health.

Currently, no present controls for mercury emission from coal-fired power plants exist. However, a court order has directed EPA to determine how coal plants shall be regulated by December 15, 2000. Environmental experts project that absent any regulation to control mercury releases from power plants, emissions levels will increase approximately 15 percent (8 tons per year) from 1994 to 2010.[22]

The burning of carbon-based fossil fuels such as coal emits large amounts of carbon dioxide, a greenhouse gas, into the atmosphere. Emissions from coal-fired plants contribute to climate change and global warming. Approximately 30 percent of the nation's total carbon dioxide emissions emanate from coal plants. There are no regulatory mechanisms in place to regulate the emissions of carbon dioxide. However, limited voluntary efforts by industry to reduce impact are taking place. In the future, global warming is expected to have a widespread impact on ecosystems and our environment.

Evaluation Criteria

The three policy options on how to best environmentally regulate coal-fired plants include: 1) an emission reduction in accordance with the CAA and NSR; 2) an effort to reform the NSR process; and 3) the issuance of an enforcement action to require an industry wide emission reduction. A consideration of several criteria will facilitate the analysis of each policy option. The criterion is composed of factors deemed necessary for effective policy

implementation. These include participation, pollution reduction, timing and economic cost. Each of these factors is listed in order of importance to assist in determining the best suitable policy action for coal plant regulation.

The most important criterion is participation, which determines to what level a policy objective will be achieved. The definition of participation for the following policy options under review is twofold. Participation is determined by the level of involvement and political feasibility or acceptance afforded from those entities affected by the policy action. The greater number of coal plants affected by an environmental policy is critical to obtain the greatest environmental benefit. Furthermore, the level of acceptance by industry will maintain adversarial posturing between the regulated community and government to a minimum, ensuring progress.

The second most important criterion is the level of environmental benefit. A larger total decline in pollutant emissions provides more human health and environmental improvement. This variable is dependent on the level of participation and timeliness of implementation on a policy action. Further signifying that policy effectiveness is contingent upon the consideration of more than one criteria factor.

The third most important criterion is the timing of a policy requirement. The maximization of greatest benefit will be dependant on the timeliness of policy implementation. In addition, it is essential that policy timing does not create a burden on an industry's business operations. An unfavorable policy is one that results in an interruption of electrical service through plant shutdowns or burdensome environmental requirements. Furthermore, a level of compliance flexibility is necessary to allow coal-fired plants adequate time to evaluate how to effectively meet policy requirements.

The least important criterion is economic cost of a policy option. It is recognized that cost is a vital determinant in policy implementation. However, for the purposes of this issue analysis, current cost recovery mechanisms exist to offset a significant amount of a coal plant's capital investment from emissions trading, electricity rate increases, and operational efficiency.

Policy Option 1: *Regulate coal plants from existing Clean Air Act and other policy requirements.*

The reduction of NOx and SO_2 emissions from coal-fired plants to date has been successfully accomplished through a cap-and-trade program. This type of program annually sets a total tonnage amount for NOx and SO_2 emissions that can be released by all sources. This programs political, environmental, and economic attractiveness has resulted in broad-based industry participation because:1) a definite environmental outcome is achieved; and, 2) there is compliance flexibility that reduces the cost of achieving the desired outcome.[23] Cap-and-trade programs allow industry to best determine how to comply with regulatory requirements, which facilitates better business planning. These programs also specify an applicable period for compliance and indicate when the next round of regulatory reform will occur. Industry then can properly forecast and prepare to implement changes necessary for compliance with future environmental standards. This type of timing and flexibility allowed for meeting these federal requirements makes them politically attractive and generally accepted throughout the electricity industry. The trading component of this program provides an incentive for a polluting source to reduce SO_2 or NOx emission rates. These pollution allowances encourage a company to reduce emissions so that unused allowances can be sold on the market for additional profit.

