**BEFORE THE**
**CLEAN AIR SUBCOMMITTEE OF**
**THE ENVIRONMENT AND PUBLIC WORKS COMMITTEE**
**UNITED STATES SENATE**

# OVERSIGHT: EPA'S CLEAN AIR REGULATIONS – ONE YEAR AFTER THE CAIR AND CAMR FEDERAL COURT DECISIONS

## THE NEED FOR COMPREHENSIVE FEDERAL POWER PLANT AIR EMISSIONS CONTROL POLICY

**TESTIMONY OF CONRAD G. SCHNEIDER**
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**July 9, 2009**

**Summary of Testimony**

Mr. Chairman, members of the Clean Air Subcommittee of the Senate Environment and Public Works Committee, good morning, my name is Conrad Schneider, Advocacy Director of the Clean Air Task Force. I appreciate the opportunity to speak to you today. Based in Boston, the Clean Air Task Force is a national non-profit, environmental advocacy organization whose mission includes reducing the adverse health and environmental impacts of power plants. Our staff and consultants include scientists, attorneys, economists, and engineers.

Mr. Chairman, I want to thank you personally for the commitment and persistence that you have shown on this issue. Today's hearing revisits the status of power plant emissions controls one year after the D.C. Circuit court decisions in the challenges to the Clean Air Interstate and Clean Air Mercury Rules. We commend EPA for its commitment, restated here, that it intends to follow the requirements of the Clean Air Act and issue stringent power plant regulations to replace those rules. There is no question that EPA should promulgate stringent power plant regulations – including regulations on carbon dioxide consistent with EPA's statutory duty as expressed by the Supreme Court in *Massachusetts v. EPA*. But, we know that just as the Bush CAIR and CAMR rules were challenged and struck down in court, so a new set of power plant regulations may founder on the shoals of court challenges and delays. To guarantee the certainty of environmental improvement that public health and the environment demand and the regulatory certainty that the electric power industry craves, Congress should act now to solve this problem.

In preparing for my testimony today, I had a sense of "déjà vu all over again". I realized that not only does this date mark the one-year anniversary of the D.C. Circuit's decisions; it very nearly marks the eighth anniversary of my first testimony before this Committee on the health and environmental damage from power plant emissions. At that time, in support of multipollutant legislation, I testified that power plants were the biggest contributor to the single largest environmental health risk we face: they cause over 30,000 preventable premature deaths each year due to inhalation of the fine particles that their pollution creates. In addition, this pollution causes many tens of thousands of respiratory and cardiovascular emergency room visits and hospital admissions. The pollution from these plants also contributes to unhealthy levels of ozone smog that trigger millions of asthma attacks each summer; damages to forests, lakes, bays and crops due to Acid Rain; contaminates our fish and wildlife with mercury; shrouds our national parks in a veil of haze; and contributes significantly to climate change.

Since that time, we have seen the Jeffords "Clean Power Act" pass the Committee but fail to be enacted, the Bush Administration's proposal of the "Clear Skies" bill -- a misguided half-measure which would have resulted in significant weakening of the Clean Air Act, and the promulgation and subsequent overturning of the Clean Air Interstate Rule, the Clean Air Mercury Rule, and the Clean Air Visibility Rule. After eight years, we are back where we started – with nothing, except the continued death, disease, and damage caused by these plants. In that time, according to EPA's own analysis, approximately 240,000 Americans have died unnecessarily due to this pollution. When we realize that the technology exists today, as it did then, to reduce these pollutants by well over 90 percent, one has to conclude that we all share a measure responsibility. It is high time for all power plants in this country to be well-controlled or shut down to make way for cleaner energy sources.

Consistent with the emissions control technologies available today, a multi-pollutant bill such as the Clean Air Power Act (CAPA) targeting power plant sulfur dioxide, nitrogen oxides and mercury should cap sulfur dioxide emissions at no more than 2 million tons per year, and cap nitrogen oxide emissions at no more than 1.6 million tons per year. With respect to mercury, CATF strongly supports EPA's recently announced intentions to complete a MACT rulemaking for all coal and oil-fired power plant hazardous air pollutants. Congress can, however provide an important "backstop" to that effort, by requiring a 95 percent plant-by-plant mercury emissions reductions at all currently-existing coal-fired power plants if the rule is not in place by 2012.

CATF opposes a so-called CAIR technical "fix" which would merely give EPA the authority to allow emissions trading in the CAIR replacement rule without at the same time setting specific emissions caps and dates for sulfur dioxide and nitrogen oxides reductions. The reductions envisioned in the CAIR rule were too little, too late to address fully the public health and environmental impacts caused by power plant nitrogen oxides and sulfur dioxide. Note too that the old "war between the states" i.e., between the Northeast vs. the Midwest and Southeast, is largely over. Today, states in each of these regions agree that deeper reductions than those contained in CAIR will be needed to bring their areas into attainment with ozone and particulate matter air quality standards.

EPA's 2005 analysis of the Clean Air Power Act (CAPA) suggests that the health and environmental benefits of the bill will range from $137 to $161 billion in 2020. EPA also estimated the incremental cost of CAPA would be approximately $9.5 billion in 2020 – less if the carbon dioxide target in that bill is omitted in favor of an economy wide approach. That means that the benefits of the bill therefore outweigh the costs by roughly 14 to 1.

CATF is aware that this debate takes place in the context of climate and energy legislation that the full Committee will be taking up later this month and the full Senate later this year. CATF commends the House of Representatives for its action passing a climate bill and supports the approach represented by the Waxman-Markey bill -- an economy-wide carbon cap and trade program – which we will work to strengthen as the bill moves forward in the Senate. But we also know that passage of the climate bill will not remedy sulfur, nitrogen, and mercury emissions from power plants. Only the installation of, for example, sulfur scrubbers, selective catalytic reduction for nitrogen oxides reduction, and activated carbon injection for mercury control – post-combustion controls that are added to power plant smokestacks -- can do this. And, if under a climate bill existing coal plants are to be retrofitted with post-combustion controls for carbon dioxide capture, it appears that they must virtually eliminate their sulfur, nitrogen, and mercury emissions for those carbon dioxide controls to function properly. As noted above, CATF supports addressing the major problems associated with conventional power plant air pollutants as part of climate legislation such as through the bi-partisan CAPA approach.

