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Calendar No. 768

107TH CONGRESS, 2d Session | SENATE | REPORT 107–347

CLEAN POWER ACT OF 2002

REPORT

OF THE

COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS UNITED STATES SENATE

TO ACCOMPANY

S. 556

TOGETHER WITH

MINORITY VIEWS

NOVEMBER 19, 2002.—Ordered to be printed.

U.S. GOVERNMENT PRINTING OFFICE
19–010 WASHINGTON : 2002

For sale by the Superintendent of Documents, U.S. Government Printing Office
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one hundred seventh congress

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107TH CONGRESS *2d Session* | SENATE | REPORT 107–347

CLEAN POWER ACT OF 2002

NOVEMBER 19, 2002.—Ordered to be printed

Mr. JEFFORDS, from the Committee on Environment and Public Works, submitted the following

REPORT

together with

MINORITY VIEWS

[to accompany S. 556]

[Including cost estimate of the Congressional Budget Office]

The Committee on Environment and Public Works, to which was referred the bill (S. 556) to amend the Clean Air Act to reduce emissions from electric powerplants, and for other purposes, having considered the same, reports favorably thereon with an amendment and recommends that the bill, as amended, do pass.

GENERAL STATEMENT

The Clean Air Act is one of the most comprehensive environmental statutes yet enacted. In general, its main goals are to assure that Americans can breathe ambient air that meets health-based standards, to decrease emissions of toxic pollutants, and to protect the environment and the public's health and welfare from air quality degradation and harmful emissions.

The modern Act was established in 1970 to combat growing air pollution-related public health and environmental damage, particularly the effects caused by pollution from vehicles and large stationary sources. The 1977 Amendments extended deadlines for achieving national ambient air quality standards (NAAQS) and articulated a more detailed framework and authorities for States to regulate stationary sources, depending on whether an area had

19–010

"clean" or "dirty" air. The 1990 Amendments specified attainment deadlines and performance criteria for Federal and State programs to be implemented and significantly expanded the scope of federally regulated pollutants, including explicit control of hazardous air pollutants and ozone depleting substances, and instituted a market-based, cap-and-trade mechanism for controlling sulfur dioxide emissions from electric generating units. The latter was created because of the environmental damage caused by acid deposition. The 1990 Amendments also differentiated the control requirements for non-attainment areas depending on severity of air quality problems.

The Clean Air Act is a complex statute with many interwoven and integral parts intended to significantly reduce health risks to the public, reverse and prevent ecological damage, and improve rural and urban visibility. The Act also serves to discourage and limit the use of the atmosphere as a free dumping ground for waste and pollution. The success of the cap-and-trade system of the acid rain title of the 1990 Amendments showed that a carefully constructed, market-based system could help clarify the value of the atmosphere to the public and industry and effectively lower the burden of acid pollutants nationally. That system, combined with other critical programs and requirements designed to protect local and regional air quality from market vagaries and interstate transboundary pollution, such as new source performance (section 111), interstate pollution abatement (section 126), maximum achievable control technology for hazardous air pollutants (section 112) , and visibility protection (section 169), has produced some significant benefits. Indeed, the benefits of the cap-and-trade program have far exceeded its costs. The U.S. Environmental Protection Agency (EPA) has estimated that the monetized health benefits of that program, due primarily to $PM_{2.5}$ (fine particulate matter smaller than 2.5 micrometers) reductions and avoided mortality, will exceed $150 billion annually in 2010. Control costs for sulfur dioxide turned out to be $1–2 billion annually, rather than the $4.1-$7.8 billion projected by industry (Rob Brenner, *St. Louis University Public Law Review,* Vol. 20:7, July 2001).

Emissions of most pollutants are generally down from 1990, since Congress last substantially amended the Clean Air Act (CAA). And, substantial new reductions are expected upon full implementation of the Amendments of 1990, according to the EPA report on the Benefits and Costs of the Clean Air Act 1990–2010 (1999).

	Actual Percent Change in Emissions, 1992–2001[1]	Estimated Percent Change in Emissions Post-CAA, 1990–2010
Nitrogen Oxides (NOx)	−3	[2] −39
Volatile Organic Compounds (VOCs)	−8	−35
Sulfur Dioxides (SOx)	−24	−31
Particulate Matter (PM_{10})[3]	−13	−4
Particulate Matter ($PM_{2.5}$)[3]	−10	−4
Carbon Monoxide (CO)	+6	−23
Lead (Pb)	[4] −5	[4] < −5

[1] EPA National Air Quality 2001 Status and Trends—six principal pollutants.

[2] Includes NOx SIP Call, but it should be noted that while emissions of all criteria pollutants except lead are down since 1992, emissions of nitrogen oxides have increased by 15 percent since 1970, and 9 percent since 1980 levels, based on the most current EPA inventory.

[3] Includes only directly emitted particles.

[4] Lead has dropped more than 95 percent since implementation of the Clean Air Act Amendments in 1977 banning lead in gasoline.

Source: GAO analysis of EPA data.

However, despite progressively more stringent statutory objectives, and some success in controlling and limiting emissions of many pollutants, 150 million or more Americans are now living in areas with unhealthy air that does not meet the national ambient air quality standards (NAAQS) for one or more of the conventional or criteria pollutants (*see* APPENDIX I for NAAQS). There are currently more than 130 ozone nonattainment areas (for the 1-hour standard), but the Agency has not yet made designations regarding the revised ozone and $PM_{2.5}$ standards as required by law (section 6101 of TEA–21—P.L. 106–377 section 427). Three years of data collection from air pollution monitors around the country have recently been compiled and suggest approximately 129 counties are in nonattainment of the $PM_{2.5}$ standard. See ozone nonattainment map above.

According to the EPA's latest air quality trends data (2001), almost 170 million tons of conventional pollutants are emitted annually. In addition, approximately 4.7 million tons of toxic air pollutants (1996—most recent data) are still emitted every year with 50 percent coming from mobile sources (excluding commercial diesel marine engines, locomotives and aircraft because of lack of data) and 50 percent from stationary sources. The highest ranking 20 percent of counties in terms of risk (622 counties) from air toxics exposure contain almost three-fourths of the U.S. population. Three air toxics (chromium, benzene, and formaldehyde) appear to pose the greatest nationwide carcinogenic risk (EPA National Air Toxic Assessment—NATA). However, that statement does not factor in the EPA's recent announcement indicating that long-term exposure to exhaust from diesel engines is likely to be a lung carcinogen hazard to humans, as well as have noncancer effects on the respiratory system. NATA also states that evidence for related exacerbation of existing allergies and asthma is emerging. These noncancer effects

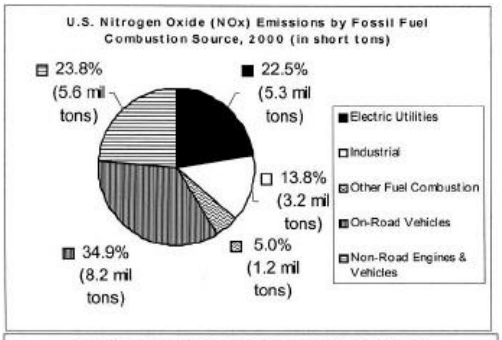
are similar to those seen with exposure to ambient particulate matter, specifically $PM_{2.5}$.

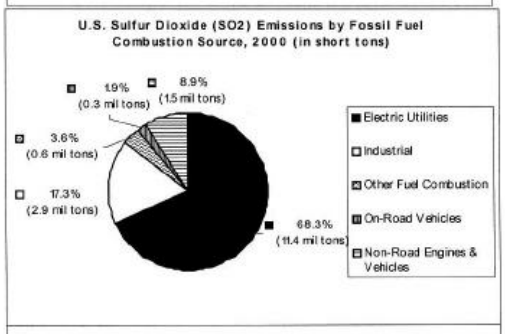
The largest change in the emissions inventory of criteria pollutants to date has come from the limitations placed on sulfur dioxide emissions from electricity generating units in Title IV of the 1990 Clean Air Act Amendments. That acid deposition control program, through a market-based cap-and-trade system, required the reduction of approximately 10 million tons of sulfur dioxide below 1980 levels to a cap of 8.95 million tons and a 2 million ton reduction in nitrogen oxides by 2000. However, the use of allowances banked through early reductions under this program may result in higher emissions than 8.95 million tons for a few years beyond 2010, with no current statutory or regulatory driver to reduce emissions further.

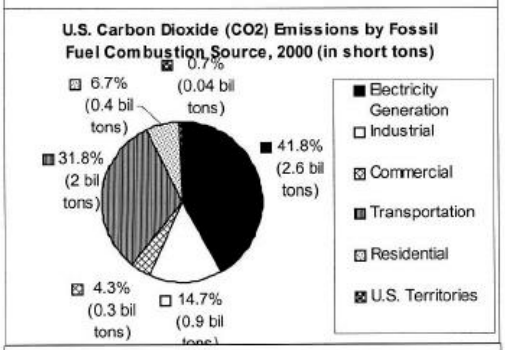
The CAA mobile source performance standards and fuel requirements, particularly reformulated gasoline, have resulted in major cuts in volatile organic compounds (VOCs). Additional regulations implementing Tier II requirements, including lower-sulfur gasoline, and those affecting heavy-duty engines and sulfur in diesel fuel will further reduce nitrogen oxides and sulfate emissions, including fine particulate matter, from the mobile sector. The EPA estimates that over the next 30 years these new standards will significantly reduce emissions of nitrogen oxides from vehicles by about 74 percent. Nevertheless, the EPA also estimates that by 2005, the benefits gained from technological advances may not be enough to compensate for the increases in vehicle use. In addition, mobile sources will continue to be a major source of air toxics with approximately 262,000 tons of hazardous air pollutant emissions projected by the EPA in 2007 without further regulation.

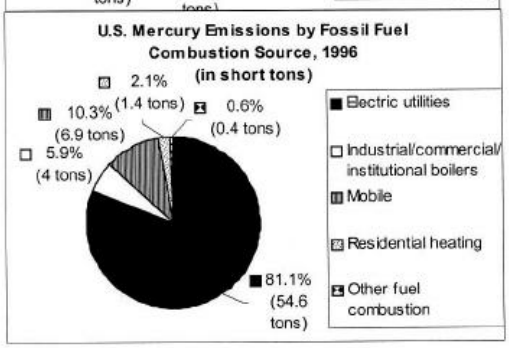
However, what is more important than total emissions, with respect to managing public health and environmental impacts, is the effect of each source's pollution on local and distant air quality, an area's attainment status, and involuntarily exposed individuals and ecosystems. This local impact concern is, of course, not applicable to carbon dioxide which contribute to global warming and climate change or to ozone depleting substances which contribute to stratospheric ozone destruction regardless of where they are emitted. The committee requested in July 2001 that the Agency provide information so the committee and the public may understand the contribution of criteria pollutant emissions from the various source categories to nonattainment in each area, especially for the ozone standard. The Agency has not yet completed providing this information.

Despite the regulatory and statutory requirements of the Clean Air Act, which has promoted emissions reductions through significant improvements to the internal combustion engine, cleaner conventional vehicle fuels and technological innovation in end-of-pipe pollution control, current air pollution levels are creating significant observable harm to public health and the environment. The bulk of this pollution is directly attributable to fossil fuel combustion.


U.S. Nitrogen Oxide (NOx) Emissions by Fossil Fuel Combustion Source, 2000 (in short tons)
23.8% (5.6 mil tons)
22.5% (5.3 mil tons)
13.8% (3.2 mil tons)
5.0% (1.2 mil tons)
34.9% (8.2 mil tons)
Electric Utilities
Industrial
Other Fuel Combustion
On-Road Vehicles
Non-Road Engines & Vehicles


U.S. Sulfur Dioxide (SO2) Emissions by Fossil Fuel Combustion Source, 2000 (in short tons)
1.9% (0.3 mil tons)
8.9% (1.5 mil tons)
3.6% (0.6 mil tons)
17.3% (2.9 mil tons)
68.3% (11.4 mil tons)
Electric Utilities
Industrial
Other Fuel Combustion
On-Road Vehicles
Non-Road Engines & Vehicles


U.S. Carbon Dioxide (CO2) Emissions by Fossil Fuel Combustion Source, 2000 (in short tons)
0.7% (0.04 bil tons)
6.7% (0.4 bil tons)
41.8% (2.6 bil tons)
31.8% (2 bil tons)
4.3% (0.3 bil tons)
14.7% (0.9 bil tons)
Electricity Generation
Industrial
Commercial
Transportation
Residential
U.S. Territories


U.S. Mercury Emissions by Fossil Fuel Combustion Source, 1996 (in short tons)
2.1% (1.4 tons)
0.6% (0.4 tons)
10.3% (6.9 tons)
5.9% (4 tons)
81.1% (54.6 tons)
Electric utilities
Industrial/commercial/ institutional boilers
Mobile
Residential heating
Other fuel combustion

The largest share of that pollution now comes and will continue to come from old, inefficient fossil fuel electric generating plants unless there is additional Federal or State action requiring further reductions. Without the adoption of substantially cleaner, and more efficient renewable electricity generating technologies, existing and projected levels of pollution will continue to degrade human health, reduce visibility, and harm ecosystems.

NECESSARY ADDITIONAL EMISSION REDUCTIONS FROM FOSSIL FUEL POWER PLANTS

While the 1990 Clean Air Act Amendments are helping to slow or reverse the growth of public health risks and ecological damage in the United States, science clearly demonstrates that the sulfur dioxide reductions target in the 1990 Amendments, and reductions through other programs and regulations of nitrogen oxides, were not set stringently enough to help prevent millions of people from continuing to breathe unhealthy air or to fully reverse the damaging effects of air quality related values such as acidification of forests, lakes and streams. Studies indicate that tens of thousands of people are dying prematurely every year due to emissions of fine particulate matter ($PM_{2.5}$). In much of the country, especially in areas east of the Mississippi River, the majority of this pollution is sulfur dioxides and nitrogen oxides emitted from burning coal.

The Clean Air Act Amendments of 1990 set specific attainment deadlines for areas to achieve the health-based NAAQS. In general, the less polluted an area was at the time of passage in 1990, the fewer control measures that area had to adopt as part of its State Implementation Plan (SIP) to achieve attainment of the NAAQS. None of the areas designated as "serious" ozone nonattainment (.160-.180 ppm), with approximately 31 million people, have met their 1999 attainment deadline. Nine of 31 "moderate" ozone nonattainment (.138-.160ppm) areas, with 6.5 million people, have not yet met their 1996 attainment deadline. This nonattainment situation has led, in part, to the EPA's promulgation of the NOx SIP Call, which requires States to adopt nitrogen oxides emissions control measures in their SIPs. The majority of these reductions will most likely come from electric generating units (EGUs), defined in the Act as units above 25 MW.

Since 1990, growing scientific evidence suggests that adverse human health impacts result from even minor exposure to air pollutants, especially ozone and fine particulate matter. Both of these pollutants also have serious harmful impacts on children including neonatal mortality, lung growth retardation and adverse birth outcomes (Woodruff (1997), Ritz (2002), Gauderman, et al. (2000), and others). A linear dose-response relationship has been clearly demonstrated for $PM_{2.5}$ and premature mortality by the American Cancer Study (Pope, 2002), Harvard Six Cities Study (Dockery et al. 1993) and the Health Effects Institute reanalysis (Krewski et al., 2000) study and others, and confirmed in testimony. Recent studies suggest a link between $PM_{2.5}$ and heart rate variability and ultimately heart attacks (Peters et al., 1999).

Significant data has been collected to show that many pollutants, including $PM_{2.5}$, have much greater than expected local impacts, but they can also travel much further, even between continents,

than initially thought and have worldwide effects. This transport effect is readily apparent in the Asian Brown Cloud phenomenon documented in the United Nations Environment Program Assessment Report (2002), and the identification of soot particles from Chinese sources in the Pacific Northwest of this country. The Ozone Transport Assessment Group has contributed substantially to the understanding of the ability of air currents to transport pollutant-laden, aged airmasses hundreds of miles. (Blumenthal et al., 1997; A Basis for Control of BART-Eligible Sources, Northeast States for Coordinated Air Use Management-(2001))

The Federal Government has demonstrated that it can act swiftly and decisively to serious threats posed by air emissions. The Clean Air Act regulates some manmade global pollutants, such as chlorofluorocarbon (CFC), which act indirectly on human and environmental health. These substances have been largely phased out due to their potential to deplete the ozone layer and thereby allow harmful ultraviolet radiation to reach the Earth's surface. On scientists' advice, the international community, including the United States, swiftly committed to global reductions in CFCs and similar gases and the development of substitutes. These actions took place swiftly because CFCs and other similar gases continue to destroy ozone for decades once they reach the upper atmosphere.

Man-made emissions of greenhouse gases, such as carbon dioxide and methane, are accumulating in the atmosphere and are causing the average surface air and subsurface ocean temperature of the Earth to increase, according to the National Academy of Sciences report Climate Change Science (2001) and the international scientific community. This warming is likely to cause more frequent severe weather, ecosystem elimination, sea-level rise, increases in tropical diseases, and other climate changes that will adversely effect human and environmental health. Greenhouse gases prevent infrared radiation (heat) from being radiated back into space from the Earth's surface. Temperatures are expected to rise about 5.4 degrees Fahrenheit or more by the end of the century (International Panel on Climate Change (IPCC), Working Group 1 Report 2001).

Greenhouse gas concentrations have increased from 270 ppm prior to the Industrial Revolution to approximately 360 ppm today and are expected to double (550 ppm) by about 2060. Ice core data indicates that today's levels are already at their highest in the last 400,000 years. There is some paleoclimate research that suggests, if emissions continue on their current path, within a century the concentrations will be the highest level the Earth has seen in 20 million years. The United States is responsible for approximately 25 percent of the total greenhouse gases emitted globally every year, yet represents only 5 percent of the world's population.

The committee finds it essential that additional and significant reductions in emissions must occur quickly for the sake of human and environmental health for today's population and generations to come. Progress has been made and continued reductions of conventional pollutants are underway in the transportation sector, particularly from passenger vehicles. However, there remain considerable challenges in reducing emissions for non-road and in-use die-

sel engines. Emissions of greenhouse gases from the transportation sector are climbing dramatically with no expected change.

Stationary sources, and in particular fossil fuel electric generating facilities, also have a poor performance record in terms of greenhouse gases. Carbon dioxide emissions from those facilities are more than 26 percent above 1990 levels, and much deeper reductions in nitrogen oxides and sulfur dioxides are needed to modernize outdated plants that are responsible for most of the sulfur dioxide emissions in the Nation and much of the nitrogen oxides from electricity generation. Reductions in power sector criteria pollutants have lagged behind those from the transportation sector largely because, unlike the automobile fleet, turnover of the power plant fleet to new, cleaner generation has not occurred.

The average efficiency of coal-fired plants hovers at 33 percent or the same level as in 1960, and one-sixth of the plants have not applied any pollution control equipment and are responsible for more than one-third of the annual national Title IV sulfur dioxide emissions. Technologies exist today that could increase these plants' efficiency to 50–60 percent, and cut criteria pollutants by up to 90–95 percent. (See EPA, ORD November 2000, A Review of SO_2 Control Technologies). However, fewer than 15 percent of power plants have installed basic sulfur dioxide removal technologies. While these emissions reductions opportunities exist, there is no assurance that such reductions will be achieved without the adoption of aggressive State or Federal multi-pollutant legislation. Major reductions from the electric generation sector are necessary, feasible and highly cost-effective, especially when market-based mechanisms are employed and a comprehensive view is taken of the long-term benefits.

FOSSIL FUEL ELECTRICITY GENERATION RELATED POLLUTION

According to the Energy Information Administration, there are 3,200 electric utility power plants in the United States. These plants are capable of generating approximately 639,143 megawatt hours of electricity annually. In 1999, fossil fuel combustion accounted for 70 percent of that generation (coal—45 percent, natural gas—19 percent and oil—6 percent), and the remainder was derived from nuclear and hydroelectric energy. In that year, fossil fuel power plants were the single greatest industrial source of four major pollutants of concern—sulfur dioxide, nitrogen oxides, mercury and carbon dioxide.

In 2000, these fossil fuel power plants emitted significant quantities of those pollutants into the atmosphere: 11.4 million tons of sulfur dioxide (SOx)—63 percent of the national total; 5.3 million tons of nitrogen oxides (NOx)—21 percent of the total; 2.6 billion tons of carbon dioxide—40 percent of the total; 52 tons of mercury—about 35 percent of the total, and approximately 394,000 tons of Toxic Release Inventory chemicals (from coal/oil combustion) or 41 percent of the total. The majority of these pollutants came from power plants that Congress expected would have been closed or substantially replaced by now with cleaner, more efficient generation. But, through life extension and modifications, these facilities continue to operate economically, though many of the largest emitters are more than 30 years old.

As noted, the Clean Air Act has resulted in significant emission reductions of nitrogen oxides and sulfur dioxide from many electric utilities. Nitrogen oxides emissions from utilities rose from 4.9 million tons in 1970 to 7.024 million tons in 1980. Sulfur dioxide emissions rose only slightly in that same period from 17.4 million tons to 17.5 million tons. By 2000, compliance with Title IV of the Clean Air Act resulted in nitrogen oxide emissions dropping to 5.3 million tons and SOx emissions dropping to 11.4 million tons. Emissions of sulfur dioxide from coal-fired electric generating facilities in 2000 were estimated to total 10.7 million tons.

The utilities covered by Title IV represented 67.2 percent of the total sulfate emissions in 1990. Phase 1 of that Title required the owners/operators of 111 electric generating facilities listed in the law larger than 100 megawatts to meet tonnage emission limitations by January 1, 1995. This reduced sulfur dioxide emission by about 3.5 million tons. Phase 2 included facilities larger than 75 megawatts, with a deadline of January 1, 2000, and was designed to bring the sector down to 8.95 million tons and keep emissions from the approximately 2,265 covered sources at that level. Electricity generation not covered by this Title is a growing segment of the total pollution inventory, according to the EPA. In 1999, industrial boilers (<250 mmBtu) were the greatest portion of this segment. They account for annual emissions of approximately 2 million tons of sulfur dioxides, 1 million tons of nitrogen oxides and 5 tons of mercury, while supplying electricity or heat through fossil fuel combustion.

Table A-7
Utility Emission Summary*
(thousand tons per year)

Pollutant/Source Category		1990	2000 Pre-CAAA	2000 Post-CAAA	2010 Pre-CAAA	2010 Post-CAAA
VOC						
	Coal	27.1	23.6	23.1	26.3	24.7
	Gas/Oil/Other	7.8	1.8	1.9	1.5	1.7
	Internal Combustion	1.9	5.6	6.1	21.2	23.5
	TOTAL	36.8	31.0	31.1	49.0	49.9
NO_x						
	Coal	6,689.5	7,895.7	3,779.0	8,700.3	3,610.0
	Gas/Oil/Other	679.1	324.1	216.0	220.0	72.6
	Internal Combustion	57.1	97.3	82.1	134.4	83.7
	TOTAL	7,425.7	8,317.1	4,077.1	9,054.7	3,766.3
CO						
	Coal	232.6	191.8	188.7	215.3	202.5
	Gas/Oil/Other	81.9	48.0	49.3	44.8	45.9
	Internal Combustion	14.7	50.7	55.4	193.6	214.8
	TOTAL	329.2	290.5	293.4	453.7	463.2
SO_2						
	Coal	15,221.9	16,111.3	10,315.0	17,696.0	9,776.6
	Gas/Oil/Other	611.9	44.1	175.5	0.0	84.2
	Internal Combustion	30.7	0.0	0.0	0.0	0.0
	TOTAL	15,897.5	16,155.4	10,490.5	17,696.0	9,860.8
PM_{10}						
	Coal	268.4	244.7	245.1	281.1	249.0
	Gas/Oil/Other	10.6	1.5	2.5	1.0	1.6
	Internal Combustion	4.1	6.1	6.6	23.4	26.0
	TOTAL	283.1	252.3	254.2	305.5	276.6
$PM_{2.5}$						
	Coal	99.2	82.9	82.3	97.0	83.7
	Gas/Oil/Other	5.9	1.3	2.4	1.0	1.6
	Internal Combustion	3.7	6.0	6.6	23.3	25.8
	TOTAL	108.8	90.2	91.3	121.3	111.1
NH_3						
	Coal	0.0	0.0	33.3	0.0	221.9
	Gas/Oil/Other	0.0	0.0	0.0	0.0	0.0
	Internal Combustion	0.0	0.0	0.0	0.0	0.0
	TOTAL	0.0	0.0	33.3	0.0	221.9

* The totals reflect emissions for the 48 contiguous States, excluding Alaska and Hawaii.

Source: EPA Report to Congress on Benefits and Costs of the Clean Air Act 1990–2010, Nov. 1999.

Table A-16
Airborne Mercury Emission Estimates

Source Category	1990 Emissions (tons)	2000 Emissions (tons) Pre-CAAA	2000 Emissions (tons) Post-CAAA	2000 Emissions (tons) Diff.	2010 Emissions (tons) Pre-CAAA	2010 Emissions (tons) Post-CAAA	2010 Emissions (tons) Diff.
Medical Waste Incin.	50	17.9	1.3	16.6	22.6	1.6	21.0
Municipal Waste Comb.	54	31.2	5.5	25.7	33.8	6.0	27.8
Electric Utility Generation	51.3	63.0	61.1	1.9	68.5	65.4	3.1
Hazardous Waste Comb.	6.6	6.6	6.6	0	6.6	3.0	3.6
Chlor-Alkali Plants	9.8	6.0	6.0	0	2.0	1.3	0.7
Total CAAA Benefits (Reductions)				44.2			56.2

Note: the post-CAAA for electric utility generation does not include the imposition of a final MACT requirement for mercury emissions that a consent decree requires to be promulgated by 2005.

Table 2-3: CO_2 Emissions from Fossil Fuel Combustion by Fuel Type and Sector (Tg CO_2 Eq.)

Fuel/Sector	1990	1995	1996	1997	1998	1999	2000
Coal	**1,692.6**	**1,792.7**	**1,878.4**	**1,930.5**	**1,949.7**	**1,956.9**	**2,030.1**
Residential	5.8	5.0	5.1	5.5	4.2	4.4	4.4
Commercial	8.7	7.6	7.7	8.2	6.3	6.6	6.6
Industrial	135.9	131.2	125.5	126.9	121.4	117.0	102.8
Transportation	NE	NE	NE	NE	NE	NE	NE
Electricity Generation	1,541.5	1,647.9	1,739.1	1,789.0	1,817.0	1,828.0	1,915.4
U.S. Territories	0.6	0.9	0.9	0.9	0.9	0.9	0.9
Natural Gas	**988.8**	**1,141.3**	**1,162.4**	**1,166.7**	**1,125.8**	**1,145.2**	**1,204.8**
Residential	238.5	263.1	284.6	270.5	246.5	256.5	268.3
Commercial	142.4	164.5	171.6	174.7	163.6	165.2	180.8
Industrial	358.0	398.5	414.8	409.6	378.0	372.9	371.3
Transportation	36.0	38.3	38.9	41.5	34.9	40.2	41.9
Electricity Generation	213.8	276.8	252.5	270.4	302.9	310.4	341.9
U.S. Territories	NO	NO	NO	NO	NO	NO	0.6
Petroleum	**2,098.2**	**2,150.9**	**2,225.6**	**2,242.0**	**2,280.3**	**2,346.3**	**2,388.2**
Residential	87.7	94.2	100.7	98.9	91.1	99.6	102.2
Commercial	66.1	51.8	53.5	50.8	47.7	48.0	51.8
Industrial	377.8	365.1	396.2	398.7	381.7	368.2	355.1
Transportation	1,435.8	1,541.0	1,579.8	1,587.3	1,620.1	1,688.0	1,747.6
Electricity Generation	103.4	64.5	69.5	78.4	106.5	107.7	95.2
U.S. Territories	27.4	34.3	25.8	27.9	33.3	34.8	36.3
Geothermal*	**0.2**	**0.1**	**0.1**	**0.1**	**0.1**	+	+
Total	**4,779.8**	**5,084.9**	**5,266.4**	**5,339.4**	**5,356.0**	**5,448.4**	**5,623.1**

NE (Not estimated)
NO (Not occurring)
+ Does not exceed 0.05 Tg CO_2 Eq.
* Although not technically a fossil fuel, geothermal energy-related CO_2 emissions are included for reporting purposes.
Note: Totals may not sum due to independent rounding.

Source: EPA Inventory of Greenhouse Gas Emissions 1990–2000

Note: Tg (CO_2 Eq) = Teragrams or 1 million metric tons of carbon dioxide equivalent = 1.1023 million short tons CO_2. CO_2 Eq. multiplied by $12/44$ equals carbon equivalent.

However, though there has been progress since the 1990 Amendments, growing electricity demand will stimulate new and greater levels of pollution. If there is no significant change in the nation's energy policy to modify that trend, electricity demand will increase by approximately 42 percent by 2020, or 5 trillion kwh (355,000 MW of new capacity). According to EIA and GAO, 88 percent of

this new demand will be satisfied by natural gas and another 9 percent by coal. (GAO–03–49). That new generation will increase carbon dioxide emissions by approximately 827 million tons, and mercury emissions by 2.8–8.5 tons. Nitrogen oxide and sulfur dioxide emissions could decline by 41–104,000 tons and 2.1 million tons respectively, because of New Source Performance Standards and other Federal and State control programs.

PUBLIC HEALTH AND ENVIRONMENTAL EFFECTS OF ELECTRICITY-GENERATION-RELATED POLLUTION

The public health and environment damaged caused by fossil fueled power plants has been the subject of substantial scientific study. Because Congress was seeking to address primarily the negative effects of acid deposition, the Clean Air Act Amendments of 1990 reduced sulfur dioxide emissions from these plants by a significant amount, and required specific cuts in nitrogen oxides. Those Amendments also created a procedure for reducing hazardous air pollutants, such as mercury, from these plants, and reaffirmed the need and process for reducing transported pollution. However, testimony before the committee indicates that the cuts in these emissions were not deep enough to adequately protect public and environmental health and welfare and that the Act must also address global warming.

Fine Particulate Matter ($PM_{2.5}$) from Sulfur Dioxide and Nitrogen Oxides Emissions

Since Congress last amended the Act, scientific progress has substantially advanced our understanding of the adverse impacts of pollution from the combustion of fossil fuel for energy, particularly on human health. Fossil fuel power plants are a major source of manmade fine particulate matter ($PM_{2.5}$), emitted as sulfur dioxide and nitrogen oxides gas that are converted in the atmosphere to sulfates or nitrate particles. These particles penetrate deep into the lungs and cause cardiopulmonary and lung cancer morbidity and premature mortality.

The seminal studies, the Harvard Six Cities Study and the American Cancer Society Study (2002) of Particulate Air Pollution Mortality, generally show that adverse health effects occur at levels commonly found in U.S. cities and that they increase with an increase in ambient concentrations of fine particulate matter. These studies were reanalyzed and validated by the Health Effects Institute in 2000 (Krewski). Scientists are still working on determining the exact mechanisms by which $PM_{2.5}$ causes health damage. However, substantial epidemiological information accumulated to cause the Administrator of the EPA to establish the first health-based standard for $PM_{2.5}$ in 1997 which was upheld by the Supreme Court in 2001 after lengthy litigation (American Trucking Association vs. EPA).

Fine particulate matter pollution from all sources may be causing as many as 50,000–100,000 premature deaths nationwide every year (Wilson and Spengler, "Particles in Our Air," Harvard (1996)). According to a report frequently cited in testimony (Abt Associates, October 2000) which uses the Krewski (2002) dose-response relationship and EPA pollution data, fossil fuel power plants are likely

to be responsible every year for as many as 30,000 premature deaths, 20,000 hospitalizations, 600,000 asthma attacks and 5,130,000 lost workdays due to illness.

Further, recent work by researchers at the Harvard School of Public Health including research summarized in "Risk in Perspective", the journal of the Harvard Center for Risk

Analysis, found that the risk from power plant pollution is not evenly distributed geographically. 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. (Levy, Spengler et al., 2001)

A bibliography of studies documenting these health effects is attached in APPENDIX II.

Ozone from Nitrogen Oxide Emissions

Power plants emit approximately 21 percent of total U.S. emissions of nitrogen oxides. As noted earlier, nitrogen oxides contribute to PM_{10} and $PM_{2.5}$ loadings, but are also the chief pollutant driving the formation of ground-level ozone. They react with volatile organic compounds (VOCs) in the presence of sunlight to create ozone, also known as smog. Ground-level ozone is a strong oxidant and lung irritant. There has been a primary NAAQS for ozone more than 30 years years largely because of its acute health effects which were thought to be primarily transitory in nature. However, new data suggests that regular exposure to ozone may cause permanent health damage, and have very serious health consequences for children. This information and multiple studies were the bases for a revision of the NAAQS for ozone in 1997, which did not become fully enforceable until 2002, because of litigation by pollution control opponents.

New studies now indicate that not only does ozone exacerbate asthma, but that new cases of asthma may be induced by ozone exposure particularly in otherwise healthy, exercising children. (McConnell et al. (2001)) According to testimony from the American Lung Association

- A study of college freshmen found that lifetime ozone exposure was linked to a reduced lung function;
- A 3-year study of 1,150 children suggests that long-term ambient ozone exposure might hinder the natural development of their lungs;
- A 10-year study of 3,300 school children found that girls with asthma, and boys who spent more time outdoors, suffered reduced ability to breathe in association with ozone.

The study concluded that exposure to air pollution may lead to a reduction in maximal attained lung function, which occurs early in adult life, and ultimately to increased risk of chronic respiratory illness in adulthood.

Some areas of the country without substantial population have regularly experienced unhealthy elevated levels of ozone. This is occurring, in part, because of nitrogen oxides emitted from and ozone caused by regional power plants. For example, in the worst case, the Great Smoky Mountains National Park, which is ringed by several coal-fired power plants, had 52 days during which the level of

the 8-hour ozone standard was exceeded in 1999, equivalent to every other day in the summer. According to testimony from the National Parks Conservation Association, the Park has recorded the highest level of nitrogen deposition of any monitored site (urban or rural) in North America, and researchers there have documented at least 30 different species of plants suffering foliar damage from ground-level ozone; an additional 60 species exhibit the same symptoms.

Only recently has ground level ozone been acknowledged as a problem due to power plant pollution in the Midwest, the Ohio River Valley and increasingly in the West. There is a high correlation between ground level ozone and proximity to power plants—especially in the Midwest and Southeast. The Ohio Environmental Council, in collaboration with the University of Michigan and Harvard University, found that 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 often than people in Boston and New York. Moreover, according to that recent study, Ohio River Valley ozone related hospital admission rates also track this pattern with admission rates higher in the Ohio Valley than in the East. In the Ohio Valley area studied, for example, emissions from coal-and oilfired power plants contribute nearly 50 percent of elevated ozone levels in the Valley, enough by themselves to cause violations of the Federal health standard.

In addition to human health, ozone also affects agricultural crops. 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 National Crop Loss Assessment Network (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.

Health and Welfare Effects of Mercury

Power plants rank first in release of toxics to the air—842 million pounds of chemical releases to the air in the 1999 Toxics Release Inventory. This accounts for over 40 percent of the nation's total toxics emissions inventory. Coal-fired power plants are responsible for approximately one-third of all U.S. mercury emissions. As other sources such as incinerators continue to reduce their emissions, and coal-fired power plants increase generation, this proportion will increase.