A weakness of the cap-and-trade program is that not every allowance allocated may be retired at the end of each year. For example, emissions may have declined from a lower demand of electricity i.e., a cool summer, which enables a plant to use these allowances in the future. Some critics claim that storing allowances may result in an increase of emissions in upcoming years. However, these concerns are discounted when one considers that industry must operate during periods of peak demand. In this scenario, the allocated and unused allowances may be utilized more rapidly to account for the increase of emissions from higher levels of electricity production. In either case, environmental regulators strongly support the emissions cap-and-trade program because of the provided certainty of a known environmental outcome.[24]

All coal-fired plants must meet Title IV of the CAA that requires emission limits on NOx and SO_2 levels. The Title IV requirements of the CAA are applied separately into two phases. Phase I began in 1995 and expired on December 31, 1999 while Phase II was initiated in January 2000. The implementation of Title IV is presented below to demonstrate its effectiveness based on industry wide participation, timeliness of implementation, and reduction of NOx and SO_2 emissions level.

The success of SO_2 emission reductions from coal-fired plants is attributed to the cap-and-trade program mandated under Title IV. In 1996, a year after the implementation of Phase I an emissions reduction of approximately 40 percent occurred below 1996 allowable levels (8.3 million allowances were allocated, but only 5.4 million tons of SO_2 were released). In 1999, emissions from the highest emitting coal-fired plants had dropped a total of 5 million tons below their 1980 levels. This has resulted in immediate improvements within forest and aquatic environments situated throughout New England where a pH of less acidic levels is beginning to allow these ecosystems to neutralize and recover.[25] However, there is a concern that an

emission-trading program will actually result in some areas experiencing an increase in pollutants. While pollution in the East has decreased emission levels have increased throughout the Midwest. However, in terms of the number of people affected, emission trading has been a net benefit. In a study conducted by Resources For the Future it was determined that Phase I of the SO_2 program provided an approximate total health benefit of $600 million. Meanwhile, compliance cost savings from the cap-and-trade program was estimated to be $100 million less in comparison to a no trading program.[26]

In 2000, Phase II began, which imposes more stringent emissions limitations than Phase I and effects all existing coal-fired generators that have an output capacity greater than 25 MW. The effects of the Phase II cap program are expected to result in emissions levels half the amount recorded in 1980 – an additional decrease of 8.5 million tons by 2010 when all allocated allowances must be retired (Table 2).[27,28] Some critics believe that 2010 is too long for the program to take effect. However, it is anticipated that environmental benefits may occur earlier from an increase in generation output to meet growing demand. This will force coal-fired plants to retire banked allowances from previous years before the 2010 deadline.

Table 2

Title IV of The CAA	**Units Affected**	**SO_2 Reductions (tons)**	**Estimated Cost of Reduction ($/ton)**
Phase I (1995-1999)	445	5 million	$110 to $320*
Phase II (2000-2010)	2,000	8.5 million	$250 to $450

***** Lowest cost is from burning lower sulfur fuel; higher cost is from the installation of scrubber technology.

Title IV also requires electricity sources to reduce NOx emissions according to Phase I and II levels designated by the EPA. The NOx reduction program unlike the aforementioned SO_2

program does not define a cap on emissions. An emission rate threshold is set to reduce concentrations of NOx emissions by 2 million tons below 1980 levels. A year after the 1996 Phase I implementation total emissions rates declined by 42 percent from more than 170 participating electric units. This first year success was attributed to the level of flexibility provided to coal-fired plants in determining how to meet the required emissions rate. Plants were provided two options for compliance: (1) comply with an emission rate for a boiler unit; or (2) average the emission rates over two or more units to meet the overall emission rate limitation. This allowed industry to develop cost-effective pollution control technology that reduces operation costs.[29] For example, cost-effective low-NOx burners (LNB) that reduce emissions between 30 and 40 percent were developed and became installed at numerous coal-fired plants. However, an increase in electricity demand also produces higher NOx emissions. The consistent high electricity demand has kept annual NOx emission levels steady at approximately 7 million tons even under Title IV compliance requirements.[30] Phase II requires lower emission rates for those boilers affected in Phase I and includes 600 additional electric units (Table 3).[31] Even with the Phase I emission rate reductions environmental stakeholders are still concerned that absent a cap, NOx emissions will steadily increase over time netting out any benefit.