We would note that one of the chief criticisms of the Waxman-Markey bill is that it gives away carbon dioxide allowances to the power sector for free. CATF believes that any giveaway of carbon allowances should be conditioned on power plants meeting at least Best Available Control Technology (BACT) or Lowest Achievable Emissions Rate (LAER) emissions limits (as applicable), for sulfur dioxide and nitrogen oxides, and Maximum Achievable Control Technology (MACT) for mercury and the other power plant hazardous air pollutants. Indeed, adding this requirement or CAPA to the Waxman-Markey climate bill would add only a small increment to the costs of the bill while multiplying its calculable benefits.

But, regardless of whether it is accomplished as part of the climate legislation or separately, Congress must commit to finishing the job of cleaning up sulfur, nitrogen, and air toxics from power plants. Congress should act now to save 30,000 lives per year, clear the vistas in our national parks, help restore the health of our forests and lakes, cut summer ozone smog, and virtually eliminate the power sector's contribution to mercury contamination in our fish. CATF submits the cost of the bill is a small price to pay and many years overdue.

I would be happy to answer any questions.

Mr. Chairman, members of the Clean Air Subcommittee of the Senate Environment and Public Works Committee, Good morning, My name is Conrad Schneider, Advocacy Director of the Clean Air Task Force. I appreciate the opportunity to speak to you today. Based in Boston, the Clean Air Task Force is a national non-profit, environmental advocacy organization whose mission includes reducing the adverse environmental impacts of fossil-fuel electric generating plants. Our staff and consultants include scientists, attorneys, economists, and engineers.

Coal-fired electric power plants are by most measures the nation's largest industrial air polluter. Power plant emissions are the biggest contributor to the single largest environmental risk to public health: death and disease due to inhalation of fine particles. Power plant air emissions cut a broad swath of damage across human health, and the local, regional and global environment. Unhealthy levels of ozone smog; fine particles that shave years off peoples lives and damage lungs; the damage to forests, lakes, bays and crops due to Acid Rain; mercury contamination of fish and wildlife; shrouds of haze blanketing our national parks; contributions to greenhouse gasses; and groundwater contamination from the lack of proper disposal of solid and liquid waste from power plant fuel combustion – these are just some of the major environmental problems associated with the nation's fossil electric generating fleet.

The suite of pollutants from power plants: sulfur dioxide, nitrogen oxides, mercury and other air toxics, and carbon dioxide interact and operate synergistically to damage the environment. For example, global warming will likely increase the incidence and severity of summer smog episodes; acidification of water bodies mobilizes existing deposits of mercury meaning more mercury uptake into the food chain, etc. For these and other reasons (cost-effectiveness, planning certainty for industry, etc.) the problem of power plant pollution demands a comprehensive solution that coordinates the reduction of all four major power plant pollutants.

We commend EPA for its commitment, restated in today's testimony, that it intends to follow the requirements of the Clean Air Act and propose and finalize stringent power plant regulations to replace those rules. There is no question that EPA should promulgate stringent power plant regulations – including regulations on carbon dioxide consistent with EPA's statutory duty as expressed by the Supreme Court in *Massachusetts v. EPA*.[1] The recent D.C. Circuit decision in *New Jersey v. EPA*[2], vacating the Bush Administration's power plant CAMR rules and other recent D.C. Circuit precedents interpreting the Maximum Available Control Technology (MACT) provision of the Act draw a clear road map for the Agency to set stringent MACT standards for power plant hazardous air pollutants (HAPs).[3] By contrast, the decision in *North Carolina v. EPA* striking down the Clean Air Interstate Rule (CAIR) presents a minefield of legal and technical obstacles that leave EPA's regulatory way forward far less clear.[4] In any case, we know that just as the Bush CAIR and CAMR rules were challenged and struck down, so a new set of power plant regulations may founder on the shoals of court challenges and delays. To guarantee the certainty of environmental improvement that the public health and the environment demand and the regulatory certainty that the electric power industry craves, Congress should act now to enact steep reduction in these three power plant pollutants.

Consistent with the emissions control technologies available today, a multi-pollutant bill like the Clean Air Power Act (CAPA) targeting power plant sulfur dioxide, nitrogen oxides and mercury should cap sulfur dioxide emissions at no more than 2 million tons per year, cap nitrogen oxide emissions at no more than 1.6 million tons per year, and require a 95 percent reduction in mercury emissions from each plant. With respect to mercury, CATF strongly supports EPA's recently announced intentions to complete a MACT rulemaking for all coal and oil-fired power plant hazardous air pollutants. Congress can, however provide an important "backstop" to that effort, by requiring a 95 percent plant-by-plant mercury emissions reductions at all currently-existing coal-fired power plants if the rule is not in place by 2012.

CATF opposes a so-called CAIR technical "fix" which would give EPA the authority to allow emissions trading in the CAIR replacement rule without at the same time setting specific emissions caps and dates for sulfur dioxide and nitrogen oxides reductions. The reductions envisioned in the CAIR rule were "too little, too late" to address fully the public health and environmental impacts caused by power plant nitrogen oxides and sulfur dioxide. CATF would also note that the old "war between the states" i.e., between the Northeast vs. the Midwest and Southeast, is largely over. States in each of these regions now agree that deeper reductions than those contained in CAIR will be needed to bring their areas into attainment with ozone and particulate matter air quality standards.

EPA's 2005 analysis of the Clean Air Power Act (CAPA) suggests that the health and environmental benefits of the bill will range from $137 to $161 billion in 2020.[5] EPA estimates the incremental cost of CAPA would be approximately $9.5 billion in 2020.[6] That means that the benefits of the bill therefore outweigh the costs by roughly 14 to 1.

The cost of this bill is not too much to pay to save 30,000 lives per year, clear the vistas in our national parks, help restore the health of our forests and lakes, cut summer ozone smog, and virtually eliminate the power sector's contribution to mercury contamination in our fish. CATF submits that this represents a small price to pay and many years overdue.