The National Research Council (2000) has found that mercury poses a serious risk to humans, particularly fetuses and children. Mercury can and does bioaccumulate in fish and animal tissue in a highly toxic form, methylmercury. Methylmercury exposure, especially when it occurs to a developing fetus through a mother's consumption of contaminated fish, and in early childhood, can cause serious neurological impairment. Forty-three States have fish

advisories warning people against eating certain species of fish from more than 60 percent of all U.S. water bodies.

The National Research Council concluded that each year about 60,000 children may be born in the U.S. at risk of neurological problems as a result of their mothers' consumption of large amounts of fish and seafood during pregnancy. A study by the Centers for Disease Control and Prevention, which examined mercury levels in blood and hair in the general population, suggests the number of at-risk children could be even higher—up to 390,000 children are at risk, with one in 10 women of childbearing age exceeding the mercury body level considered safe by the EPA. According to the National Atmospheric Deposition Program 2000 Annual Summary, every State in the lower 48 States that monitors mercury deposition has had to issue fish consumption advisories to its citizens. The 6 States without advisories do not monitor mercury.

In EPA tests, 67 different HAPs were detected in the flue gases from coal fired power plants. Of these, 55 are known to be neurotoxic or developmental toxics (i.e., affect development of a child's brain, nervous system or body). Examples include cadmium, manganese and selenium. In addition, 24 are also known, probable or possible human carcinogens. Examples include arsenic, chromium, and beryllium. Electric utilities reported to the 2000 Toxic Release Inventory emissions of over 60 different toxic chemicals and compounds.

Global Warming and Climate Change from Carbon Dioxide Emissions

Fossil fuel power plants account for 40 percent of national carbon dioxide emissions and 10 percent of global carbon dioxide emissions. Carbon dioxide is largely a byproduct of fossil fuel combustion and a principal cause of global warming, but is not now explicitly regulated by the Clean Air Act, and does not have a direct impact on human health. However, concentrations of carbon dioxide and other greenhouse gases are increasing in the atmosphere due to human activity, and causing surface air temperatures and subsurface ocean temperatures to rise. This warming is expected to continue throughout the next century, with increases of 3.5 to 10 degrees Fahrenheit by 2100, and is expected to have serious public health and environmental effects, including increased incidence of disease, such as tropical vector-borne illnesses like malaria, and heat-related deaths, and enhanced conditions for formation of ground-level ozone.

This warming will interfere with the Earth's climatological system, increasing the probability of extreme weather events, including heat waves, floods, droughts and similar natural disasters, including higher ozone concentrations and increases in water-borne and insect-borne infectious diseases. The United States has an advanced public health system and adaptation will be less difficult here compared to developing countries, but adaptation to climate change will still come at a substantial cost domestically, especially if solutions are delayed. Some economists have projected net annual U.S. costs of all climate related impacts as approaching 1–3 percent of GDP by 2060 at which time a doubling of greenhouse

gas concentrations will likely be reached. (Nordhaus (1991), Cline (1992), Titus (1992), Fankhauser (1995), and R.S.J. Tol (1995))

The adverse impacts of increasing greenhouse gas concentrations include climate-related shifts in ecosystems. Human communities may be able to adapt on the rapid timescale of expected climate changes, but some biomes may not have that ability. The Administration's Climate Action Report to the U.N. Framework Convention on Climate Change for 2002 said:

"Some ecosystems that are already constrained by climate, such as alpine meadows in the Rocky Mountains, are likely to face extreme stress and disappear entirely in some places. . . . In the northeastern United States, both climate scenarios suggest changes mainly in the species composition of the forests, including the northward displacement of sugar maples, which could lead to loss in some areas. . . . Basically, changes in land cover were projected to occur, at least to some degree, in all locations, and these changes cannot generally be prevented if the climate changes and vegetation responds as much as projected."

The National Assessment on Climate Change (2000) and the regional assessments that have been completed indicate there are likely to be significant economic dislocations and specific regional impacts of global warming as well. Crop distributions will change, including the probable disappearance of the sugar maple from the Northeast. Decreased snowpack and/or earlier season melting will affect water availability and resource cycles and supply infrastructure. Existing outdoor recreation and tourism businesses will likely shift from traditional patterns. Fire seasonal severity rating will increase by 10–50 percent over most of North America, translating into increased forest fire activity (Flannigan et al., 2000) and potential economic losses. In 2002, 6.5 million acres have burned in wildfires exacerbated by drought, nearly double the 10-year average (National Interagency Fire Center).

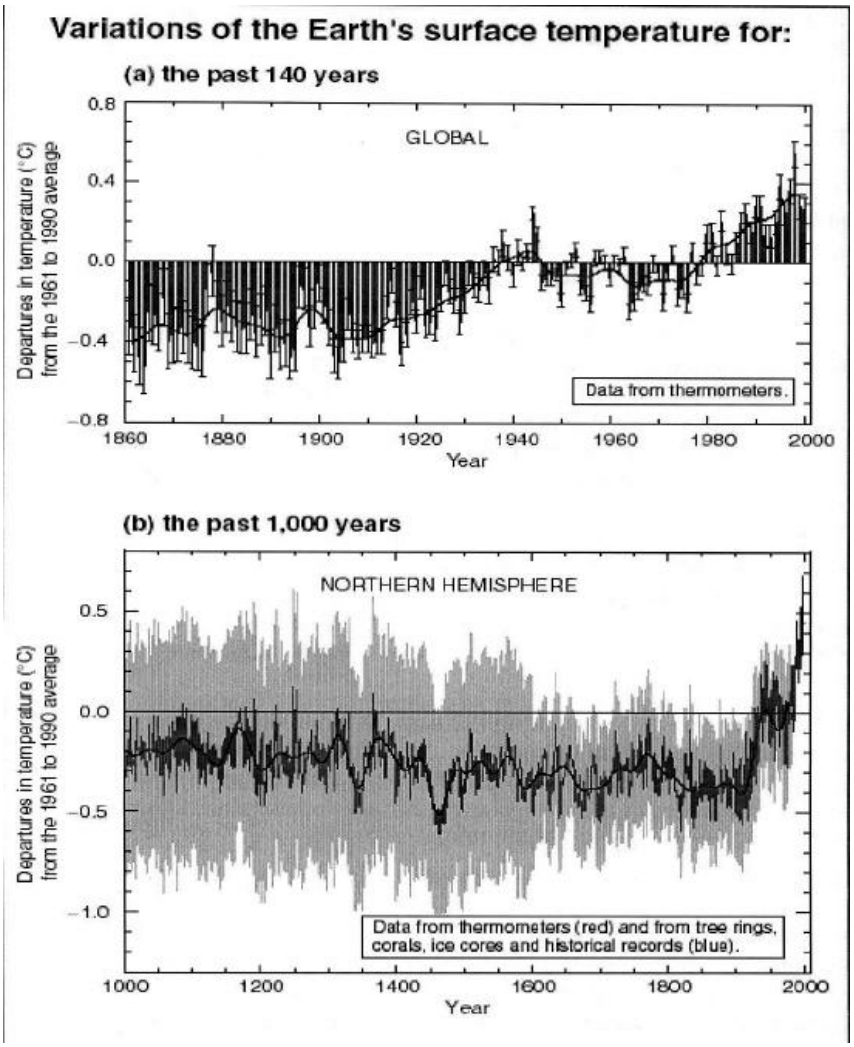
The committee has also heard testimony that human community growth patterns are likely to increase the vulnerability of infrastructure to weather extremes, whatever their originating cause or enhancement. Fifty-three percent of the U.S. population lives within the coastal regions, along with trillions of dollars of infrastructure. These people and their property will be affected by the continued sea level rise that the Administration projects to be approximately 19 inches over the next century, though it may rise by as much as 36 inches.

According to a report by the Pew Center on Global Climate Change, Sea-Level Rise and Global Climate Change (2000), "National assessments suggest that a one-meter rise in global sea levels could have significant impacts, including the inundation of about 35,000 square kilometers or 13,000 square miles, divided equally between wetlands and upland." And,". . . the 100-year coastal flood plain could increase by 38 percent, or at least 18,000 square kilometers." (FEMA, 1991)

According to the EPA's global warming web page, "nationwide, a two foot rise in sea level could eliminate 17–43 percent of US wetlands. . . . Including both the wetlands and dry land that would be lost to the sea, a two foot rise in sea level would eliminate approximately 10,000 square miles of land, an area equal to the com-

bined size of Massachusetts and Delaware." (Source cited: Coastal Management 19:186–87, 199–201 (1991))

The majority of the analyses of the climatological effects from increasing greenhouse gas concentrations have assumed a gradual warming and related impacts. However, in a 2002 report, the National Academy of Sciences indicated that". . . greenhouse gas warming and other human alterations of the earth system may increase the possibility of large, abrupt and unwelcome regional or global climatic events." Such events may be triggered in a switch-like fashion rather than gradually complicating adaptation responses. The Academy recommended that U.S. research priorities be directed toward an observation system that will detect early signs of "threshold crossing," or the development of abrupt and persistent changes in the climate system that will have the greatest impact on human communities and ecosystems. The existing system and near-term improvements, as described by Administration witnesses before the committee, appear inadequate to ensure early detection of dangerous trends.



Source: Intergovernmental Panel on Climate Change Working Group I, Summary for Policymakers, p. 3.

The main objective of the United Nations Framework Convention on Climate Change, ratified by the Senate in 1992, is to avoid such a situation by taking preventative actions:

> The ultimate objective of this Convention and any related legal instruments that the conference of the Parties may adopt is to achieve, in accordance with the relevant provisions of the Convention, stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. Such a level should be achieved within a timeframe sufficient to allow ecosystems to adapt naturally to climate change, to ensure that food production is not threatened and to enable economic development to proceed in a sustainable manner.

In his February 14, 2002, climate policy speech, President Bush said: "I reaffirm America's commitment to the United Nations

Framework Convention and it's central goal, to stabilize atmospheric greenhouse gas concentrations at a level that will prevent dangerous human interference with the climate." Given that the Administration now projects in its Climate Action Report that it is likely that some ecosystems will disappear, as noted earlier, the country and the world may have already entered a zone of "dangerous interference" with the climate system.

Acid Rain from Sulfur Dioxide and Nitrogen Oxide Emissions

Ecosystems are already under considerable stress from the enormous volume of currently emitted conventional pollutants such as sulfur dioxide and nitrogen oxide. Limitations and programs in the existing Clean Air Act have begun to reduce emissions of these pollutants substantially. But, sulfate and nitrate deposition, largely in the form of acid rain, has severely damaged and continues to damage the sustainability of the northeastern ecosystem, and accumulating data suggests that similar damage is occurring in the southeast part of the country.

Approximately 41 percent of lakes in the Adirondacks and 15 percent of lakes in New England still exhibit chronic and/or episodic acidification, and 83 percent of these impacted lakes are acidic due to atmospheric deposition. Other sensitive areas in the United States include the mid-Appalachians, southern Blue Ridge and high-elevation western lakes. 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. As acidity climbs, the mean number of fish species falls dramatically.

Comparison of fish data collected in the Allegheny Plateau and Ridge and Valley region 40 years ago to data collected in the mid–1990's found an overall decrease in species diversity, with the most dramatic declines occurring in five species of non-game, acid-sensitive fish. Streams that experienced a loss of species had greater increases in acidity and more episodic acidification than streams that either gained or had no change in species. In the same area, acid rain has been associated with poor sugar maple and red oak regeneration as well as deterioration of tree health and excessive mortality in mature trees of both species.

The Hubbard Brook Research Foundation has determined that an 80 percent reduction in sulfur dioxide emissions from power plants will be necessary before biological recovery could begin by 2050 in the Northeast. A recent study (DeHayes, Hawley, Schaberg 2002) done at the University of Vermont indicates that the damage from acid rain may be far worse and more widespread than previously documented. The pollution may cause trees, as with immune compromised humans, to appear and function as if healthy, until exposed to even routine stresses or disease, then experience declines far more pronounced than would otherwise be expected.

Acid rain saps calcium from the needles of trees, weakening the cell membranes and making the trees susceptible to damage from freezing in the winter and more vulnerable to diseases and/or insect outbreaks. Acid rain also depletes soil nutrients largely cal-

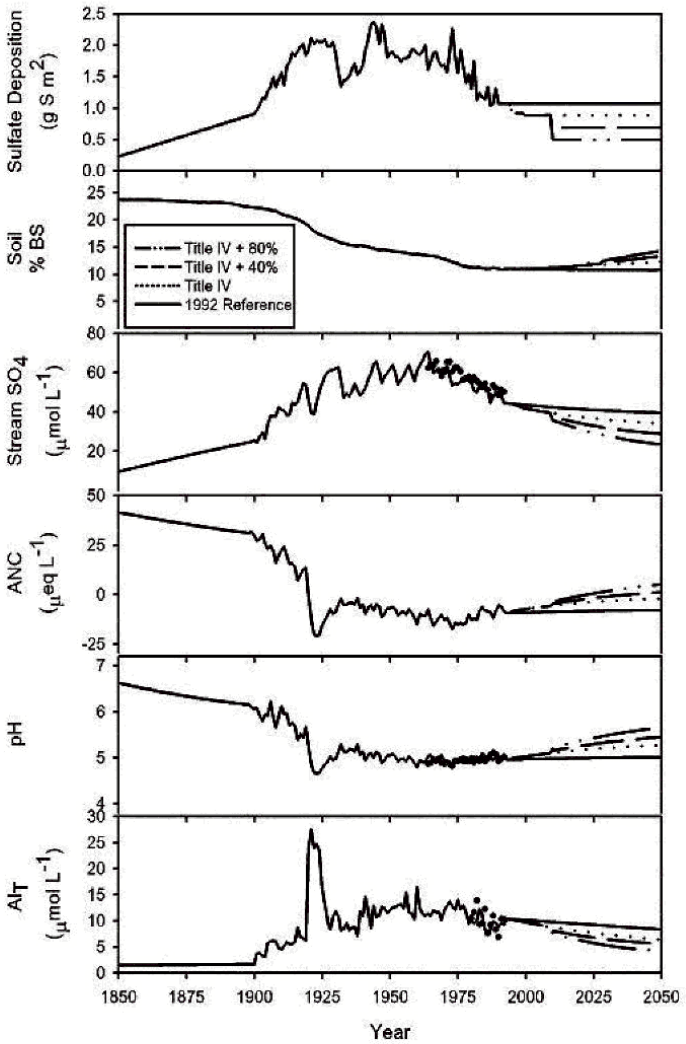
cium and magnesium needed for healthy forest growth. The leaching of calcium from needles and soils makes aluminum in the soil more bioavailable to tree root system and in lakes and streams. Aluminum is harmful to the trees, but also interferes with fish reproduction and other benthic process.

The U.S. Geological Survey has shown that calcium in forest soils has decreased at locations in the northeastern and southeastern U.S. forest soils, with acid rain as a major factor contributing to this depletion. Although most evidence shows that conifers tend to be more impacted than hardwood trees, acid rain is also hurting deciduous trees. Detection of patches of dead trees in northern hardwood forests of the Southern Appalachian National Forests has been attributed to the interactions of many stressors, including air quality. Analyses at forest sites in the southeastern United States suggest that within 80 to 150 years, soil calcium reserves will not be adequate to supply the nutrients needed to support the growth of merchantable timber. Model simulations in the Shenandoah Valley 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. But, a 70 percent reduction would simply prevent further increases in Virginia stream acidification.

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

In the Chesapeake Bay, power plant emissions account for 10 percent of nitrogen entering the ecosystem. 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. This nitrogen input has significant ecological impacts, including loss of biological diversity, degradation of the marine habitat and die-offs of plants and animals. High nitrate concentrations in high elevation western lakes, from fossil fuel combustion and fertilizing activities, appear to be changing alpine biotic communities.

Acid Rain Impacts—Ecosystem Indicators



SOURCE OF DATA FOR GRAPHS—HUBBARD BROOK RESEARCH FOUNDATION

Key: Reduction scenarios assume emissions reductions from electric utilities only.

Title IV + 80 percent = Title IV SO_2 reduction levels plus an additional 80 percent reduction.

Title IV + 40 percent = Title IV SO_2 reduction levels plus an additional 40 percent reduction. . . . etc.

Timeline periods: Background (pre-industrialization), industrialization and increased human activity, 1970 Clean Air Act and some ecological improvement, 4-scenario model for 50 years into the future.

a) Sulfate Deposition: Amount of sulfate deposition from the atmosphere as measured in kilograms per hectare. Demonstrates that controls in emissions have positive impact on the ground, improving ecology. b) Soil percent Base Saturation: Percentage of all soil that contains base elements like calcium and magnesium that can buffer against acid rain. Ideally, this should be at least 20 percent. This changes very slowly because the soil has to regain calcium over time. c) Stream SO4: Concentration of stream sulfate. There is no threshold value here, but it declines (improves) over time as emissions decline depending on the buffering capacity of nearby soils. d) ANC: Shows the acid neutralizing capacity of a stream, i.e., how many equivalents of acid can be neutralized in 1 liter of stream water. The higher the ANC, the better. Preferably, this number should be over 50, though HBEF's goal is to make it above 0. ANC changes slowly over time. e) pH: Stream acid level. This is logarithmic, meaning for every point change in pH there is a 10-fold difference in hydrogen ion content. In the HB region, the goal is 6.0. At 6.0 ecosystem recovery is stimulated. f) Al: Total concentration of stream aluminum. High aluminum levels are very harmful to fish, worse even than high acid levels. The aluminum target value is less than 2.

Visibility Impairment from Sulfur Dioxide and Nitrogen Oxide Emissions

Throughout the United States, in National Parks, wilderness areas, and wildlife refuges experience significant manmade haze. There are none that are unaffected. Visibility—the distance, clarity, contrast and color in a scenic vista—has declined dramatically over the past half century, especially in the eastern United States. Visibility has begun to improve in some areas because of the Clean Air Act, yet a few are still deteriorating. In the East, annual mean visibility is commonly one quarter of natural conditions and as little as one-eighth in the summer.

Taken together, sulfur dioxide and nitrogen oxide emissions are responsible for as much as 80 percent or more of this visibility impairment in the East, especially in the southern Appalachian Mountains. In the West, haze is a combination of sulfates and a larger share of nitrates as well as carbon aerosols. When these components are assessed for their contribution to the problem, electric power accounts for about ⅔ of the emissions that lead to regional haze-related visibility impairment in the East, most of which is caused by sulfur dioxide emissions that become sulfates. In the West, some areas are dominated by nitrates, (e.g. Yosemite National Park). Notably, as sulfur dioxide emissions are reduce in the future, nitrates will play a larger role as more ammonium becomes available to form nitrate particles from nitrogen oxides. For this reason, sulfur dioxide and nitrogen oxides emissions reductions must occur simultaneously.

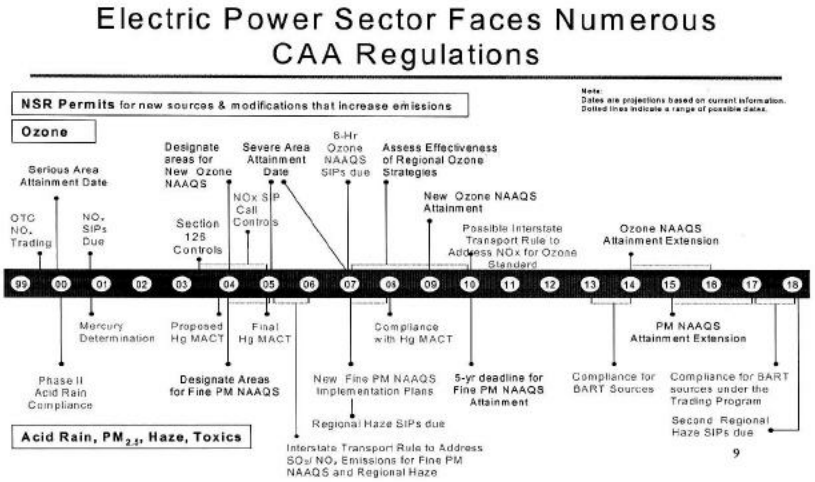
The cuts in sulfur dioxide to date under the acid rain program have reduced sulfates and slightly reduced visibility impairment but have yet to result in perceptibly improved vistas. Research shows that visibility improves more rapidly with progressively deeper cuts in sulfate than have occurred. According to the EPA, average visual range in most Eastern Class I areas is 15–25 miles, compared to estimated natural visibility of about 90 miles. In the West, average visual range is 35–90 miles for most Class I areas, compared to estimated natural visibility of about 140 miles. Accord-

ing to the Department of the Interior," Visibility impairment is the most ubiquitous air pollution-related problem in our national parks and refuges parks and refuges such as Grand Canyon, Cape Romain, and Great Smoky Mountains have evidenced declining visibility all areas monitored for visibility show frequent regional haze impairment." (EPA Docket No. A–2000–28)

FEDERAL ACTIONS AND AUTHORITIES TO REDUCE POLLUTION WITHOUT CHANGING THE CLEAN AIR ACT

As mentioned above, the Clean Air Act does not rely on any single program to address the problems created by pollution from fossil fuel power plants. There are a variety of requirements that can and will be applied to these large sources of pollution to ensure that there is continued progress in emissions reductions, without the need for additional statutory changes. (See EPA graphic below) These may occur in the form of implementation of existing Federal regulations, new rules, or enforcement.

Implementation of measures to achieve many of these reductions—for example, reductions in the many new areas that will fail to meet the 8-hour NAAQS for ozone—has already been substantially delayed by litigation. Due to the Federal cap-and-trade allowance program used for sulfur dioxide emissions in the acid rain title, reductions at a given facility do not necessarily reduce the total national level of emissions unless the allowances representing those emission reductions are retired or unused. The committee has repeatedly and unsuccessfully sought to obtain from the Administration its official estimate of the future emissions reductions that are necessary or likely from power plants through full implementation of the Clean Air Act in the coming years. The Agency's 2001 unofficial straw proposal, "A Comprehensive Approach to Clean Power," projects large reductions in mercury, nitrogen oxides, and sulfur dioxides, required under "business-as-usual" implementation with concomitant benefits of greater than $154 billion by 2020.



NAAQS for $PM_{2.5}$ and Ozone

In 2001, the Supreme Court upheld the constitutionality of the Administrator's decision to promulgate the new NAAQS for ozone and fine particulate matter (Whitman v. American Trucking Ass'ns, Inc., 531 U.S. 457 (2001); on remand sub nom. American Trucking Ass'ns, Inc. v. EPA, 283 F.3d 355 (D.C. Cir. 2002)). Once the Agency makes nonattainment designations of areas based on those standards, according to the schedule laid out in Title VI of the Transportation Equity Act for the 21st Century (TEA–21) and section 427 of P.L. 106–377 and as prescribed by the Clean Air Act, the States will then be required to develop implementation plans (SIPs) and adopt control measures to achieve those standards.

The Agency is substantially behind the timeline laid out by Congress, which dictates that designations occur no later than June 2001 for the new ozone standard. For $PM_{2.5}$, designations must begin in late 2004 for areas with 3 years of data and conclude no later than the end of 2005. The design values required for these designations were published by the EPA in September 2002, thereby starting the 2 year period by the end of which designations must be complete. In addition, the EPA has not yet issued an implementation strategy for the ozone standard, as remanded to the Agency in the 2002 D.C. Court of Appeals decision rejecting any remaining challenges.

The EPA has declined to respond comprehensively to committee inquiries to estimate what emissions reductions might be expected from power plants to achieve attainment with the ozone and $PM_{2.5}$ standards. The Agency indicates there is no way to project how States will decide to revise their SIPs to achieve attainment. However, in August 2001, the EPA enumerated to industry the various control requirements and the potential costs and probable timeline for the imposition of the requirements. This presentation and the Regulatory Impact Analysis that accompanied the ozone/$PM_{2.5}$ standards indicated that those new standards could require a reduction of at least 60 percent in sulfur dioxide emissions from currently required levels under Title IV of the Act to assist in achieving cost-effective attainment. This would bring power plant sulfur dioxide emissions down to approximately 3.6 million tons by the approximate attainment date of 2010–2012 or earlier, assuming States adopt the most cost-effective control measures, i.e. power plant reductions, as part of their SIPs.

Nitrogen Oxides Reductions—SIP Call and Interstate Transport Rules

Various regulations with respect to nitrogen oxides, which contribute to ozone formation, should assist in attaining the 8-hour ozone standard. In March 2001, the Supreme Court upheld the EPA's NOx SIP Call which should reduce approximately 1.14 million tons of nitrogen oxide emissions annually by 2007. Under the authority of section 110(a)(2)(D), and backed up by the data collected through the multi-state Ozone Transport Assessment Group, the EPA required 19 States and D.C. to revise their SIPs to reduce nitrogen oxides emissions no later than June 2004. States are most likely to require these reductions come from the most cost-effective source, fossil fuel power plants.

A group of 12 Northeastern States submitted petitions to EPA under section 126 of the Clean Air Act for controlling pollution coming from coal-fired power plants in the Mid-West and South, which are contributing to non-attainment in the downwind States. EPA granted those petitions and, after that decision was upheld by the D.C. Circuit Court of Appeals (Appalachian Power Co. v. EPA; May 2001), promulgated a requirement that specifies NOx allocations for 392 facilities in 12 States and the District of Columbia, and implemented through a cap-and-trade program. The court agreed with EPA's decisions to make the compliance deadline the same as that for the NOx SIP Call. The 126 petitions are expected to result in NOx reductions of approximately 660,000 tons from these plants during the ozone season. These reductions requirements may also be obtained by requirements imposed under the NOx SIP Call.

Hazardous Air Pollutants—Maximum Achievable Control Technology

The Clean Air Act requires that sources of hazardous air pollutants (HAPs) apply maximum achievable control technology (MACT) if their emissions exceed certain levels. As noted earlier, coal-fired power plants are very large emitters of hazardous air pollutants, particularly mercury, chromium, nickel, arsenic, manganese, and others, and well above the thresholds that define major sources of HAPs. Under section 112(n) of the Act, the EPA was to study the hazards to public health of these pollutants and report to Congress by 1994, and then determine whether regulation of these plants was necessary and appropriate. That report was submitted in 1998.

In December 2000, based on that report to Congress, the Administrator made an affirmative determination (Federal Register, v. 65, no.245, 79826) to regulate HAPs emissions from coal-and oil-fired electric generating units. Pursuant to a consent decree entered into with the Natural Resources Defense Council, the Agency must promulgate a final rule to control mercury and other HAPs from fossil fuel power plants no later than December 15, 2004 ("Consent Decree"). Based on testimony before the committee, and EPA presentations to the industry and elsewhere, those control requirements are expected to require reductions of mercury emissions by 70–95 percent from all covered oil-and coal-fired electric generating units (>25MW) by 2007. That will lower total sector emissions of mercury to somewhere between 13.5 tons and 2.25 tons annually by 2007. Control requirements are also expected for nickel emissions from oil-fired electric generating units. Though the Act requires it and EPA's study and determination identified non-trivial public health risks from various HAPs emitted by these units (for example, arsenic, chromium, nickel, cadmium, dioxins, hydrogen chloride, and hydrogen fluoride), the EPA does not appear to have begun a process for setting emission standards for the other HAPs emitted by these units.

Under the Clean Air Act, the EPA was to have promulgated MACT standards for all major HAPs emission source categories by November 15, 2000. No later than 18 months after that date, the States are required to develop MACT standards themselves for any categories that the EPA has failed to address. As of November 15,

2000, the Agency had failed to promulgate standards for 56 source categories covering 84,000 major emitting sources, including industrial and commercial boilers and many other fossil fuel combustion sources. Rather than enforce the law, the EPA has chosen to act in direct contradiction to the Act's statutory requirements and promulgated a rule providing itself and the States substantially more time before all the final Federal MACT standards will be issued. If the law is followed, pursuant to a consent decree or other settlement in Sierra Club v. EPA, No. 02–1135 (D.C. Cir. Filed Apr. 25, 2002), significant reductions in HAPs from all sources, including fossil fuel combustion, should take place reasonably quickly.

Visibility—Regional Haze and BART

In 1977, Congress established a national goal in section 169 of the Clean Air Act—the prevention of any future, and the remedying of any existing impairment of visibility in mandatory Class I Federal areas which impairment results from manmade air pollution. Twenty-five years later, there has been little progress toward that goal. By November 1992, the EPA was to have promulgated regulations to assure reasonable progress toward this national goal. Those regulations were to provide guidance to the States on methods for achieving this goal, and to require SIPs to be revised to contain emission limits for major stationary sources which emit air pollutants which may reasonably be anticipated to cause or contribute to any impairment in any mandatory Federal area and require those sources to apply best available retrofit technology (BART).

In 1999, the Agency promulgated the regional haze rule, which lays out a pathway to achieve the national goal set out in section 169 within 60 years. The implementation of those rules has also been delayed by litigation. Provisions of the rule, in particular BART, were litigated by industry (American Corn Growers Association v. EPA, D.C. Cir., No. 99–1348, May 2002) and the rule was remanded to the EPA by the U.S. Court of Appeals. The committee expects the EPA to expeditiously respond to the Court's decision and act swiftly to implement the law. Based on previous EPA estimates that there are approximately 600 electric generating units emitting 6 million tons of sulfur dioxide annually, and based on a feasible 90–95 percent control level under BART, then full implementation of this section of the Act could reduce those sources by 5.4–5.7 million tons by 2013. Similar control levels are expected for nitrogen oxides, resulting in 1.5 million tons in reductions.

Increasing demand for electricity, without substantial changes in the nation's energy policy that encourage conservation, efficiency and renewable sources, will increase carbon dioxide emissions, mercury and other HAPs, and perhaps nitrogen oxides emissions in the west. The national sulfur dioxide cap and the NOx SIP Call in the eastern part of the country will serve to limit growth in those pollutants in those areas. Additionally, section 111 of the Clean Air Act also requires that all new sources meet, at a minimum, New Source Performance Standards (NSPS).

New Source Performance Standards—New Source Review

Under the Clean Air Act, electricity generating units (>25MW) built or modified after August 17, 1971, are required to comply with NSPS. Units built before that date, often referred to as "grandfathered" power plants, and those that have not undergone modifications that increase emissions, do not have to meet these minimum standards.

The NSPS currently applicable to electric utility steam generating units are presented below. For each of the pollutants, there may be certain additional requirements for specific cases (e.g., anthracite coal, noncontinental area) but these limits are those that are most widely applicable. Section 111(b)(1)(B) of the Act provides that the "Administrator shall, at least every 8 years, review and, if applicable, revise such standards. . . ." The Administrator need not review any NSPS "if the Administrator determines that such review is not appropriate in light of readily available information on the efficacy of such standard." The date of last review of each of the standards is also shown in the table. Despite the statutory requirement to make a determination on information availability in lieu of reviewing and revising the NSPS, the EPA has not made any such determinations nor conducted any reviews on the particulate matter or sulfur dioxide NSPS.

Electric Utility Steam Generating Units; 40 CFR Subpart D[1]

Pollutant	Emission limit	Last reviewed
Particulate matter:		
Solid, liquid, or gaseous fuel	0.03 lb/MMBtu	June 11, 1979
Sulfur dioxide:		
Solid fuel	1.2 lb/MMBtu and 90 percent reduction OR	June 11, 1979
	0.6 lb/MMBtu and 70 percent reduction[1]7	
Liquid or gaseous fuel	0.8 lb/MMBtu and 90 percent reduction OR	June 11, 1979
	0.6 lb/MMBtu[1]	
Nitrogen oxides:		
Solid, liquid, or gaseous fuel	0.15 lb/MMBtu[1]	September 16, 1998

[1] 30-day rolling average (Additional standards for steam units can be found in 40 CFR Subparts Da, Db, Dc, and GG).

MMBtu= million British Thermal Units

Note: According to the Congressional Research Service—"In 1998, EPA promulgated a new NOx NSPS for coal-fired facilities of 0.15 lb. of NOx per million Btu a standard more in line with available technology. However, this new standard was challenged in court. In September, 1999, the D.C. Court of Appeals vacated the new NOx NSPS with respect to modified utility boilers, while upholding the NSPS with respect to new sources. By vacating the modified standard, the NSPS for modified sources returns to the previous 1979 standard until such time as EPA proposes a revised NSPS. As a result, the floor for determining BACT or LAER for modified coal-fired sources is unclear at the current time."

According to the General Accounting Office (GAO–02–709 Air Pollution), 57 percent of the fossil fuel units that generated electricity in 2000 began operating before 1972. Provided that they obtain and surrender to the Administrator the appropriate SOx allowances to cover their total annual emissions, these older units may legally emit SOx and NOx at higher rates than new units which are subject to NSPS. That GAO report states:

Older electricity generating units those that began operating before 1972 emitted 59 percent of the sulfur dioxide, 47 percent of the nitrogen oxides, and 42 percent of the carbon dioxide from fossil-

fuel units in 2000, while generating 42 percent of all electricity produced by fossil-fuel units. Units that began operating in or after 1972 were responsible for the remainder of the emissions and electricity production. For equal quantities of electricity generated, older units, in the aggregate, emitted about twice as much sulfur dioxide and about 25 percent more nitrogen oxides than did the newer units which must meet the new source standards for these substances. Older and newer units emitted about the same amount of carbon dioxide for equal quantities of electricity generated. Of the older units, those in the Mid-Atlantic, Midwest, and Southeast produced the majority of the emissions, and in disproportionate quantities for the amount of electricity they generated compared with units located in other parts of the country. Older units that burned coal released a disproportionate share of emissions for the electricity they produced compared with units burning natural gas and oil.

In 2000, 36 percent of older units emitted sulfur dioxide at levels above the new source standards applicable to newer units, and 73 percent emitted nitrogen oxides at levels above the standards. These "additional" emissions—the difference between actual emissions and the NSPS levels—accounted for 34 percent of the sulfur dioxide and 60 percent of the nitrogen oxides produced by older units. Most of the additional emissions were released from units located in the Mid-Atlantic, Midwestern, and Southeastern United States. Coal-burning units emitted 99 percent of the additional sulfur dioxide and 91 percent of the additional nitrogen oxides, while other fossil fuel-burning units accounted for the remainder.

Based on GAO's data and EPA testimony, the total emissions of sulfur dioxide nitrogen oxides would be dramatically lower if all existing coal-fired sources, particularly those plants built prior to1972, were to apply, at a minimum, the New Source Performance Standards. The EPA estimates that annual emissions would be reduced by 3.4 million tons of SOx by the application of NSPS to all fossil-fuel electric generating units. To date, the Agency has been unable to estimate the affect of NSPS on NOx and fine particulate matter ($PM_{2.5}$) emissions for the same plants. GAO indicates that application of NSPS to just the pre-1972 plants would reduce SOx emissions by 2.13 million tons and NOx emissions by 1.41 million tons annually from those plants. In 1977, when Congress provided those plants with the exemption from immediate application of NSPS, the general understanding was that the plants would either be substantially repowered with cleaner technologies or would become uneconomic and therefore closed by this point in time.

Total pollution inventories would have been further reduced if existing coal-fired electric generating units had complied with the Act's requirement to apply more stringent pollution controls when making modifications, according to the Department of Justice and the EPA. These agencies, and the Attorneys General of New York, Vermont and other States, have taken legal enforcement action against eight companies and the Tennessee Valley Authority that allegedly illegally modified their 51 power plants in a manner that increased emissions without complying with Title I, parts C and D of the Act and the implementing regulations. The Agency has estimated that the enforcement actions, if successfully settled, could

result in annual emissions reductions of 3.1—4.6 million tons of SOx and 0.5—1.4 million tons of NOx, beyond implementation of the NOx SIP Call. The sources in question are alleged to have engaged in modification projects at these power plants which have extended the lives of the plants beyond their normally expected term of operation, and increased emissions in violation of the law.