Table 3

Title IV of The CAA	**Units Affected**	**NOx Reductions (tons/year)**	**Estimated Cost of Reduction ($/ton)**
Phase I (1996-1999)	150	340,000	$227
Phase II (2000-2010)	750	2 million	$229

In addition, to Title IV of the CAA the federal Ozone Transport Commission (OTC) and NOx SIP Call regulate NOx emissions throughout the Eastern United States. Both of these policies are based on a cap-and-trade program that has broad acceptance by industry and proven success. This region is where the most severe human health and environmental impacts occur from NOx emissions during the ozone season (May to October).

In 1999, the OTC, born from the Acid Rain Program, established a cap and trade program for NOx within eight northeastern states. In collaboration with EPA a regional emissions cap for 1999 (219,000 tons) and 2003 (143,000 tons) was established. This regulation would be administered through an emission-trading program similar to the Title IV SO_2 program. This program is designed to take a more aggressive approach with electricity plants to further reduce NOx emissions. After the first year of the program, there was a 20 percent reduction in NOx emissions with a significant portion of that occurring from coal-fired plants. In 2003, the program is designed to reduce total emission levels less than half of the amount of emissions released in 1990 (490,000 tons).[32] The results from these reductions will improve air quality and reduce concentrations of ground level ozone in those participating states.

On October 27, 1998, to broaden the reduction of NOx emission levels similarly to NSR requirements EPA proposed the NOx SIP Call. This policy requires 22 states and the District of Columbia to submit a SIP that identifies NOx reduction sources. The selection of these states is based on the severity of ozone levels and associated human health and environmental effects within these areas from May through October. The EPA has identified coal-fired plants as the most cost-effective source to address under this policy.

The NOx SIP Call is a cap-and-trade program built on the success of the Title IV SO_2 emissions trading program. EPA established a NOx budget program for each state specifying a

total emissions cap based on a 0.15 lb. (NOx)/mMbtu emissions rate (equivalent to NSR).[33] Each state then allocates according to source a number of allowances that will comply with the cap set by EPA. The NOx SIP Call reduction target is scheduled to begin May 31, 2004. At this time, coal-fired plants are required to be compliant with the capped emissions rate under the OTC program. Since this proposal was published, EPA has been met with legal opposition from both the affected states and coal plants. Specifically, coal-fired plants believe that the timing of compliance following Title IV and the OTC NOx Budget program does not sufficiently allow an opportunity to make operational changes and install pollution control technology. However, the NOx SIP Call has survived several court challenges ensuring that it will remain in effect. During litigation, a number of affected plants specified that over 21,000 Mw of generation would have pollution controls installed before program implementation in 2004. This further reaffirms the level of acceptance and participation by industry in response to a cap-and-trade program. In addition, this program enables plants to recover costs from the installation of pollution controls that reduce emissions through the sale of excess NOx allowances producing a negligible effect on consumer prices.[34]

Table 4[35,36]

Regulatory Action/Compliance Date	**Affected Regions**	**NOx Reductions (tons)**	**Estimated Cost of Reduction ($/ton)**
OTC NOx Budget Program (May 1,1999) (May 1, 2003)	12 States & DC: CT, DE, ME, MD, MA, NH, NJ, NY, PA, RI, VT, VA	245,000 in 1999 320,000 in 2003	$1,500
NOx SIP Call (May 31, 2004)	22 States & DC: AL, CT, DE, GA, IL, IN, KY, ME, MD, MI, MO, NJ, NY, NC, OH, PA, RI, SC, TN, VA, WV, WI	1.1 million by 2007	$1,500

The NOx and SO_2 cap-and-trade program is successfully reducing pollution levels without a disruption to electrical service for meeting consumer demand. This policy's success is attributed to broad-based industry participation, compliance flexibility, and cost-effectiveness.

Policy Option 2: *Reform the NSR process to be more workable with coal plants.*

The NSR process is a lengthy complex issue that is unclearly defined by EPA. There exists a high degree of uncertainty from coal plants on determining whether maintenance activities trigger NSR. This has lead to the reluctance of plants to conduct specific maintenance activities to improve operational performance for fear of triggering the NSR process.[37] The NSR permit process takes years for approval and may reopen delicate siting, labor, and land use issues while forcing capital investments of hundreds of millions of dollars. Therefore, old coal-fired plants operate without engaging activities that would trigger requirements to reduce NOx and SO_2 emissions. Those modification activities undertaken are cautiously done within the WEPCO rule interpretation. However, environmental stakeholders argue that allowing the operation of regulatory-exempt coal-fired plants creates a barrier for new plants to enter the market. These new plants would operate more efficient and are cleaner as they are required to meet costly, stringent environmental standards and siting requirements.