CATF commends the House of Representatives for passing economy-wide climate change legislation which, if enacted, would result in reductions in power sector carbon dioxide. Power plants are the single largest source of CO2 emissions in the United States, representing 41 percent of all CO2 emissions.[7] But, even enactment of the Waxman-Markey bill legislation will not appreciably reduce power plant sulfur dioxide, nitrogen oxides, or mercury emissions. This is because the Waxman-Markey bill does not target these emissions and will not result in the curtailment or shutdown any appreciable number of coal plants for the foreseeable future. Only installation of specifically-targeted pollution controls – e.g., flue gas desulfurization for sulfur dioxide, selective catalytic reduction for nitrogen oxide emissions, and the addition of activated carbon injection to these technologies for mercury reduction – can result in the level of pollution reductions necessary to achieve the public health and environmental goals that public health and the environment demand. And, if under a climate bill existing coal plants are to be retrofitted with post-combustion controls for carbon dioxide capture, it appears that they must virtually eliminate their sulfur, nitrogen, and mercury emissions for those carbon dioxide controls to function properly

CATF supports addressing the sulfur, nitrogen, and mercury impacts from coal plants as part of climate legislation such as through the bi-partisan Clean Air Power Act (CAPA). One of the chief criticisms of the Waxman-Markey bill is that it gives away carbon dioxide allowances to the power sector for free. At a minimum, CATF believes that any giveaway of allowances to electric utilities should be conditioned on plants meeting Best Available Control Technology (BACT) for sulfur dioxide and nitrogen oxides and MACT for mercury and the other power plant hazardous air pollutants. But, regardless of whether it is accomplished as part of the climate legislation or separately, Congress must commit to finishing the job of cleaning up sulfur, nitrogen, and mercury from power plants.

Because this hearing is focused on the three pollutants addressed in the Clean Air Interstate Rule (CAIR) and the Clean Air Mercury Rule (CAMR) i.e., sulfur dioxide, nitrogen oxides, and mercury, CATF will confine our testimony today to the public health, environmental science, and public policy imperatives to reducing the power sector's share of these pollutants. CATF's views on the necessity of regulating carbon dioxide and other greenhouse gases are expressed in our comments on EPA's proposed "endangerment finding" filed on June 23, 2009.[8]

The best science available demonstrates the need for steep cuts in these pollutants and the technical feasibility of achieving these reductions:

- Reductions in power plant emissions of sulfur dioxide down to 2 million tons per year;
- Reductions in power plant emissions of nitrogen oxides down to 1.6 million tons per year;
- Mercury emission reductions of at least 95 percent below from current levels on a plant-by-plant basis at new and existing plants.

I will address the impacts from each of these pollutants in turn and discuss the science that supports these reduction targets:

## Sulfur Dioxide

The problems associated with sulfur dioxide include: deadly fine particles, damage from Acid Rain, and the haze that obscures scenic vistas in national parks and our urban areas. Power plants emit about two-thirds of the sulfur dioxide emitted in the U.S. each year.

***A 2 Million Ton Per Year Sulfur Dioxide Emissions will Avoid Over 30,000 Particulate-Related Premature Deaths Each Year***

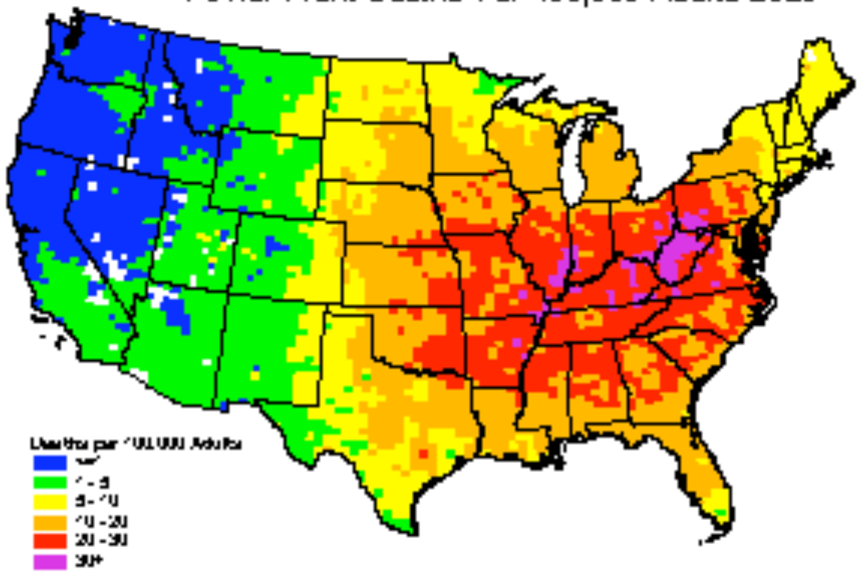
The most deadly pollutant resulting from power plant emissions is fine particulate matter. Fine particles, such as those that result from power plant sulfur and nitrogen emissions, defeat the defensive mechanisms of the lung, and can become lodged deep in the lung where they can cause a variety of health problems. EPA's latest review of the scientific literature indicates that short-term exposures can not only cause respiratory (e.g., triggering asthma attacks), but also cardiac effects, including heart attacks.[9] In addition, long-term exposure to fine particles increases the chances of death, and has been estimated to shave years off the life expectancy of people living in our most polluted cities, relative to those living in cleaner ones.[10]

Fine particulate matter may be emitted directly from tailpipes and smokestacks (known as "primary" particulate matter), but the largest proportion of fine particles come from gas emissions (called "secondary" particulate matter). Sulfur dioxide emissions from coal plants contribute the most to secondary particle formation. Sulfur dioxide is chemically altered in the atmosphere after it is released from a smokestack to become a "sulfate" particle. Sulfates include sulfuric acid particles that, when breathed, reach deep into the human lung. Indeed, analysis of the relative toxicity of particles indicates that sulfate particles are among the most toxic.[11] In the East and Midwest U.S., sulfate makes up the largest proportion of the particles in our air—in many regions well over half of the fine particles. Moreover, power plants currently emit two thirds of the sulfur dioxide in the U.S. Therefore, to reduce particulate matter, major reductions in pollution emissions from fossil-fuel power plants are needed.