In addition to setting out requirements for emissions standards for new sources, Title I, parts C and D require new and existing sources making modifications to their facilities that will increase emissions, to go through a pre-construction/pre-modification process called New Source Review and obtain the appropriate permit. Permits for sources in attainment areas are referred to as prevention of significant air quality deterioration (PSD) permits (section 165 of CAA); while permits for sources located in nonattainment areas are referred to as nonattainment (NAA) permits (sections 171 and 172 of CAA). Permits must ensure the facility will meet the performance standards established under section 111. The entire program, including both PSD and NAA permit reviews, is referred to as the NSR program.

In general, the purpose of new source review (NSR) is to ensure that ambient air quality does not deteriorate any further in nonattainment areas, while PSD ensures that areas with good air quality will continue to maintain good air quality. The relevant regulations can be found at 40 CFR Part 51 and in 40 CFR Part 52.

If NSR is determined to apply for reasons described below, then existing sources are required to install the best available pollution control equipment. More specifically, in nonattainment areas, this means using the control technology with the "lowest achievable emission rate" or LAER. In attainment areas, sources must apply the "best available control technology" or BACT. This latter standard allows for the consideration of cost in the selection of the technology. In both kinds of areas, the choice of control technology must not be less stringent than the New Source Performance Standards, which are to be revised every 8 years as noted earlier.

There are approximately 20,000 sources considered to be major under NSR. (Major means those new sources that could potentially emit 100 tons per year of a criteria pollutant, or a source that could increase emissions by 40 tons per year of NOx or SOx through modification.) Approximately 250 sources apply for a PSD or NSR permit annually. According to the EPA's 90-day NSR Review Background Paper in June 2001, PSD sources take permit caps to stay below the NSR threshold and thereby avoid about 1.4 million tons per year of new emissions compared to what would be emitted if there were no such Federal or State permitting.

According to that paper, approximately 90 percent of these reductions are thought to come from electricity generating facilities and have average health related benefits, not including visibility, of approximately $4 billion annually. EPA estimates suggest that, over the life of the program, PSD has prevented more than one hundred million tons of air pollution. The EPA has not, despite repeated requests from the committee for comprehensive public health and air quality analysis on the NSR program, produced an estimate of the pollution prevented by the entire NSR program or the proposed

changes to the implementing regulations, or a thorough analysis of its benefits.

This committee, which has primary Senate legislative jurisdiction over Federal regional economic development entities, including the Tennessee Valley Authority (TVA), takes a dim view of TVA's decision to attempt to oppose the EPA administrative enforcement orders on NSR in a Federal court. The TVA, as a Federal agency, has no standing to pursue such a course, particularly because the TVA's facilities are clearly contributing a significant portion of the emissions that are polluting the Great Smoky Mountains National Park and surrounding and distant areas. The committee expects Federal agencies to be leaders in compliance with the law and well ahead of the private sector in pollution prevention and control technology. Instead of reducing emissions, however, TVA used emission reduction credits under the national trading program in 2001 to emit approximately 300,000 tons of sulfur dioxide above its Phase II allocation. Those excess emissions interfere with visibility and damage public health. While the market-based trading regime in the CAAA of 1990 provides for such use of credits, the committee expects TVA to be primarily a seller of credits, by reducing emissions below permitted levels.

The United Nations Framework Convention on Climate Change

The United Nations Framework Convention on Climate Change, which the Senate ratified in 1992, committed the United States to aim to reduce greenhouse gas emissions to 1990 levels and report on its adoption of policies and measures to return emissions, individually or jointly with other nations, to those levels. Total national emissions of greenhouse gases have increased 14 percent above 1990 levels, despite improvements in national emissions intensity (tons emitted per dollar of gross domestic product).

Emissions from the electricity generation sector have risen rapidly. The sector emitted approximately 2.05 billion tons of carbon dioxide, the principal greenhouse gas, in that year. Emissions from this sector are now 26 percent higher and continue to grow. Voluntary reduction efforts have failed to achieve the 1990 target and the U.S. has failed to report to the U.N. on the policies and measures that it has adopted to achieve 1990 levels.

During 2000, then-Presidential candidate Governor George Bush announced his support for multi-pollutant legislation that would control carbon dioxide emissions from electric power plants. In March 2001, in a letter to several Senators, he reversed that position and, in addition, confirmed his opposition to the Kyoto Protocol, which was negotiated by the U.S. and 180 other countries and signed by President Clinton in 1998. However, the Protocol was not sent to the Senate for ratification nor was any implementing legislation proposed by that Administration. The Kyoto Protocol would have required the United States to reduce greenhouse gas emissions by approximately 7 percent below 1990 levels, with an average reduction across the industrialized nations of about 5 percent below 1990 levels.

American multi-national companies with operations in Europe and other Kyoto-signatories are likely to take steps to reduce net greenhouse emissions in those countries, including the development

of more efficient energy technologies and carbon sequestration methods. That technology may eventually be transferred to American operations and businesses, and around the world. Several American companies have already begun to reduce their greenhouse gas emissions and have established their own targets. In addition, requirements for reporting and disclosure of greenhouse gas emissions due to State laws or shareholder actions may encourage U.S. companies to invest in control efforts.

STATE ACTIONS TO REDUCE POLLUTION FROM POWER PLANTS

The Clean Air Act does not preempt a State from seeking to apply more stringent controls to those sources in that State or, in the case of interstate transport, to sources in other States, so that attainment of the NAAQS can be achieved. Several States, such as New Hampshire, North Carolina, Massachusetts, Oregon and others have taken significant steps to reduce emissions of power plants below what is required by Federal law or regulation. Here are some examples:

State	Bill No.	Purpose	Latest Action
Connecticut	HB5209	The bill limits sulfur dioxide emissions from older power plants to the average rate of 0.33 lbs/MMbtu per quarter per unit by 2003. The use of credit trading as a means of meeting SO_2 standards from older power plants becomes limited in 2004.	Signed Apr. 2, 2002
	Exec. Order	The Governor signed an executive order requiring the development of regulations to reduce emissions of: sulfur dioxide by 30–50 percent from current commitments; and nitrogen oxides by 20–30 percent from current commitments.	May, 2000
Illinois	SB372	Legislation requires Illinois EPA to promulgate rule by 2005 establishing 3P cuts; establishes voluntary registry for carbon cuts.	Signed Aug. 26, 2001
Massachusetts	310 CMR 7.29 Final Rule.	The Dept. of Environmental Protection promulgated a set of regulations requiring reductions at the six dirtiest electric utilities of about 50 percent below current emission levels for NOx and SO_2 by October, 2004. The utilities are also required to cut average CO_2 emissions by about 10 percent below an average of 1997–1999 levels by October of 2006 or 2008 for plant retrofit or replacement. CO_2 credit trading, sequestration, and other offsite strategies are allowed. A final rule for mercury reductions is to be promulgated by December, 2002, with a compliance deadline of 2006.	Finalized Apr. 23, 2001
New Hampshire.	HB284	The NH Clean Power Act caps emissions of carbon dioxide at a slightly higher level than 1990 levels by 2010, which is consistent with the Climate Change Action Plan adopted in 2001 by the New England Governors and Eastern Canadian Premiers. Also, a 75 percent reduction in SO_2 emissions and a 70 percent reduction in NOx emissions are mandated beginning in 2007. Credit trading and banking are allowed for the three pollutants. An assessment of actual mercury emissions is requested, to inform a future legislative process curbing those emissions.	Signed May 9, 2002

State	Bill No.	Purpose	Latest Action
North Carolina	S1078	The NC Clean Smokestacks bill requires all coal-fired utilities over 25MW together to reduce emissions of SO_2 and NOx by 73 percent and 77 percent of 1998 levels, respectively, by 2013 for SO_2 and 2009 for NOx. Annually, the State must report on SO_2 and NOx-scrubbing co-benefits for mercury and recommend additional control requirements for mercury by 2005, if necessary. Similarly, the State must report annually on control options for CO_2 and make a recommendation by 2003.	Signed June 20, 2002
Oregon	HB3283	Any new power plant must reduce net CO_2 emissions by 17 percent below the level of the best existing combustion-turbine plant anywhere in the United States. CO_2 is capped at 0.7 lbs/Kwh for natural gas-fired plants; in 1999 the cap was lowered to 0.675 lbs/Kwh. The standard can be met by any combination of efficiency, cogeneration, and offsets from CO_2 mitigation measures, including paying $0.85 (currently) per ton of CO_2 into a Climate Trust.	Signed June 26, 1997

SUMMARY AND DISCUSSION OF THE BILL'S PROVISIONS

Section 1. Short title

The Clean Power Act of 2002.

Sec. 2. Electric Energy Generation Emission Reductions

A new title is added to the Clean Air Act—Title VII—Electric Energy Generation Emission Reductions. The following is a discussion and summary of provisions of the new Title:

Sec. 701. Findings

Sec. 702. Purposes

Sec. 703. Definitions

Sec. 704. Emission Limitations

SUMMARY

a) EPA is required to promulgate regulations to assure that by 2008 total annual emissions from electric generating facilities (EGFs) greater than 15 Megawatts (or the equivalent in thermal energy generation) are no more than the following: sulfur dioxide—1,975,000 tons in the eastern region and 275,000 in the western region; nitrogen oxides—1,510,000 tons; carbon dioxide—2.05 billion tons; mercury—5 tons. This limitation applies to electric generators that sell electricity generated through combustion of fossil fuels and emit a pollutant listed in the previous sentence. b) The regulations will provide for banking of emissions allowances. In other words, more pollutants may be emitted in a given year than the amounts specified under (a) if EGFs have unused allowances created under this new program from previous years. c) The emissions limitations in a) must be reduced annually by the amount of pollutant emissions from EGFs below 15 MW in the preceding year.

DISCUSSION

This section and section 705 establish the basis for an emission trading program for sulfur dioxide, nitrogen oxides, and carbon dioxide, patterned after the successful emission allowance cap and trade system established in 1990 by the Clean Air Act Amendments Title IV. That system was created in tandem with and in addition to a variety of requirements imposed on electric generating units and other sources, as part of the overall structure of the Act of "cooperative federalism." These sections are intended to operate in a similarly efficient market-based manner, allowing EGFs to make the most economical investments at the appropriate facility-specific pace and still comply with the overall limitation. A cap and trade program for mercury is not established.

These provisions ensure that the Administrator actively maintains the integrity of the caps, yet allows for the flexibility that is necessary in a market-based cap-and-trade system. It also insures, unlike Title IV of the Clean Air Act Amendments of 1990, that growth in pollution from sources below the statutory threshold (i.e. <15 MW) is automatically accounted for and revised in setting the annual cap. According to the EPA, there is a growing trend in the development of smaller and potentially less clean sources, e.g. the large diesel generators that were employed during California's price spikes.

The emissions caps were chosen to reflect necessary emissions reductions that must take place quickly to improve environmental and public health. The limits for sulfur dioxide, nitrogen oxides and mercury, are set at approximately the levels that are achievable and expected to be achieved through faithful implementation of the existing Clean Air Act. The carbon dioxide limit is set at the sector's proportional responsibility toward fulfillment of the country's international treaty commitment under the United Nations Framework Convention on Climate Change. According to EPA presentations to the Edison Electric Institute in the fall of 2001, the likely scenario of "business-as-usual" implementation of the Act's authorities, which are intended to protect public health and the environment, would result in the following limits and compliance dates: sulfur dioxides at 2,000,000 tons by 2012, nitrogen oxides at 1,250,000 tons by 2010, and mercury at 5 tons by 2008.

The deadline for achieving the caps in the bill on sulfur dioxide and nitrogen oxides are set, in part, to coincide with the requirements for mercury reductions, as per the consent decree described previously.[1] Integrating these requirements, and that for carbon dioxide, will provide greater certainty for and greater cost-effectiveness in investments in pollution control and prevention and in environmental protection. According to testimony from the head of a large coal-fired utility in the Midwest,

" . . . the electric power industry faces enormous uncertainties as it contemplates long-term investment decisions involving billions of dollars. Inevitably, the lack of coordination and consistency among the many existing and proposed initiatives will mean that energy consumers as well as our shareholders will bear far higher costs than necessary to achieve clean air. Still, the prospect of future CO_2 emissions controls is a major source of uncertainty for the power generation sector. If CO_2 requirements are imposed that compel massive expenditures by companies to switch

[1](*See*, "Consent Decree," referenced on page 25 of this report.

coal-fired power plants to natural gas or to purchase expensive allowances, the sizable investments we will make to install pollution control equipment over the next 10 years could be wasted.

For these reasons, Cinergy could support a CO_2 component in this bill, especially if it helped encourage the further commercial development of carbon-friendly technologies such as solar and wind power, micro turbines, fuel cells that are the key to making real progress on this issue." (Jim Rogers, President and CEO of Cinergy Corp.)

In addition, testimony from Jeffrey Smith of the Institute for Clean Air Companies, an association that represents the commercial purveryors of equipment and control systems that would be necessary to meet the bill's deadlines:

"The air pollution control technology industry has the technology to achieve the NOx, SO_2, and mercury reductions contemplated by Sen. Jefford's bill (S. 556), and the resources to deliver that technology within the timeframes the bill contemplates. Of course there will be site-specific issues, but in the 31-year history of the Clean Air Act the air pollution control technology industry has always delivered on the charge this committee has given it."

Testimony from witnesses expert in integrated gasification combined cycle (IGCC) technology indicates that current technology is also capable of reducing carbon dioxide emissions substantially and well within the requirements and timeframe of this bill.

"High IGCC efficiencies yield CO_2 greenhouse gas emissions that are 12 percent lower than those of state-of-the-art coal steam-boiler plants. These emissions are approximately 30 percent lower than those of average coal plants operating today, for comparison purposes."—(Edward Lowe, Gas Turbine-Combined Cycle Product Line Manager, General Electric Power Systems)

Further, in a May 2001 report, "Increasing Electricity Availability From Coal-Fired Generation in the Near-Term," the National Coal Council said that IGCC technology is available now and has major benefits.

"Integrated Gasification Combined Cycle (IGCC) has become a commercially available technology for both greenfield and repowering applications. IGCC is a clean, new technology option insensitive to fuel quality variation. While natural gas will fuel the majority of new capacity additions during this time period there are currently about 321,000 MW of coal-fired capacity in service. While not all of this capacity can be targeted for the new technologies discussed in this report, it is estimated that 75 percent of it can be retrofitted with one of these technologies. (emphasis added)

This additional increase in capacity is estimated to be 40,000 MW and much of it could be brought on line in the next 3 years. This minimizes economic impacts while new generation facilities are sited, constructed, and brought into service without increasing emissions at existing facilities and, in some cases, lowering emissions. Approximately 25 percent of existing facilities can be targeted for repowering with much cleaner and more efficient coal-based power generation."

These caps are set at levels that will save more than 18,900 lives annually, reduce the number of projected nonattainment areas in 2010 to fewer than 23 for $PM_{2.5}$ and fewer than 27 for ozone, expedite the recovery of the northeastern and southeastern ecosystems, improve visibility in national parks and other protected areas, and make progress in addressing global warming. The annual cap on nitrogen oxides represents an extension of the seasonal caps in the NOx SIP Call into a national cap. For EGFs in the eastern region, their cap can largely be met by running equipment installed to meet current summer time emission limitations on a year round basis. The mercury cap is approximately a 90 percent reduction from 1999 emissions levels, and based on an EPA presentation in December 2001, is the total reduction expected from the sector, even if the MACT rulemaking subcategorizes coal types.

The sulfur dioxide limit of 2.25 million tons has been split into two sub-caps primarily to assure that visibility is protected in the West. This sub-cap for the western region (AZ, CA, CO, ID, MT, NV, NM, OR, UT, WA and WY) is intended to reflect the milestones and objectives of the Western Regional Air Partnership (WRAP), though not each State listed is a member of the WRAP. The WRAP is an outgrowth of the Grand Canyon Visibility Transport Commission established under section 169B of the Clean Air Act. A separate sulfur dioxide cap will ensure that the western region benefits equally from actual reductions, as opposed to meeting limits through the purchase of credits from Eastern utilities.

The carbon dioxide cap is necessary to begin to comply with the nation's international responsibility to reduce greenhouse gas concentrations to safe levels. Testimony before the committee indicates that major investments in more energy efficient and less carbon-intensive energy production and consumption will be necessary very soon to avoid a doubling of carbon concentrations in the atmosphere this century. "It is also important to note that the transition must begin in the very near future. For a global concentration of 550 ppm, global carbon dioxide emissions must begin to break from present trends within the next 10–15 years." (Dr. Jae Edmonds, Department of Energy's Pacific Northwest National Laboratory, May 2001) A variety of scientists, (including Oppenheimer, "Dangerous Climate Impacts and the Kyoto Protocol." Science 296, 2002) have voiced concern that atmospheric carbon concentrations of 550 ppm constitute "dangerous interference" with the climate systems and will severely impact human communities and ecosystems.

In part because "business-as-usual" implementation has proceeded more slowly than expected due to litigation by pollution sources, and litigation to prevent or further delay that implementation and future controls is likely, the committee finds it is essential that specific and certain statutory targets be set for the earliest feasible date possible. In general, this Administration has not responded rapidly with the promulgation of rules necessary to comport with judicial decisions and ensure swift implementation of the Act.

In addition, the Administration's Clear Skies proposal, S. 2815, would take substantially longer than "business-as-usual" in achieving important public health and environmental benefits and eliminates existing local air quality protections without evidence that that legislation would provide equal or better air quality protections. That proposal would encourage the refinement of existing end-of-pipe control technology and direct investments to extend the life of older, dirtier facilities that would last many years, rather than integrating carbon dioxide controls to push innovation in more efficient and more environmentally sustainable technology and infrastructure. Many witnesses testified and industry experts expect that EGFs are likely to face limits on carbon dioxide emissions in the near future, so it is economically irrational to ignore these expectations in regulating or investment decisions. The Administration continues to oppose any agreement that would require reductions in such emissions by U.S. sources. Both the Senate and the House, however, have approved resolutions (Title XI—Part A—of H.R. 4, as passed by the Senate; section 745 of H.R. 1646 as passed

by the House) urging the President to re-engage in international negotiations to produce a binding agreement to reduce greenhouse gas emissions.

Sec. 705. Emission Allowances

SUMMARY

a) Emission allowances for sulfur dioxide, nitrogen oxides, and carbon dioxide, are created by statute equal in number to the emissions caps. Each allowance represents permission to emit one ton of the covered pollutants. Each year, the Administrator must reduce the number of emissions allowances created in this subsection by the amount of pollutant emissions from EGFs below 15 MW in the preceding year. Note that mercury emission allowances are not created, since the bill does not create an emissions trading program for that pollutant.

b) The Administrator is required to promulgate regulations to establish an emission allowance tracking and transfer system, and emissions monitoring requirements, incorporating current requirements in section 412 of the Clean Air Act for sources to install and operate continuous emission monitoring systems. As under the existing acid rain program, the provision clarifies that emission allowances are not a property right and does not limit the Federal Government's ability to terminate or otherwise limit the use of such allowances.

c) Each emission allowance will be given a unique serial number and an annual vintage. An allowance may be used in that year or any subsequent year, i.e. it may be banked or reserved. In the case of sulfur dioxide emission allowances, the Administrator shall ensure that those emission allowances allocated to EGFs in the western region are distinct from others.

d) Beginning on April 1, 2009, and each year after that, each EGF must submit to the Administrator one allowance for each ton of the covered pollutant emitted by that EGF. In the event that an EGF's nitrogen oxide emissions are found by a State and the Administrator to be significantly contributing to non-attainment of the ozone NAAQS and that EGF is inadequately controlled, the Administrator may require that the EGF submit 3 nitrogen oxide allowances for every ton emitted. In addition, sulfur dioxide emission allowances from the western region may not be used for submission by EGFs in the eastern region and vice versa.

e) The Administrator is required to maintain an adequate system of emissions monitoring, verification and record keeping, which is publicly accessible and represents ambient concentrations accurately. In addition, the Administrator, in cooperation with the States must maintain an inventory of emissions of sulfur dioxide, nitrogen oxides, carbon dioxide, and particulate matter from small EGFs (<15MW). EGFs with capacity greater than 50MW must maintain ambient monitoring of sulfur dioxides and hazardous air pollutants (HAPs).

f) In cases where an EGF fails to submit sufficient allowances to the Administrator in the same amount as were emitted in a given year, the excess emission penalties of section 411 of the Clean Air Act shall apply generally, except that the penalty will be calculated

by the excess emissions by three times the average annual market price of emission allowances. In the case of mercury, the penalty will be calculated by multiplying the number of grams emitted in excess of the permitted emission limitation by three times the average cost of mercury controls at EGFs.

g) To cure a potential adverse public health or environmental impact, the Administrator may impose a specific limit on the emissions of any EGF and thereby preclude the use of banked or transferred allowances for emissions in excess of that limitation.

h) If the national emission limitations in section 704 are not reasonably anticipated to protect public health or welfare or environment, including sensitive subpopulations, the Administrator may reduce that limitation accordingly. In 2011 and every 3 years after, the Agency shall complete a study of the impacts of the trading of emission allowances on ambient air quality in areas around EGFs and the national average ambient air quality.

i) Sulfur dioxide and nitrogen oxides emission allowances created and banked under Titles I or IV of the Clean Air Act may only be used at the ratio of 1:4 for use in complying with the emission limitations of this Act. If allowances are banked early because an EGF achieved and maintained the NSPS in the period 2000–2007, before the imposition of the caps, then those allowances may be used for compliance at their full value.

DISCUSSION

This section builds off the existing Title IV cap and trade system structure and is intended to create the basic mechanisms necessary for operating an efficient and reliable allowance trading system for sulfur dioxide, nitrogen oxides, and carbon dioxide. In addition, however, because of growing scientific evidence, particularly with respect to $PM_{2.5}$ and related adverse health effects and the growing contribution of nitrogen oxides from EGFs toward ozone nonattainment, the Administrator is given latitude to limit or direct the use of allowances in cases where their use may harm local air quality or the environment, or significantly contribute to downwind nonattainment. EGFs that are significantly contributing to nonattainment of the ozone NAAQS may be required to reduce their emission rates or acquire additional nitrogen emission allowances to comply with a 3:1 submission rate for the period of any ozone exceedance which the Administrator determines is partly the result of that EGFs emissions.

Due to concerns about local air quality impacts noted earlier in this Report related to the health and environmental effects of pollution and the need to swiftly reduce overall sulfur dioxide and nitrogen oxides emissions into the environment, banked allowances of either pollutant under Title IV are reduced in value by 75 percent, in keeping with the purpose of this bill. This will minimize the utility of the large 11 million or greater allowances that are currently in reserve and represent tons that would otherwise be emitted. This requirement is a recognition that the original cap in Title IV for sulfur dioxide was not set low enough.

The prohibition on the use of sulfur dioxide emission allowances from other regions (eastern vs. western regions) for compliance with the caps is intended primarily to maintain the viability of the

milestones and objectives in the WRAP and to avert emissions growth in the West that would jeopardize visibility and public and environmental health.

In addition, because local and State government agencies cannot afford a comprehensive ambient monitoring system around each EGF, where the majority of adverse health impacts appear to occur (J.I. Levy et al., 2002) in the case of $PM_{2.5}$ especially, EGFs will be required to do such monitoring and make it available to the public. The EPA has also found that exposure to short-term concentrations of sulfur dioxide can be dangerous to asthmatics living or working in the immediate area, within 3 miles, of EGFs. The current monitoring networks is not designed to capture and record high short-term sulfur dioxide concentrations.

This system will provide vital information to public health agencies which is now lacking. Continuous emission monitoring systems (CEMS), required by this section, will also provide valuable information for public health data collection and studies. CEMS for all covered pollutants, including mercury, are now either commercially available or nearly ready for commercial markets.

Sec. 706. Permitting and Trading of Emission Allowances

Within 1 year of enactment, the Administrator is required to promulgate regulations to establish a permitting and emission allowance trading system for sulfur dioxides, nitrogen oxides and carbon dioxide. Trading of allowances may only occur between EGFs, except in the case of carbon dioxide emission allowances generated from limits placed on those emissions from the entirety of another industrial sector. This provision could provide additional flexibility to EGFs in complying with the carbon dioxide limitations.

Sec. 707. Emission Allowance Allocation

a) Allocation to Electricity Consumers

SUMMARY

For 2008, the Administrator will allocate approximately 63 percent of the total emission allowances value to households based on per household population and the percentage of national electricity consumption of the State in which the household is located. This annual allocation will rise to nearly 80 percent by 2018. The Administrator will promulgate regulations to ensure that the fair-market value of those allowances is conveyed to households, by appointing as necessary one or more trustees who will obtain fair market value for the allowances and distribute the proceeds to households equitably.

DISCUSSION

Because the atmosphere is a public good, limitations have been imposed on the use of the atmosphere for dumping waste products and pollutants. As the EPA and noted economists (Burtraw et al., 2002—Distributional Impacts of Carbon Mitigation Policies) have indicated, the most economically efficient manner for allocating access to that public good is through an auction mechanism. "The auction approach is about twice as cost-effective as grandfathering

or GPS, when viewed over a wide range of emission reduction targets."(Burtraw)

By placing a limit on how much pollution may be released into the atmosphere, the bill makes emissions allowances a scarce resource with substantial economic value. Preliminary analysis by the Natural Resources Defense Council and the Clean Air Task Force suggests that the value of households' allocation may be $16.2—37.7 billion in 2008, and $19.7–45.8 billion in 2017. The analysis depends on the price of natural gas and the cost of a carbon dioxide allowance most significantly. (*See* APPENDIX III).

The bill assigns the bulk of that value to the residential consumers of electricity, rather than to the producers of electricity. This allocation system ensures that the most efficient and least-polluting producers of electricity will be rewarded competitively as they will need to purchase fewer emissions allowances. The allocation of allowances primarily to consumers will largely insulate them from price increases. The value of the allowances allocated to consumers should equal or exceed any increases in their electricity costs. According to the analysis mentioned above, electricity consumers are likely to receive approximately 1.5 times the cost of any increases in electricity costs.

The committee believes the most probable structure for conveying the value of the allowances to households is likely to be through the Administrator competitively awarding contracts with retail electricity distributors, the States or other entities with significant organizational capacity, to serve as trustees. It is anticipated that these trustees will act as brokers, selling emissions allowances on the market, and returning the proceeds to households. The method of return may be a rebate on an electricity bill, a clean air State tax benefit, or other forms.

The committee heard testimony from some witnesses that requiring electricity generators to purchase allowances will cause electricity prices to rise more than if generators are given the allowances for free on the basis of historical emissions (so-called "grandfathering"). The committee concluded that given the predominance of a competitive marketplace at the wholesale level and, increasingly, at the retail level, this argument is unlikely to be accurate. In such a marketplace, generators will factor allowances into electricity prices based on their resale value, whether or not they are initially received for free. As a result, consumers will see the same electricity price increases whether or not allowances are allocated to them. Grandfathering allowances primarily to electric generators thus results in bestowing on them a windfall worth billions of dollars, without protecting consumers from price increases. In contrast, allocating most allowances to residential consumers will protect those consumers by offsetting such price increases.

b) Allocation for Transition Assistance

SUMMARY

In 2008, the Administrator will allocate 6 percent initially, declining in steps of 0.5 annually to 1.5 percent in 2017, of the total emission allowances for transition assistance to

(A) dislocated workers and communities, receiving 80 percent of that amount. The Administrator shall promulgate regulation as in (a) to ensure that the fair-market value of the allowances is conveyed for grants for training, adjustment assistance, income-maintenance payments, and grants to States and local governments for attracting new employers or operating essential local government services.

(B) manufacturers of energy intensive products, receiving 20 percent of that amount. Those allowances will be distributed by a formula which multiplies a manufacturers percentage of the total products manufactured, the average amount of electricity used in making a product with the most energy efficient process, and the average emissions of covered pollutants per MWH of EGFs.

DISCUSSION

The bill will produce large health, environmental and economic benefits for the Nation by reducing emissions of the covered pollutants. However, some communities, workers and industries may be temporarily bear a disproportionate share of the costs of transition to more efficient, cleaner electricity generation. The Clean Air Act Amendments of 1990 recognized the potential impact of Title IV on such transitions and sought to ameliorate them. The allowances provided under this provision are estimated to be worth approximately $8–18 billion over the 10-year period for which they are authorized. Eighty percent of the allowances are allocated to employees, such as coal mine workers, in the event of job losses directly related to the bill's requirements, and to communities that experience disproportionate economic impacts from implementation of the bill. The bill uses a trustee system, as described earlier, to convert the allowances value into grants for training, income support, and other forms of transition assistance.

Twenty percent of the allowances are distributed to manufacturers who use substantial amounts of electricity in making products, i.e. 5 percent of the costs of production of a product are from electricity consumption. The committee expects that these manufacturers would use the value of the allowances to adopt innovative, less energy-intensive and therefore less polluting technologies and processes.

c) Allocation to Renewable Electricity-Generating Units, Efficiency Projects, and Cleaner Energy Sources

SUMMARY

The Administrator will allocate 20 percent of the total emission allowances available for distribution to

(1) owners and operators of renewable electric generating units, those using wind, biomass, landfill gas, geothermal, solar thermal or photovoltaic sources, or a fuel cell using fuel from a renewable source. They may obtain allowances according to the number of MWH they generate multiplied by the average rate of emissions of covered pollutants per MWH of EGFs.

(2) owners and operators of energy efficient buildings, producers of energy efficient products and entities that implement energy efficiency projects. They may obtain allowances according to the num-

ber of MWH generated or the amount of natural gas saved multiplied by the average rate of emissions of covered pollutants per MWH of EGFs.

(3) owners and operators of new clean fossil fuel-fired EGFs, those that have operated for less than 10 years and are highly efficient (>55 percent), use best available control technology, use IGCC, or use fuel cells operating on fuel from nonrenewable sources. They may obtain allowances according to the number of MWH generated by the facility multiplied by ° of the average rate of emissions of covered pollutants per MWH of EGFs.

(4) owners and operators of combined heat and power electricity-generating facilities according to the BTUs produced and productively used multiplied by the average rate of emissions of covered pollutants per BTU at EGFs.

DISCUSSION

The Administrator is required to set aside 20 percent of all allowances to encourage energy efficiency, renewable electricity generation, combined heat and power, and cleaner fossil fuel generation. These allowances, with an estimated annual value of $5.2–12.1 billion, will provide an incentive for these activities that will help realize multi-billions of dollars in cost savings for consumers, public health, and the economy as a whole.

That beneficial effect of implementing such policies and stimulating incremental technology investments and penetration is demonstrated in the study by the Department of Energy's Oak Ridge National Laboratory, entitled Scenarios for a Clean Energy Future (November 2000). That study shows that energy efficiency and renewable power could meet 60 percent of the demand for new power plants projected by the Administration in May 2001. By lowering total emissions from fossil generation, these incentives will also tend to reduce the overall cost of the program; with lower demand for scarce emissions allowances, allowance prices will be reduced. This set aside approximates the levels of investment that were modelled in that study's moderate scenario and could result in net direct savings of $40 billion annually to the economy by 2010.

The allowances under c) are generally distributed according to the amount of pollution they avoid from the conventional fossil fuel generation of electricity or thermal energy. The Administrator will determine the emissions avoided by multiplying the national average number of tons of a pollutant emitted per MWH of electricity generated by fossil fuel EGFs and the MWH (or thermal equivalent) generated by the renewable project or facility or the amount of avoided generation/energy saved by an energy efficient project. For the purposes of these determinations, the committee expects the Agency to use data from a variety of sources and voluntary industry standards where they are applicable. For instance, for the purpose of baselining energy consumption for buildings to establish emissions avoided and to measure/calculate improvements to award allowances, the Agency could use ASHRAE 90.1 standards (American Society of Heating, Refrigerating and Air-Conditioning Engineers) and the International Energy Conservation Code (IECC) developed by the International Code Council.

This provision will encourage more renewable energy generation by lowering the cost of technology. It will encourage an array of energy efficiency measures, from the production of more EnergyStar products to the construction of more energy-efficient homes and commercial buildings. Combined heat and power systems will also be advantaged and encouraged as captured thermal energy put to productive use will have additional value in the form of allowances received under this provision.

Coal IGCC technology development and use will be encouraged, increasing coal plant efficiency, reducing related emissions and creating a path toward greater use of coal than is otherwise expected under Clean Air Act requirements. All things being equal, growth in coal use for new electricity generation is projected by EIA to grow at the most by 9 percent by 2020, while natural gas use will increase by more than 200 percent.

d) Transition Assistance to Electricity-Generating Facilities

SUMMARY

Starting in 2008, owners and operators of EGFs will receive 10 percent of the total allowances available, declining by a percentage point annually until it reaches 1 percent in 2017. The allowances will be distributed according to the EGF's percentage of the national total amount of electricity generated in 2001.

DISCUSSION

This provision is intended to limit any reduction in asset or shareholder value that a company may experience as a result of complying with the bill's caps. Existing coal-fired EGFs, in particular, will need to make substantial investments in emission reduction/efficiency improvements or in acquiring emission allowances in order to comply with the limitations in section 704. The bulk of allowances are distributed to consumers and other beneficiaries as described above, and will be made available to electricity generators primarily through an auction mechanism, which is considered a highly efficient means of allocation. But, the committee is persuaded that providing gradually declining transition assistance will ameliorate existing facilities' exposure to financial uncertainty and increased costs until new or repowered facilities can be financed. The allowances provided here are expected to be valued at approximately $2.6–6 billion in 2008, declining to $260–600 million in 2017.

There have been few studies focused on determining the exact level of "grandfathered" allowances necessary to hold harmless the existing EGFs asset value. One study (Burtraw 2002) mentioned previously concluded: "Paradoxically, owners of existing generation assets may be better off paying for carbon dioxide emission allowances than having them distributed for free. This analysis shows that it takes just 7.5 percent of the revenue raised under an auction to preserve the asset values of existing generators." The other studies also suggest that some limited asset value protection is appropriate and useful. Most careful analyses indicate that providing EGFs with all the allowances free of charge produces windfall profits for the owners of those facilities. Allocating a larger fraction of

allowances to EGFs based on historical emissions levels and free of charge has perverse result of overcompensating EGF company shareholders at the expense of consumers.

e) Allocation to Encourage Biological Carbon Sequestration

SUMMARY

From the total carbon dioxide emission allowances created in section 704, the Administrator shall allocate 0.075 percent for biological carbon dioxide sequestration in an environmentally sound manner. That value of these allowances is expected to range from $19.2–40 million annually. One-third of those allowances shall be distributed to not more than 5 States or multi-state land or forest management agencies to projects to improve biological carbon inventorying processes. Two-thirds of those allowances shall be awarded competitively to the States for establishing State revolving loan funds to implement forest and forest soil carbon sequestration activities. If the allowances are sold, the proceeds from their sale must be used for the purposes of this subsection. The Administrator, with USDA, will report to Congress with recommendations for a system for allocating carbon dioxide emission allowances to incremental carbon sequestration efforts.