In 1992, EPA began to reform NSR and lessen the regulatory burden on coal-fired plants. This effort included an update on rules that reflect the CAA amendments and a simplification of the NSR process. After four years, EPA published their revision proposal for NSR. The most significant change was the applicable definition of routine maintenance. In contrast to the past-actual to future-actual methodology, decided in the WEPCO case, EPA proposed a past actual to

future-potential methodology to determine if NSR is triggered. This new interpretation applies NSR when any routine maintenance activity restores and/or prevents deteriorated capacity. This methodology proposal is the same that the court declared illegal in the WEPCO case for determining whether a life extension project violated NSR.[38] In addition, the "demand growth" WEPCO provision that allows an increase of plant capacity to meet energy demands without triggering NSR will no longer be applicable. Therefore, reaffirming that demand for additional generation capacity beyond a plant's current existing capacity will be from units permitted under the NSR process. In 1998, to facilitate the process of reforming NSR, EPA requested stakeholder comment on the alternate methodology for determining the applicability of NSR to modifications.

The electricity industry strongly objects to this proposal since it broadly characterizes any maintenance or modification activity as non-routine. Furthermore, this action seeks to narrow the WEPCO rule and question common industry practices from the last 25 years. Electricity companies view this proposal as a way to force coal-fired plants to retire or retrofit units with advanced pollution control technology. The significant number of plants required to shut down to install equipment as well as plants forced into retirement from the burden of NSR seriously questions electricity supply reliability. Broadening the scope of NSR to include existing sources instead of intended new sources has created a political deadlock inhibiting progress for reform. Even though this reform effort would better define the NSR process, it lacks political acceptance and regulatory flexibility that are vital to industry wide participation.

The second reform proposal by EPA is the introduction of Plant-wide Applicability Limits (PALs) designed to maintain operational flexibility and minimize compliance burden on industry. Essentially, a PAL is a cap on plant emissions applied on a case-by-case basis. A coal

plant's emission cap would be established from the highest emission level at a plant that has occurred over the past 10 years. An exceedence of the emissions cap triggers the NSR process. In addition, if a modification results in an increase of emissions greater than the established PAL an NSR permit is required.[39] When renewing operating permits every five years, the regulatory authority would evaluate the current PAL according to an assessment of plant operational changes and regional air quality. This review then determines if adjustments to a PAL are necessary. However, defining a standard that determines the level of reduction for a PAL that requires an adjustment remains unresolved by EPA. Industry recognizes and supports the PAL proposal as a more viable application of NSR. However, electricity companies are waiting to review how a PAL is reduced before determining the adequacy of this program.

The EPA has since proposed additional changes within the NSR reform package. These changes suggest the assignment of a designated grace period without inquiry to determine whether certain modification activities trigger NSR. In addition, larger modifications that remain undefined by EPA would not have to undergo the NSR process. The purpose is to allow coal-fired plants to determine how to effectively meet NSR requirements before a designated deadline. This closing date would be dictated from the length of the specified grace period. However, during this time all coal plants would comply with the CAA (i.e., Title IV) and state regulatory standards as currently required. At the end of this grace period, NSR limitations would apply to all major source units. A "one-stop" process would replace the inflexibility and administrative burden currently associated with NSR.[40] It is undetermined at this time how the new proposal would fit in with the entire NSR reform approach. In addition, this specific reform to NSR policy raises the issue of necessity, if coal plants are already required to comply with existing CAA regulations that mandate industry wide emissions reductions.