In 2005, USEPA analyzed the benefits of a 2 million ton per year power sector sulfur dioxide cap and concluded that capping emissions at this level would save an estimated 30,000 lives per year along with avoiding tens of thousands of other adverse health effects such as asthma attacks and chronic bronchitis.[12]

Thus, the evidence is clear, and has been confirmed independently, fine particle air pollution, and especially those particles emitted primarily by fossil-fuel power plants, are adversely affecting the lives and health of Americans. The importance of these particulate matter-health effects relationships is made clear by the fact that virtually every American is directly impacted by this pollution. People living in the Midwest and Southeast, where the greatest concentrations of coal-fired power plants are located, face the greatest risk. See map below.[13]

Power Plant Deaths Per 100,000 Adults 2020

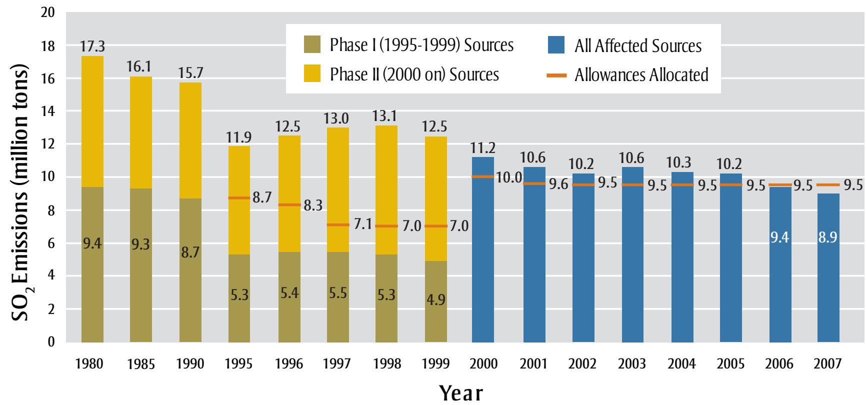


In addition, work by researchers at the Harvard School of Public Health found that the risk from power plant pollution is not evenly distributed geographically.[14] The risk was found to be greatest in relatively close proximity to the power plants: people living within 30 miles of a plant were found to face a risk of mortality from the plant's emissions 2-3 times greater than people living beyond 30 miles do.[15] These "local" impacts suggest that a national "cap and trade" program that allows some plants to escape pollution controls through the purchase of emission credits will not reduce the specific risk posed by those emissions to the surrounding population. This work supports the need for the "birthday bill" provision in CAPA that requires each facility to meet modern pollution standards by a date certain.

### *Only a 2 Million Ton Per Year Sulfur Dioxide Cap Will Allow Ecosystem Recovery from Acid Rain by Mid-Century*

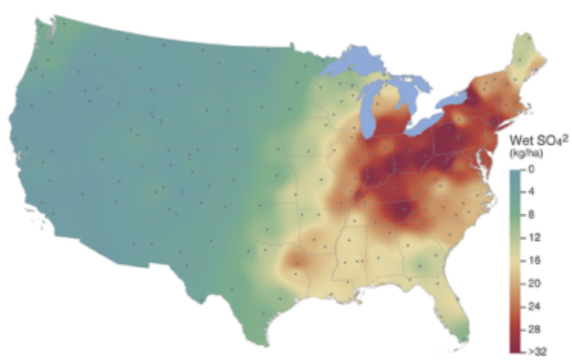
Although sulfur dioxide emissions have been reduced by approximately 50 percent since 1980 through the 1990 Clean Air Act Amendment's Acid Rain program, the program has now reached its emissions target[16] – a target that scientists say is far higher than the level necessary to allow for full ecosystem recovery in the Adirondacks and Southern Appalachian mountains.

Figure 2: $SO_2$ Emissions from Acid Rain Program Sources



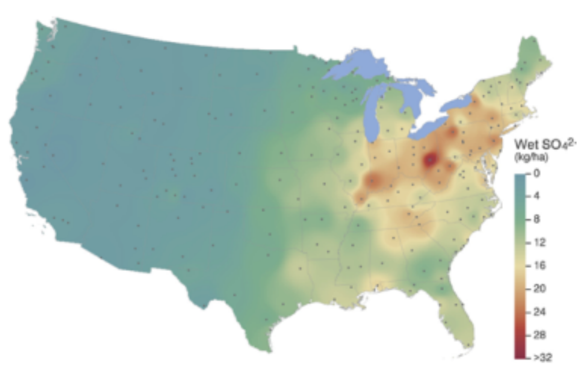

Source: EPA, 2008

Annual Mean Wet Sulfate Deposition, 1989–1991




Source: NADP, 2008

Annual Mean Wet Sulfate Deposition, 2005–2007




Source: NADP, 2008

It is increasingly well-documented that the problem of Acid Rain has not been solved and that the Acid Rain provisions of the 1990 Clean Air Act Amendments will not be sufficient to solve it. Over 150 years of deposition of sulfur has taken a serious toll on ecosystems. Although sulfur emissions have declined in recent years, they remain very high when compared to historic levels.[17,18,19,20,21]

As a result of this legacy, lakes and streams and the aquatic life that live in them are experiencing the most widespread impact from high concentrations of acidity. The majority of sensitive water bodies are those that are located atop soils with a limited ability to neutralize (or buffer) acidity. Sensitive areas in the U.S. include the Adirondack Mountains, Mid-Appalachians, southern Blue Ridge[22] and high-elevation western lakes.[23] Water bodies are affected not just by the chronic acidification that occurs from cumulative deposition but also by episodic acidification that occurs when pulses of highly acidic waters rush into lakes and streams during periods of snowmelt (acids have collected in the snow over the winter) and heavy downpours.

In some places, chronic and episodic acidification together have completely eradicated fish species. For example, acid-sensitive fish have disappeared and/or populations have been reduced in Pennsylvania streams where they formerly occurred in large numbers. Acidification, together with high levels of aluminum leaching, is blamed for the reduction in fish diversity that many Pennsylvania streams have experienced over the past 25-34 years.[24]

Acidic deposition has impaired, and continues to impair, the water quality of lakes and streams in the eastern U.S. in three important ways: lowering pH levels (i.e., increasing the acidity); decreasing acid-neutralizing capacity (ANC); and increasing aluminum concentrations. Many surface waters in New England, the Adirondack region of New York, and the Northern, Central and Southern Appalachian Mountain regions exhibit chronic and/or episodic (i.e., short-term) acidification. Moreover, elevated concentrations of dissolved inorganic aluminum have been measured in acid-impacted surface waters throughout the East. [25,26,27,28,29]

**Damage to Freshwater Marine Ecosystems**

High concentrations of aluminum and increased acidity have reduced the species diversity and abundance of aquatic life in many lakes and streams draining acid-sensitive regions in the East. Fish have received the most attention to date, but entire food webs are often negatively affected. For example, in a survey of lakes in the Adirondacks, 346 lakes (24% of the total) did not contain fish. These fishless lakes had significantly lower pH and higher concentrations of dissolved inorganic aluminum when compared to those lakes with fish. [30,31,32,33,34,35].