DISCUSSION

This subsection will help clarify the value of sinks or biological carbon sequestration in reducing net carbon dioxide emissions. Two programs are established, using the value of allowances as capitalization funds, to develop reliable carbon inventorying methods and to encourage environmentally sound sequestration activities. If these activities can be ascertained to be sufficiently permanent and reliable, then biologically sequestered carbon may eventually be valuable as a tool in reducing net emissions from EGFs at a lower cost until such time as the economy transitions to less carbon intensity.

f) Allocation to Geological Carbon Sequestration

SUMMARY

Beginning in 2008, the Administrator will allocate not more than 1.5 percent of the total carbon dioxide emission allowances to entities that carry out environmentally sound carbon dioxide geological sequestration projects. They will be distributed according to the number of tons of carbon dioxide that an EGF sequesters. If the allowances are sold, the proceeds from their sale must be used for the purposes of this subsection.

DISCUSSION

This set aside of allowances is intended to expedite the development of permanent geological sequestration of carbon dioxide from EGFs. Large amounts of carbon dioxide are already being used for enhanced oil recovery, remaining underground once the oil has been dislocated. Preliminary studies suggest that there is a very large potential for storage underground, though this option, like activities encouraged by (e), is most likely transitional. Substantial

and expensive research must be completed, and will be supported by these allowances' value, before permanence and other environmental impacts can be resolved. See Putting Carbon Back in the Ground (International Energy Administration, 2001) for a discussion of those issues.

Sec. 708. Mercury Emission Limitations

SUMMARY

Within 1 year of enactment, the Administrator must promulgate regulations to limit mercury emissions from EGFs such that the total emitted is no more than the cap set out in section 704. In no case, however, may any EGF emit an average of more than 2.48 grams of mercury per 1000 MWH, over any 30-consecutive day period. In the event that total mercury emissions averaged over the previous 2 years exceeds the national limitation, the Administrator must revise the emissions limitations in this section within a year to prevent that from reoccurring. In addition, by 2005, the Administrator must promulgate regulations to ensure that mercury captured from EGFs is not re-released into the environment.

DISCUSSION

The purpose of this section is to lower the total mercury emitted from the currently uncontrolled power plant sector by 90 percent to no more than 5 tons in 2008. Based on information collected by the EPA and presentations from the Agency, the standards to be promulgated under section 112 of the Clean Air Act regarding HAPs emissions could require such reduction in the same timeframe. Under the consent decree described previously, the Administrator must require EGFs to comply with these requirements by December 2007. Those requirements, known as the MACT (maximum achievable control technology) rule, require that the maximum degree of reduction in mercury emissions that is deemed achievable for new sources shall not be less stringent than the emission control achieved in practice by the best controlled source. For existing sources, the standards must be as least as stringent as the average emission limitation achieved by the best performing 12 percent of existing sources (for which the Agency has emissions information).

According to the EPA, if the MACT rule were issued now (presentation—December 2001) and plants were not subcategorized by coal type, each existing coal-fired generating unit would have to reach 98 percent removal. This would be done most likely through fluidized bed combustion and fabric filter technology application. If the rule were issued now and subcategorization by coal type is permitted, then bituminous coals would have to achieve 99 percent removal for new sources and 98 percent removal for existing sources resulting in total annual emissions of .84 tons; subbituminous coal 86 percent and 76 percent removal, respectively for new and existing sources resulting in 2.35 tons annually; and, lignite 66 percent and 58 percent removal, respectively for new and existing sources resulting in 1.88 tons annually. Total tons of mercury emitted annually would be 5.07 tons if the rule subcategorizes by coal type and is based on the average emissions achieved by the top 12 per-

cent of existing sources and the emission limitation achieved by the best performing sources for new sources. The EPA projected that subcategorization by boiler type would result in similar reductions, resulting in 5.5 tons of mercury emitted annually in 2008.

The bill's output based emission rate limitation for each coal-fired power plant is intended to produce, on average, a 90 percent reduction from 1999 emissions levels. The exact level of reduction required of each power plant will depend on controls already installed, type of coal being burned, controls that will be installed to meet the NOx SIP Call and other Clean Air Act requirements. This emission rate may require some plants to install one or a combination of available controls, including upstream controls, fuel blending, modifying the burn to air ratio, or, in some cases, no other controls would be needed to meet the standard. Several plants already have existing emission rates below the levels specified in the bill.

This provision, in combination with section 709(e), gives industry more flexibility than is available under the existing law to meet the mercury limit, and provides additional certainty of environmental protection. Unlike the MACT requirements, which will impose limits on each individual generating unit, the bill allows allows emissions averaging over more than one generating unit at a facility.

Public health and the environment are also protected by a requirement that, as new generation capacity and technologies come on-line, the Administrator will have information available to regulate to maintain the integrity of the 90 percent reduction from 1999 levels. In addition, because the EPA found in its report on wastes from the combustion of fossil fuels that there is a potential risk of re-release of mercury captured or recovered from emission controls, the Administrator is required to promulgate regulations to address critical relevant issues involving re-release.

Sec. 709. Other Hazardous Air Pollutants

SUMMARY

The EPA is required to collect additional data on hazardous air pollutants (HAPs) emissions from EGFs and to promulgate emission standards for those HAPs under section 112(d) of the Clean Air Act by 2006 and enforce them by 2007. The emission limitation established for mercury and HAPs in this bill are deemed to represent the maximum achievable control technology for the purposes of section 112(d) of the Act.

DISCUSSION

The committee is aware that there are concerns that the Agency has not sought adequate data to set a MACT standard for non-mercury HAPs, which are emitted in substantial amounts by coal-fired EGFs. The deadlines established in this section are structured to coincide with the EPA's current schedule of obligations under the consent decree and the Utility MACT Federal Advisory Commission.

Sec. 710. Effect of Failure to Promulgate Regulations

If the Administrator fails to promulgate and implement the emission limitations in section 704, then by 2007 each EGF must reduce

emissions of nitrogen oxides by 85 percent, carbon dioxide by 25 percent, and for coal-fired EGFs, reduce sulfur dioxides by 95 percent and mercury by 90 percent, below a similar uncontrolled facility. As noted throughout this Report, the committee believes that swift and significant cuts in emissions must take place to protect public health and the environment. This is a failsafe provision intended to ensure that those reductions take place, regardless of litigation that seeks to delay regulations or the failure of the Administration to act in good faith to regulate and achieve the purposes of this legislation. Other environmental laws incorporate similar "backstop" measures.

Sec. 711. Prohibitions

This provision makes it unlawful to be in noncompliance with the requirements of the new Title or to use emission allowances except in approved manners.

Sec. 712. Modernization of Electricity Generating Facilities

SUMMARY

Beginning on the later of January 1, 2013, or 40 years after an EGF commences operation, an EGF must achieve emission limitations that are as good or better than occurs through application of best available control technology on a new major source of a similar size and type.

DISCUSSION

In 1977, Congress exempted EGFs built before 1972 from immediate compliance with New Source Performance Standards. The rationale at the time was that such compliance would be too costly and compel their closure. To balance this exemption, Congress required that new and modified EGFs must meet those standards, thereby assuring that as the fleet of EGFs aged and were replaced or repowered, they would become cleaner. Instead of becoming more efficient and cleaner, many EGFs, particularly coal-fired plants, continued to expand capacity without appropriate environmental review and improvement under best available control technology (BACT) requirements. There is lengthy discussion in the body of the report on the legal and environmental problems created by EGF life-extension projects and non-compliance with New Source Review requirements. The sluggish pace of modernization led to the compelling need to reduce national emissions from these dirty plants through the imposition of a cap in Title IV of the 1990 Clean Air Act Amendments. Despite this cap, there are still more than 300 EGFs that do not meet the NSPS, much less BACT. Congress did not intend that this exemption, or "grandfathering" should become a permanent shield from reducing emission rates.

The committee has largely adopted the cap-and-trade mechanism for reducing emissions of sulfur dioxide, nitrogen oxides and carbon dioxide. However, as experience with Title IV shows, such a cap does not guarantee emission reductions from all facilities. Some continue to find it in their economic interest to purchase emission allowances rather than meet stringent emission rates required by BACT. This provision in S. 556 allows the market based system to

reduce total covered pollutant emissions to move forward, but additionally requires the application of BACT for the criteria pollutants at all EGFs by a time certain to ensure that local air quality is protected. The reported bill allows more time for sources to apply BACT than provided by S. 556 as introduced. This change is a recognition of the need to motivate early and innovative action and to increase flexibility in achieving the caps.

Sec. 713. Relationship to Other Law

Nothing in this new Title limits the application of other provisions of the Act or precludes a State from adopting more stringent requirements than are imposed under this new Title.

Sec. 3. Savings Clause

This section ensures that this legislation will not affect or disrupt any regulations, standards, rules, notices, orders or guidance promulgated or issued prior to the enactment of the Clean Power Act of 2002, unless they are inconsistent with this legislation.

Sec. 4. Acid Precipitation Research Program

This section amends existing section 103(j) of the Clean Air Act, revising the assessment requirements of the National Acid Precipitation Assessment Program to include a review of the reduction in acid deposition rates necessary to avert a decline in the number of water bodies with adequate acid-neutralizing capacity. The Administrator must also report to Congress every 4 years on those steps and that will protect and restore acid-sensitive ecosystems. By 2011, the Administrator must determine if the emission reduction requirements of Titles IV and the new Title VII are adequate to protect these sensitive ecosystems. If they are not, the Administrator must reduce emissions further. This provision averts the need for additional legislation to lower the caps if they are not sufficient for acidified ecosystems to recover adequately. The longer it takes to reset the caps, when it is demonstrated they are not promoting timely recovery, the greater the environmental harm is done and the longer it takes to remedy.

Sec. 5. Authorization of Appropriation for Deposition Monitoring

There are several programs authorized at many agencies for FY03–12 to enhance pollutant monitoring and deposition, including equipment and site modernization needs. These include the National Atmospheric Deposition Program National Trends Network, the National Atmospheric Deposition Program Mercury Deposition Network, the National Atmospheric Deposition Program Atmospheric Integrated Research Monitoring Network, the Clean Air Status and Trends Network, and the Temporally Integrated Monitoring of Ecosystems and Long-Term Monitoring Program.

HEARINGS

106th Congress

On October 14, 1999, the Subcommittee on Clean Air, Wetlands, Private Property, and Nuclear Safety held a hearing on review and oversight of the Clean Air Act, particularly addressing the con-

tinuing problem of air pollution from power plants, as well as global warming. Testimony was given by Robert Perciasepe, Assistant Administrator, Office of Air and Radiation, U.S. Environmental Protection Agency; John Graham, Professor, Harvard Center for Risk Analysis; Richard Revesz, Professor, New York University School of Law; Alison Kerester, University of Texas School of Public Health, Mickey Leland National Urban Air Toxic Research Center; Michel R. Benoit, Executive Director, Cement Kiln Recycling Coalition; Bernard C. Melewski, Counsel, Adirondack Council; and Bill Tyndall, Vice President of Environmental Services, Cinergy Corporation, on behalf of Edison Electric Institute.

On February 28, 2000, the Subcommittee on Clean Air, Wetlands, Private Property, and Nuclear Safety held a hearing on the Clean Air Act's New Source Review regulatory program. Testimony was given by the Honorable Ted Strickland, U.S. Representative from the State of Ohio; John S. Seitz, Director, Office of Air Quality Planning and Standards, North Carolina; Joe Bynum, Executive Vice President, Fossil Power Group, Tennessee Valley Authority; Bob Slaughter, Director, Public Policy, National Petrochemical and Refiners Association; W. Henson Moore, President and Chief Executive Officer, American Forest and Paper Association; David Hawkins, Director, Air and Energy Programs, Natural Resources Defense Council; and Bill Tyndall, Vice President of Environmental Services, Cinergy Corporation.

On May 2, 2000, the Committee on Environment and Public Works held a hearing on successful State environmental programs, addressing States' difficulty in controlling electric utility emissions under Clean Air Act programs. Testimony was given by W. Michael McCabe, Acting Deputy Administrator, U.S. Environmental Protection Agency; Peter F. Guerrero, Director, Environmental Protection Issues, General Accounting Office; R. Lewis Shaw, Deputy Commissioner, Environmental Quality Control, South Carolina Department of Health and Environmental Control President, Environmental Council of the States; Robert W. Varney, Commissioner, New Hampshire Department of Environmental Services; James Seif, Secretary, Pennsylvania Department of Environmental Protection; Brent C. Bradford, Deputy Director, Utah Department of Environmental Quality; Lynn Scarlett, Executive Director, Reason Public Policy Institute; Erik D. Olson, Senior Attorney, Natural Resources Defense Council; and Jason S. Grumet, Executive Director, Northeast States for Coordinated Air Use Management.

On May 17, 2000, the Subcommittee on Clean Air, Wetlands, Private Property, and Nuclear Safety held a hearing on incentive-based utility emissions under the Clean Air Act. Testimony was given by David G. Wood, Assistant Director, Resources, Community and Economic Development Division, U.S. General Accounting Office; James E. Rogers, Vice Chairman, President, and CEO, Cinergy Corporation; Charles McCrary, President, Southern Company Generation; Frank Cassidy, President and COO, PSEG Power, LLC; Armond Cohen, Executive Director, Clean Air Task Force; and Wayne Brunetti, Chairman and CEO, New Century Energies.

On June 14, 2000, the Subcommittee on Clean Air, Wetlands, Private Property, and Nuclear Safety held a hearing on environ-

mental benefits and impacts of ethanol under the Clean Air Act, addressing ethanol's effects on air pollution and global warming. Testimony was given by Dan Greenbaum, President, Health Effects Institute; Blake Early, Environmental Consultant, American Lung Association; Michael Graboski, Director, Colorado Institute for Fuels and High Altitude Engine Research, Department of Chemical Engineering, Colorado School of Mines; Bob Slaughter, Director, Public Policy, National Petrochemical and Refiners Association; Jack Huggins, Vice President, Ethanol Operations, Williams Energy Services; Jason S. Grumet, Executive Director, Northeast States for Coordinated Air Use Management; Stephen Gatto, President and CEO, BC International; Gordon Proctor, Director, Ohio Department of Transportation; The Honorable Charles Grassley, U.S. Senator from the State of Iowa; The Honorable Tom Harkin, U.S. Senator from the State of Iowa; The Honorable Richard Durbin, U.S. Senator from the State of Illinois; and The Honorable Peter Fitzgerald, U.S. Senator from the State of Illinois.

On September 27, 2000, the Subcommittee on Clean Air, Wetlands, Private Property, and Nuclear Safety held a hearing on State reauthorization issues under the Clean Air Act, addressing the concept of multi-pollutant legislation as a way to simplify the numerous Clean Air Act requirements imposed on States. Testimony was given by Karen A. Studders, Commissioner, Minnesota Pollution Control Agency; Jeff Saitas, Executive Director, Texas Natural Resources Conservation Commission; Dennis Hemmer, Director, Wyoming Department of Environmental Quality; John E. Terrill, Air Quality Director, Oklahoma Department of Environmental Quality; Kenneth Colburn, Director, Air Resources Division, New Hampshire Department of Environmental Services; Ron Methier, Air Protection Branch Chief, Georgia Environmental Protection Division; The Honorable Richard Homrighausen, Mayor of the city of Dover, Ohio; Marcia Willhite, Assistant Chief, Pollution Prevention-Air Quality Environmental Health Division, city of Lincoln, Nebraska; and Zach Taylor, Executive Director, Association of Central Oklahoma Governments.

107th Congress

On March 21, 2001, the Subcommittee on Clean Air, Wetlands, Private Property, and Nuclear Safety held a hearing on harmonizing the Clean Air Act with our nation's energy policy. Testimony was given by Linda Stuntz, former Deputy Secretary, Department of Energy; Katie McGinty, former Chair, Council on Environmental Quality; Anthony J. Alexander, President, First Energy; David Nemtzow, President, Alliance to Save Energy; Olon Plunk, Vice President for Environmental Services, Excel Energy; and David Hawkins, Director, Air and Energy Programs, Natural Resources Defense Council.

On April 4, 2001, the Subcommittee on Clean Air, Wetlands, Private Property, and Nuclear Safety held a hearing on Clean Air Act regulations and energy policy, especially as it relates to oil and gas issues. Testimony was given by Robert Hirsch, Board of Directors, Annapolis Center (also chair of the NAS energy and environment board); The Honorable Eliot Spitzer, Attorney General of the State of New York; Thomas Stewart, Executive Vice President, Ohio Oil

and Gas Association; Jason S. Grumet, Executive Director, Northeast States for Coordinated Air Use Management; Bob Slaughter, Director, Public Policy, National Petrochemical & Refiners Association; Carlos J. Porras, Executive Director, Communities for a Better Environment; and Taylor Bowlden, Vice President, Policy and Government Affairs, American Highway Users Alliance.

On May 2, 2001, the Committee on Environment and Public Works held a hearing on the state of global warming science and issues related to reducing net greenhouse gas emissions. Testimony was given by Dr. Richard S. Lindzen, Alfred P. Sloane Professor of Meteorology, Massachusetts Institute of Technology; Dr. Kevin E. Trenberth, Head, Climate Analysis Section, Climate and Global Dynamics Division, National Center for Atmospheric Research; Dr. John R. Christy, Professor, Department of Atmospheric Science, University of Alabama at Huntsville; Dr. Jae Edmonds, Pacific Northwest National Laboratory, Battelle Memorial Institute; Dr. Rattan Lal, School of Natural Resources, Ohio State University; James E. Rogers, Chairman, President, and CEO, Cinergy Corp.; Dr. Marilyn A. Brown, Director, Energy Efficiency and Renewable Energy Program, Oak Ridge National Laboratory.

On May 30, 2001, the Committee on Environment and Public Works held a hearing on innovative environmental technologies, addressing advances in multi-pollutant control technologies. Testimony was given by Frank Alix, CEO and President, Powerspan Corp.; Judith A. Bayer, Director, Environmental Government Affairs, United Technologies; Richard Taylor, CEO and President, Ocean Power Technologies; Richard Eidlin, Vice President and Business Development Director, Solar Works, Inc.; David Goldstein, Energy Program Co-Director, Natural Resources Defense Council; Tom Kelly, Ph.D., Director, Office of Sustainability, University of New Hampshire; and Casimer Andary, Director, Mobile Source Affairs, Alliance of Automobile Manufacturers.

On July 26, 2001, the Committee on Environment and Public Works held a hearing on the public health and environmental effects of electric power plant emissions. Testimony was given by the Honorable Susan M. Collins, U.S. Senator from the State of Maine; the Honorable Christine Todd Whitman, Administrator, U.S. Environmental Protection Agency; Scott Johnstone, Secretary, Vermont Agency of Natural Resources; George Thurston, Associate Professor of Environmental Medicine, New York University School of Medicine; C. Boyden Gray, Partner, Wilmer, Cutler, and Pickering, on behalf of the Electric Reliability Coordinating Council; Dale E. Heydlauff, Senior Vice President, Environmental Affairs, Edison Electric Institute; and Conrad Schneider, Advocacy Director, Clean Air Task Force.

On November 1, 2001, the Committee on Environment and Public Works held a hearing on how S. 556 would affect the environment and the economy, and any improvements or amendments that should be made to the legislation. Testimony was given by the Honorable Sherwood L. Boehlert, U.S. Representative from the State of New York; The Honorable Jeffrey Holmstead, Assistant Administrator, Office of Air and Radiation, Environmental Protection Agency; Mary Hutzler, Acting Administrator, Energy Information Administration; Ken Colburn, Director of Air Resources, New Hamp-

shire Department of Environmental Services; Dave Ouimette, Manager, Stationary Sources, Air Pollution Control Division, Colorado Department of Public Health and the Environment; Brock Nicholson, Chief, Air Quality Planning Division, North Carolina Department of Environmental Natural Resources; and Michael Callaghan, Secretary, West Virginia Department of Environmental Protection.

On November 15, 2001, the Committee on Environment and Public Works held a hearing on S. 556, the Clean Power Act. Testimony was given by the Honorable Howard Dean, M.D., Governor of the State of Vermont; Gerard M. Anderson, President & COO, DTE Energy Resources, DTE Energy Company; Jeffery E. Sterna, Chairman, President and CEO, Public Service Company of New Mexico; Robert LaCount, Air Quality Manager—Environmental Affairs, PG&E National Energy Group; Jeffrey C. Smith, Executive Director, Institute of Clean Air Companies; David Hawkins, Program Director, Climate Center, Natural Resources Defense Council; Ronald J. Tipton, Senior Vice-President for Programs, National Parks Conservation Association; John Kirkwood, Chief Executive Officer, American Lung Association; and Bill Banig, Director of Governmental Affairs, United Mine Workers of America.

On January 29, 2002, the Subcommittee on Clean Air, Wetlands, and Climate Change held a hearing on compliance options for electric power generators under S. 556. Testimony was given by Robert S. Kripowicz, Acting Assistant Secretary for Fossil Energy, U.S. Department of Energy; Ed Lowe, Gas Turbine-Combined Cycle Product Line Manager, General Electric Power Systems; Phil Amick, Vice President, Commercial Development, Global Energy, Inc.; Dr. Richard L. Sandor, Chairman and CEO, Environmental Financial Products LLC; Dr. Michael D. Durham, President, ADA Environmental Solutions; Richard L. Miller, Fabric Filter & FGD Sales Manager, Hamon Research-Cottrell, Inc.; Frank Alix, CEO, Powerspan Corp.; and George Offen, Area Manager for Air Emissions & By-Products, Environmental Department, Electric Power Research Institute.

On March 13, 2002, the Committee on Environment and Public Works held a hearing on the economic and environmental risks associated with increasing greenhouse gas emissions. Testimony was given by Dr. F. Sherwood Rowland, Donald Bren Research Professor of Chemistry and Earth System Science, University of California, Irvine; Dr. Roger A. Pielke, Jr., Associate Professor, Center for Science and Technology Policy Research, University of Colorado/CIRES; Adam Markham, Executive Director, Clean Air-Cool Planet; Dr. Sallie Baliunas, Astrophysicist, Harvard-Smithsonian Center for Astrophysics; Dr. David M. Legates, C.C.M., Director, Center for Climatic Research, University of Delaware; Dr. Martin Whittaker, Managing Director, Innovest; and Jack D. Cogen, President, Natsource.

On June 12, 2002, the Committee on Environment and Public Works held a hearing on the benefits and costs of multi-pollutant legislation. Testimony was given by the Honorable Dennis J. Kucinich, U.S. Representative from the State of Ohio; Ronald C. Methier, Branch Chief, Georgia Department of Natural Resources, Environmental Protection Division, Air Protection Branch, on behalf of the State and Territorial Air Pollution Program Administra-

tors and the Association of Local Air Pollution Control Officials (STAPPA/ALAPCO); Bob Page, Vice President of Sustainable Development, Transalta Corporation; William F. Tyndall, Vice President, Environmental Services and Federal Affairs, Cinergy Corp.; David G. Hawkins, Director, Climate Center, Natural Resources Defense Council; Lee Hughes, Vice President, Corporate Environmental Control, Bayer Corporation, on behalf of the American Chemistry Council; Don Barger, Senior Director, National Parks Conservation Association, Southeast Regional Office; and Tom Mullen, Secretary, Catholic Charities Health and Human Services, Diocese of Cleveland.

On July 16, 2002, the Committee on Environment and Public Works and the Committee on the Judiciary jointly held a hearing on New Source Review policy, regulations, and enforcement activities. Testimony was given by the Honorable Thomas L. Sansonetti, Assistant Attorney General, Environment and Natural Resources Division, U.S. Department of Justice; The Honorable Jeffrey Holmstead, Assistant Administrator for Air and Radiation, U.S. Environmental Protection Agency; The Honorable William H. Sorrell, Attorney General of the State of Vermont; The Honorable Eliot Spitzer, Attorney General of the State of New York; The Honorable Bill Pryor, Attorney General of the State of Alabama; Eric Schaeffer, Director, Environmental Integrity Project, Rockefeller Family Fund; Bob Slaughter, President, National Petrochemical & Refiners Association; Hilton Kelley, Community In-power and Development Association, Refinery Reform Campaign; Steve Harper, Director, Environment, Health, Safety, and Energy Policy, Intel, Corp.; John Walke, Clean Air Director, Natural Resources Defense Council; and E. Donald Elliott, Paul, Hastings, Janofsky & Walker LLP.

On October, 2, 2002, the Committee on Environment and Public Works held a hearing on the status and studies of the health impacts of fine particulate matter air pollution ($PM_{2.5}$), particularly those effects associated with power plant emissions. Testimony was given by Dr. Jonathan M. Samet, Co-Director, Risk Sciences and Public Policy Institute, and Professor and Chair of the Department of Epidemiology, Johns Hopkins Bloomberg School of Public Health; Robert M. O'Keefe, Vice President, Health Effects Institute; Dr. Ron Wyzga, Technical Executive and Manager of Air Quality, Health and Risk, Electric Power Research Institute; Ben Rose, Executive Director, Green Mountain Club; and Dr. Jonathan Levy, Assistant Professor of Environmental Health and Risk Assessment, Department of Environmental Health, Harvard School of Public Health.

[Note: In addition, on October 4–5, 2001, the Chairmen and Ranking Members of the Committee on Environment and Public Works and the Subcommittee on Clean Air, Climate Change and Wetlands hosted a stakeholder meeting on multi-pollutant legislation which was attended by representatives of utilities, environmental groups, States, tribes, and other interested parties.]

LEGISLATIVE HISTORY

On March 15, 2001, S. 556 was received in the Senate, read twice, and referred to the Committee on Environment and Public

Works. On June 27, 2002, the committee held a business meeting to consider the bill. The Chairman offered an amendment in the nature of a substitute. Prior to the final vote on the substitute, several Senators offered and withdrew amendments, including several amendments in the nature of substitutes. Three amendments were approved by voice vote: Senator Boxer offered an amendment to include sensitive subpopulations in EPA consideration of revising the overall emission caps; Senator Clinton offered an amendment to assure that the EPA regularly monitors acidification of water bodies and takes action to reduce emission caps if they are threatened; and, Senators Smith and Jeffords offered an amendment to authorize air quality monitoring programs at various Federal agencies. The bill, as amended, was ordered reported.

ROLLCALL VOTES

On June 27, 2002, at 9:55 a.m., the committee held a business meeting to consider S. 556 and other bills. A motion to report the bill was made by the Chairman. The bill, as amended, was passed by a vote of 10–9. Recorded as voting ″aye″ were Senators Jeffords, Reid, Graham, Lieberman, Boxer, Wyden, Carper, Clinton, Corzine, Chafee. Recorded as voting ″no″ were Senators Smith, Warner, Inhofe, Bond, Voinovich, Crapo, Specter, Domenici, Baucus.

REGULATORY IMPACT STATEMENT

There is substantial regulatory authority granted by this bill to the Administrator of the U.S. EPA to reduce emissions of pollutants that are harming or have the potential to harm public health and the environment. As noted in the body of the Report, there are already a substantial number of regulations in the process of being implemented, pursuant to existing authority, statutory deadlines, and consent decrees, to achieve purposes similar to this bill.

The Administrator is required to issue regulations affecting owners and operators of fossil fuel electric generating facilities by capping annual emissions of sulfur dioxide, nitrogen oxides, carbon dioxide, and mercury. Allocations of emissions allowances will be made by regulation among the various categories of recipients. Clarification of those categories and the process by which emissions allowances or their value will be distributed will require a variety of rulemakings. These will include the selection and operation of trustees to convey the value of auctioned emission allowances to households, dislocated workers, biological carbon sequestration projects, etc.

The cap-and-trade system created by the bill, which applies to the first three pollutants, is modelled after the successful and efficient Title IV-Acid Deposition of the Clean Air Act Amendments of 1990. That system's establishment and maintenance have not required significant increases in regulations or government resources to operate, including the identification and tracking of emission allowances or the submission of allowances for compliance purposes.

However, the Administrator will need to revise the existing system regulations to accommodate the addition of two more pollutants, nitrogen oxides and carbon dioxide. The existing NOx SIP call trading mechanism employed in the summer in the ozone transport

region will provide a useful template for the national program in this bill. The Administrator must also regularly review and revise the implementing regulations to assure the environmental integrity of the cap is retained and public health and ecosystems are protected.

The Administrator is required to promulgate an emission limitation for mercury and other hazardous air pollutants emitted by coal-fired EGFs by a time certain. This is primarily a codification of existing regulatory requirements. These rules must be regularly reviewed and revised as appropriate to ensure that growth in electricity demand does not increase mercury emissions above the cap. The Administrator must also issue regulations to ensure that captured mercury is not re-released into the environment.

Guidelines must be prepared by the Agency for EGFs for the conduct of required ambient monitoring within the vicinity of those facilities.

If the Administrator fails to promulgate regulations implementing the emissions caps, automatic reductions in emissions are required from EGFs and their permits are automatically amended to reflect those new emission rates.

MANDATES ASSESSMENT

In compliance with the Unfunded Mandates Reform Act of 1995 (P.L. 104–4), the committee finds that this bill imposes no Federal intergovernmental unfunded mandates on State or tribal governments. To the extent that local governments may be operating EGFs, those power plants will be required to demonstrate compliance with the emission limitations in the same manner as the private sector EGFs. None of the cost estimates provided to the committee from the EPA, the Energy Information Administration (EIA), or other sources have differentiated costs between publicly owned and privately owned facilities, so it is not possible to quantify the direct costs associated with requirements of this bill.

The legislation includes a variety of Federal private sector mandates, many of which, with the exception of carbon dioxide emission limitations, are expected to be imposed under existing authorities and requirements of the Clean Air Act. This bill imposes them sooner, except in the case of mercury and hazardous air pollutant emissions, which is on a schedule pursuant to a consent decree.

The mandates center around the establishment of a market-based, cap and trade program to limit emissions of sulfur dioxides, nitrogen oxides and carbon dioxide, and specific emissions limitations for mercury. They will require EGFs to invest in pollution control and prevention equipment, such as wet scrubbers (sulfur dioxide), selective catalytic reduction (nitrogen oxides), absorbent carbon injection (mercury), and efficiency improvements and integrated gasification combined cycle units for coal (carbon dioxide). Or, except mercury, they may choose to acquire sufficient emissions allowances to match their emissions, whichever is more cost-effective. The adoption of the cap and trade program will maximize the efficiency of control investments, reducing the overall cost of the program, though individual EGFs may experience high costs if they are currently significantly above BACT or MACT emission rates.

Projections of the cost of these allowances to EGFs range dramatically depending on the assumptions that are made regarding existing requirements, trading, the price of natural gas and alternative energy sources, and many other market and technology penetration considerations. The estimated costs of allowances in 2010 vary significantly—sulfur dioxide at $46-$306 per ton, nitrogen oxides at $0 to $1,564 per ton, and carbon dioxide $54–110 per metric ton.

The cost of the mandates imposed on EGFs in this bill, therefore, could range from $11.5 billion to $25.9 billion in 2010, though benefits are expected to outweigh these costs by between 4.2–6.4 to 1. The true cost imposed on EGFs depends on their ability to pass through costs to consumers. Under their "business as usual" case, which exempt many of costs of existing Clean Air Act requirements, the EPA has estimated that the annual costs to EGFs could be $17 billion per year in 2015, or, with the increased investment in renewables and efficiency that will be stimulated by the bill's allocation method, approximately $500 million annually. The committee would also note that in each case that the Agency analyzed, regarding a four-pollutant bill, the generation costs per kilowatt hour were less than today's levels.

Estimating the benefits of these caps is similarly difficult. However, the EPA has provided estimates of control levels similar to those provided in this legislation ranging from $75–150 billion due to avoided loss of life from $PM_{2.5}$ exposure resulting from sulfur dioxide and nitrogen oxides emissions, plus $1 billion in visibility benefits. The EPA has not been able to provide to the committee a monetized estimate of the benefits of controlling mercury and carbon dioxide emissions, or attempted to evaluate the ecosystem services benefits that accrue from these reductions.

The committee would note that witnesses, the Administration's Climate Action Report, and economic literature indicate that global warming and climate change, exacerbated by manmade greenhouse gas emission, already appears to be having a significant and negative impact on communities, ecosystems, public health and infrastructure. Economists are not agreed on the cost estimates of these impacts, but those making such estimates have projected a range of 1–3 percent of GDP could be lost due to these effects. Carbon reduction requirements in the utility sector, which represents about one-third of the nation's carbon dioxide emissions, will not on their own stop these effects, but should lead to new technologies, including IGCC and geologic sequestration, that will reduce greenhouse gas concentrations and slow global warming and its effects.

In addition to compliance with the costs of achieving the costs, EGFs will incur additional costs associated with the monitoring systems required by the bill. The committee is not able to provide a qualitative or quantitative evaluation of the cost of this mandate.

COST OF LEGISLATION

It is essential that the committee comment on the inaccuracy of assumptions affecting the cost estimates that have been performed to date as part of analyses of multi-pollutant control strategies and scenarios prepared by the EIA and the EPA, which can be found as part of the committee hearing record of November 1, 2001.

Neither of these analyses, in projecting the future costs of implementation of multi-pollutant legislation, makes any comprehensive effort to compare the cost of S. 556 to the costs that will otherwise be or are already being incurred by EGFs in complying with existing law and regulation. For instance, the EPA has indicated to industry that MACT requirements for emissions of mercury and other hazardous air pollutants, as driven by a consent decree, will very likely produce an emission reduction limitation of a minimum of 70 percent. The agencies' reference or "business as usual" cost estimates do not include this driver, thereby making the incremental cost appear higher. These and other reduction requirements are outlined in the section above on Federal Programs, Regulations and Actions. Despite the omission of an accurate "business as usual" baseline, EPA's analysis found that net GDP impacts would be essentially unchanged in a $13 trillion economy.

Most notably, EIA inaccurately attributes the costs of substantial new natural gas generation capacity to multi-pollutant legislation. However, as of April 2002, nearly 130,000 MW of new natural gas combined cycle base load generating capacity had either become operational or was under construction that was not included in EIA's analysis—which is about 45,000 MW or 50 percent more new such capacity than EIA projected would be in operation in 2010. This strong new generation development trend is being driven by forces other than this legislation. As noted in a previous section, EIA projects that 88 percent of the demand for 355,000 MW in new generating capacity by 2020 will come from natural gas, regardless of passage of this legislation. The committee would note that it appears that the market is anticipating potential compliance costs with the Federal Programs, Regulations and Actions, but the agencies projections do not.

Neither agency adequately considered the potential for the widespread application of relatively new and more efficient technologies, such as IGCC for coal, to enter the market, particularly as stimulated by the introduction of carbon dioxide emission limitations. As one expert witness indicated, "Gasification is a widely used, commercially proven technology. Today there are approximately 130 gasification plants in operation around the world with some 35 additional facilities in various stages of development, design and construction. When all of these plants are operating they will have the capacity produce the energy equivalent of 750,000 barrels per day of clean gas for use in power generation as well as for the production of fuels and chemicals. In the U.S. there are 20 gasification plants in operation producing a variety of products including electricity; at least one-half again that many are in the pipeline." In addition, the EIA analysis stated that, "Numerous options exist for reducing carbon dioxide emission within the electricity sector, including generation efficiency improvements, transmission and distribution system efficiency improvements, . . . and the electricity sector can and currently does use non-greenhouse gas-emitting energy sources, such as wind, solar, hydropower,. . . ."

In January 2001, the EPA's Clean Air Market Programs estimated that the annual incremental costs of a comprehensive, four-pollutant strategy in 2010 would be approximately $11.5 billion, while continuing with the current system of controlling each pollut-

ant individually including reducing carbon dioxide to 1990 levels, would be approximately $16 billion. There are obvious and substantial cost savings from a multi-pollutant approach versus a piecemeal approach.