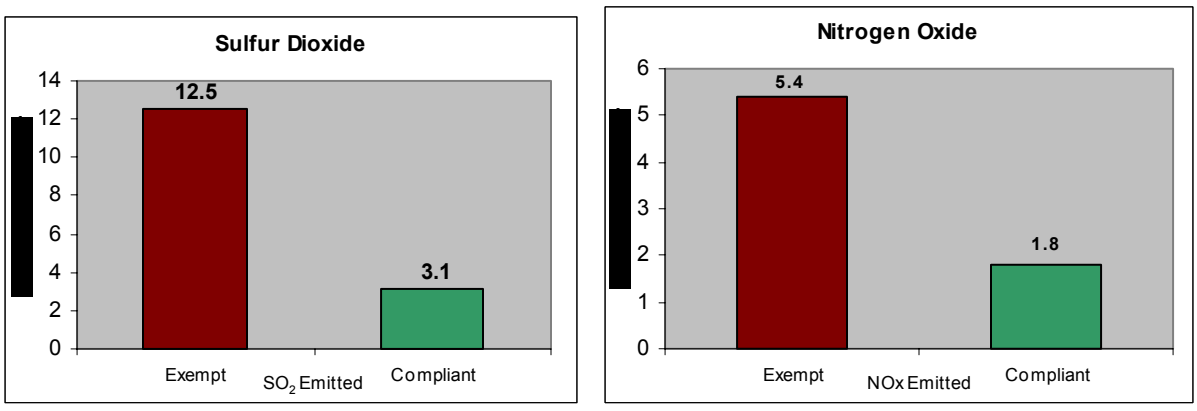
Since the NSR reform proposal was published in 1996, EPA has not released a finalized approach to alter the original format of NSR. A reason for the delay is a lack of consensus among stakeholders in determining an acceptable program. Industry has criticized EPA for trying to accomplish too much within NSR reform. The proposed elimination of the WEPCO rule, establishment of PALs, and the introduction of a grace period to comply with NSR on a plant-by-plant basis is confusing. This further complicates the process and its prospective compliance requirements. This has lead to the introduction of several alternative proposals from industry and EPA. Each proposed program specifies different periods ranging from 5 to 10 years for determining when coal-fired plants should be subject to NSR process requirements.

Industry has opted for a program that is dependent on the age of a particular plant. For example, a plant 55 years or older must comply with NSR by 2010 with all other sources compliant by 2030. This would be achieved through a streamlined NSR process as established by a cap and trade program coupled with the WEPCO provisions.[41] EPA's similar alternate approach includes a voluntary program that requires a commitment from industry to attain emission reductions within a 10 to 15 year program. Any modifications that occur at a plant would be subject to NSR using a potential-to-potential test (comparison of generation capacity before and after a modification) to determine applicability. Furthermore, this approach would include a cap-and-trade program to facilitate emissions reductions in a cost-effective manner.

Environmental groups argue that a 10 to 15 year timeframe for NSR compliance is too lenient and needs to be shortened. Their sentiment is that industry has operated in exemption from regulations long enough and environmental benefits from NSR need to be realized as early as possible. Environmental stakeholders advocate an integrated approach that would control NOx, SO_2, mercury, and CO_2 emissions within the NSR program. The EPA and industry both

criticized this approach for creating too much burden on coal-fired plants. Furthermore, it is questionable how CO_2 and mercury emissions would be regulated since EPA's regulatory authority for controlling these pollutants is undetermined. Other stakeholders argue that the inclusion of CO_2 and mercury would decrease the number of participants in a voluntary program limiting its effectiveness.[42] Both alternate programs proposed by EPA and Industry makes NSR more workable. The level of environmental improvement is impressive if all existing coal-fired plants met current NSR requirements (Figure 2). It is unlikely that this will occur within the timeframe suggested because of electricity demand constraints and industry's unwillingness to voluntarily undertake a broad-based commitment. Without adequate participation from industry, an emission-trading program will not produce a significant environmental benefit.

Figure 2



A lack of broad-based stakeholder support for an industry wide NSR program ensures development and implementation challenges will be difficult to overcome. The level of political posturing by industry and EPA has limited the amount of available information available on the cost-effectiveness from an alternate approach. Furthermore, the implementation of a reformed NSR process will not be popular within the electric industry where an emission cap-and-trade program is advocated to resolve these issues. In anticipation of the finalization of a NSR reform package in 2000, it is expected that EPA will eliminate the WEPCO rule provisions.[43] This will

result in a legal challenge that is certain to delay the implementation of any reform to NSR, which allows industry to continue operating under the existing exemption rule as it has done so favorably thus far.