There are important linkages between acidic deposition and other water quality problems. For example, mercury contamination of fish is coupled to surface water acidification through a pattern of increases in fish mercury concentration with decreases in surface water pH. Studies across the eastern U.S. have shown that many surface waters have elevated concentrations of mercury in fish tissue as a result of atmospheric emissions and deposition of mercury. "Biological mercury hotspots" have been identified at five areas in eastern North America.

Emissions targets set in the U.S. thus far have been met or exceeded. Decreases in sulfate have been measured at monitoring sites throughout the Northeast U.S., although many sites in the Southeast U.S. are still showing increases in sulfate deposition. Where there are declines, improvements in acid-base chemistry have also been measured. Fish populations in marginally affected lakes are recovering. Unfortunately no improvements have been observed in lakes that have been more seriously and chronically impacted by acidification, indicating that deeper cuts are needed. [36,37,38]

**Damage to Forest Ecosystems**

Acidic deposition has altered, and continues to alter, forest soil by accelerating the leaching of calcium and magnesium and increasing concentrations of dissolved inorganic aluminum in soil waters. At high concentrations, dissolved inorganic aluminum can hinder the uptake of water and essential nutrients by tree roots.

The alteration of soils by acid deposition has serious consequences for acid-sensitive forest ecosystems. Soils that are compromised by acidic deposition are less able to neutralize additional inputs of strong acids, and provide poorer growing conditions for plants and delay the recovery of surface waters. [39,40,41,42,43].

Experimental additions of calcium in terrestrial sites, which mimics reduced acidifying deposition, show that recovery can be achieved. Modeling exercises conducted for three affected watershed in the Northeast US show that at the levels of reductions called for in this bill, chemical conditions would approach recovery thresholds by mid-century. [44,45,46].

**The Need to Monitor the Benefits of Emission Controls**

Environmental monitoring is a critical tool to help track the effectiveness of past controls of emissions of air pollutants and to guide future air quality management in the U.S. There are several national programs that are widely used by the research and policy communities to evaluate the extent and change in atmospheric deposition and to assess changes in surface water chemistry in response to changes in emissions of air pollutants. Without these critical monitoring programs it will be difficult if not impossible to track the response of atmospheric chemistry and acid-sensitive surface waters to current and future controls on emissions of air pollutants. There is also a critical need to develop a national program for monitoring ecosystem response to controls on emissions of mercury to the atmosphere.

**What will it take to Solve the Problem?**

In summary, it is well documented that surface waters in New England, the Adirondacks, and the Northern, Central and Southern Appalachian mountain regions have been adversely impacted by elevated inputs of atmospheric sulfur and nitrogen deposition. Surface waters in these areas exhibit chronically acidic conditions or have low values of acid neutralizing capacity, which make them susceptible to short-term episodic acidification.

The modest decreases in sulfate concentrations and increases in pH and acid neutralizing capacity exhibited in some surface waters is an encouraging sign that impacted ecosystems are responding to emission controls and moving toward chemical recovery. Nevertheless the magnitude of these changes is small compared to the magnitude of increases in sulfate and decreases in acid neutralizing capacity that have occurred in acid-impacted areas following historical increases in acidic deposition.

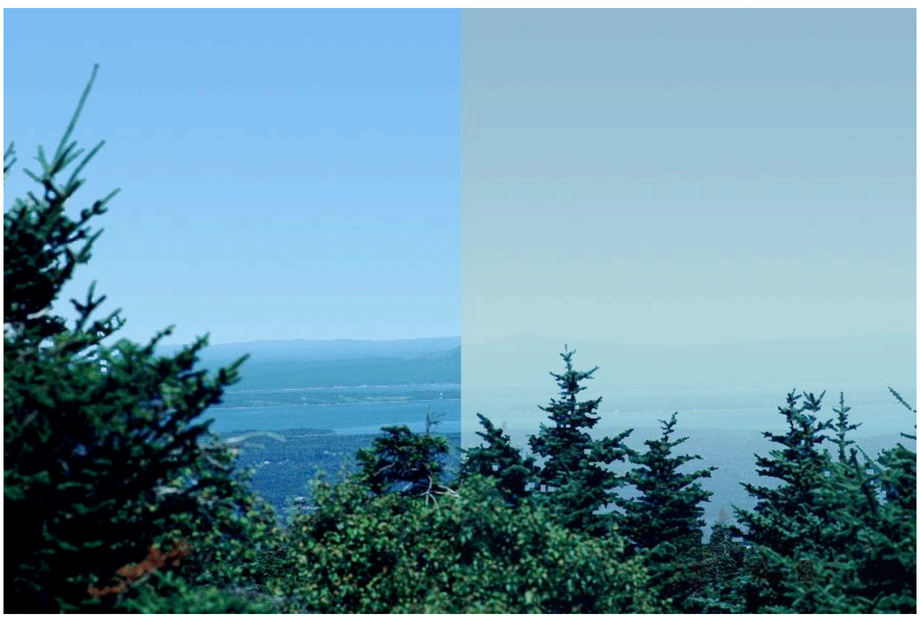
Despite declines in power plant sulfur emissions due to Acid Rain provisions of the 1990 Clean Air Act amendments, the acidity of many water bodies has not improved.[47] Scientists believe that cuts called for in the 1990 amendments to the Clean Air Act will not be adequate to protect surface water and forest soils of the northeastern U.S.[48]

What will it take to reverse the impacts of nitrogen saturation, ozone and Acid Rain? Work by scientists with the Hubbard Brook Research Foundation found that an additional 80 percent reduction in sulfur from levels achieved by Phase II of the Acid Rain program of the Clean Air Act Amendments of 1990 would be needed to allow biological recovery to begin by mid century in the Northeastern U.S.[49] Model simulations in the Shenandoah project that greater than 70 percent reduction in sulfate deposition (from 1991 levels) would be needed to change stream chemistry such that the number of streams suitable for brook trout viability would increase. A 70 percent reduction would simply prevent further increase in Virginia stream acidification.[50] In the Great Smoky Mountains National Park, two separate ecosystem models have concluded that sulfate reductions of 70 percent are necessary to prevent acidification impacts from increasing. Deposition reductions above and beyond these amounts are necessary to improve currently degraded aquatic and terrestrial ecosystems.[51,52] The Title IV Acid Rain cap under the current Clean Air Act is 8.9 million tons per year.