In addition, as testimony cited previously and appears throughout the hearing record on this legislation, there is a need for and a value to certainty of emission reduction requirements which has not been captured by any analysis. Industry anticipates that there will be a constraint on carbon dioxide emissions in the near future and yet will need to make decisions to add new capacity. As the CEO of Cinergy noted, not integrating carbon dioxide into the capacity investment decisions now will substantially devalue any capacity investments made in the very near term. Anecdotal speculation by market analysts suggest that the value of certainty may be as high as $40 billion annually.

Further, the agencies' studies do not take note of the beneficial effects of the allocation system in S. 556, as reported, or of the flexibility for using carbon dioxide allowances obtained from other industrial sectors that are subject to a cap on greenhouse gas emissions. Section 707 of the bill allows trading between entities in the power sector and entities in any other domestic industrial sector that is subject to an emissions cap. Access to emissions reduction allowances produced outside of the power sector will significantly lower carbon allowance prices.

Access to emissions reduction allowances from other capped industrial sectors outside of the power sector will significantly lower carbon allowance prices below levels projected in the several EIA and EPA analyses of a range of multi-pollutant scenarios including a carbon emissions cap. The EIA and EPA analyses responding to the Jeffords/Lieberman request projected carbon allowance prices ranging from $51 to $138 per metric ton of carbon in 2015.

A recent report by the Pew Center for Global Climate Change documents early carbon emissions reduction allowance market prices in the United Kingdom and Danish "compliance" carbon reductions markets at a mid range of about $21/MTC (million tons of carbon) in the UK and $11/MTC in Denmark. The EIA's analysis in response to the request by Senators Smith, Voinovich and Brownback, assumed that domestic and global carbon offsets would be available for purchase by U.S. carbon emitters. The EIA found that U.S. carbon allowance prices would drop dramatically with global trading of carbon emissions reductions. In this study, EIA projected (based on modeling by DOE's Pacific Northwest Laboratory) that carbon allowance prices for a 2008 power sector carbon cap with global trading would clear at a price of about $10 per metric ton of carbon in 2020. However, U.S. entry into the global market would most likely necessitate U.S. participation in an international agreement to limit carbon emissions.

Because many non-domestic power sector carbon cap programs will definitely exist within the next several years, it seems highly likely that the provisions of section 707(b)(2) would be implemented, dropping carbon allowance costs into the $10—$21 per metric ton range, which is 92 percent to 60 percent below the carbon allowance prices projected by the EPA and the EIA.

A variety of studies have been included and referenced in the hearing record, from the Tellus Institute, Resources for the Future, International Project for Sustainable Energy Paths, the Department of Energy's Clean Energy Futures report, and others that have demonstrated that an integrated approach such as provided in this bill and including other domestic policy initiatives can successfully reduce greenhouse gas emissions without economic harm.

"Economic studies have found that there are many potential policies to reduce greenhouse gas emissions for which the total benefits outweigh the total costs. For the United States in particular, sound economic analysis shows that there are policy options that would slow climate change without harming American living standards, and these measures may in fact improve U.S. productivity in the longer run. (Statement signed by 2500 economists led by Nobel laureates Kenneth Arrow and Robert Solow, January 1997, American Economics Association)

Finally, the bill provides for a hybrid allocation system, which has not been modelled effectively by either agency. Indeed, the Agency assumed that allowances would be given freely to EGFs. Instead, the bulk of the allocations are sold by a trustee at auction and the revenue is recycled directly back to consumers. The committee has heard testimony and collected information that indicates that an auction/revenue recycling system is the most cost-effective way to implement emissions limitations. As noted in testimony from various witnesses, consumers of electricity are likely to see a reduction in electricity prices and the bill is designed to hold harmless the asset value of owners and shareholders of EGF properties.

The following cost estimate provided by the Congressional Budget Office is an improvement on the analyses provided by the EPA and the EIA. However, it still does not incorporate an adequate discussion of the pollution control regulatory costs and ensuing investment decisions that electricity generators will likely face regardless of enactment of this legislation. This omission skews the projected future marginal implementation costs higher than the committee anticipates.

Section 403 of the Congressional Budget and Impoundment Control Act requires that a statement of the cost of the reported bill, prepared by the Congressional Budget Office, be included in the report. That statement follows:

U.S. CONGRESS,
CONGRESSIONAL BUDGET OFFICE,
Washington, DC, November 18, 2002.

Hon. JAMES M. JEFFORDS, *Chairman,*
Committee on Environment and Public Works,
U.S. Senate, Washington, DC.

DEAR MR. CHAIRMAN: The Congressional Budget Office has prepared the enclosed cost estimate for S. 556, the Clean Power Act of 2002.

If you wish further details on this estimate, we will be pleased to provide them. The CBO staff contact is Lisa Cash Driskill, who can be reached at 226–2860.

Sincerely,

DAN L. CRIPPEN.

S. 556, Clean Power Act of 2002, as ordered reported by the Senate Committee on Environment and Public Works on June 27, 2002

Summary

S. 556 would amend the Clean Air Act to establish new limits starting in 2008 on the emission of carbon dioxide, sulfur dioxide, nitrogen oxides, and mercury from electricity-generating facilities. The bill also would require that electricity generators, including the federally owned Tennessee Valley Authority (TVA), annually purchase a number of permits equal to the number of tons of regulated emissions generated, except mercury. That is, each permit would represent the authority to emit one ton of a regulated emission for 1 year.

S. 556 would allocate the emission permits to different recipients who could sell them to owners and operators of electricity plants. The owners and operators of electricity-generating facilities and certain energy efficiency and carbon reduction projects also would receive a portion of the permits. Most of the permits would be allocated to the Federal Government for sale to power plant owners and operators. Proceeds from the sale of those Government-owned permits would be distributed to household electricity consumers, workers, communities, and companies adversely affected by the new emission limits.

CBO estimates that enacting S. 556 would increase governmental receipts (i.e., revenues) by about $113 billion, net of income and payroll tax offsets over the 2009–2012 period. CBO estimates that enacting S. 556 would result in direct spending of about $0.3 billion in 2003, $3 billion over the 2003–2007 period, and $154 billion over the 2003–2012 period. Over the next 6 years, all of the estimated increase in spending would be by TVA to comply with pollution limits imposed by the bill. Those costs would be offset over time (perhaps 30 to 40 years) by increased rates on TVA's power sales. Beginning in 2009, the revenues collected under the bill for sale of emission permits would be spent, resulting in most of the estimated direct spending over the 2003–2012 period.

Finally, CBO estimates that implementing S. 556 would cost $25 million in 2003, $175 million over the 2003–2007 period, and $371 million over the 2003–2012 period, assuming appropriation of the authorized and necessary amounts for preparing rules, implementing new pollution control programs, and air quality monitoring initiatives that would be established by S. 556.

S. 556 contains several intergovernmental and private-sector mandates as defined in the Unfunded Mandates Reform Act (UMRA). The single most costly mandate contained in the bill would cap the amount of emissions of carbon dioxide, sulfur dioxide, and nitrogen oxides emitted by large electricity-generating facilities and would require the owners and operators of such facilities to purchase permits for the right to emit those pollutants be-

ginning in 2009. CBO estimates that the cost to the electricity industry of meeting those emission limits could amount to as much as $40 billion in 2009. NonFederal public power represents roughly 8 percent of the nation's electricity generation from fossil fuels. CBO expects that public power facilities would absorb a proportional amount of the total cost borne by the sector; the remaining share would accrue to private utilities. While we cannot precisely estimate the costs of many of the other mandates in the bill, CBO estimates that the aggregate direct costs of all the mandates would be well in excess of the annual thresholds for intergovernmental and private-sector mandates established by UMRA ($58 million and $115 million in 2002, respectively, adjusted annually for inflation), starting in 2009.

Estimated Cost to the Federal Government

The estimated budgetary impact of S. 556 is shown in the following table. The costs of this legislation fall within budget functions 300 (natural resources and environment) and 270 (energy).

Basis of Estimate

For this estimate, CBO assumes that S. 556 will be enacted near the beginning of calendar year 2003. The following paragraphs explain our estimates of the revenues that would be collected from the sale of emissions permits and the spending associated with these revenues. Also detailed below is our estimate of the roughly $30 million a year in discretionary costs to implement the bill. Outlays for discretionary programs are based on historical rates of spending for similar programs.

By Fiscal Year, in Millions of Dollars

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
CHANGES IN REVENUES										
Sale of Emission Permits:										
Estimated Revenues	0	0	0	0	0	0	24.1	26.8	29.6	32.7
CHANGES IN DIRECT SPENDING[1]										
Spending from Sale of Emission Permits:										
Estimated Budget Authority	0	0	0	0	0	0	32.2	35.8	39.5	43.6
Estimated Outlays	0	0	0	0	0	0	32.2	35.8	39.5	43.6
Tennessee Valley Authority:										
Estimated Budget Authority	0.3	0.6	0.7	0.8	0.8	0.6	0.1	−0.2	−0.2	−0.2
Estimated Outlays	0.3	0.6	0.7	0.8	0.8	0.6	0.1	−0.2	−0.2	−0.2
Total Changes in Direct Spending:										
Estimated Budget Authority	0.3	0.6	0.7	0.8	0.8	0.6	32.3	35.6	39.3	43.4
Estimated Outlays	0.3	0.6	0.7	0.8	0.8	0.6	32.3	35.6	39.3	43.4

[1] In addition to increasing direct spending, CBO estimates that implementing this bill would cost an average of about $30 million a year, subject to the availability of appropriated funds, to conduct air-quality monitoring and administer the emission permits required under the bill.

Revenues from Sale of Permits

S. 556 would establish a system to cap the emission of certain air pollutants created as a by-product of the generation of electricity-using fossil fuels and would require owners and operators of electricity-generating facilities to purchase annual permits for any of the covered pollutants emitted. Under the bill, the permits would

each represent the authority to emit one ton of the regulated pollutants for a year. S. 556 would allocate such permits to various groups who could sell them to the electricity industry. Electricity generators, qualified energy efficiency projects, and certain carbon reduction projects would receive about 32 percent of the permits starting in 2008, decreasing to 23 percent by 2017. The remainder of the permits would be allocated to the Federal Government on behalf of certain groups and for designated purposes.

In CBO's view, the pollution permitting system established in S. 556 would have an effect similar to a tax on pollution emitted by electricity generators. A direct tax on pollution would increase the cost of emitting pollution in an amount designated by the Government. S. 556 would increase the cost of pollution by an amount equal to the price established in the marketplace for pollution permits. Thus, CBO would consider the funds generated from the annual sale of permits by the Government to be governmental receipts (i.e., revenues).

Based on the estimated value of permits discussed below, we estimate that the sale of permits by the Government would generate net revenues of about $113 billion over the 2009–2012 period. Although permits would be available starting in 2008, companies would not be required to provide proof of purchase until 2009 when we estimate collections and spending would start. In addition, the bill would establish penalties for firms that generate pollution in excess of the permits they hold, but CBO estimates that such penalties would be negligible because we expect firms would comply with the requirement to obtain permits.

Emission Caps: Starting in 2008, S. 556 would establish annual caps on the emissions of carbon dioxide at 2,050 million tons, sulfur dioxide at 2.25 million tons, and nitrogen oxides at 1.51 million tons. Mercury emissions would be capped at 5 tons, but there would be no permits issued or required for that pollutant. These limits would require reductions in emissions by the electricity industry of roughly 75 percent below the 1997 emissions levels for nitrogen oxides and sulfur dioxide, 90 percent below the 1997 emissions level of mercury, and a reduction to the 1990 level of carbon dioxide emissions (the 1990 level was about 12 percent below the 1997 level).

Permit Price: The revenues that would be collected under S. 556 depend on the price received from the sale of the permits. To estimate the price of pollution permits that would be issued under this bill, CBO used an analysis by the Energy Information Administration (EIA) that models a scenario similar to what would be imposed by S. 556. In July 2001, EIA issued a report titled Strategies for Reducing Multiple Emissions from Electric Power Plants. In that report, EIA analyzed the effects on the electricity industry of capping the four pollutants addressed in S. 556 to levels very similar to those in the bill. According to the EIA analysis, if all four pollutants were reduced to levels similar to those imposed by S. 556, the effort to meet the carbon dioxide and mercury limits would result in effectively meeting the caps on the other emissions. Thus, for this estimate, we assume that the only permit with a significant cash value would be the carbon dioxide permit. That is, electricity

generators would likely be willing to pay a significant price for the carbon dioxide permit.

Although the bill also would require that owners and operators of electricity plants obtain permits for any sulfur dioxide or nitrogen oxides released during the generation of electricity, we expect that the permits for those two pollutants would have a negligible price. As a consequence of meeting the carbon dioxide and mercury caps in the bill, electricity generators would reduce the amount of sulfur dioxide and nitrogen oxides emissions below the caps established by S. 556. That action would result in a supply of permits for those two pollutants well in excess of the demand for those permits. In this situation, we expect that the permits for sulfur dioxide and nitrogen oxides would be sold at a negligible price that would cover any transaction costs involved in the process of selling the permits. As a result, we have estimated only the value to the Government of selling the carbon dioxide permits.

EIA estimated the market price of permits to emit carbon dioxide by using its model of the U.S. electricity system to estimate the permit price that forces power suppliers and consumers to make sufficient changes in investment, operations, and conservation activities to meet each of the caps. Because coal-fired generation produces the highest levels of pollution that would be reduced and regulated under the modeled scenario, EIA estimates significant reductions in the use of coal to make electricity. Currently, about 50 percent of total electricity generation in the United States is produced from coal. Under the scenario modeled by EIA and used for this estimate, electricity generation from coal would be about 40 percent lower by 2010 than it would have been without legislation to establish pollution caps. Natural gas generation and, to a lesser degree, renewable energy generation would increase under the model.

The amount of fuel switching in the electricity industry that EIA projects under a multi-pollution cap scenario relies on some significant assumptions. Specifically, the model assumes that new generating capacity would be built as needed to replace generation that would no longer be economic to operate under the pollution caps. It assumes that siting and permitting for new plants would occur without significant delays and that taking electricity plants off-line to install significant upgrades of new pollution-control technology would not affect the reliability of the electricity system. Finally, the EIA model assumes that by 2010, the combination of imports and domestic production of natural gas could increase enough to accommodate much more natural gas generation of electricity (about 70 percent above what it would have been without new pollution caps with no more than a 20 percent increase in natural gas prices). Any changes in these assumptions could change the estimate of permit prices dramatically.

Based on the information in the EIA report, CBO estimates that the price of carbon dioxide permits would be about $23, starting in 2008, and would increase to $32 by 2012. The permit price would increase annually because as demand for electricity grows and new firms enter the market, the availability of permits would remain the same, and in some cases, could decrease. This would increase the demand for the permits, and thus the price for the permits. In

the EIA model, the value of the permits to electricity producers is equal to the cost of eliminating one more ton of the pollutant (the marginal cost) and generally reflects the lowest-cost combination of investments that electricity producers could make to capture pollutants and raise the efficiency of their coal-fired power plants and replace coal-fired plants with natural gas-fired generation. Changes in the assumptions used by EIA would yield a different estimate of permit prices.

Revenue Calculation. Under S. 556, we assume that starting in 2008 and for each year thereafter, the amount of carbon dioxide generated from electricity production would meet the 2,050 million ton cap established in the bill. To achieve that result, we expect that the Government would sell all of its permits each year at the prices discussed above. Thus, we estimate that the Government's 1,403 million permits (68.4 percent of the total in 2008, increasing annually) would generate about $32 billion in 2009 because permits generated for emissions in 2008 would not be required until the following year. The lag between when emissions are generated and when permits must be obtained would continue. Overall, we estimate that S. 556 would generate gross revenues of about $151 billion over the 2009–2012 period.

However, the cost of the permits adds to the cost of the electricity industry, which passes the cost on to consumers. When consumers spend less in the economy, the result is a reduction in corporate and individual taxes. CBO estimates that this decline in income and payroll tax receipts would equal 25 percent of the total amount of the revenue generated from permit sales. Thus, we estimate that net revenues under S. 556 would total about $24 billion in 2009 and $113 billion over the 2009–2012 period.

Penalties. Under S. 556, civil penalties would be assessed for failure to submit the adequate number of permits for each of the pollutants covered under the bill. Because civil penalties would be assessed at a cost of three times the market rate for a permit, we would expect most firms to comply with the bill. Currently, under the Environmental Protection Agency's Acid Rain Program, penalties are collected on emissions of sulfur dioxide and nitrogen oxides in excess of submitted allowances. Penalties currently collected under that program are less than $500,000 a year, and CBO estimates that any additional revenues that would be collected under S. 556 also would be less than $500,000 a year.

Direct Spending

Enacting S. 556 would increase direct spending primarily by using the proceeds from the sale of pollution permits, beginning in 2009, for assistance to electricity consumers. Some of the proceeds would be used for other purposes as well. In addition, complying with the bill would cause an increase in spending by TVA over the next several years (but that spending would be offset, over time, by increases in TVA receipts). In total, CBO estimates direct spending increases of $3 billion over the 2003–2007 period and $154 billion over the 2003–2012 period.

Allocation of Pollution Permits: S. 556 would allocate permits to different groups who could sell them to the electricity industry and use the proceeds for designated purposes. Electricity generators,

qualifying energy efficiency projects, and certain projects designed to remove carbon from the atmosphere would receive 31.6 percent of the permits starting in 2008, decreasing to 22.6 percent by 2017. The remainder would be allocated to the Federal Government for various programs. CBO estimates that spending of the proceeds from the sale of permits by the Government under S. 556 would start in 2009 and total about $153 billion over the 2009–2012 period. Such spending would be spread among various purposes designated in the bill as discussed below.

Household Electricity Consumers: S. 556 would allocate most of the permits to residential electricity consumers. Through the Federal Government (or its agent), consumers would receive 62.4 percent of the proceeds from the sale of permits in 2009, increasing annually by 1.5 percent. Electricity consumers could receive the proceeds from the sale of the permits as a rebate on their electricity bill or by some other means. CBO estimates that such assistance to electricity consumers would start at about $29 billion in 2009 and increase, as the permit price and the amount of permit sale proceeds allocated to electricity consumers increases, to about $41 billion in 2012. We estimate that spending by the Government for assistance to electricity consumers over the 2009–2012 period would total about $140 billion.

Transition Assistance: In 2009, S. 556 would allocate 6 percent of proceeds from permit sales to workers and communities that experience adverse economic impacts as a result of the emissions reductions imposed by the bill and to producers of electricity intensive products. The percentage of permit sale proceeds available to these groups would be reduced annually by one-half of a percent, reaching 4 percent in 2012 and 1.5 percent of permit sales in 2017. Either the Federal Government or its agent would be responsible for allocating the proceeds to these groups. CBO estimates that spending for transition assistance would start at about $2.8 billion in 2009 and be reduced to about $2.7 billion in 2012. We estimate that total spending for transition assistance would be about $11 billion over the 2009–2012 period.

Tennessee Valley Authority: CBO estimates that implementing this bill would increase direct spending by the Tennessee Valley Authority by about $3 billion over the 2003–2012 period, but should have no net budgetary impact over 30 to 40 years. TVA is one of the nation's largest electricity marketers and currently accounts for about 5 percent of the country's coal-generation capacity. For this estimate, CBO assumes that TVA would comply with the bill in the same manner as private utilities. We estimate that replacing 40 percent of its coal facilities by 2009 would cost about $6 billion (including interest costs), but we expect that this increase would be partially offset by lower spending on pollution controls and other upgrades to the facilities being taken out of service, saving about $1 billion relative to current law. TVA is required to recover all of its costs over time through proceeds from electricity sales. For this estimate, we assume that the agency would increase rates to recover the cost of the new investments over a 30-year period and that the additional amounts collected to recover those expenditures would total about $2 billion over the 2003–2012 period.

Hence, the net effect of those TVA actions over the 10-year period is about $3 billion.

In addition, we expect that TVA would increase electricity rates by about $6 billion over the 2009–2012 period, which is the amount necessary to cover the annual cost of carbon dioxide permits for its own use. We assume that TVA would purchase all of its permits from the Government. Because the increase in receipts to TVA would be used to purchase the required permits, there would be no net increase in direct spending resulting from this requirement. However, the increased receipts would be counted as revenues collected by the Government from the sale of its permits.

Spending Subject to Appropriation

S. 556 would authorize the appropriation of $27.2 million annually over the 2003–2012 period for operational support, equipment, and modernization for several air quality monitoring programs managed by the Environmental Protection Agency (EPA) and supported by several other agencies. In addition, based on information from EPA, we estimate that the bill would authorize $11 million in 2003 and $55 million over the 2003–2007 period for new rulemakings, reports, and pollution control programs that would be established by the bill. We estimate that outlays for these purposes under S. 556 would total $25 million in 2003, $175 million over the 2003–2007 period, and about $370 million over the 2003–2012 period, assuming the appropriation of the necessary and authorized amounts.

Air Quality Monitoring: S. 556 would authorize the appropriation of $27.2 million a year over the 2003–2012 period for operational support, equipment, and modernization for several air quality monitoring programs managed by EPA and supported by other agencies. In 2002, those programs received about $20 million. CBO estimates that implementing these monitoring programs would cost $18 million in 2003, $125 million over the 2003–2007 period, and about $260 million over the 2003–2012 period, assuming appropriation of the authorized amounts.

Program Implementation: Based on information from EPA, CBO estimates that implementing S. 556 would require the appropriation of $11 million in 2003, $55 million over the 2003–2007 period, and $115 million over the 2003–2012 period for rulemakings, program implementation, air quality monitoring, and reporting relating to the pollution control programs that would be established by the bill. Currently, EPA manages a program to issue rulemakings and manage and track the trading of permits for pollutants covered under the Acid Rain Program. Based on information from EPA, we estimate that the agency will spend about $12 million on that program in 2002.

We expect that new programs established under S. 556 would cost slightly less than the current Acid Rain Program, as some pollution permitting and tracking systems through that program are currently in place. Based on information from EPA, we expect that about $3 million a year would be spent on outside contracting for modeling and programming related to the new air quality standards and for workshops and guidance programs for regulated firms. About $8 million a year would be spent on additional staff to man-

age and support the complex rulemakings, allocation of emissions permits, monitoring, and data collection and analysis required by the bill. Overall, we expect that spending for the new programs authorized by S. 556 would be $7 million in 2003, $50 million over the 2003–2007 period, and $110 million over the 2003–2012 period, assuming appropriation of the necessary amounts.

Intergovernmental and Private-Sector Impact

S. 556 would impose mandates by:

- Establishing national caps on emissions of carbon dioxide, sulfur dioxide, and nitrogen oxides produced by large electricity-generating facilities and requiring the owners or operators of such facilities to purchase permits for the right to emit the substances;
- Requiring owners or operators of coal-fired generating facilities to reduce their emissions of mercury;
- Eliminating current exemptions for certain coal-fired facilities from adopting best available control technology, as determined by the EPA Administrator;
- Requiring electricity generators to monitor ambient air quality and report on local emissions of sulfur dioxide, nitrogen oxides, and carbon dioxide;
- Establishing standards intended to prevent the re-release of captured mercury;
- Requiring EPA to issue standards for hazardous air pollutants emitted from coal-fired generating facilities;
- Granting EPA new authority to establish additional emission reductions to prevent adverse local impacts, to protect public health, welfare or the environment and to protect certain sensitive ecosystems; and
- Requiring States, as part of their State Implementation Plans, to identify electric facilities that are significantly contributing to that State's nonattainment status under the Clean Air Act.

While we cannot precisely estimate the costs of many of the mandates in the bill, CBO estimates that the aggregate direct costs of both the intergovernmental and private-sector mandates in S. 556 would be well in excess of the annual thresholds established by UMRA starting in 2009. The thresholds are $58 million for intergovernmental mandates and $115 million for private-sector mandates in 2002, and are adjusted annually for inflation.

Cap and Trade Program for Emissions of Carbon Dioxide, Sulfur Dioxide, and Nitrogen Oxides

Beginning in 2008, S. 556 would establish national caps on emissions of carbon dioxide, sulfur dioxide and nitrogen oxides. The bill would require the owners or operators of large electricity-generating facilities, those which have a capacity to generate 15 megawatts or more, to purchase permits consistent with the amount of annual emissions from their facility. S. 556 would establish caps on the emissions of carbon dioxide at 2,050 million tons; sulfur dioxide at 2.25 million tons; and nitrogen oxides at 1.51 million tons. Those limits would require reductions in emissions by the electricity industry of roughly 75 percent below the 1997 emissions levels for sulfur dioxide and nitrogen oxides and a reduction to the 1990 level of carbon dioxide emissions. Programs to control atmos-

pheric emissions from the production of electricity already exist, largely under the authority of the Clean Air Act. Such programs include a mix of emissions standards, technology standards, and cap and trade programs that directly affect emissions of sulfur dioxide and nitrogen oxides, among other air pollutants. Those programs may affect carbon dioxide emissions indirectly by influencing fuel choice, but no programs specifically targeting carbon dioxide emissions currently exist.

Under S. 556, the owners and operators of large electricity-generating facilities would purchase one permit for each ton of a pollutant emitted. The July 2001 EIA analysis, upon which CBO has based its estimate of permit prices, indicated that if facilities meet the carbon dioxide and mercury limits, they also would effectively meet the caps on the other two pollutants. Therefore, the permit prices for sulfur dioxide and nitrogen oxides emissions would be negligible (covering only relevant transactions costs) if the caps on those pollutants would be applied in combination with the carbon dioxide and mercury limitations. Accordingly, CBO estimates that the cost to the electricity-generating industry of complying with the sulfur dioxide and nitrogen oxides cap and trade programs would be minimal.

CBO estimates that the price of carbon dioxide permits would be about $23 per short ton of carbon dioxide in 2009, increasing to $32 by 2012. CBO expects that plants will begin making expenditures to comply with the emissions caps well in advance of 2009. If the electricity-generating industry were required to purchase all carbon dioxide permits available in 2009, the cost would amount to roughly $47 billion. However, S. 556 would allocate 10 percent of the permits to the industry in 2009 and would decrease that allocation by 1 percent each year until 2017. Other offsets for individual generators may exist because certain clean fossil fuel generating units, combined heat and power generators, utilities that improve the efficiency of transmission and distribution systems, and utilities involved in geologic carbon sequestration would be eligible to receive an additional allocation of permits. Thus the total cost to industry could amount to as much as $40 billion in 2009, when the permits are first purchased, increasing to as much as $60 billion in 2012. Because nonFederal public power represents 8 percent of the industry, CBO estimates that about $3 billion of the cost would be absorbed by public power in 2009, increasing to roughly $5 billion in 2012.

Standards for Mercury Emissions Generated By Coal-Fired Facilities

Mercury emissions are currently regulated only indirectly under the requirement that new plants adopt the best available control technology. In December 2000, EPA stated its intent to regulate mercury from coal-fired power plants. The agency is not scheduled to issue final regulations until December 2004. S. 556 would establish a national emissions standard, set at 2.48 grams of mercury per 1,000-megawatt hours of electricity from all coal-fired generating facilities, beginning in 2008. That standard may be raised after 2 years if generators are unable to reduce national emissions of mercury by electricity generators to 5 tons annually. According

to the EIA analysis, achieving the carbon dioxide cap required by the bill would advance the industry's progress toward meeting the mercury limit. Additional costs above the carbon dioxide requirement could be about $2.2 billion annually, beginning in 2008, based upon a compliance cost of approximately $220,000 per pound of mercury emitted. The incremental cost of meeting the mercury limit contained in S. 556 could be lower if in 2004 EPA issues regulations to limit mercury emissions that would take effect prior to 2008.

Eliminate Exemptions for Coal-fired Facilities from Adopting Best Available Control Technology

The Clean Air Act Amendments of 1977 exempt generating facilities that existed prior to 1971, and plants that did not make major modifications to their facilities, from the requirements of the New Source Review program. That program requires plants to install particular equipment to limit emissions, known as the best available control technology or BACT, as determined by the EPA Administrator. At the time, it was believed that older plants would soon be retired, but the industry has successfully extended their lives and in many cases increased their generating capacity. Starting in 2013, S. 556 would bring those older facilities (there are over 700 of them) under the same restrictions on technology that apply to newer facilities. Further, the provision would require all coal-fired facilities, upon their 40th birthday, to install BACT when modifying the facility, regardless of whether the modification is major or not. Information provided by industry and governmental sources indicates that the technology that would be installed to meet the carbon dioxide and mercury emissions caps would satisfy the BACT standard. Therefore, CBO expects that there would be no cost for complying with this mandate.

Monitoring of Air Quality and Reporting on Local Emissions.

Under S. 556, EPA would issue regulations requiring that electricity generators report information on the amount of covered pollutants emitted each year, gathered through the use of continuous emissions monitoring systems. The bill details specific requirements for monitoring of ambient air quality at large coal-fired facilities to begin January 2004, which would include stationing monitors at no fewer than two points within three miles of the facility. Currently, there are requirements for the continuous monitoring and reporting of sulfur dioxide and nitrogen oxides emissions for units regulated under the Acid Rain program and nitrogen oxides emissions programs. In addition, EPA has specified procedures for monitoring or estimating carbon dioxide emissions, although to date, such monitoring has not been required. Accordingly, some facilities are already monitoring emissions from their facilities voluntarily to comply with existing regulations. CBO does not have sufficient information on current emissions monitoring practices in the industry nor the requirements that would be contained in future EPA regulations to estimate the cost of this mandate.

Safeguards Against the Re-Release of Captured Mercury

The bill would require EPA to promulgate regulations ensuring that mercury contained in coal wastes is not re-released into the environment in either disposal or recycling of the substance. Coal wastes are a byproduct of the treatment of coal before combustion, coal combustion itself, sulfur dioxide scrubbing, and the treatment of flue gases. While a portion of the coal wastes are contained in disposal units, some of the wastes, including ash, are recycled for use in agricultural applications or in the production of wallboard and cement. In terms of coal waste disposal, among other requirements, the regulations to be promulgated by EPA would require daily covers on all active waste disposal units and permanent covers on all inactive waste disposal units. In terms of coal waste recycling, the regulations would eliminate agricultural uses and require businesses that process or use coal wastes to limit mercury emissions. According to industry sources, those recycling applications account for roughly half of the current use of all coal combustion byproducts. At this time, neither EPA nor the industry could provide any information on the costs stemming from such regulations. Therefore, CBO cannot determine the cost of this mandate.

New Standards for Hazardous Air Pollutants

Prior to January 2006, S. 556 would require EPA to promulgate emissions standards for hazardous air pollutants emitted by coal-fired generating facilities. Because there are numerous substances to which regulations could be applied and EPA cannot provide information as to the scope of such regulations, CBO cannot estimate the impact of such regulations on affected facilities.

Additional Authority to Regulate Emissions

Pending the outcome of a 3-year study on emissions allowance trading, the bill would grant EPA the authority to limit the emissions from a specific electricity-generating facility in order to avoid adverse local impacts such as the endangerment of public health, contribution to acid deposition in a sensitive area, and other degradation of the environment. In addition, S. 556 would allow the Administrator to require reductions in national emissions beyond those required by the bill if the Administrator believes the reductions are not reasonably anticipated to protect public health or welfare or the environment. And finally, beginning as early as 2008, the bill would grant EPA the authority to regulate emissions of sulfur dioxide and nitrogen oxides for the protection of sensitive ecosystems. Sensitive ecosystems identified by the bill include the Adirondack Mountains, mid-Appalachian Mountains, Rocky Mountains, southern Blue Ridge Mountains, the Great Lakes, Lake Champlain, Long Island Sound, and the Chesapeake Bay. In the event the agency uses any of the new authority granted, compliance with new limits would constitute a mandate under UMRA. However, because EPA could not provide information as to whether such authority would be used, CBO has no basis to estimate the cost for the industry to comply.

State-Reporting Requirements

States would be required, as part of their responsibilities under the Clean Air Act, to periodically report on the electricity-generating facilities that are significantly contributing to their nonattainment status for ozone. Based on information from State air pollution administrators, CBO estimates that this new requirement would not significantly increase the costs that States incur to comply with the Clean Air Act.

Estimate Prepared By: Federal Spending: Lisa Cash Driskill (226–2860); Federal Revenues: Annabelle Bartsch (226–2685), Lisa Cash Driskill (226–2860), Dick Farmer and Terry Dinan (226–2940); Impact on State, Local, and Tribal Governments: Theresa Gullo (225–3220); Impact on the Private Sector: Lauren Marks and Dick Farmer (226–2940).

Estimate Approved By: Peter H. Fontaine, Deputy Assistant Director for Budget Analysis; and G. Thomas Woodward, Assistant Director for Tax Analysis.

APPENDIX I

National Ambient Air Quality Standards

	Pollutant Standard	Standard Type
Carbon Monoxide (CO):		
8-hour Average	9 ppm (10 mg/m3)	Primary
1-hour Average	35 ppm (40 mg/m3)	Primary
Nitrogen Dioxide (NO_2):		
Annual Arithmetic Mean	0.053 ppm (100 μg/m3)	Primary & Secondary
Ozone (O3):		
1-hour Average	0.12 ppm (235 μg/m3)	Primary & Secondary
8-hour Average	0.08 ppm (157 μg/m3)	Primary & Secondary
Lead (Pb):		
Quarterly Average	1.5 μg/m3	Primary & Secondary
Particulate (PM_{10})—Particles with diameters of 10 micrometers or less:		
Annual Arithmetic Mean	50 μg/m3	Primary & Secondary
24-hour Average	150 μg/m3	Primary & Secondary
Particulate ($PM_{2.5}$)—Particles with diameters of 2.5 micrometers or less:		
Annual Arithmetic Mean	15 μg/m3	
Primary & Secondary		
24-hour Average	65 μg/m3	
Primary & Secondary		
Sulfur Dioxide (SO_2):		
Annual Arithmetic Mean	0.03 ppm (80 μg/m3)	Primary
24-hour Average	0.14 ppm (365 μg/m3)	Primary
3-hour Average	0.50 ppm (1300 μg/m3)	Secondary

Parenthetical value is an approximately equivalent concentration.

APPENDIX II—BIBLIOGRAPHY OF RESEARCH ON HEALTH IMPACTS OF $PM_{2.5}$

2002

National Environmental Trust. 2002. "Toxic Beginnings: Cancer Risks to Children from California's Air Pollution." See http://environet.policy.net/health/toxic—beginnings02.pdf.

Pope, C. Arden III, Burnett, Richard T., et al. March 6, 2002. "Lung Cancer, Cardiopulmonary Mortality, and Long-Term Exposure to Fine Particulate Air Pollution." Journal of the American Medical Association 287(9):1132–1141.

2001

Avol, E.L., Gauderman, W.J., et al. 2001. "Respiratory Effects of Relocating to Areas of Differing Air Pollution Levels." American Journal of Respiratory and Critical Care Medicine 164:2067–2072.

Brown, K.H., Suh, H.H., et al. April, 2001. "Characterization of Personal-Ambient $PM_{2.5}$ Relationships for Children and Older Adults." Health Effects Institute Annual Conference, Program and Abstracts.

Katsouyanni, K., Touloumi, G., et al. 2001. "Confounding and Effect Modification in the Short-Term Effects of Ambient Particles on Total Mortality: Results from 29 European Cities within the APHEA2 Project." Epidemiology 12:521–531.

Lewtas, J., Binkova, B., et al. 2001. "Biomarkers of Exposure to Particulate Air Pollution in the Czech Republic." In: Teplice Program: Impact of Air Pollution on Human Health. Academia Press: Prague.