Policy Option 3: *Initiate an enforcement action on plant modifications that authorizes compliance with NSR requirements.*

On November 3, 1999, EPA filed an enforcement action against 32 coal-fired electric plants alleging that their "routine maintenance" activities performed over the last 30 years violate NSR requirements of the CAA.[44] This action stems from EPA only receiving approximately 200 applications for new source review permits when 900 applications are expected annually. If successful, this action will set a precedent on how existing maintenance activities at coal-fired plants are evaluated by EPA to determine whether NSR requirements are applicable. This approach may result in defining how coal-fired plants are regulated as well as becoming a mandatory fix to greatly reduce emission levels. The purpose of this unprecedented action is to reduce the amount of SO_2 and NOx emissions released by coal plants. It is anticipated that additional enforcement actions will be filed against other coal-fired plants as EPA estimates indicate that over 50 percent of plants are operating in noncompliance. In March, EPA sent Notices of Violation (NOV), which are preliminary to litigation, to other electric companies that operate a number of coal plants. It is believed that EPA investigators have been examining 100 coal-fired plants.[45] The EPA can seek up to $27,500 per day in penalties for violations beginning or continuing after January 31, 1997 and $25,000 per day for earlier violations.[46]

Modification activity over the last thirty years has been interpreted according to common practice within industry or by the broad definition of the WEPCO rule. This enforcement action

highlights the reoccurring debate between EPA and industry regarding the modification rule interpretation of "routine maintenance" activities. Prior to this action, electricity companies collaborated and provided EPA thousands of pages of documentation related to past plant modifications. Coal plants were confident that these actions would benefit future negotiations with EPA.[47] Following the lawsuit announcement, Carol Browner, EPA Administrator, stated, that companies implicated were allowed to perform routine maintenance not make significant changes to coal plant operations – increased generation capacity, or life extension modifications – without seeking an NSR permit. This calls into question the level of fairness of EPA's enforcement action. For if regulators did not object to plant maintenance activities at the time they were conducted why are these actions now being legally scrutinized. The narrowing of NSR trigger levels by EPA has many throughout the industry uncertain if past or current maintenance operational activities qualify as a violation of the CAA. Other plants are bracing for a legal battle from the anticipation of the issuance of additional enforcement actions.

To date only two companies implicated in enforcement actions have settled. An examination of these settlements and the issues around them will help identify this policy action's efficacy. Each settlement includes a timing, environmental benefit and cost component. Unfortunately, there is very little available information on the specific amount of environmental benefit from this enforcement action. Therefore, environmental benefit will have to be appropriately weighted with the level of industry participation to determine the overall effectiveness of this option.

One interesting aspect of these lawsuits involves Tampa Electric, the first company to settle with the EPA. The settlement requires the company to pay a $3.5 million civil penalty and up to $11 million for environmental beneficial projects that mitigate emission impacts from two

of their coal-fired plants. Tampa Electric must install pollution control technology to meet NSR emission limits and retire pollution allowances over a 10-year schedule effectively removing these plants from the SO_2 emissions trading market. At the plant where EPA alleged a violation, Tampa Electric was already installing scrubber technology for a 90 percent reduction of SO_2 emissions. Furthermore, according to a company official, Tampa Electric was meeting with EPA to discuss an implementation approach for a long-term cost-effective environmental strategy. Other electric companies have also been undertaking pollution reduction projects. Southern Company, this nations largest electricity producer, has reduced NOx emissions by 20 percent and SO_2 emissions by 30 percent since 1990 and with more reductions planned.[48] EPA's enforcement action demonstrates that as coal-fired plants conduct modification activities they cannot solely rely on past industry practices and the WEPCO rule to determine compliance. This issue seems to further blur the definition of modification activity and its application to coal plants.

In a similar case, modification actives conducted by the Virginia Power Company resulted in an EPA issuance of a NOV on NSR requirements. This is separate from the enforcement action against 32 other coal-fired plants. However, Virginia Power faces similar fines and penalties. Recently, Virginia Power settled with the EPA and agreed to invest $1.2 billion to reduce NOx and SO_2 emissions by 70 percent over 12 years. These reductions will result from a requisite installation of new pollution control equipment at eight of their plants. Company officials concur that the level of flexibility given to Virginia Power that allows the continuation of routine maintenance and repairs facilitated their decision. This is in contrast to existing NSR requirements. Furthermore, the company avoids any future lawsuits or fines from the EPA over similar kinds of issues at other company owned coal plants.[49] This settlement,

although costly, provides certainty for the next 12 years and enables Virginia Power to develop long-term business plans that will meet environmental compliance requirements cost-effectively.