Meeting a 2 million ton per year sulfur dioxide cap that would represent the 75 to 80 percent reduction from current Title IV targets is a precondition for recovery to get a foothold by mid-century. Make no mistake about it; there is no time to waste. At the Hubbard Brook Cooperators meeting this week, Dr. Charles Driscoll is presenting research results making it clear that there is an urgent need to reduce levels of sulfur dioxide and nitrogen oxides to arrest soil acidification, which continues because of all the buffering capacity that has already been lost. Even with deep reductions irreversible damage has already occurred. It will take acid waters many decades to recover once acid inputs are reduced to close to pre-industrial levels; soils and water bodies will take centuries to recover. While recovery may be slow, maintaining emissions at today's level will mean even more irreversible damage and even a longer wait before improvement can be measured. Even tighter targeted cuts may be necessary for sources directly impacting sensitive areas. And, the longer we wait for the reductions to begin, the longer we will await recovery of these precious systems.

***A 2 Million Ton Per Year Sulfur Dioxide Cap will be Necessary to Regain Pristine Vistas in our National Parks and Wilderness Areas***

In the last several decades, visibility – how far you can see on an average day – has declined dramatically, especially in the Eastern half of the United States. In the East, annual mean visibility is commonly one quarter of natural conditions and as little as one-eighth in the summer. One of the greatest casualties of this upsurge in regional haze has been the national parks. Examples of the magnitude of visibility decline due to high air pollution levels are shown below in Acadia National Park and the Great Smoky Mountains National Park. These are actual photographs of vistas in those parks taken on clear days and days on which sulfate particulate matter levels were high.



Acadia National Park on a Clear and a Polluted Day

Great Smoky Mountains National Park on a Polluted and a Clear Day

There is no question that power plants are the major driver of this problem: visibility impairment has tracked closely in parallel with sulfate and electric power production for nearly half a century. Taken together, sulfur, carbon and nitrogen oxide emissions are responsible for about well over 80 percent of this visibility impairment. When these components are assessed for their contribution to the problem, electric power is accountable for about two-thirds of the emissions that lead to regional haze-related visibility impairment in the East, most of which is caused by sulfate.

Half-measures will not solve the problem of visibility impairment in our nation's parks. EPA has set a long-term goal of eliminating man-made haze by 2060. That goal will never be achieved without steeply cutting power plant emissions consistent with the 2 million ton per year reduction target in CAPA. Indeed, the cuts in sulfur dioxide to date under the Acid Rain program have not led to perceptibly improved vistas. Research shows that visibility improves more rapidly with deeper cuts in sulfate. Thus, we will achieve pristine views in those areas shrouded in a sulfate haze only when the deepest cuts in sulfur dioxide emissions have been achieved.

There is concern about haze from other quarters as well. Research is showing that both haze and particulate matter are depressing optimal yields of crops.[53] Yield decreases in the northeastern United States are estimated to be occurring in the 5 – 10 percent range. In the southeast the decrease in optimal yields for summertime crops is likely higher — about 10–15 percent.

## Nitrogen Oxides

The problems associated with nitrogen oxides include the massive health and ecosystem damage due to ozone smog and nitrogen deposition. Power plants are responsible for about one-quarter of the nitrogen oxides emitted in the U.S. each year.

Ground level ozone is a colorless, odorless pollutant that causes respiratory damage ranging from temporary discomfort to long-term lung damage. According to a recent study[54], in the Eastern half of the United states, ground level ozone sends an estimated 159,000 people to emergency rooms each summer; triggers 6.2 million asthma attacks, and results in 69,000 hospital admissions. Many more millions of Americans experience other respiratory discomfort.

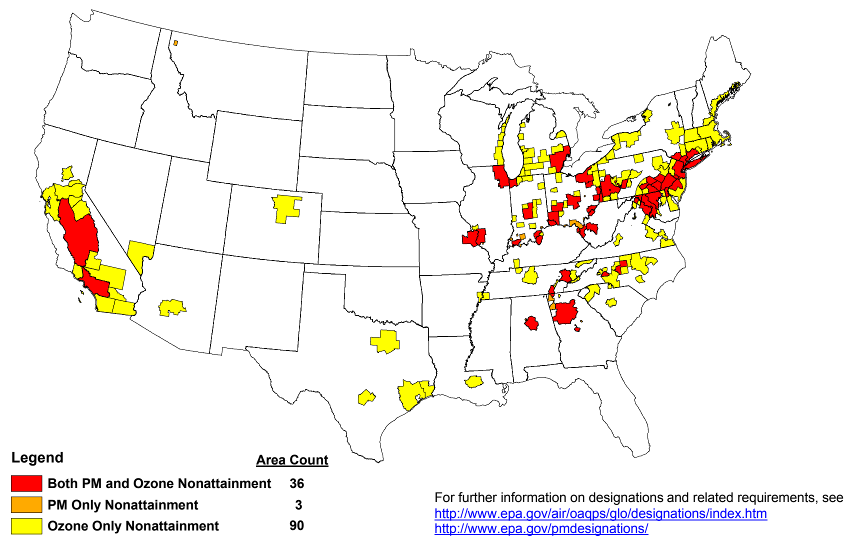
Although much of the controversy around ground level ozone in recent years has centered on ozone levels in the Northeast, and the impact of Midwest and Southern emissions on the Northeast, this misses an important part of the story. ***In fact, many Midwestern and Southeastern states suffer greater ozone exposures and per capita health impacts than many Northeast states.*** According to a study by the Ohio Environmental Council, in collaboration with the University of Michigan and Harvard University,[55] for example, people in Ohio River Valley communities such as Cincinnati and Marietta, Ohio are often exposed to dangerous levels of ground level ozone as much as 75 percent ***more*** than people in Boston and New York. Ohio River Valley ozone hospital admission rates also track this pattern – with admission rates higher in the Ohio Valley than in the East.