Ostro, B., Lipsett, M., et al. 2001. "Air Pollution and Exacerbation of Asthma in African-American Children in Los Angeles." Epidemiology 12(2):200–208.

Otto, D., Skalik, I., et al. 2001. "Neurobehavioral Effects of Exposure to Environmental Pollutants in Czech Children." In: Teplice Program: Impact of Air Pollution on Human Health. Academia Press: Prague.

Peters, Annette, Dockery, Dougles, et al. 2001. "Increased Particulate Air Pollution and the Triggering of Myocardial Infarction." Circulation 103:2810–2815.

2000

Abt Associates, Inc. with ICF Consulting. October, 2000. "The Particulate-Related Health Benefits of Reducing Power Plant Emissions." Bethesda, MD; and

Clean Air Task Force. October, 2000. "Death, Disease & Dirty Power: Mortality and Health Damage Due to Air Pollution from Power Plants." Boston, MA.

Gauderman, J.W., McConnell, R., et al. 2000. "Association between Air Pollution and Lung Function Growth in Southern California Children." American Journal of Respiratory and Critical Care Medicine 162:1383–1390.

Goldberg, M.S., Bailar, J.C. III, et al. October, 2000. "Identifying Subgroups of the General Population That May be Susceptible to Short-Term Increases in Particulate Air Pollution: A Time-Series Study in Montreal, Quebec." Health Effects Institute, Research Report Number 97.

Heinrich, J., Hoelscher, B., and H.E. Wichmann. 2000. "Decline of Ambient Air Pollution and Respiratory Symptoms in Chil-

dren." American Journal of Respiratory and Critical Care Medicine 161:1930–1936.

Krewski, D., Burnett, R.R., et al. July, 2000. "Reanalysis of the Harvard Six Cities Study and the American Cancer Society Study of Particulate Air Pollution and Mortality." Health Effects Institute: Boston, MA.

Pope, C.A. III. 2000. "Epidemiology of Fine Particulate Air Pollution and Human Health: Biological Mechanisms and Who's at Risk?" Environmental Health Perspectives 108(suppl 4):713–723.

Samet, J.M., Dominici, F., et al. June, 2000. "The National Morbidity, Mortality, and Air Pollution Study. Part II: Morbidity, Mortality and Air Pollution in the United States." Health Effects Institute Research Report 94, Part II; and

Samet, J.M., Zeger, S.L., et al. May, 2000. "The National Morbidity, Mortality, and Air Pollution Study. Part I: Methods and Methodological Issues." Health Effects Institute Research Report 94, Part I.

Schwartz, Joel. 2000. "The Distributed Lag Between Air Pollution and Daily Deaths." Epidemiology 11:320–326.

Thurston, G.D. September 1, 2000. "Particulate Matter and Sulfate: Evaluation of Current California Air Quality Standards with Respect to Protection of Children." California Air Resources Board, Office of Health Hazard Assessment.

Tolbert, P., et al. 2000. "Air Quality and Pediatric Emergency Room Visits for Asthma in Atlanta, Georgia." American Journal of Epidemiology 151(8):798–810.

1999

Bobak, M. and D. Leon. 1999. "The Effect of Air Pollution on Infant Mortality Appears Specific for Respiratory Causes in the Postneonatal Period." Epidemiology 10(6):666–670.

Holgate, S.T., Samet, J.M., et al. (eds). 1999. Air Pollution and Health. San Diego: Academic Press.

Loomis, D., Castillejos, M., et al. 1999. "Air Pollution and Infant Mortality in Mexico City." Epidemiology 10:118–123.

Norris, G., Young Pong, N., et al. 1999. "An Association Between Fine Particles and Asthma Emergency Department Visits for Children in Seattle." Environmental Health Perspectives 107(6):489–493.

Pope, C. Arden, III., Dockery, D. 1999. "Epidemiology of Particle Effects." In: Holgate, S., Samet, J., et al. (eds.) Air Pollution and Health. Academic Press: London, UK, pp. 673–705.

Pope, C. Arden, III., Gold, D., et al. 1999. "Particulate and Ozone Pollutant Effects on the Respiratory Function of Children in Southwest Mexico City." Epidemiology 10:8–16.

Pope, C. Arden, III., Dockery, D., et al. 1999. "Oxygen Saturation, Pulse Rate, and Particulate Air Pollution: A Daily Time-series Panel Study." American Journal of Respiratory and Critical Care Medicine 159:365–372.

Pope, C. Arden, III., Hill, R. and G. Villegas. 1999. "Particulate Air Pollution and Daily Mortality on Utah's Wasatch Front." Environmental Health Perspectives 107:567–573.

Pope, C. Arden, III., Verrier, R., et al. 1999. "Heart Rate Variability Associated with Particulate Air Pollution." American Heart Journal 138:890–899.

Pope, C. Arden, III., Dockery, D., et al. 1999. "Daily Changes in Oxygen Saturation and Pulse Rate Associated with Particulate Air Pollution and Barometric Pressure." Health Effects Institute Research Report Number 83.

1998

Thurston, G.D. 1998. "Determing the Pollution Sources Associated with PM Health Effects." AWMA VIP–81(2):889.

Zmirou, D., Schwartz, J., et al. 1998. "Time-Series Analysis of Air Pollution and Cause-Specific Mortality." Epidemiology 9(5):495–503.

1997

Anderson, H.R., Spix, C., et al. 1997. "Air Pollution and Daily Admissions for Chronic Obstructive Pulmonary Disease in 6 European Cities: Results from the APHEA Project." European Respiratory Journal 10:1064–1071.

Brunekreef, Burt. November, 1997. "Air Pollution and Life Expectancy: Is There a Relation?" Occupational Environmental Medicine 54(11): 781–4.

Katsouyanni K., Touloumi G., et al. 1997. "Short-Term Effects of Ambient Sulphur Dioxide and Particulate Matter on Mortality in 12 European Cities: Results from the APHEA Project." British Medical Journal 314:1658–1663.

Spix, C., Anderson R., et al. 1997. "Short-Term Effects of Air Pollution on Hospital Admissions of Respiratory Diseases in Europe. A Quantitative Summary of the APHEA Study Results." Archives of Environmental Health 53:54–64.

Timonen, K.L. and J. Pekkanen. 1997. "Air Pollution and Respiratory Health Among Children with Asthmatic or Cough Symptoms." American Journal of Respiratory Critical Care Medicine 156:546–552.

Touloumi, G., Katsouyanni K., et al. 1997. "Short-Term Effects of Ambient Oxidant Exposure on Mortality: A Combined Analysis within the APHEA Project." American Journal of Epidemiology 146:177–185.

Wang, X., Ding, H., et al. 1997. "Association Between Air Pollution and Low Birth Weight: A Community-Based Study." Environmental Health Perspectives 15:514–520.

Woodruff, T.J., Grillo, J., and Schoendorf, K.C. 1997. "The Relationship Between Selected Causes of Postneonatal Infant Mortality and Particulate Air Pollution in the United States." Environmental Health Perspectives 105:607–612.

1996

American Thoracic Society, Committee of the Environmental and Occupational Health Assembly. 1996. "Health Effects of Outdoor Air Pollution. Part 1." American Journal of Respiratory Critical Care Medicine 153:3–50; and

American Thoracic Society, Committee of the Environmental and Occupational Health Assembly, Bascom R., Bromberg P.A., et al. 1996. "Health Effects of Outdoor Air Pollution. Part 2." American Journal of Respiratory and Critical Care Medicine 153:477–498.

Touloumi G., Samoli E., et al. 1996. "Daily Mortality and 'Winter Type' Air Pollution in Athens, Greece A Time Series Analysis within the APHEA Project." Journal of Epidemiology and Community Health 50(suppl 1):S47-S51.

1995

Katsouyanni, K., Schwartz, J., et al. 1995. "Short Term Effects of Air Pollution on Health: A European Approach Using Epidemiologic Time Series Data: The APHEA Protocol." Journal of Epidemiology and Community Health 50(Suppl 1):S12-S18.

Pope, C.A., Thun, M.J., et al. 1995. "Particulate Air Pollution as a Predictor of Mortality in a Prospective Study of U.S. Adults." American Journal of Respiratory and Critical Care Medicine 151:669–74.

1993

Dockery, D.W., Pope C.A., et al. 1993. "An Association Between Air Pollution and Mortality in Six U.S. Cities." New England Journal of Medicine 329:1753–9.

1992

Pope, C.A., Dockery, D.W. 1992. "Acute Health Effects of PM_{10} Pollution in Symptomatic and Asymptomatic Children." American Review of Respiratory Disease 145:1123–1128.

APPPENDIX III -ESTIMATE OF DISTRIBUTION AND VALUE OF STATE EMISSION ALLOWANCES DONE BY CLEAN AIR TASK FORCE AND NATURAL RESOURCES DEFENSE COUNCIL AT THE COMMITTEE'S REQUEST

Estimated Allocations based on Residential Consumption and Generation Only

State	Fossil Generation (MWh)		Residential Sales (1000 MWh)		Allocation Percent	Low Value/ Year	High Value/ Year
Allocation		10.00%		65.00%			
TOTAL	2,624,333	100.00%	1,183,135	100.00%	75.00%		
TX	322,269	10.00%	116,895	10.00%	10.00%	260	4280
FL	149,388	5.69%	99,006	8.37%	6.01%	149388.052111	0.0569241927
CA	94,493	3.60%	78,011	6.59%	4.65%	1985.9753	2642.47747
OH	130,173	4.96%	46,488	3.93%	3.05%	1256.6526	1743.56732
NC	77,510	2.95%	46,537	3.93%	2.85%	1205.6669	1624.68909
GA	83,914	3.20%	44,560	3.77%	2.77%	1164.0538	1577.83732
PA	118,503	4.52%	41,448	3.50%	2.73%	1122.8325	1560.12296
NY	77,179	2.94%	41,556	3.51%	2.58%	1084.5113	1469.00285
IL	85,569	3.26%	40,146	3.39%	2.53%	1058.621	1444.33016
TN	62,797	2.39%	36,622	3.10%	2.25%	950.57586	1282.65549
VA	45,850	1.75%	37,541	3.17%	2.24%	956.0786	1272.49377
IN	131,324	5.00%	28,649	2.42%	2.07%	825.06189	1191.33816
MI	80,933	3.08%	30,700	2.59%	2.00%	824.89033	1139.92315
AL	81,250	3.10%	28,756	2.43%	1.89%	778.04759	1080.18197
WA	16,814	0.64%	33,036	2.79%	1.88%	818.03172	1065.98702
MO	65,358	2.49%	29,581	2.50%	1.87%	782.316	1069.5101
LA	74,046	2.82%	27,719	2.34%	1.81%	745.75558	1031.4576
KY	90,865	3.46%	23,374	1.98%	1.63%	657.0198	934.765638
AZ	49,781	1.90%	24,844	2.10%	1.55%	651.9751	886.557425

SC	40,331	1.54%	25,270	2.14%	1.54%	652.94592	878.200917
MD	33,518	1.28%	23,914	2.02%	1.44%	613.3029	820.447841
NJ	27,184	1.04%	24,064	2.03%	1.43%	610.66656	810.632715
OK	52,940	2.02%	19,640	1.66%	1.28%	528.86767	731.914096
WI	43,805	1.67%	19,929	1.68%	1.26%	526.82857	720.019549
MN	32,896	1.25%	18,629	1.57%	1.15%	484.48518	654.641847
MA	30,288	1.15%	17,534	1.48%	1.08%	455.33929	614.620487
OR	12,609	0.48%	18,212	1.54%	1.05%	454.27116	595.290158
MS	24,553	0.94%	17,193	1.45%	1.04%	441.38619	590.903472
CO	41,855	1.59%	14,029	1.19%	0.93%	381.77613	532.047069
AR	28,848	1.10%	14,871	1.26%	0.93%	389.31477	528.498989
WV	91,272	3.48%	9,738	0.82%	0.88%	326.64658	511.564704
KS	35,355	1.35%	12,528	1.06%	0.82%	338.92652	470.501086
IA	34,806	1.33%	12,029	1.02%	0.79%	326.27817	453.725348
CT	13,658	0.52%	11,645	0.98%	0.69%	296.01103	393.43019
NV	29,082	1.11%	9,406	0.80%	0.63%	256.97957	359.053242
NE	18,871	0.72%	8,346	0.71%	0.53%	221.14978	302.736885
UT	35,574	1.36%	6,514	0.55%	0.49%	193.25822	283.943176
NM	33,206	1.27%	4,936	0.42%	0.40%	152.63335	229.44661
ID	3	0.00%	7,006	0.59%	0.38%	169.95142	217.919639
ND	29,000	1.11%	3,390	0.29%	0.30%	110.96468	171.745267
WY	43,893	1.67%	2,103	0.18%	0.28%	94.499584	165.763329
MT	14,681	0.56%	3,901	0.33%	0.27%	109.17391	154.901478
DE	5,782	0.22%	3,574	0.30%	0.22%	92.425248	124.38492
NH	4,452	0.17%	3,638	0.31%	0.22%	92.659748	123.334058
SD	3,982	0.15%	3,423	0.29%	0.20%	86.978768	115.572281
HI	8,743	0.33%	2,765	0.23%	0.19%	75.73421	105.99121
RI	5,742	0.22%	2,664	0.23%	0.17%	70.311408	95.9894511
AK	3,671	0.14%	1,855	0.16%	0.12%	48.635276	66.0916784

VT	144	0.01%	2,037	0.17%	0.11%	49.555524	63.6880334
ME	5,431	0.21%	1,259	0.11%	0.09%	35.920458	51.5754356
DC	142	0.01%	1,624	0.14%	0.09%	39.534881	50.8369473
NOTES:						175243.530782	39286.3665186
Residential allocation value (million$)	Low estimate		28,700				
	High estimate		36800				
Generation allocation value (million$)							
	Low estimate		2600				
	High estimate		6000				

Data Source were the Year 2000 Electricity Sales to Residential Sector from EIA Form EIA-861, "Annual Electric Utility Report" - Year 2000 Fossil generation data from Benchmarking report

Note: In the assessment of the range of potential value of the allowance allocations directed by S. 556, the Clean Air Task Force used the allowance prices for CO2, SOx and NOx that were the high and low found in Scenarios A, B & C of the EIA/EPA analyses responding to the Jeffords/Lieberman request as reported at Table 2, page 10 in EPA, Comparison of Jeffords-Lieberman and Smith-Voinovich-Brownback, presented to the Senate Environment and Public Works Committee, October 2001.

The national average emissions rates used in calculating the benefits analyses:

	All Fossil	All Electricity Generation
SO2	2.23 lbs/MWh	1.62 lbs/MWh
NOx	1.3 lbs/MWh	0.94 lbs/MWh
CO2	390 lbs/MWh	283 lbs/MWh

APPENDIX III—PART II

GENERAL ACCOUNTING OFFICE

ESTIMATE OF DISTRIBUTION OF STATE EMISSION ALLOWANCES DONE BY THE GENERAL ACCOUNTING OFFICE AT THE COMMITTEE'S REQUEST

Analysis of emissions allowance allocations under S. 556

OVERVIEW AND KEY ASSUMPTIONS

The following tables summarize an analysis of emissions allowance allocations in 2008 and 2017 under S. 556, using the June 27,2002 version of the legislation.

The allocation calculations are based on the allocation mechanism outlined in section 707 of the bill. As described in section 707[c], generators of renewable electricity, efficiency projects, and cleaner energy sources can receive up to 20 percent of the total allocation, depending on a variety of factors. We analyzed the allocation under two scenarios; the first allocates 10 percent of the total to these sources, while the second allocates them the maximum 20 percent.

In addition, the analysis assumes that .0075 percent of the carbon dioxide allowances will be allocated to biologic carbon sequestration. This is the maximum allowed under the legislation. Similarly, the analysis assumes that 1.5 percent of the carbon allowances will be allocated to geological carbon sequestration—also the maximum allowed under the legislation.

The analysis of allocations to electricity consumers in the States relies on EIA's 2001 data on household electricity consumption, by State. These consumption values are static and were not adjusted to account for projected changes in electricity demand between 2001 and 2017, such as those that might result in anticipation of implementing the legislation or due to changes in the economy. The reliability of EIA's data was not tested.

The total number of allowances was not reduced to account for emissions from electricity co-generation or generation at units under 15 Megawatts in size, as required under section 704[c], or as required under section 705[h], due to data limitations. The legislation calls for reductions in the total number of allowances equal to the emissions from these sources.

Allowance Allocation Scenario 1 (Per Section 707 of S. 556)

10 Percent of allowances allocated to renewable electricity generating units, efficiency projects, and cleaner energy sources.

Allocation category	Number of allowances in 2008			Number of allowances in 2017		
	Carbon dioxide	*Nitrogen oxides*	*Sulfur dioxide*	*Carbon dioxide*	*Nitrogen oxides*	*Sulfur dioxide*
Transition assistance, dislocated workers, affected communities, and producers of energy intensive products	123,000,000	90,600	135,000	30,750,000	22,650	33,750
Transition assistance for electricity generators	205,000,000	151,000	225,000	20,500,000	15,100	22,500
Renewable generating units, efficiency projects, and cleaner sources	205,000,000	151,000	225,000	205,000,000	151,000	225,000
Households	1,484,712,500	1,117,400	1,665,000	1,761,462,500	1,321,250	1,968,750
Biological carbon sequestration	1,537,500	na	na	1,537,500	na	na
Geological carbon sequestration	30,750,000	na	na	30,750,000	na	na
TOTAL	2,050,000,000	1,510,000	2,250,000	2,050,000,000	1,510,000	2,250,000

Distribution of Allowances to Households, by State, Per Section 707[a][2] of S. 556, in 2008 and 2017

			2008 Allocation (number of allowances)			2017 Allocation (number of allowances)		
State	2001 EIA Data for Residential electricity consumption (million kilowatt hours)	Percent of total U.S. electricity consumption	Carbon dioxide	Nitrogen oxides	Sulfur dioxide	Carbon dioxide	Nitrogen oxides	Sulfur dioxide
Alabama	13,637	2.9%	34,585,704	26,029	38,785	41,032,469	30,778	45,881
Alaska	968	0.2%	2,456,009	1,848	2,753	2,912,622	2,185	3,256
Arizona	11,562	2.0%	29,323,158	22,069	32,884	34,788,987	26,095	38,883
Arkansas	7,099	1.2%	18,004,247	13,550	20,190	21,360,233	16,022	23,874
California	36,736	6.3%	93,168,615	70,119	104,482	110,535,220	82,911	123,543
Colorado	6,977	1.2%	17,694,634	13,317	19,844	20,993,147	15,747	23,464
Connecticut	5,938	1.0%	15,059,757	11,334	16,888	17,866,892	13,402	19,960
Delaware	1,594	0.3%	4,803,500	3,615	5,387	5,696,871	4,275	6,370
District of Columbia	877	0.1%	2,224,216	1,674	2,494	2,638,812	1,979	2,949
Florida	48,063	8.2%	121,895,775	91,739	136,697	144,617,114	108,475	161,638
Georgia	21,080	3.6%	53,462,392	40,236	59,954	63,427,767	47,576	70,892

Hawaii	1,292	0.2%	3,276,727	2,466	3,675	3,887,508	2,916	4,345
Idaho	3,596	0.6%	9,120,055	6,864	10,227	10,820,031	8,116	12,093
Illinois	19,522	3.3%	49,511,044	37,262	55,523	58,739,889	44,060	65,652
Indiana	14,397	2.5%	36,513,190	27,480	40,947	43,319,239	32,493	48,417
Iowa	5,829	1.0%	14,783,915	11,126	16,576	17,532,991	13,156	19,603
Kansas	5,612	1.0%	14,232,967	10,712	15,961	16,885,988	12,666	18,873
Kentucky	11,915	2.0%	30,216,425	22,742	33,886	35,851,131	26,891	40,070
Louisiana	12,304	2.1%	31,204,994	23,485	34,994	37,021,596	27,769	41,378
Maine	1,979	0.3%	5,019,074	3,777	5,629	5,954,628	4,466	6,655
Maryland	12,713	2.2%	32,242,286	24,266	36,157	38,252,230	28,693	42,754
Massachusetts	9,038	1.5%	22,921,874	17,251	25,705	27,194,505	20,398	30,395
Michigan	15,254	2.6%	38,686,685	29,116	43,384	45,897,873	34,427	51,299
Minnesota	9,086	1.6%	23,043,610	17,343	25,842	27,338,932	20,507	30,556
Mississippi	8,069	1.4%	20,464,328	15,402	22,949	24,276,873	18,211	27,136
Missouri	14,640	2.5%	37,129,479	27,944	41,638	44,050,403	33,042	49,234
Montana	2,070	0.4%	5,249,865	3,951	5,887	6,228,438	4,672	6,961
Nebraska	4,140	0.7%	10,499,730	7,902	11,775	12,456,876	9,344	13,923
New Hampshire	1,913	0.3%	4,851,687	3,651	5,441	5,756,040	4,318	6,433
Nevada	4,343	0.7%	11,014,571	8,290	12,352	13,067,685	9,802	14,605
New Jersey	11,984	2.0%	30,393,420	22,874	34,084	36,058,746	27,047	40,302
New Mexico	2,452	0.4%	6,218,680	4,680	6,974	7,377,841	5,534	8,246
New York	21,278	3.6%	53,964,553	40,614	60,517	64,023,530	48,023	71,558
North Carolina	23,370	4.0%	59,270,213	44,607	66,467	70,318,165	52,745	78,593
North Dakota	1,860	0.3%	4,717,270	3,550	5,290	5,596,568	4,198	6,255
Ohio	23,541	4.0%	59,703,898	44,933	66,954	70,832,688	53,131	79,168
Oklahoma	9,054	1.5%	22,962,452	17,282	25,751	27,242,647	20,434	30,449
Oregon	9,684	1.7%	24,560,237	18,484	27,543	29,138,259	21,856	32,567
Pennsylvania	23,752	4.1%	60,239,029	45,336	67,554	71,467,567	53,607	79,878
Rhode Island	1,329	0.2%	3,370,565	2,537	3,780	3,998,838	2,999	4,469
South Carolina	12,486	2.1%	31,671,648	23,836	35,518	37,575,235	28,185	41,997
South Dakota	1,804	0.3%	4,575,245	3,443	5,131	5,428,069	4,072	6,067
Tennessee	19,109	3.3%	48,463,607	36,474	54,349	57,497,210	43,128	64,283
Texas	53,348	9.1%	135,299,415	101,827	151,729	160,519,189	120,403	179,409
Utah	3,135	0.5%	7,950,882	5,984	8,919	9,432,925	7,076	10,543
Virginia	19,127	3.3%	48,509,258	36,508	54,400	57,551,371	43,169	64,324
Vermont	1,044	0.2%	2,647,758	1,993	2,969	3,141,299	2,356	3,511
Washington	18,164	3.1%	46,066,990	34,670	51,661	54,653,793	40,995	61,085
West Virginia	5,908	0.9%	13,461,972	10,132	15,097	15,971,280	11,980	17,851
Wisconsin	9,899	1.7%	25,105,513	18,894	28,151	29,785,174	22,341	33,290
Wyoming	1,143	0.2%	2,898,838	2,182	3,251	3,439,181	2,580	3,844
SUM OF ALL	565,416	100.0%	1,434,712,500	1,117,400	1,665,000	1,761,462,500	1,321,250	1,968,750

Allowance Allocation Scenario 2 (Per Section 707 of S. 556)

20 Percent of allowances allocated to renewable electricity generating units, efficiency projects, and cleaner energy sources.

Allocation category	Number of allowances in 2008			Number of allowances in 2017		
	Carbon dioxide	*Nitrogen oxides*	*Sulfur dioxide*	*Carbon dioxide*	*Nitrogen oxides*	*Sulfur dioxide*
Transition assistance, dislocated workers, affected communities, and producers of energy intensive products	123,000,000	90,600	135,000	30,750,000	22,650	33,750
Transition assistance for electricity generators	205,000,000	151,000	225,000	20,500,000	15,100	22,500
Renewable generating units, efficiency projects, and cleaner sources	410,000,000	302,000	450,000	410,000,000	302,000	450,000
Households	1,279,712,500	966,400	1,440,000	1,556,482,500	1,170,250	1,743,750
Biological carbon sequestration	1,537,500	na	na	1,537,500	na	na
Geological carbon sequestration	30,750,000	na	na	30,750,000	na	na
	2,050,000,000	1,510,000	2,250,000	2,050,000,000	1,510,000	2,250,000

Distribution of Allowances to Households, by State, Per Section 707[a][2] of S. 556, in 2008 and 2017

			2008 Allocation (number of allowances)			2017 Allocation (number of allowances)		
State	2001 EIA Data for Residential electricity consumption (million kilowatt hours)	Percent of total U.S. electricity consumption	Carbon dioxide	Nitrogen oxides	Sulfur dioxide	Carbon dioxide	Nitrogen oxides	Sulfur dioxide
Alabama	13,637	2.3%	28,810,322	22,512	33,544	36,257,087	27,260	40,620
Alaska	968	0.2%	2,116,037	1,598	2,381	2,573,650	1,935	2,883
Arizona	11,562	2.0%	25,274,398	19,086	28,440	30,740,225	23,113	34,439
Arkansas	7,099	1.2%	15,518,331	11,719	17,462	18,874,317	14,191	21,145
California	36,736	6.3%	80,304,465	60,649	90,363	97,671,069	73,435	109,424
Colorado	6,977	1.2%	15,251,640	11,518	17,162	18,549,952	13,947	20,782
Connecticut	5,938	1.0%	12,980,398	9,802	14,608	15,787,533	11,870	17,687
Delaware	1,894	0.3%	4,140,262	3,127	4,659	5,035,633	3,786	5,642
District of Columbia	877	0.1%	1,917,112	1,448	2,157	2,331,705	1,753	2,612
Florida	48,003	8.2%	105,065,153	79,342	118,225	127,786,492	96,070	143,163
Georgia	21,080	3.6%	46,080,632	34,799	51,852	56,046,007	42,139	62,790
Hawaii	1,292	0.2%	2,824,297	2,133	3,178	3,435,078	2,583	3,848

Idaho	3,596	0.6%	7,860,814	5,936	8,845	9,560,790	7,168	10,711
Illinois	19,522	3.3%	42,674,863	32,227	48,020	51,903,708	39,025	58,149
Indiana	14,397	2.5%	31,471,673	23,766	35,414	38,277,722	28,780	42,884
Iowa	5,829	1.0%	12,742,126	9,622	14,338	15,497,731	11,652	17,363
Kansas	5,612	1.0%	12,267,766	9,264	13,804	14,920,787	11,218	16,716
Kentucky	11,915	2.0%	26,046,050	19,669	29,308	31,678,756	23,818	35,491
Louisiana	12,304	2.1%	26,895,399	20,311	30,265	32,713,002	24,596	36,649
Maine	1,979	0.3%	4,326,071	3,267	4,868	5,261,625	3,956	5,895
Maryland	12,713	2.2%	27,790,469	20,987	31,271	33,000,422	25,413	37,868
Massachusetts	9,083	1.5%	19,756,962	14,920	22,232	24,029,593	18,067	26,921
Michigan	15,254	2.6%	33,345,065	25,181	37,522	40,556,252	30,493	45,436
Minnesota	9,086	1.6%	19,861,889	14,999	22,350	24,157,212	18,163	27,064
Mississippi	8,069	1.4%	17,638,739	13,320	19,848	21,453,984	16,130	24,035
Missouri	14,640	2.5%	32,002,868	24,168	36,011	38,923,793	29,265	43,607
Montana	2,070	0.4%	4,524,996	3,417	5,092	5,503,569	4,138	6,166
Nebraska	4,140	0.7%	9,049,991	6,834	10,184	11,007,133	8,276	12,332
New Hampshire	1,913	0.3%	4,181,796	3,158	4,706	5,086,149	3,824	5,698
Nevada	4,348	0.7%	9,493,747	7,169	10,683	11,546,860	8,682	12,936
New Jersey	11,994	2.0%	26,196,883	19,783	29,478	31,862,208	23,956	35,696
New Mexico	2,452	0.4%	5,360,043	4,048	6,031	6,519,204	4,902	7,304
New York	21,278	3.6%	46,513,458	35,126	52,339	56,572,436	42,535	63,360
North Carolina	23,370	4.0%	51,086,546	38,579	57,485	62,134,497	46,717	69,611
North Dakota	1,860	0.3%	4,065,938	3,070	4,575	4,945,236	3,718	5,540
Ohio	23,541	4.0%	51,460,349	38,861	57,905	62,589,140	47,059	70,120
Oklahoma	9,054	1.5%	19,791,938	14,946	22,271	24,072,132	18,099	26,969
Oregon	9,684	1.7%	21,169,110	15,986	23,821	25,747,132	19,358	28,845
Pennsylvania	23,752	4.1%	51,921,593	39,210	58,425	63,160,131	47,480	70,749
Rhode Island	1,329	0.2%	2,905,178	2,194	3,269	3,533,451	2,657	3,959
South Carolina	12,488	2.1%	27,298,621	20,615	30,718	33,202,208	24,964	37,197
South Dakota	1,804	0.3%	3,943,523	2,978	4,437	4,796,347	3,606	5,373
Tennessee	19,109	3.3%	41,779,050	31,545	47,004	50,805,653	38,199	56,919
Texas	53,348	9.1%	116,618,101	88,066	131,225	141,837,875	106,643	158,905
Utah	3,135	0.5%	6,853,073	5,175	7,711	8,335,115	6,267	9,338
Virginia	19,127	3.3%	41,811,397	31,575	47,048	50,853,510	38,235	56,973
Vermont	1,044	0.2%	2,282,172	1,723	2,568	2,775,713	2,087	3,110
Washington	18,164	3.1%	39,706,291	29,985	44,680	48,293,154	36,310	54,104
West Virginia	5,308	0.9%	11,603,226	8,762	13,057	14,112,534	10,611	15,811
Wisconsin	9,899	1.7%	21,639,098	16,341	24,349	26,318,758	19,788	29,486
Wyoming	1,149	0.2%	2,498,585	1,887	2,812	3,038,927	2,285	3,405
SUM OF ALL	585,416	100.0%	1,279,712,500	966,400	1,440,000	1,556,462,500	1,170,250	1,743,750

MINORITY VIEWS OF SENATOR SMITH

The effort to develop a multi-pollutant bill in the Senate Committee on Environment and Public Works has long been regarded as an effort to address three discreet challenges: 1) the need for significant reductions of harmful emissions from the nation's power plants, 2) the need to streamline the regulatory burdens placed on the power sector in a manner that increases business certainty for the regulated community and improves the investment climate for beneficial new technologies, and 3) builds on the success of the Acid Rain Program in a way that modernizes our approach to environmental policymaking. In the more than 18 hearings held on this topic bipartisan support for tackling all three issues simultaneously has been voiced by Environment and Public Works Committee Members. Regrettably, only the first challenge is taken up by S. 556. Additionally, because of the inclusion of a program to address carbon dioxide emissions that can be described as politically implausible at best, the passage of S. 556 by the committee ended any serious discussion on narrowing differences to move a bipartisan bill.

Objectives of Multi-Pollutant Legislation

As demonstrated by numerous statements of Members of the Committee on Environment and Public Works, there is widespread agreement that scientific evidence continues to demonstrate harmful effects on human health and the environment of emissions of certain pollutants from power plants and other sources. There is also agreement that the mechanisms authorized in the Clean Air Act (CAA) to address these pollutants have failed to do so in an efficient, effective and comprehensive manner. The disjointed nature of those mechanisms have resulted in significant uncertainties regarding their potential to protect the environment and further uncertainties in the business and investment communities.

As written the CAA provides no clear limit of emissions of pollutants from the nation's electricity sector. The chaotic jumble of regulatory authorities increases business uncertainties for power companies and their investors. The disjointed nature of implementation of Title I of the CAA increases the costs associated with reducing pollution. The lack of a clear implementation time line and the lack of flexibility in compliance options stifles investment in and development of new, cleaner and more efficient energy production and pollution control technologies.

This dual problem of environmental and economic uncertainties seems unlikely to be solved unless the Congress addresses a larger question of environmental policymaking. Most congressional efforts to update and revise Federal environmental policies are at a stalemate nearing paralysis. Congress must seek ways to modernize our approach to shed the combative nature of the traditional command-and-control policy concept. While great strides toward protecting human health and the environment have been made through this traditional regulatory system, it is insufficiently dynamic to adjust to the rapidly evolving nature of the economy. The very nature of the problems we face often shift faster than regulations can be written to address them.

Many members of the Committee on Environment and Public Works expressed their desire to use the multi-pollutant bill to develop a new and more flexible approach to environmental policy. Our hope has been to develop a program that would provide enough clear benefits to both the environment and the economy that it would reduce the level of argument about environmental and economic goals interfering with each other. To achieve that outcome, the Acid Rain Program was seen by many as the best model in existing Federal environmental law upon which to build. The reasons for that are detailed below.

We believe that the statements by Members of the Committee on Environment and Public Works clearly illustrate that all of the objectives described above should be addressed in multi-pollutant legislation.

"That solution is a market-based, cap-and-trade program modeled on the Acid Rain Program a program with clear emission reduction levels and compliance dates set in law a program that avoids needless litigation and delay and a program that provides industry with incentives to make deeper and faster reductions than required. That's my goal, and that's what I think we all should be working to achieve the most reductions with the least litigation and delay."[Senator SMITH: July 16, 2002 joint hearing before the Committee on Environment and Public Works and the Committee on Judiciary hearing to review the New Source Review policy, regulations, and enforcement activities.]

"We, as nation, need to rethink the manner in which we approach regulation. We all need to keep an open mind. During the debates on various regulatory reform initiatives, I am tired of continually hearing that these efforts are "sneak attacks on the environment." In fact, it is the opposite. If we rethink regulation, we could find ourselves in a place where we can have far greater environmental protection and more reliable and diverse energy sources." [Senator INHOFE: Ibid.]

"Eventually, the dam of resistance to this bill will break, and a cleaner and clearer future for America's environment and a more predictable regulatory climate for our industry will result." [Senator LIEBERMAN: June 27, 2002 full committee business meeting to markup S. 556 and other pending business.]

" . . . S. 556 provides no regulatory relief. While it does recognize half of the goals of re-authorizing the Clean Air Act, which was to reduce emissions from power plants, it completely ignores the other half that is supposed to be considered at the same time—that is, to streamline the Clean Air Act and make it more cost-effective. This markup confirms a disturbing trend in this committee—a trend of politics over policy." [Senator INHOFE: Ibid.]

"As I have stated many times, I was optimistic that we could reach a bipartisan compromise to continue to improve the environment and public health, reduce utility emissions, create greater regulatory certainty, and ensure that American consumers will have safe, reliable and cost-effective electricity." [Senator VOINOVICH: Ibid.]

"The electric power industry is currently poised to invest billions of dollars to rebuild aging energy infrastructure. A clear emissions policy would give the industry a solid basis for investment decisions involving shareholder money and the future of its employees. It just is not sensible to invest in emissions controls, new facilities and new technologies while trying to decipher the future . . ." [Senator CORZINE: Ibid.]

"There has been, and continues to be, a great deal of interest in multi-pollutant legislation, on both sides of the aisle and within the Administration. I believe that all have the same goal as they consider the best way to craft multi-pollutant legislation to achieve maximum environmental benefits in the most efficient and effective manner possible, at the least cost to our economy. Deregulation and restructuring of the electric utility industry in many areas of the country have complicated the cost equation associated with updating pollution control technologies. Industry has come to Congress, asking for greater regulatory certainty to help them plan for long-term capital investments in the electric utility sector." [Senator BAUCUS: November 1, 2001 full committee hearing to receive testimony on how S. 556 would affect the environment, the economy, and any improvements or amendments that should be made to the legislation.]