These two examples demonstrate the effectiveness of an enforcement action to achieve emission reductions. In each case, an amenable resolution was tailored to provide a level of compliance flexibility that includes significant certainty and tangible environmental results. In addition, a plant specific emissions cap was established that results in certain SO_2 and NOx reductions. However, even with the success from these cases it is difficult to expect EPA to deliberate every enforcement action case by case. This would place a heavy burden on EPA and only affect a small number of coal-fired plants considering the more than 400 plants in operation.[50] Even if all the plants involved with the current enforcement action settle, it is uncertain how much of an emissions reduction would actually occur. Furthermore, companies may be reluctant to agree on any type of settlement with the EPA without hedging a legal battle to either delay an enforcement action or reach an acceptable resolution. It is not expected that many electric companies would concede to an agreement that mandates collaboration with the EPA on determining the types of large capital investments necessary to reduce emissions.

The electricity industry expects a tightening of regulatory requirements to reduce NOx and SO_2 emission levels at coal-fired plants. Industry also realizes that federally exempt plants eventually will be shutdown or equipped with technology to reduce emissions.[51] The EPA has not clearly defined the NSR process making this a complex regulatory issue shrouded with ambiguity. These enforcement action settlements do provide clarity as to what is expected from a plant to meet compliance requirements. However, coal-fired plant operators proclaim they should not be penalized for modification activities conducted in line with legislative action shortfalls and precedents set by court cases. Many in the electricity industry and throughout the

federal government do not believe it is politically or economically feasible to present an enforcement action against a significant number of coal-fired plants. Furthermore, alleging that electricity companies conducted illegal activities that were acceptable to regulators in the past is unfair. This type of policy is unfavorable and is certain to drive electricity companies and regulatory officials into a more adversarial position inhibiting process.

Conclusion

The operation of coal-fired plants provides a low-cost, reliable energy source that meets electricity demand. Coal plants also release 66 percent of total SO_2 emissions and 23 percent of total NOx emissions into the environment.[52] An exemption from the CAA is responsible for allowing coal-fired plants to operate without a reduction in SO_2 and NOx emissions. This exemption relies on a broad definition of modification activity that allows routine maintenance to occur at a coal-fired plant. These modification activities extend operational life of coal-fired plants delaying their retirement and replacement by new plants that meet NSR requirements. The NSR process is a complex lengthy procedure that requires the installation of advanced control technology to reduce emissions. There are concerns that to comply with NSR a number of plants will be forced to retire and temporary plant shutdowns necessary to install new equipment technology will seriously threaten electricity supply. The ambiguity of the NSR process has resulted in a perpetual state of confusion between industry and the federal government for determining which modification activities trigger the NSR process. The challenging issue is how to best bring coal-fired plants into compliance with current pollution control standards in a timely manner that maximizes environmental benefit without sacrificing electricity reliability.

The three policy options on how to best environmentally regulate coal-fired plants include: 1) an emission reduction in accordance with the CAA and NSR; 2) an effort to reform the NSR process; and 3) the issuance of an enforcement action to require an industry wide emission reduction. The criterion for determining which policy option presents a viable alternative is dependent on the level of industry wide participation, amount of environmental benefit, timeliness of implementation and cost-effectiveness (Table 5). The issue of how to regulate coal-fired plants is complex as apparent from the debate surrounding the NSR process. Industry has not widely accepted the more stringent emission controls. The existing regulatory requirements coupled with other policy proposals are putting too much pressure on industry to comply with a number of environmental requirements within a limited period.