The reason is not hard to discern. There is a high correlation between elevated ground level ozone and proximity to power plants – especially in the Midwest and Southeast where roughly 60 percent of the nation's coal-fired generating capacity is located. In the Ohio Valley area studied, for example, emissions from coal- and oil-fired power plants contribute nearly ***fifty percent*** of elevated ozone levels in the Valley, enough by themselves to cause violations of the federal health standard.[56] Partly out of recognition of this in-region problem, the decades old "war between the states" i.e. the Northeast v. the Midwest and Southeast, is largely over. Today, states in each of these regions recognize that deeper reductions in nitrogen oxides emissions than those contained in CAIR will be necessary to bring their areas into attainment with the new ozone standards.

> ***Only a Cap on Nitrogen Oxides of 1.6 Million Ton Per or less (Coupled with a 2 Million Ton Per Year Sulfur Dioxide Cap) will Allow Attainment in Virtually All Eastern U.S. Counties That Violate Ambient Air Quality Standards.***

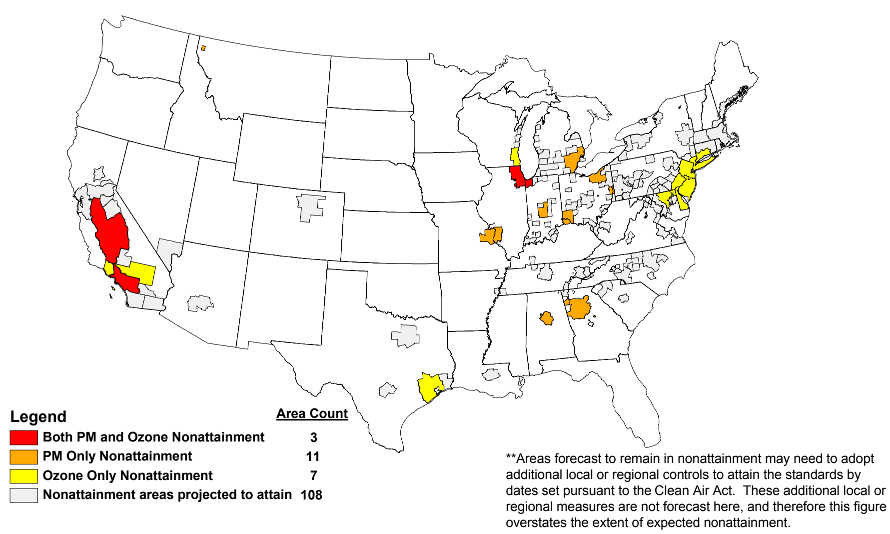
States currently face deadlines for submitting State Implementation Plans (SIPs) for ozone and fine particulate matter.[57] As part of EPA's 2005 analysis of the Clean Air Power Act, the Agency modeled the estimated number of areas that would remain in nonattainment for these pollutants in 2020 under the bill. EPA found that of the 129 areas designated as nonattainment for 8-hour ozone and/or PM2.5, the pollution caps in the CAPA bill would eliminate nonattainment in all but 21 areas urban areas where additional industrial and mobile source emission reduction may be needed to achieve attainment. See maps below.[58]

## 129 Areas Designated as Nonattainment for 8-Hour Ozone and/or $PM_{2.5}$




## 108 Areas Projected to Meet the $PM_{2.5}$ and 8-Hour Ozone Standards in 2020

with the Clean Air Planning Act (Carper, S.843) and Some Current Rules* Absent Additional Local Controls



**Crop Losses Due to Ozone Smog**

Human health is not smog's only victim. There is strong scientific evidence showing that current levels of ground level ozone are reducing yields, particularly in sensitive species — soybean, cotton, and peanuts from NCLAN studies. Annual crop loss from ozone for soybeans alone in Illinois, Indiana and Ohio has been calculated to fall between $198,628,000 – 345,578,000. Ozone-induced growth and yield losses for the seven major commodity crops in the Southeast (sorghum, cotton, wheat barley, corn, peanuts and soybeans) are costing southeast farmers from $213-353 million annually.[59]

***Year-Round Reductions of Nitrogen Oxides will be Necessary to Minimize the Effects of Nitrogen Deposition***

Power plant nitrogen emissions deposited on land and water — sometimes at great distances from their original sources —is an important contributor to declining water quality.[60] Estuarine and coastal systems are especially vulnerable. Too much nitrogen serves as a fertilizer, causing excessive growth of seaweed. The result is visual impairment and loss of oxygen. With the loss of oxygen, many estuarine and marine species — including fish — cannot survive.[61]

The contribution of nitrogen from atmospheric deposition varies by watershed. In the Chesapeake Bay, atmospheric nitrogen accounts for 27 percent of nitrogen entering the system.[62] Of that amount, power plants account for about a third.

Nitrogen is also being deposited on ocean surfaces many, many miles away from land. Atmospheric nitrogen accounts for 46 to 57 percent of the total externally supplied (or new nitrogen) deposited in the North Atlantic Ocean Basin.[63]

## Mercury

***A 95 Percent Reduction in Mercury and other Power Plant Hazardous Air Pollutants is Achievable and Necessary to Minimize the Risk to Children***

The threats posed by toxic chemicals in power plant air emissions are both serious and long lasting. The electric power industry emits more than 65 air toxics. Of these pollutants, mercury often has received the most attention. This is so, in part, because the coal-fired utility industry is the single largest industrial emitter of mercury air pollution: nationwide, approximately 1,100 coal-fired units at more than 450 existing power plants emit approximately 48 tons of mercury into the air each year -- over one-third of U.S. mercury emissions.[64]

But, coal-fired power plants also emit annually to the air 56 tons of arsenic, 62 tons of lead compounds, 62 tons of chromium compounds, 23,000 tons of hydrogen fluoride, and 134,000 tons of hydrochloric acid, all of which are among the hazardous air pollutants listed by Congress in Clean Air Act section 112(b).[65] Coal-fired power plants also emit dioxins, which are cancer-causing agents that are highly toxic even in very small amounts.[66] Oil-fired power plants emitted 320 tons of nickel in 1994.[67]

Mercury contamination is a persistent and widespread problem with devastating effects on some of the most vulnerable Americans. Mercury is a potent neurotoxin. Human exposure to mercury most commonly occurs through the consumption of contaminated fish. High maternal blood levels of mercury are linked to particularly toxic effects in children exposed as developing fetuses, including delayed developmental milestones, reduced neurological test scores and, at high doses, cerebral palsy.[68] The scope of the problem is broad: hundreds of thousands of children born in the U.S. each year are at risk of serious harm from exposure to high maternal blood-mercury levels resulting from contaminated fish consumption.[69] Mercury's risks include delayed developmental milestones, reduced neurological test scores and, at high doses, cerebral palsy.[70]