"While it is the role of the government to set environmental thresholds, it shouldn't mandate how to get there. I don't think that any of us, regardless of where we are on the political spectrum, believe that the Federal Government is more innovative, efficient, or technically competent than the private sector. Instead of stifling, even punishing innovation, as is current practice, I want to provide incentives to be innovative, not only reach the cap, but to do better. This is about using the free-market process to reduce emissions. If we allow the flexibility for innovation, then technology that has already proven itself effective can find its way into the mainstream." [Senator SMITH: July 26, 2001 full committee hearing on the public health and environmental effects of electric power plant emissions.]

"This bill will provide the utility industry with the flexibility and certainty they need to make business decisions while avoiding adverse environmental and public health impacts." [Senator LIEBERMAN: Ibid.]

"Companies like these are leading the way and demonstrating that investments in cleaner, more efficient technologies can help our economy, as well as our environment. But, it is the responsibility of government to foster the development of these cutting-edge technologies. We can accomplish this by providing regulatory certainty for industry, combined with appropriate incentives." [Senator CLINTON: Ibid.]

"Our task together on this committee is to find common ground on an issue important to the entire nation. We must strive to improve the nation's air quality even further. We will also try to bring certainty to an industry facing an array of complicated rules." [Senator JEFFORDS: July 26, 2001 full committee hearing on the public health and environmental effects of electric power plant emissions.]

"My goal as subcommittee chairman is to harmonize our Federal clean air regulations with our nation's energy needs. I want a clean environment and cost-effective reliable sources of energy that will allow continued economic growth." [Senator VOINOVICH: March 21, 2001 subcommittee hearing to receive testimony on harmonizing the Clean Air Act with our nation's energy policy.]

"The regulatory flexibility of a "cap and trade" program, exemplified by the SO_2 Allowance Program, has been successful because of the flexibility it allows affected utilities. It promotes innovation and competition in emissions reduction technologies and has produced tremendous cost savings. Since 1990, studies have estimated that the cost savings due to emissions trading, compared to the traditional command-and-control approach, have been between $230 million and $600 million per year. These successes are encouraging but our work is not yet done.

"In conclusion, I want to say that the success of the 1990 Clean Air Act Amendments cannot be questioned. The SO_2 Allowance Program established by that legislation has achieved extraordinary benefits at program compliance costs less than half of initial projections. The efficacy of the approach is proven. The current science indicates, however, that we did not go far enough in 1990 in setting our emissions reduction targets. We must buildupon our accomplishments thus far, and to begin the work which remains to be done." [Senator MOYNIHAN: October 14, 1999 subcommittee hearing to consider issues relating to the re-authorization of the Clean Air Act.]

We are pleased that there is so much common purpose behind this effort to revise the CAA. To have a common target only increases our chances of success in the long run. As stated above, it sadly is our contention that S. 556 does not provide any evidence of an effort to achieve these lofty, but nonetheless realistic, goals. One need look no further than the layers of regulatory complexity S. 556 would add to the CAA or the nearly party line vote on the bill to comprehend the failure of this bill to satisfy the goals set for it.

The Acid Rain Program

Others have summarized the underpinnings of the Acid Rain Program (ARP) and the reasons for its success are quite well understood. Rather than duplicate those explanations, we will simply touch on some of the most relevant factors. The ARP was included in the Clean Air Act Amendments of 1990 in response to evidence of the damage to the environment caused by emissions of sulfur dioxide. These emissions contributed to extremely high acid levels in

lakes, streams, and soils, particularly in the Northeast. At the time, the ARP was considered something of an experiment.

This program has been an unparalleled success. We have seen nearly 100 percent compliance without any enforcement activity. Many of the reductions were made before they were required, and overall reductions have generally been greater than required. Implementation and compliance costs have been a fraction of the estimates at time of enactment. Implementation has not been delayed by litigation; in fact, the Acid Rain Program has not sparked a single significant lawsuit to date.

The performance of the ARP stands in stark contrast with the rest of Federal environmental law because the mechanism of the program is entirely unlike any other Federal environmental program. The flexibility allowed under the cap complements rather than competes with the traditional modes of business. It allows implementation to coincide with other planned physical changes to a facility rather than to add to or drive those schedules. It encourages facility managers to seek cost avoidance by finding the least expensive compliance strategy thereby spurring both investment in and competition among the control options.

At the same time, the environmental performance of the program has been enhanced by the same flexibility. Because of the allowance trading program, many participants chose to overcomply and bank allowances for the future. This in turn resulted in environmental benefits being realized more rapidly. Additionally, the fixed emission cap sets a firm limit of environmental exposure to emissions no matter what techniques are used to control emissions. This compares favorably to the traditional approach which dictates the application of specific control devices for specific facilities, but places no limit the overall emissions to the atmosphere.

Cap-and-Trade in the Utility Context

Many interested parties saw a comprehensive cap and trade system for the electric utility industry as preferable to the current command and control system because cap and trade would effectively address the three major problems discussed above environmental certainty, business certainty, and a change of approach in environmental policymaking. The ease of monitoring emissions from power plants and the homogeneity of the industry make a cap and trade system for the power sector attractive from an implementation standpoint.

This type of system provides a clear and certain environmental outcome, particularly as compared to any of the current CAA programs such as New Source Review. Under the New Source Review Program, we can be certain of the type of hardware a plant must install, but we will have no clear idea of the overall effect on emissions.

A cap and trade program also offers certainty to the business community. A single system, rather than innumerable and uncoordinated regulations, allows each electric utility to maximize long-term investment decisions. Such a system also internalizes the cost of pollution in a way that unleashes all the favorable forces of the American capitalist market to allow for minimizing the cost of achieving environmental protection. It also rewards developers of

new, environmentally beneficial technologies by giving them direct access to a market without forcing them to first seek bureaucratic approval of each detail of the technology.

An agreement to accept regulatory streamlining for business certainty and emissions reductions for environmental certainty would provide the best long-term hope for reducing the amount of fractious, hyperbolic debate that threatens to stymie all efforts at rational environmental policymaking.

Why S. 556 Is Not the Answer

Unfortunately, S. 556 does not solve any of the three problems discussed above, and it actually exacerbates them. In addition to the current scheme of uncoordinated regulation, S. 556 would add at least 24 rulemaking directives, with the obligation of multiple rulemakings under several of the directives. This excessive volume of new regulations will only slow down the process of controlling emissions by providing countless opportunities for litigation and delay and drive up the cost of implementation for both the public and private sectors. This approach builds on the worst performing aspects of the existing CAA.

Given the partisan result of consideration of S. 556 in the Committee on Environment and Public Works, the bill exacerbates rather than ameliorates the problems associated with seeking constructive progress on environmental problems.

It is our hope that future efforts to advance multi-pollutant legislation will hew more closely to the intentions expressed by those Senators that have taken an active interest in pursuing this initiative.

MINORITY VIEWS OF SENATOR VOINOVICH

As the former chairman and current ranking member of the Clean Air, Wetlands, and Climate Change Subcommittee, I must object strenuously to S. 556 as reported by the Environment and Public Works (EPW) Committee. The majority's report cites selective research, and ignores new findings that call into question the basis for the claims that are made. It vilifies fossil fuel combustion, especially coal combustion, and fails to recognize the tremendous environmental progress that we have already achieved—as is evidenced in the EPA trends reports—and the progress that is continuing to be made with the air quality legislation that we currently have in place.

In the 107th Congress, several bills have been introduced to provide for further reductions of power plant emissions. However, the approach taken by Senators James Jeffords (I-VT) and Joseph Lieberman (D-CT) in their proposed legislation S. 556, the Clean Power Act, would have drastic effects on the U.S. economy. This is due in large part to the fact that it will cause massive fuel switching from low-cost and abundant coal to natural gas, which is subject to extremely volatile price swings.

The Jeffords/Lieberman proposal mandates reductions in power plant emissions of nitrogen oxide (NOx), sulfur dioxide (SO_2), carbon dioxide (CO_2), and mercury through draconian command and control regulations which are impossible to meet in the timeframe called for in the bill. Although the impact would be the most severe for those regions of our nation whose economies rely on manufacturing, S. 556 would affect many industries causing disastrous consequences to our global competitiveness and our economy. Sadly, the hardest hit by this short-sighted legislation would be low-income and disadvantaged families.

The Clean Air Act

The Clean Air Act has been extremely successful in reducing emissions of pollutants. Since the 1970's, our nation's air quality has greatly improved as emissions of all criteria pollutants have been reduced by 29 percent: carbon monoxide, lead, particulate matter, NOx, ozone, and SO_2. At the same time, our population has increased by 38 percent, our nation's energy consumption has increased by 45 percent, the number of miles our vehicles travel each year has increased by 143 percent, and our gross domestic product has increased by 160 percent. More can and should be done, however.

ILLUSTRATION NO. 1

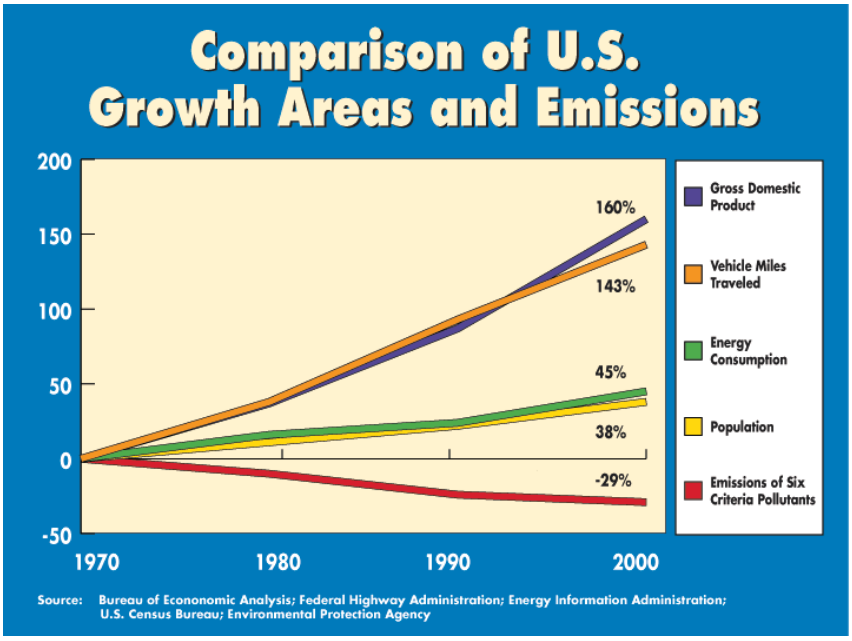
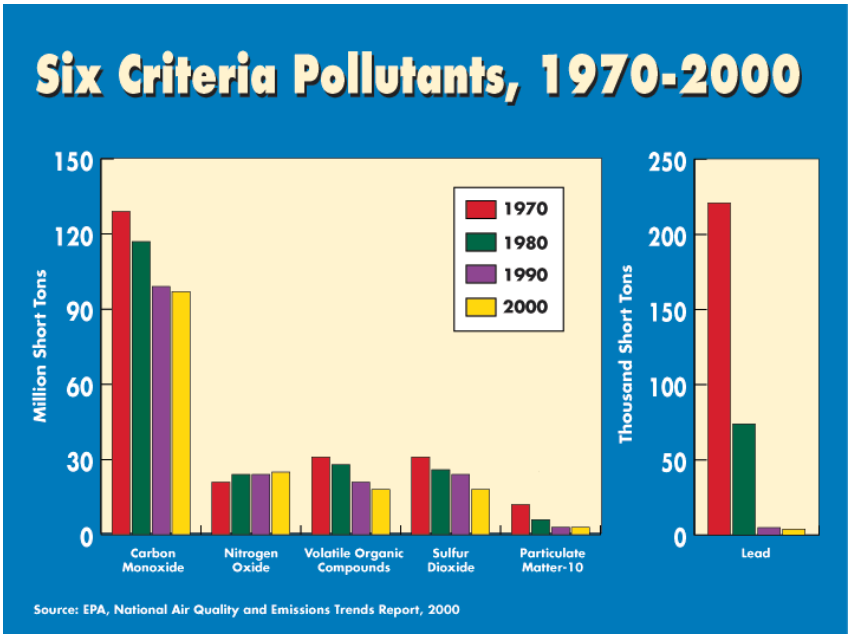


ILLUSTRATION NO. 2



I support tough new regulations to further ratchet down pollutants from power plants and believe we could have accomplished just that we could have gotten all interested parties to sit at the table to discuss and compromise on multi-pollutant legislation.. It is unfortunate that the Senate will accomplish no clean air improvements this year because the time is right to further reduce power plant emissions. The Jeffords/Lieberman proposal should have been used as a starting point for negotiation.

When Congress established the Clean Air Act in 1970, it included minimum national standards for utility emissions in order to improve air quality. However, in addition to providing low-cost and reliable electricity, these power plants unfortunately emit harmful substances into the air that impact public health and the environment.

Since its enactment, the Act has been amended several times and has resulted in significant reductions of NOx and SO_2 from electric utilities. Despite this success, several studies have shown that further reductions of NOx and SO_2 are essential to, among other things, curb acid rain, reduce ground-level ozone, and decrease concentrations of particulate matter.

Additionally, there has been an ongoing debate on the need to reduce emissions of mercury and CO_2. Mercury has been proven to bioaccumulate in fish and animal tissue in a highly toxic form, and it can cause health impacts. CO_2, however, is not a pollutant in the traditional sense but is linked to the highly uncertain and controversial issue of climate change.

Fuel Switching

In passing this legislation, the committee ignores the simple underlying fact that the U.S. relies heavily on fossil fuel combustion for the vast majority of its electricity generation. Currently, our nation relies on coal for 52 percent of our nation's electricity generation. By far, this is our cheapest and most abundant energy source, with enough domestic supply to meet our country's electricity needs for the next 250 years. Although it is cleaner today than ever before, coal emissions present challenges for air quality. Because coal is an important and necessary part of our energy policy and economic future, our government has provided substantial resources to develop clean coal technologies to make it environmentally friendly.

Despite the progress to make coal increasingly cleaner, the Jeffords/Lieberman proposal will put coal out of business for two main reasons. First, the bill mandates an unwarranted reduction of CO_2 emissions to 1990 levels, which is about a 20 percent decrease from today's levels. While there is no consensus in the scientific community that such a drastic reduction is justified, this level will effectively eliminate coal as a viable resource for our Nation. This is extremely troubling considering our immediate focus on national security and reliance on foreign sources for energy.

Second, the Jeffords/Lieberman bill mandates huge reductions of NOx (75 percent), SO_2 (75 percent), mercury (90 percent), and CO_2 (1990 levels) all in 6 years. Additionally, S. 556 includes a "birthday provision," which requires all facilities to install the latest control technology either by January 1, 2013 or before the facility becomes 40 years old. This command and control provision is man-

dated for all facilities regardless of past investments, fuel use, costs, regional differences, or installed technology. According to the Edison Electric Institute (EEI), 74 percent of our nation's coal units will be 40 years or older by 2013, and 83 percent by 2018.

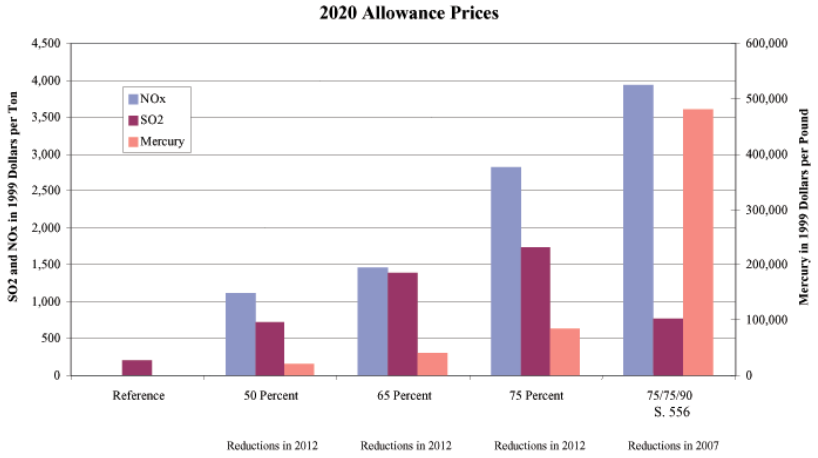
Unfeasible and Costly

The timelines and provisions of the Jeffords/Lieberman bill are economically impractical and impossible to implement. If implemented today, all firms would have to invest simultaneously in the latest control technologies. Furthermore, these massive investments would have to occur within 6 years. The workforce required to install this equipment is not available within the timeframe of the legislation. Skilled workers from such crafts as the boilermakers, pipefitters, and electricians are needed to install the equipment, but the workers just are not there.

For example, boilermakers have a capacity of 40 million manhours of labor per year. According to one equipment manufacturer, S. 556 would require over 60 million manhours to install the equipment by a 6-year deadline. It is impossible to recruit the labor force necessary to meet this requirement of S. 556 where after 6 years these jobs will no longer be needed.

These arbitrary timelines are not feasible and are unnecessarily costly. According to the Energy Information Administration (EIA), the costs of reducing NOx, SO_2, and mercury would be substantially less if there was an 11 year deadline instead of a 6-year deadline, which are represented by the years 2012 and 2007 in this analysis. For NOx, the compliance costs would be $1,000 less per ton. It is important to note that SO_2 costs are actually less for a 6-year compliance date because the mercury controls have a side benefit of also reducing SO_2. Yet, a 90 percent reduction of mercury in 6 years is about five times more costly than a 75 percent reduction in 11 years.

ILLUSTRATION NO. 3



CAPTION TO ILLUSTRATION NO. 3: *EIA has estimated the expected costs of four different proposals addressing NOx, SO_2, and mercury reductions. The first three scenarios show 50 percent, 65 percent, and 75 percent reductions in all three pollutants in 11 years (2012). This is contrasted with the reductions in S. 556, which are called for in 6 years (2007).*

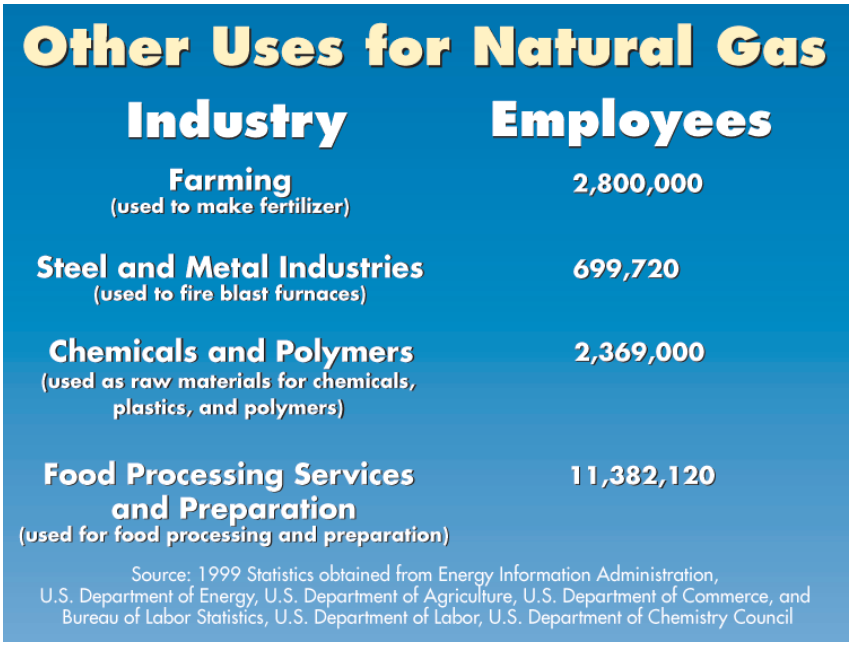
Since coal costs about half as much as natural gas, compliance costs are only one factor in the costs attributed to S. 556. Currently, natural gas provides 16 percent of our nation's electricity. In order to meet the emissions levels and timelines of S. 556, utilities would have to abandon their reliance on coal and switch to natural gas, greatly increasing our reliance on this fuel. As the recent large price swings in natural gas have shown, increased reliance will only put more pressure on this one fuel, causing price fluctuations to occur more frequently.

According to EIA, the Jeffords/Lieberman proposal without the birthday provision would increase the average delivered price of electricity in 2020 by 30 percent, and natural gas prices would increase by 20 percent.

Impacts Across Industries and Regions

Due to its high BTU value and its use as a raw material, natural gas is an extremely valuable commodity. Therefore, increases in natural gas prices have a larger effect than just on electricity prices and the manufacturing industry. In fact, natural gas is used directly by many different industries, including plastics and agriculture, meaning that millions of Americans depend on its reliability and price for their livelihoods.

ILLUSTRATION NO. 4



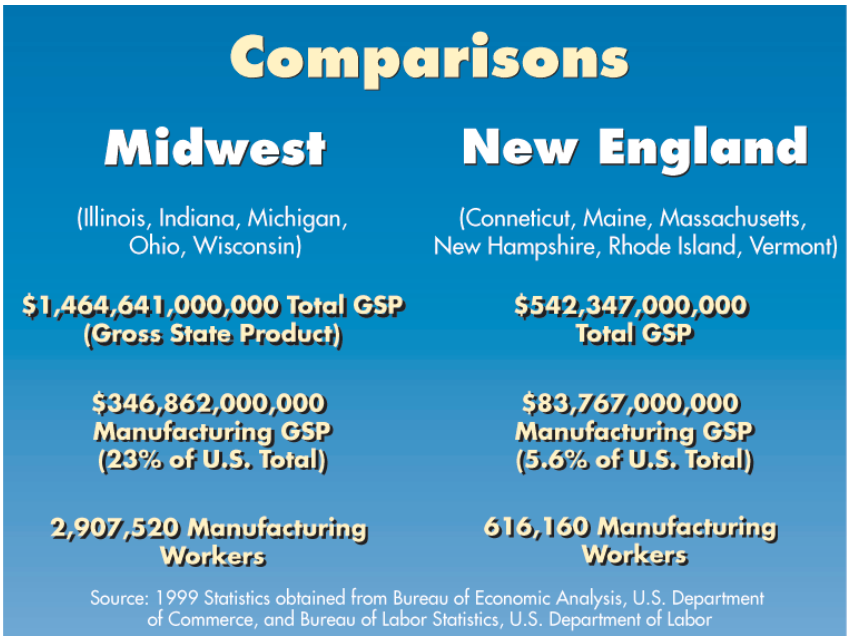
CAPTION TO ILLUSTRATION NO. 4: *The agriculture industry, which uses natural gas to make fertilizer, employs nearly 3 million people. The steel and metals industry, which uses natural gas for their blast furnaces, employs almost 700,000 people. Using natural gas as a raw material, the chemical, plastics, and polymer industries employs over 2.3 million people, and the food industry, which uses natural gas for food processing and preparation, employs over 11 million people.*

Of course, the compliance costs of S. 556 and the higher prices of natural gas will be passed on to the consumers. By applying a one size fits all policy, some regions will be more impacted than others by the increased costs of electricity. Specifically, the effects would be felt the hardest by the Midwest because it is the manufacturing base of our country.

Manufacturing is the lifeblood of our economy. It is centered in the Midwest because this region and its border States of West Virginia, Pennsylvania, Virginia, and Kentucky are the source of low-cost and abundant coal, along with iron ore in the Great Lakes. If the Midwest does not have reasonably priced and reliable energy sources for the manufacturing industry, then these companies will not stay in the U.S. They will take their jobs and go elsewhere in the world, where they can get cheaper labor and electricity.

Therefore, while this has been a regional debate between the Midwest and New England, the fact of the matter is that higher energy prices in the Midwest will have a direct, negative impact on the economy of the entire nation. The Midwest represents 23 percent of the total U.S. manufacturing Gross State Product (GSP) with almost 3 million manufacturing jobs. This is compared to New England's 5.6 percent of manufacturing GSP with 615,000 jobs. When energy prices go up, manufacturing declines and workers are laid off.

ILLUSTRATION NO. 5



CAPTION TO ILLUSTRATION NO. 5: *Twenty-three percent of our nation's GSP for manufacturing is concentrated in the five States which compromise the Midwest: Ohio, Indiana, Michigan, Illinois, and Wisconsin.*

Job Loss

S. 556 will directly displace workers in those industries that depend on low-cost reliable electricity from coal or natural gas as an input. These lost jobs would have a ripple effect across the economy.

While some people discount such predictions of job losses, past increases in natural gas prices have had a dramatic effect. Specifically, the chemical, polymer, and fertilizer industries were all negatively affected in early 2001 when natural gas prices spiked.

According to the American Chemistry Council, every dollar that the price of natural gas increases translates to about $1 billion in additional annual cost for the chemical industry, which employs more than one million people directly and 36 million indirectly. Like many industries, these costs cannot be passed on to their customers because companies are competing in a global marketplace. When the price of natural gas is $4 per unit, the U.S. chemical industry can no longer compete with foreign producers. However, natural gas prices increased to over $10 a unit in 2001, causing several plant closings.

Additionally, polymers use natural gas as a raw material. Since it has a significant effect on the cost of polymers, greater reliance on natural gas as a fuel for electricity would have a decidedly negative impact on our global competitiveness, threatening our domestic industry. When natural gas prices spiked, many of the polymer

companies had a difficult time remaining competitive with their foreign counterparts.

Furthermore, natural gas is a major ingredient in the production of fertilizers. In early 2001, fertilizer companies, who had purchased natural gas contracts in advance, sold their natural gas on the market at a higher price instead of making fertilizer. As a result, there was less fertilizer in the market which increased the price, causing some farmers to either not plant crops or forego the use of fertilizer, which reduced yields.

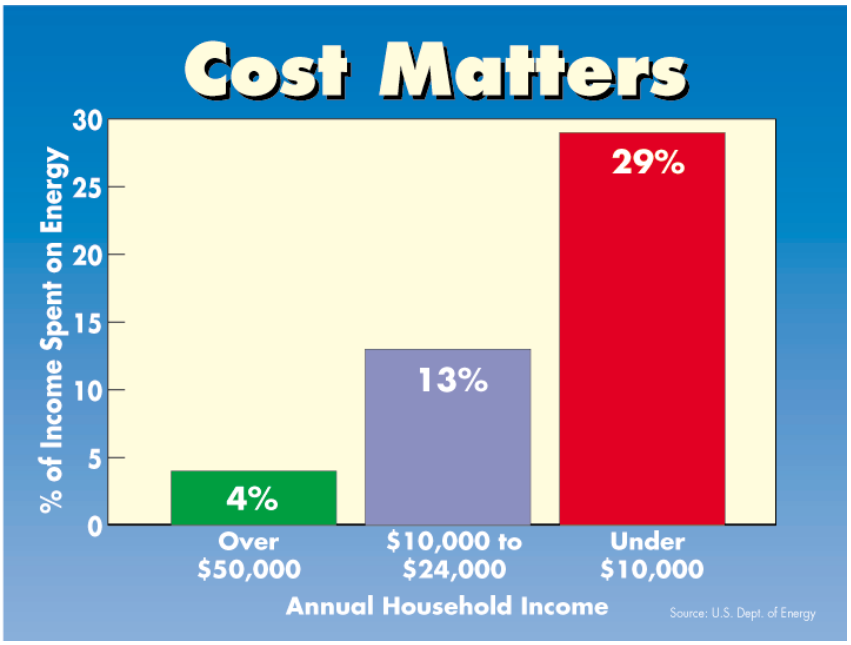
Impacts on the Disadvantaged

These recent experiences foreshadow the extreme effects that S. 556 would have on individual consumers. A study by the Edison Electric Institute (EEI) concluded that by causing fuel switching to natural gas the Jeffords/Lieberman proposal would result in an overall reduction in our Gross Domestic Product (GDP) of $75 billion by the year 2010 and $150 billion in 2020. The country would lose more than 600,000 jobs by 2010 and more than 900,000 jobs by 2020. Additionally, national household earnings would decline by up to $550 annually.

According to EIA, the bill would increase electricity costs for industrial users by 45 percent, commercial users by 37 percent, and residual consumers by 26 percent.

Although high electricity prices would severely impact businesses and their ability to compete in the global marketplace, it will have a more profound affect on low-income families and the elderly. Everyday many Americans are forced to make choices between electricity or paying for food when energy prices are high. It is troubling to consider the effects of the Jeffords/Lieberman proposal on the elderly and low-income families who are already struggling to survive.

ILLUSTRATION NO. 6



CAPTION TO ILLUSTRATION NO. 6: *The Department of Energy reports that an individual or family making less than $10,000 a year will spend 29 percent of their income on energy.*

At an EPW hearing on the costs and benefits of S. 556, Thomas Mullen of Catholic Charities and Health and Human Services of Cleveland, Ohio expressed concern about how children would be impacted by S. 556. "In Cleveland, over one-fourth of all children live in poverty and are in a family of a single female head of household. These children will suffer further loss of basic needs as their moms are forced (under S. 556) to make choices of whether to pay the rent or live in a shelter; pay the heating bill or see their child freeze; buy food or risk the availability of a hunger center. These are not choices any senior citizen, child, or, for that matter, person in America should make."

Regrettably, some Americans must make these choices each day. The Center for Disease Prevention and Control (CDC) states that more people, specifically the elderly and children, died from heat exposure (8,015) from 1979 to 1999 then from hurricanes, lightning, tornadoes, floods, and earthquakes combined. The CDC also claims that air conditioning is the No. 1 preventive factor against heat exposure. Due to the projected increase in electricity costs under S. 556, fewer people would turn on their air conditioners and the impacts would be more severe.

Climate Change

The only thing accomplished by this legislation is a political statement on CO_2, which is the millstone that sinks this bill. The

majority of the committee has held real emissions reductions hostage to the political issue of CO_2, resulting in no emissions reduction bill passing this Congress. But for CO_2, we would be saving lives this year. During debate on the energy bill earlier this year, the Senate rejected mandatory carbon controls three times: twice with votes on CAFE and once by rejecting a mandatory carbon registry and replacing it with a voluntary program. For the EPW committee to report out a mandatory CO_2 provision ignores the will of the full Senate.

The Senate is not willing to set mandatory carbon controls because more research is needed to understand the effects of carbon in our atmosphere, whether something needs to be done at this time, and what options are available. Recently, I met with Danish environmentalist Dr. Bjourn Lomberg, author of the "Skeptical Environmentalist." According to his analysis, if the Kyoto Treaty were fully implemented, the effects they predict will occur in 106 years as opposed to 100 years. He believes that the funds which would be expended under the Kyoto Treaty would be better spent on research or safe drinking water programs for Third World nations.

However, the majority's report maintains that the science behind climate change is settled and the effects will be devastating. This is hardly the case. In a 2002 report, the National Academy of Sciences (NAS) noted that "because there is considerable uncertainty in current understanding of how the climate system varies naturally and reacts to emissions of greenhouse gases and aerosols, current estimates of the magnitude of future warming should be regarded as tentative and subject to future adjustments upward or downward."

Due to this uncertainty, the U.S. should not embark on a national policy to drastically reduce emissions of CO_2 when the effects of such a program would be overwhelming to our energy supply and economy. The United Nations Framework Convention on Climate Change, which was ratified by the Senate in 1992, states that the Parties to the Convention should implement policies and measures that are "appropriate for the specific conditions of each Party and should be integrated with national development programmes, taking into account that economic development is essential for adopting measures to address climate change." Contrary to the NAS report and the Framework, S. 556 would set an arbitrary level and drastic timeline for CO_2 reductions that is not warranted and would harm economic development.

Comments on Federal Actions and Authorities Section

The majority's report unjustifiably attacks the Tennessee Valley Authority (TVA) and makes claims that have never been considered by this committee before. In fact, at the February 28, 2000, Clean Air Subcommittee field hearing in Cincinnati, Ohio on New Source Review (NSR), when TVA testified, the committee was careful not to take a position on the dispute between EPA and TVA. While the report states that "TVA, as a Federal agency, has no standing to pursue such a course," EPA has also not justified its course of action and claims against TVA.

The majority's report also maintains that TVA has not lowered emissions but used emission reduction credits to emit more pollu-

tion. However, TVA has substantially invested in emissions control technology and lowered its emissions. TVA did earn emission reduction credits as a result of early compliance and is using some of these credits to offset emissions from one of its units until a scrubber becomes operational in 2006. Nevertheless, overall emissions of SO_2 from TVA were reduced in 2001. By adding scrubbers, upgrading technology, and using lower sulfur coal, TVA reports it has reduced SO_2 emissions by 73 percent since 1976 and NOx emissions by 50 percent since 1995.

Additionally, the report fails to recognize the harmful economic and environmental impacts of the uncertain and complicated NSR program. The NSR program dates back to the 1977 amendments to the Clean Air Act. The original goal of the program was to ensure that new facilities and older facilities that make major modifications install the best technology. The program worked well for more than 20 years, helping to produce a cleaner environment. However, as any program ages, changes often need to be made. The EPA first issued a 20-page regulation in 1980 defining NSR and since has gone on to produce more than 4,000 pages of guidance documents explaining and reinterpreting the regulation. This continual reinterpretation over the years has led to confusion and misunderstanding by the Agency, the regulated community, States, and interested outside groups.

In 1996, the Clinton Administration issued a proposed rulemaking to reform NSR. However, in 1998, due to an EPA guidance that changed the definition of routine maintenance, EPA filed lawsuits alleging NSR modification violations at 24 different facilities in a variety of industries, reaching back as many as 22 years. Therefore, companies are not investing in cleaner, less polluting technologies for fear that such improvements would be considered a violation. According to a recent National Coal Council study, commissioned by the Clinton Administration, if the EPA were to return to the pre-1998 NSR definitions the U.S. could generate 40,000 new megawatts of electricity from coal-fired facilities and reduce pollution at the same time.

There is strong bipartisan support for a regulatory definition of routine maintenance and repair in order to end the uncertainty in the program. On May 13, 2002, I joined Senator Kent Conrad (D-ND) and 24 other senators in a letter to EPA Administrator Christie Todd Whitman calling on her to "complete the review and to undertake the necessary regulatory process in the near future to clarify and reform the NSR program." This was a bipartisan letter signed by nine Democrats and 17 Republicans, all calling for reform.

In response to our request, on June 13, 2002, EPA announced plans to finalize many of the Clinton-era NSR reforms and to move forward on proposing a new definition for "routine maintenance, repair, and replacement." The new proposal would be subject to public review and comment. The proposal is already the result of over 10 years of work by the EPA (across three administrations) and has involved over 130,000 written comments in the last year alone. Following these steps will produce a better understood regulatory program which will provide needed certainty to the regulated community and will continue to protect public health and improve the

environment. NSR reform is important for any multi-pollutant legislation because it allows companies to make the necessary investments and improvements in their plants to reduce emissions.

Comments on the Legislative History and Hearings Sections

In marking up this bill, the majority circumvented the committee process. For over a year and a half the committee held hearings and debated the original five page Jeffords bill. With less than 1 week's notice, the majority substituted the five page bill for a 53-page chairman's mark.