Table 5

Policy Comparison	Number of Plants Affected	Environmental Benefit (Amount of Emissions Reduction)		Time for Implementation	Economic Cost
		SO_2	NOx		
Policy Option #1	~ 400	13.5 million tons (1)	3 million tons (1)	<10 years	NOx $220 to $1,500 SO_2 $110 to $450
Policy Option #2	~ 400	9.4 million tons	3.6 million tons	10 to 15 years	Undetermined
Policy Option #3	40	N/A (2)	N/A (2)	10 years to ? (3)	Undetermined

1) Includes both Title IV Phase I and II reductions.

2) Not Available since reductions are conducted on a case-by-case basis.

3) Based on the compliance dates from the 2 enforcement settlements, assumes litigation from a majority of those implicated further delaying implementation.

This mounting pressure is evident in light of EPA's enforcement action against a number of electricity companies for modification activities that occurred decades ago. Many companies are now bracing for a legal challenge or are preparing for major capital investments as required by the NSR process if implicated by the EPA. The level of pressure that industry is concerned about does present an effective method to administer regulatory requirements on coal-fired

plants. However, this needs to be applied in a manner that does not trigger a flurry of legal actions. Litigation by industry can either derail a policy proposal or delay implementation ultimately reducing its effectiveness and minimizing environmental and human health benefit.

The type of pressure administered under the Title IV of the CAA and the NOx SIP Call has produced favorable results. These programs are favorable within the electricity industry and have had a minimal level of litigation. This is apparent from the lower level of total SO_2 and NOx emissions. The emission trading of SO_2 and NOx provides an incentive to implement a pollution control strategy to reduce emission rates. Coal-fired plants learn how to efficiently reduce emissions through cost-effective means when faced with binding regulatory action.

For example, the reduction of NOx emission levels as mandated by Title IV and the OTC NOx budget program increased a demand for advanced pollution control technology. The development of efficient equipment recently unavailable to larger electric generators was now available for plant installation. Selective Catalytic Reduction (SCR) technology was refined in an effort to increase NOx reductions at large coal-fired plants to meet compliance requirements. This type of technology was capable of NOx emission reductions in the range of 60 to 80 percent. Through development experience and applicability, this technology has shown the ability to achieve greater than 90 percent emission reduction.[53] As a result, coal-fired plants are retrofitting generation units to efficiently reduce NOx emissions necessary for compliance. They are also earning a profit from the sale of surplus NOx allowances. Furthermore, if a high level of demand for pollution allowances persists, allowance prices will rise. This provides an increased incentive for a plant to implement reductions that once seemed too expensive, which justifies the installation of new technology.[54] This is the same case and trend occurring with the advancement and implementation of scrubber technology for SO_2 emission reductions. Through

a cap-and-trade program, it is projected that a capital investment outlay for the installation of pollution controls is recouped from revenues generated in the emission trading market.[55]

The attractive component of the cap-and-trade program is attributed to the level of compliance flexibility that enables industry to maintain operations while working to reduce emission levels. Furthermore, the implementation of a program with a clearly set compliance date permits industry to strategically alter business plans with minimal impact on day-to-day operations. The emissions market enables companies to literally buy time in the form of pollution allowances to allow for the design and installation of innovative technology. For example, clean coal technologies, which are divided into two technologies –repowering and retrofitting –, replace a major portion of an existing plant to operate more environmentally efficient and permit the use of different forms of fuel. Compliance programs that gradually take effect over a number of years facilitates the development of innovative technologies that mutually benefit business operations and the environment.

Recommendation

The first policy option – an emission reduction in accordance with the CAA and NSR – is the most effective that will include the largest number of coal-fired plants and result in the greatest environmental benefit. The cap-and-trade program as administered under the Title IV of the CAA has proven success for reducing pollution levels from coal-fired plants. This policy minimizes confusion and provides certainty of what is to be expected from industry. In addition, these programs provide for a level of flexibility that encourages technological innovation for reducing emission levels. This programs political, economical, and environmental success makes the policy option the best suited to effectively reduce pollution through industry wide cooperation.

Coal-fired plants should continue to be regulated under existing statutory requirements of the CAA. The modification interpretation determined in the WEPCO ruling should remain. However, if a plant's modification activity increases electrical generation capacity beyond original design, strict enforcement measures need to be imposed. The NSR process should only apply to new sources as intended. Coal plants regulated under Title IV of the CAA and the NOx SIP Call shall be federally exempt from any NSR requirements to avoid redundancy.

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