Native Americans who rely on fish or contaminated mammals for food, as part of their cultural experience, and low-income persons for whom locally caught freshwater fish is an important source of inexpensive protein, also are at higher risk. Significant evidence also links methylmercury exposure to cardiovascular disease in adults.[71] A large body of scientific literature exists documenting numerous risks to wildlife.[72]

According to EPA, all 50 states now have issued mercury fish consumption advisories urging children and women who are pregnant, may become so, or are nursing, and other vulnerable populations – to avoid eating or limit intake of specific kinds of fish. In 35 of these states the mercury warnings apply to all waters statewide.[73] Advisories blanket significant segments of our recreational waterways: approximately 38 percent of the nation's total lake acreage and 26 percent of the nation's total river miles were subject to advisories in 2006.[74]

The economic impact of this mercury contamination is significant: total costs of lost U.S. population IQ points due to *in utero* exposure to methylmercury from all sources has been estimated at $3.1 billion to $19.9 billion per year.[75] By contrast, estimated benefits from $86 million to $4.9 billion per year could accrue from the avoided cardiovascular events and premature mortality from even a modest 70 percent cut in power plant mercury.[76]

What can be done to limit air toxics, including mercury? After years of delay, including promoting the unlawful CAMR and delisting rules that were recently vacated in their entirety by the D.C. Circuit, EPA finally has indicated its plans to develop maximum achievable control technology-based emissions standards under the existing Clean Air Act, for all the hazardous air pollutants emitted by the coal- and oil-fired utility industry.[77]

During the period between EPA's issuance of CAMR and the appellate court's decision, some states issued emissions limits for mercury from coal-fired electric generating units. Additionally, applications have been submitted for upwards of 22,000 MW of new coal-fired capacity.[78] These plants are likely to operate for many years, and the pollution control technology choices made by plant owners and operators represent significant capital investments. Under Clean Air Act section 112(g) and EPA regulations, each of these plants must demonstrate it will meet MACT emission limitations, determined on a case-by-case basis. Those limits must be equal to or better than those achieved by the best performing similar source, for mercury and for other air toxics as well. Experience under certain states' regulations demonstrates that coal-fired power plant mercury emission reductions of up to 95 percent below intake levels of mercury in the combusted coal are being met at existing older coal-fired power plants using commercially available technologies.[79] Reductions of 98 percent and more can be achieved at new units. Technical means for controlling mercury include using advanced coal technologies with carbon capture beds, or at conventional combustion units, combinations of coal cleaning, the co-benefits associated with scrubbers for the control of sulfur dioxide, fabric filters, carbon sorbent injection, adoption of cleaner fuels, and, of course, the replacement of coal-fired electricity generation with greater reliance on energy efficiency and clean renewable energy resources.

We strongly support the development of MACT standards by EPA and will engage the Agency in that effort. Because the long record of delay and industry litigation associated with this particular rulemaking, however, CATF would support a statutory backstop to the rule. Specifically, if by January 1, 2012 a MACT standard for this industry is not in place, all existing coal-fired electricity generating units should be required to control mercury emissions levels to achieve at least 95 percent reductions from inlet coal mercury content by a date no later than January 1, 2015. Emissions limits for new units, of course, would continue to be governed by the section 112(g) case-by-case MACT requirements mandated by the Act, and required to meet the emissions limit achieved in practice by the best-performing similar source. Certainly nothing in the proposed statutory backstop provision should be construed to abrogate the right of the permitting agencies to set tighter standards for mercury as appropriate.

### Reductions Appropriate In Federal Policy

In each of the above areas, the best scientific evidence calls for steep reductions in power plant pollution:

- In the case of sulfur dioxide, capping power plant emissions nationally at 2 million tons per year will save 30,000 lives per year.
- In addition, reductions in power plant sulfur dioxide emissions at least this deep are a precondition to ecosystem recovery from Acid Rain while dividends in the form of fine particle reduction and reduced haze will result as well.
- In the case of nitrogen oxides, ozone smog health impacts and air quality standard violations will be dramatically reduced by capping emissions of nitrogen oxides at 1.6 million tons per year as will year round nitrogen and Acid Rain impacts.
- Mercury is highly toxic in small amounts, and, as for other industries, maximum available control thresholds should be pursued consistent with the best-performing mercury removal technology – upwards of 95 percent on a plant-specific basis.

Fortunately, the technology is at hand to dramatically reduce these power plant emissions and their resultant impacts throughout the nation, at reasonable costs. For example:

- Power sector reductions of sulfur dioxide down to 2 million tons per year are readily achievable through a combination of flue gas desulfurization (scrubbing), use of cleaner fuels, and greater commitment to energy efficiency and renewable resources.
- Year round nitrogen reductions down to a cap of 1.6 million tons per year are achievable through selective catalytic and non-catalytic reduction technology, low NOx burners, overfire air, and use of cleaner fuels, and greater commitment to energy efficiency and renewable resources.
- Power sector reductions of mercury upwards of 95 percent have been achieved on older coal plants in compliance with Massachusetts law.[80] Technical means include coal cleaning, sulfur dioxide and nitrogen oxides scrubbing co-benefits, fabric filters, activated carbon injection, and adoption of cleaner fuels.

## The Time For Action Is Past Due

The discussion we are having today is hardly new. It goes back at least to 1995, when EPA initiated its "Clean Air Power Initiative" designed to bring stakeholders together around a comprehensive set of pollution reductions. It continued in the Jeffords "Clean Power Act – S. 556", which passed the Environment and Public Works Committee in 2002. For the last eight years, the debate has focused largely on the Bush Administration's controversial "Clear Skies" proposal and its set of "Clean Air" rules (CAIR, CAMR, and CAVR). Now, in the wake of the suite of court opinions that struck down each of those regulations, we are back where we started -- with EPA beginning the process of issuing power plant regulations anew. In the meantime, the public health and environmental damage wreaked by the nation's power plants continues unabated. It is high time – and the right time -- for Congress finally to act to reduce this damage once and for all.

## ENDNOTES

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[6] http://www.epa.gov/airmarkets/progsregs/cair/docs/carper.pdf at slide 30.
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