The following charts show the implementation steps for the original five page bill versus the fifty-three page mark. Only four main implementation steps, including two rulemakings which are denoted in italics text, were required under the original version. The other two charts show the new implementation steps required under the new version; again the italics bullets denote either rulemakings or notice and comment requirements. There are 35 different rulemakings or notice and comment provisions between now and 2008 alone. I would point out that these charts only go up to 2018, many of the allocation steps and adjustments will require annual rulemaking actions in perpetuity. All of the italics bullet items and many of the other bullets as well would be open to litigation and lawsuits. Of course all of this will be layered on top of the existing Clean Air Act. Therefore, we are taking one of the most litigated environmental statutes and making it harder to implement and open to more uncertainty through lawsuits. This bill is a lawyer's dream and a nightmare to anyone who cares about reducing emissions.

ILLUSTRATION NOS. 7–9

Implementation of the Jeffords/Lieberman Bill – Original Version

The red text in italics signifies rulemaking or notice and comment by EPA

2004

- ***Rulemaking to achieve the emission reductions specified for all four pollutants—S132(b)***

2007

- **Defacto reductions if EPA fails to promulgate regulations—S132(b)**
- **Birthday provision for all units 30 years old and older—S132(d)**

2008

- ***Rulemaking to require additional reductions if Administrator determines they are necessary to further protect public health or welfare S132(c)***

Implementation of the Jeffords/Lieberman Bill – June 24TH Version

The red text in italics signifies rulemaking or notice and comment by EPA

2003

- Facilities submit mercury data to EPA for coal pulverizer—§712(a)
- EPA makes mercury data available to public—§712(a)
- *Rulemaking to determine methodology for definition of Electricity Generating Facility—§712*
- *Rulemaking to determine definition of Energy Efficient Project—§712*
- *Rulemaking to determine standards of efficiency for dedicated purposes—§712*
- *Rulemaking to determine definition of Energy Efficient Building—§712*
- *Rulemaking to determine the lifetime of an energy efficiency project—§712*
- *Rulemaking to establish monitoring system for pollutants (100 days)—§712(a)*
- *Rulemaking to update verification, monitoring, and recordkeeping of emissions—§712*
- *Rulemaking to establish permitting and emission allowance trading compliance program and methodology—§712(a)*
- *Rulemaking to determine methodology for definition of Small Electricity Generating Facility—§712*
- *Rulemaking to establish emission allowance trading and transfer system—§712(b)*
- *Rulemaking to establish header for allowance allocation in households—§712(a)*
- *Rulemaking to establish header for allowance allocation to dedicated workers and communities—§712(a)*

2004

- Facilities submit mercury data to EPA for coal pulverizer—§712(a)
- EPA makes mercury data available to public—§712(a)
- EPA makes 30-mile radius air monitoring data available to the public—§712(a)
- *Rulemaking to improve air monitoring within 30 miles of affected facilities—§712(a)*
- *Rulemaking to exempt small electricity generating facilities—§712(a)*
- *Information request for boundaries on pollutants other than mercury emitted by coal units—§712(a)*

2005

- Facilities submit mercury data to EPA for coal pulverizer—§712(a)
- EPA makes mercury data available to public—§712(a)
- *Rulemaking to exempt mercury from small electricity generating facilities—§712(a)*
- *Rulemaking to prevent systemic or incremental mercury from being released into the environment—§712(b)*
- *Proposed rulemaking to set emission standards for boundaries on pollutants—§712(b)*

2006

- Facilities submit mercury data to EPA for coal pulverizer—§712(a)
- EPA makes mercury data available to public—§712(a)
- Administrator report on establishing options for quantifying carbon sequestration—§712(a)
- *Rulemaking to exempt mercury from small electricity generating facilities—§712(a)*
- *Final rulemaking to set emission standards for boundaries on pollutants—§712(b)*

2007

- Some identify facilities contributing to nonattainment—§712(j)
- Facilities submit mercury data to EPA for coal pulverizer—§712(a)
- EPA makes mercury data available to public—§712(a)
- Administrator limits emissions if necessary for significant adverse local impacts—§712(j)
- *Rulemaking to exempt mercury from small electricity generating facilities—§712(a)*
- *Notice and comment: EPA allocates transition assistance allowances—§712(b)*
- *Rulemaking to define dedicated workers and communities—§712(a)*
- *Rulemaking to establish levels of transition assistance—§712(b)*
- For allocation purposes, EPA collects information on electricity intensive products—§712(b)
- For allocation purposes, EPA collects information on electricity use of electricity intensive products—§712(b)
- *Rulemaking to allocate emission allowances to renewable electricity generating units—§712(a)*
- *Notice and comment: EPA allocates renewable electricity generating unit allowances—§712(a)*
- *Notice and comment: EPA allocates dedicated workers and communities allowances—§712(a)*
- *Notice and comment: EPA allocates energy efficient buildings, products, and projects allowances—§712(b)*
- *Notice and comment: EPA allocates new clean fossil fuel fired electricity generating facilities allowances—§712(a)*
- *Notice and comment: EPA allocates emission allowances to combined heat and power electricity generating facilities allowances—§712(a)*
- For allocation purposes, EPA collects information on renewable electricity generating units—§712(a)
- For allocation purposes, EPA collects information on energy efficient buildings, products, and projects—§712(b)
- For allocation purposes, EPA collects information on new clean fossil fuel fired electricity generating facilities—§712(a)
- For allocation purposes, EPA collects information on combined heat and power electricity generating facilities—§712(a)
- *Notice and comment: EPA allocates electricity generating facilities allowances—§712(a)*
- *Notice and comment: EPA allocates emission allowances to states, agencies, and entities for biological carbon sequestration projects—§712(a)*
- *Notice and comment: EPA allocates emission allowances for a state revolving loan program for carbon sequestration activities—§712(a)*
- States, agencies, and entities apply for allowances for biological carbon sequestration projects—§712(a)
- States submit proposals to conduct carbon sequestration projects—§712(a)
- *Notice and comment: EPA allocates geological carbon dioxide sequestration allowances—§712(a)*
- Entities apply for geological sequestration allowances—§712(b)

2008

- Facilities surrender SNOx allowances per 1 ton NOx emitted, if the Administrator determines they contributed to nonattainment areas—§712(j)
- Administrator limits emissions if necessary for significant adverse local impacts—§712(j)
- Facilities submit monitoring data to EPA for each pollutant—§712(a)
- *Notice and comment: EPA allocates new clean fossil fuel fired electricity generating facilities allowances—§712(a)*
- EPA makes monitoring data available to the public—§712(a)
- *Notice and comment: EPA allocates emission allowances to combined heat and power electricity generating facilities allowances—§712(a)*
- Administrator may require additional reductions if study warrants additional controls—§712(h)
- Administrator requires additional reductions if necessary to protect public health or welfare—§712(i)
- For mercury enforcement purposes, EPA determines average cost of controls—§712(d)
- EPA determines average annual market price for emission allowances for enforcement purposes—§712(d)
- Identify each allowance by serial number, pollutant, year, and for SO2, by region—§712(b)
- *Rulemaking to create allocation for SO2, NOx, and CO2—§712(a)*
- *Rulemaking to inventory emissions from small electricity generating facilities—§712(a)*
- *Rulemaking to set emissions limitations for each pollutant—§712(a)(2)*
- Defaults regulations if Administrator fails to promulgate regulations for emission limits by January 1, 2008—§712
- *Notice and comment: EPA allocates transition assistance allowances—§712(b)*
- Dedicated workers and communities apply for assistance—§712(b)
- For allocation purposes, EPA collects information on electricity intensive products—§712(b)
- For allocation purposes, EPA collects information on electricity use of electricity intensive products—§712(b)
- *Notice and comment: EPA allocates renewable electricity generating unit allowances—§712(a)*
- *Notice and comment: EPA allocates dedicated workers and communities allowances—§712(a)*
- Renewable electricity generating units apply for allowances—§712(a)
- *Notice and comment: EPA allocates energy efficient buildings, products, and projects allowances—§712(b)*
- Entities apply for energy efficient buildings, products, and projects allowances—§712(b)
- New clean fossil fuel fired electricity generating facilities apply for allowances—§712(a)
- Combined heat and power facilities apply for allowances—§712(a)
- For allocation purposes, EPA collects information on renewable electricity generating units—§712(a)
- For allocation purposes, EPA collects information on energy efficient buildings, products, and projects—§712(b)
- For allocation purposes, EPA collects information on new clean fossil fuel fired electricity generating facilities—§712(a)
- For allocation purposes, EPA collects information on combined heat and power electricity generating facilities—§712(a)
- *Notice and comment: EPA allocates electricity generating facilities allowances—§712(a)*
- *Notice and comment: EPA allocates emission allowances to states, agencies, and entities for biological carbon sequestration projects—§712(a)*
- *Notice and comment: EPA allocates emission allowances for a state revolving loan program for carbon sequestration activities—§712(a)*
- States, agencies, and entities apply for allowances for biological carbon sequestration projects—§712(a)
- States submit proposals to conduct carbon sequestration projects—§712(a)
- *Notice and comment: EPA allocates geological carbon dioxide sequestration allowances—§712(a)*
- Entities apply for geological sequestration allowances—§712(b)

2009

- Facilities surrender SNOx allowances per 1 ton NOx emitted, if the Administrator determines they contributed to nonattainment areas—§712(j)
- Facilities submit allowances to EPA for each emission—§712(c)
- *Notice and comment: EPA allocates new clean fossil fuel fired electricity generating facilities allowances—§712(a)*
- Administrator limits emissions if necessary for significant adverse local impacts—§712(j)
- Facilities submit monitoring data to EPA for each pollutant—§712(a)
- *Notice and comment: EPA allocates emission allowances to combined heat and power electricity generating facilities allowances—§712(a)*
- EPA makes monitoring data available to the public—§712(a)
- For mercury enforcement purposes, EPA determines average cost of controls—§712(d)
- Combined heat and power facilities apply for allowances—§712(a)
- EPA determines average annual market price for emission allowances for enforcement purposes—§712(d)
- *Rulemaking to adjust allocations by the number of tons emitted by small facilities and by number of reductions—§712(a)*
- *Rulemaking to inventory emissions from small electricity generating facilities—§712(a)*
- New clean fossil fuel fired electricity generating facilities apply for allowances—§712(a)
- *Rulemaking to set emissions limitations for each pollutant—§712(a)*
- *Notice and comment: EPA allocates transition assistance allowances—§712(b)*
- Dedicated workers and communities apply for assistance—§712(b)
- For allocation purposes, EPA collects information on electricity intensive products—§712(b)
- For allocation purposes, EPA collects information on electricity use of electricity intensive products—§712(b)
- *Notice and comment: EPA allocates renewable electricity generating unit allowances—§712(a)*
- *Notice and comment: EPA allocates dedicated workers and communities allowances—§712(a)*
- Renewable electricity generating units apply for allowances—§712(a)
- *Notice and comment: EPA allocates energy efficient buildings, products, and projects allowances—§712(b)*
- Entities apply for energy efficient buildings, products, and projects allowances—§712(b)
- For allocation purposes, EPA collects information on renewable electricity generating units—§712(a)
- For allocation purposes, EPA collects information on energy efficient buildings, products, and projects—§712(b)
- For allocation purposes, EPA collects information on new clean fossil fuel fired electricity generating facilities—§712(a)
- For allocation purposes, EPA collects information on combined heat and power electricity generating facilities—§712(a)
- *Notice and comment: EPA allocates electricity generating facilities allowances—§712(a)*
- *Notice and comment: EPA allocates emission allowances to states, agencies, and entities for biological carbon sequestration projects—§712(a)*
- *Notice and comment: EPA allocates emission allowances for a state revolving loan program for carbon sequestration activities—§712(a)*
- States, agencies, and entities apply for allowances for biological carbon sequestration projects—§712(a)
- States submit proposals to conduct carbon sequestration projects—§712(a)
- *Notice and comment: EPA allocates geological carbon dioxide sequestration allowances—§712(a)*
- Entities apply for geological sequestration allowances—§712(b)

2010

- Facilities surrender SNOx allowances per 1 ton NOx emitted, if the Administrator determines they contributed to nonattainment areas—§712(j)
- Combined heat and power facilities apply for allowances—§712(a)
- *Notice and comment: EPA allocates new clean fossil fuel fired electricity generating facilities allowances—§712(a)*
- States identify facilities contributing to nonattainment—§712(j)
- Facilities submit allowances to EPA for each emission—§712(c)
- *Notice and comment: EPA allocates emission allowances to combined heat and power electricity generating facilities allowances—§712(a)*
- Administrator limits emissions if necessary for significant adverse local impacts—§712(j)
- Facilities submit monitoring data to EPA for each pollutant—§712(a)
- EPA makes monitoring data available to the public—§712(a)
- For mercury enforcement purposes, EPA determines average cost of controls—§712(d)
- EPA determines average annual market price for emission allowances for enforcement purposes—§712(d)
- *Rulemaking to adjust allocations by the number of tons emitted by small facilities and by number of reductions—§712(a)*
- *Rulemaking to inventory emissions from small electricity generating facilities—§712(a)*
- *Rulemaking to set emissions limitations for each pollutant—§712(a)(2)*
- *Notice and comment: EPA allocates transition assistance allowances—§712(b)*
- Dedicated workers and communities apply for assistance—§712(b)
- For allocation purposes, EPA collects information on electricity intensive products—§712(b)
- For allocation purposes, EPA collects information on electricity use of electricity intensive products—§712(b)
- *Notice and comment: EPA allocates renewable electricity generating unit allowances—§712(a)*
- *Notice and comment: EPA allocates dedicated workers and communities allowances—§712(a)*
- Renewable electricity generating units apply for allowances—§712(a)
- *Notice and comment: EPA allocates energy efficient buildings, products, and projects allowances—§712(b)*
- Entities apply for energy efficient buildings, products, and projects allowances—§712(b)
- For allocation purposes, EPA collects information on renewable electricity generating units—§712(a)
- For allocation purposes, EPA collects information on energy efficient buildings, products, and projects—§712(b)
- For allocation purposes, EPA collects information on new clean fossil fuel fired electricity generating facilities—§712(a)
- For allocation purposes, EPA collects information on combined heat and power electricity generating facilities—§712(a)
- *Notice and comment: EPA allocates electricity generating facilities allowances—§712(a)*
- *Notice and comment: EPA allocates emission allowances to states, agencies, and entities for biological carbon sequestration projects—§712(a)*
- *Notice and comment: EPA allocates emission allowances for a state revolving loan program for carbon sequestration activities—§712(a)*
- States, agencies, and entities apply for allowances for biological carbon sequestration projects—§712(a)
- States submit proposals to conduct carbon sequestration projects—§712(a)
- *Notice and comment: EPA allocates geological carbon dioxide sequestration allowances—§712(a)*
- Entities apply for geological sequestration allowances—§712(b)

2011

- EPA conducts study on emission allowance trading—§712(h)
- Facilities surrender SNOx allowances per 1 ton NOx emitted, if the Administrator determines they were located in nonattainment areas—§712(j)
- *Notice and comment: EPA allocates emission allowances to combined heat and power electricity generating facilities allowances—§712(a)*
- Combined heat and power facilities apply for allowances—§712(a)
- Facilities submit allowances to EPA for each emission—§712(c)
- New clean fossil fuel fired electricity generating facilities apply for allowances—§712(a)
- *Notice and comment: EPA allocates new clean fossil fuel fired electricity generating facilities allowances—§712(a)*
- Administrator limits emissions if necessary for significant adverse local impacts—§712(j)
- Facilities submit monitoring data to EPA for each pollutant—§712(a)
- EPA makes monitoring data available to the public—§712(a)
- For mercury enforcement purposes, EPA determines average cost of controls—§712(d)
- EPA determines average annual market price for emission allowances for enforcement purposes—§712(d)
- *Rulemaking to adjust allocations by the number of tons emitted by small facilities and by number of reductions—§712(a)*
- *Rulemaking to inventory emissions from small electricity generating facilities—§712(a)*
- *Rulemaking to set emissions limitations for each pollutant—§712(a)(2)*
- *Rulemaking to create allocation for SO2, NOx, and CO2—§712(a)*
- *Mercury reduction levels are met, then EPA is to revise mercury reduction levels—§712(a)*
- *Rulemaking to set emissions limitations for each pollutant—§712(a)*
- *Notice and comment: EPA allocates transition assistance allowances—§712(b)*
- Dedicated workers and communities apply for assistance—§712(b)
- For allocation purposes, EPA collects information on electricity intensive products—§712(b)
- For allocation purposes, EPA collects information on electricity use of electricity intensive products—§712(b)
- *Notice and comment: EPA allocates renewable electricity generating unit allowances—§712(a)*
- *Notice and comment: EPA allocates dedicated workers and communities allowances—§712(a)*
- Renewable electricity generating units apply for allowances—§712(a)
- *Notice and comment: EPA allocates energy efficient buildings, products, and projects allowances—§712(b)*
- Entities apply for energy efficient buildings, products, and projects allowances—§712(b)
- For allocation purposes, EPA collects information on renewable electricity generating units—§712(a)
- For allocation purposes, EPA collects information on energy efficient buildings, products, and projects—§712(b)
- For allocation purposes, EPA collects information on new clean fossil fuel fired electricity generating facilities—§712(a)
- For allocation purposes, EPA collects information on combined heat and power electricity generating facilities—§712(a)
- *Notice and comment: EPA allocates electricity generating facilities allowances—§712(a)*
- *Notice and comment: EPA allocates emission allowances to states, agencies, and entities for biological carbon sequestration projects—§712(a)*
- *Notice and comment: EPA allocates emission allowances for a state revolving loan program for carbon sequestration activities—§712(a)*
- States, agencies, and entities apply for allowances for biological carbon sequestration projects—§712(a)
- States submit proposals to conduct carbon sequestration projects—§712(a)
- *Notice and comment: EPA allocates geological carbon dioxide sequestration allowances—§712(a)*
- Entities apply for geological sequestration allowances—§712(b)

2012

- Facilities surrender SNOx allowances per 1 ton NOx emitted, if the Administrator determines they were located in nonattainment areas—§712(j)
- Facilities submit allowances to EPA for each emission—§712(c)
- Administrator limits emissions if necessary for significant adverse local impacts—§712(j)
- *Notice and comment: EPA allocates new clean fossil fuel fired electricity generating facilities allowances—§712(a)*
- Facilities submit monitoring data to EPA for each pollutant—§712(a)
- *Notice and comment: EPA allocates emission allowances to combined heat and power electricity generating facilities allowances—§712(a)*
- Combined heat and power facilities apply for allowances—§712(a)
- EPA makes monitoring data available to the public—§712(a)
- For mercury enforcement purposes, EPA determines average cost of controls—§712(d)
- EPA determines average annual market price for emission allowances for enforcement purposes—§712(d)
- *Rulemaking to adjust allocations by the number of tons emitted by small facilities and by number of reductions—§712(a)*
- New clean fossil fuel fired electricity generating facilities apply for allowances—§712(a)
- EPA determines if mercury reduction levels have been met during the preceding two years—§712(a)

These charts show some of the complexity of this legislation, but the reality is that no one really knows how any of it would work. While the majority claims that many hearings have been held on this subject and specifically on S. 556, not one hearing has been held on the bill the committee passed because it did not exist until right before the business meeting on June 27, 2002. Even if the chairman had not introduced a completely different bill, I do not believe the committee was ready to consider this important piece of legislation. Although I requested the hearings, the committee never examined the impacts of multi-pollutant legislation on our environment, energy supply, and economy.

Evidenced by the four substitutes introduced at the business meeting, other members of the committee also did not think we were ready to vote on multi-pollutant legislation. Furthermore, Senators Thomas Carper (D-DE) and Lincoln Chafee (R-RI), who both introduced and withdrew substitutes at the business meeting and supported S. 556, recently introduced multi-pollutant legislation S. 3135. Additionally, the Administration proposed the Clear Skies Initiative to also reduce power plant emissions. While S. 556 might have been a starting point for negotiations, Senator Jeffords made it clear from the very start that he was unwilling to compromise. At the beginning of a stakeholder meeting that was held in October 2001 to discuss multi-pollutant legislation, the chairman stated that he intended to markup the bill, even before a comment was heard from a single stakeholder.

I have been enormously frustrated by the process the majority has used and their refusal to compromise and pass meaningful legislation to reduce pollutants in our air today. I am not alone in my disappointment, which is probably best summed up by the comments of Senator Max Baucus (D-MT) at the business meeting to consider S. 556:

"But although I agree with the goals of this legislation, I again respectfully say I cannot support the means that you have chosen to achieve these goals. This bill as written is not fair to my State of Montana. It is not fair to the West and it frankly could have a devastating impact on our economy, on the Montana coal industry and on consumer electricity prices.

"For those reasons and for many others, we all know that your bill as written as has been stated by the Senator from New Hampshire, will not pass the Senate this year. So why are we here? Are we here to advance the best way to improve the Nation's air quality, to protect public health, and to protect the environment? Frankly, no. We are here primarily for political reasons, that is to make political statements either in favor of the air or one way or the other, because this is not a consensus approach. It is not an approach that we all know is necessary to get solid results.

"But what is most frustrating to me, Mr. Chairman, is that we are even having this discussion today. We are not trying to craft a piece of legislation that is achievable; that protects the reliability of our energy system; that will not unnecessarily hurt our economy or displace our workers; and that achieves dramatic reductions in harmful air pollutants from the Nation's power plants, including SO_2, nitrogen oxides, mercury and CO_2.

" . . . we are not even close to having a serious discussion about these alternative proposals or any other proposal for that matter . . . Over many years—many, many years—this committee has passed landmark environmental laws—Clean Water Act, Clean Air Act, Safe Drinking Water Act—that protect the Nation's air quality, water quality, wildlife, and public health—landmark legislation. How did we do that? Through compromise, through consensus—that is the legacy of this committee. There is just no other way to get things done when it comes to environmental resolution. And frankly, there is no other way to get things done in the Senate."

Comments on the Costs of Legislation Section

The majority's report tries to discount the work that EIA has done to provide cost analyses of multi-pollutant control strategies and scenarios. In fact, no one has done more rigorous modeling than EIA, and I believe they provide the most reliable available estimates of the costs of S. 556. The majority is simply trying to discredit these analyses because it does not like the results.

Citing specifically the MACT requirements for emissions of mercury, the majority's report discredits EIA analyses based on the notion that there has been no effort to compare the cost of S. 556 to the costs that will otherwise be or already are being incurred. EIA did not incorporate future mercury emission reductions because

those regulations are still being developed by EPA and it is not known what form they will finally take. The costs estimated by EIA cannot be disregarded because the costs of carbon dioxide reduction are much higher than those of the other emissions and would dominate the costs associated with multi-pollutant requirements. For instance, in a report entitled Analysis of Strategies for Reducing Multiple Emissions from Electric Power Plants: Sulfur Dioxide, Nitrogen Oxides, Carbon Dioxide, and Mercury and a Renewable Portfolio Standard, prepared at the request of the House Government Reform Committee, EIA estimated that the price of electricity would be about 0.2 cents per kilowatt-hour higher in 2010 and 2020 as a result of a 90 percent reduction in mercury emissions, without changes in current emission caps for sulfur dioxide, nitrogen dioxide, and carbon dioxide. However, in a four-pollutant case, with carbon dioxide emission caps set at 1990 levels and the other emission caps similar to those of S. 556, the impact on electricity prices would be between 2.0 and 2.2 cents per kilowatt-hour higher, showing the much smaller impact of mercury caps alone.

The majority's report claims that "EIA has inaccurately attributed the costs of substantial new natural gas generation capacity to multi-pollutant legislation." First, the new natural gas generating capacity coming on line recently represents an acceleration of the capacity EIA has projected, but this does not appreciably change the capacity needed to meet demands projected for 2010. Contrary to the report's assertion, EIA projected 107,000 megawatts (MW) of natural gas combined cycle capability would be on line in 2010, which is 23,000 MW less than is now planned, not 45,000 MW as stated in the majority's report. More important, by 2015, all of this capacity and more will be needed to meet demand, with nearly 100,000 additional MW needed to meet the demand for natural gas-fired generation in a multi-pollutant scenario. Second, the additional demand for natural gas, both for new capacity and the more intensive use of existing capacity, would tend to drive up natural gas prices. Therefore, despite the recent spurt of combined cycle construction, the previously estimated additional costs of S. 556 remain substantially the same.

Contrary to the majority's report, IGCC for coal and other advanced technologies such as fuel cells and biomass gasification are explicitly represented in all multi-pollutant analyses developed by EIA. The IGCC technology was not chosen in carbon constrained scenarios because the costs of the technology are higher than the alternative advanced natural gas technology, particularly when a carbon limit is imposed. IGCC, while more efficient than traditional pulverized coal generating technologies, would not reduce carbon dioxide emissions sufficiently to penetrate the market under the carbon constraints required by S. 556. In fact, under a policy including carbon dioxide reductions, no new coal capacity would be expected to be built because of the high cost of carbon dioxide allowances that would have to be incurred for new coal capacity, unless economical methods of carbon sequestration could be achieved. At this time, the costs of carbon sequestration are too high to penetrate the market.

The majority's report also states that no analysis has been done of the allocation system included in S. 556. While this claim is true because there has not been time to analyze it, the cost of meeting multi-pollutant legislation is unaffected by the original allocation of allowances. The system to allocate allowances affects the wealth of producers and consumers, but in equilibrium the cost of an allowance is equal to the marginal cost of abatement. Therefore, electricity prices would increase due to the impact of higher natural gas prices and the cost of allowances. The allocation scheme chosen could alleviate, but not eliminate these impacts. Under no circumstances has EIA projected a lower price of electricity under a multi-pollutant regime.

Conclusion

Congress should act quickly to develop a strategy for further reducing power plant emissions in order to improve public health and protect the environment, provide better regulatory certainty, and ensure continued access to safe, reliable, low-cost electricity. By causing fuel switching away from coal, the Jeffords/Lieberman proposal would cause natural gas price increases that would negatively affect a wide variety of industries and displace people from their jobs. S. 556 would be disastrous to our nation's economy and manufacturing industries—like a tornado sweeping across the country, leaving in its wake unemployed individuals and ruined manufacturing facilities.

For years, the discussion on utility emissions has resulted in a regional debate between the Northeast and the Midwest. What is lost in the debate is the fact that an economic hit on one region has a ripple effect across the entire country. Given this symbiotic relationship, it is all the more important that everyone work together to achieve the goal of a clean environment and reasonable energy costs for American consumers.

Due to the various projections of the Jeffords/Lieberman proposal, more time should be spent on this issue. Perhaps most importantly, there needs to be a better understanding of what different reduction levels and timelines would mean to consumers and our nation's economy. Currently, there is even uncertainty on whether the technologies are available for the reductions mandated in the bill.

The Jeffords/Lieberman bill would cost a great deal to our consumers, businesses, and it would have a devastating impact on the U.S. economy. Without a doubt, many people will lose their jobs if this bill is enacted. For these reasons and due to the fact that S. 556 will not reach the floor of the Senate because of the CO_2 provisions, both sides need to come together to craft a sensible bill that makes real reductions today of NOx, SO_2, and mercury. Real reductions in these three pollutants can be made which will greatly improve our environment and provide low-cost and reliable electricity to our nation's consumers.

CHANGES IN EXISTING LAW

In compliance with section 12 of rule XXVI of the Standing Rules of the Senate, changes in existing law made by the bill as reported are shown as follows: Existing law proposed to be omitted is enclosed in [black brackets], new matter is printed in italic, existing law in which no change is proposed is shown in roman:

THE CLEAN AIR ACT [1]

TITLE I—AIR POLLUTION PREVENTION AND CONTROL

PART A—AIR QUALITY AND EMISSION LIMITATIONS

FINDINGS AND PURPOSES

SEC. 101. (a) The Congress finds—

* * * * * * *

SEC. 103. (a) The Administrator shall establish a national research and development program for the prevention and control of air pollution and as part of such program shall—

(1) conduct, and promote the coordination and acceleration of, research, investigations, experiments, demonstrations, surveys, and studies relating to the causes, effects (including health and welfare effects), extent, prevention, and control of air pollution;

(2) encourage, cooperate with, and render technical services and provide financial assistance to air pollution control agencies and other appropriate public or private agencies, institutions, and organizations, and individuals in the conduct of such activities;

(3) conduct investigations and research and make surveys concerning any specific problem of air pollution in cooperation with any air pollution control agency with a view to recommending a solution of such problem, if he is requested to do so by such agency or if, in his judgment, such problem may affect any community or communities in a State other than that in which the source of the matter causing or contributing to the pollution is located;

(4) establish technical advisory committees composed of recognized experts in various aspects of air pollution to assist in the examination and evaluation of research progress and proposals and to avoid duplication of research; and

(5) conduct and promote coordination and acceleration of training for individuals relating to the causes, effects, extent, prevention, and control of air pollution.

(b) In carrying out the provisions of the preceding subsection the Administrator is authorized to—

(1) collect and make available, through publications and other appropriate means, the results of and other information, including appropriate recommendations by him in connection therewith, pertaining to such research and other activities;

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[1] The Clean Air Act (42 U.S.C. 7401–7626) consists of Public Law 159 (July 14, 1955; 69 Stat. 322) and the amendments made by subsequent enactments.

(2) cooperate with other Federal departments and agencies, with air pollution control agencies, with other public and private agencies, institutions, and organizations, and with any industries involved, in the preparation and conduct of such research and other activities;

(3) make grants to air pollution control agencies, to other public or nonprofit private agencies, institutions, and organizations, and to individuals, for purposes stated in subsection (a)(1) of this section;

(4) contract with public or private agencies, institutions, and organizations, and with individuals, without regard to sections 3648 and 3709 of the Revised Statutes (31 U.S.C. 529; 41 U.S.C. 5);

(5) establish and maintain research fellowships, in the Environmental Protection Agency and at public or nonprofit private educational institutions or research organizations;

(6) collect and disseminate, in cooperation with other Federal departments and agencies, and with other public or private agencies, institutions, and organizations having related responsibilities, basic data on chemical, physical, and biological effects of varying air quality and other information pertaining to air pollution and the prevention and control thereof;

(7) develop effective and practical processes, methods, and prototype devices for the prevention or control of air pollution; and

(8)[1] construct facilities, provide equipment, and employ staff as necessary to carry out this Act.

In carrying out the provisions of subsection (a), the Administrator shall provide training for, and make training grants to, personnel of air pollution control agencies and other persons with suitable qualifications and make grants to such agencies, to other public or nonprofit private agencies, institutions, and organizations for the purposes stated in subsection (a)(5). Reasonable fees may be charged for such training provided to persons other than personnel of air pollution control agencies but such training shall be provided to such personnel of air pollution control agencies without charge.

(c) AIR POLLUTANT MONITORING, ANALYSIS, MODELING, AND INVENTORY RESEARCH.—In carrying out subsection (a), the Administrator shall conduct a program of research, testing, and development of methods for sampling, measurement, monitoring, analysis, and modeling of air pollutants. Such program shall include the following elements:

(1) Consideration of individual, as well as complex mixtures of, air pollutants and their chemical transformations in the atmosphere.

(2) Establishment of a national network to monitor, collect, and compile data with quantification of certainty in the status and trends of air emissions, deposition, air quality, surface water quality, forest condition, and visibility impairment, and to ensure the comparability of air quality data collected in different States and obtained from different nations.

[1] Section 901(a)(2)(C) of Public Law 101–549 (104 Stat. 2700) added a new paragraph (8) at the end of section 103(b). Paragraph (8) probably was intended to have been added after paragraph (7), as it is shown here.

(3) Development of improved methods and technologies for sampling, measurement, monitoring, analysis, and modeling to increase understanding of the sources of ozone percursors, ozone formation, ozone transport, regional influences on urban ozone, regional ozone trends, and interactions of ozone with other pollutants. Emphasis shall be placed on those techniques which—

(A) improve the ability to inventory emissions of volatile organic compounds and nitrogen oxides that contribute to urban air pollution, including anthropogenic and natural sources;

(B) improve the understanding of the mechanism through which anthropogenic and biogenic volatile organic compounds react to form ozone and other oxidants; and

(C) improve the ability to identify and evaluate region-specific prevention and control options for ozone pollution.

(4) Submission of periodic reports to the Congress, not less than once every 5 years, which evaluate and assess the effectiveness of air pollution control regulations and programs using monitoring and modeling data obtained pursuant to this subsection.

(d) ENVIRONMENTAL HEALTH EFFECTS RESEARCH.—(1) The Administrator, in consultation with the Secretary of Health and Human Services, shall conduct a research program on the short-term and long-term effects of air pollutants, including wood smoke, on human health. In conducting such research program the Administrator—

(A) shall conduct studies, including epidemiological, clinical, and laboratory and field studies, as necessary to identify and evaluate exposure to and effects of air pollutants on human health;

(B) may utilize, on a reimbursable basis, the facilities of existing Federal scientific laboratories and research centers; and

(C) shall consult with other Federal agencies to ensure that similar research being conducted in other agencies is coordinated to avoid duplication.

(2) In conducting the research program under this subsection, the Administrator shall develop methods and techniques necessary to identify and assess the risks to human health from both routine and accidental exposures to individual air pollutants and combinations thereof. Such research program shall include the following elements:

(A) The creation of an Interagency Task Force to coordinate such program. The Task Force shall include representatives of the National Institute for Environmental Health Sciences, the Environmental Protection Agency, the Agency for Toxic Substances and Disease Registry, the National Toxicology Program, the National Institute of Standards and Technology, the National Science Foundation, the Surgeon General, and the Department of Energy. This Interagency Task Force shall be chaired by a representative of the Environmental Protection Agency and shall convene its first meeting within 60 days after the date of enactment of this subparagraph.

(B) An evaluation, within 12 months after the date of enactment of this paragraph, of each of the hazardous air pollutants listed under section 112(b) of this Act, to decide, on the basis of available information, their relative priority for preparation of environmental health assessments pursuant to subparagraph (C). The evaluation shall be based on reasonably anticipated toxicity to humans and exposure factors such as frequency of occurrence as an air pollutant and volume of emissions in populated areas. Such evaluation shall be reviewed by the Interagency Task Force established pursuant to subparagraph (A).

(C) Preparation of environmental health assessments for each of the hazardous air pollutants referred to in subparagraph (B), beginning 6 months after the first meeting of the Interagency Task Force and to be completed within 96 months thereafter. No fewer than 24 assessments shall be completed and published annually. The assessments shall be prepared in accordance with guidelines developed by the Administrator in consultation with the Interagency Task Force and the Science Advisory Board of the Environmental Protection Agency. Each such assessment shall include—

(i) an examination, summary, and evaluation of available toxicological and epidemiological information for the pollutant to ascertain the levels of human exposure which pose a significant threat to human health and the associated acute, subacute, and chronic adverse health effects;

(ii) a determination of gaps in available information related to human health effects and exposure levels; and

(iii) where appropriate, an identification of additional activities, including toxicological and inhalation testing, needed to identify the types or levels of exposure which may present significant risk of adverse health effects in humans.

(e) ECOSYSTEM RESEARCH.—In carrying out subsection (a), the Administrator, in cooperation, where appropriate, with the Under Secretary of Commerce for Oceans and Atmosphere, the Director of the Fish and Wildlife Service, and the Secretary of Agriculture, shall conduct a research program to improve understanding of the short-term and long-term causes, effects, and trends of ecosystems damage from air pollutants on ecosystems. Such program shall include the following elements:

(1) Identification of regionally representative and critical ecosystems for research.

(2) Evaluation of risks to ecosystems exposed to air pollutants, including characterization of the causes and effects of chronic and episodic exposures to air pollutants and determination of the reversibility of those effects.

(3) Development of improved atmospheric dispersion models and monitoring systems and networks for evaluating and quantifying exposure to and effects of multiple environmental stresses associated with air pollution.

(4) Evaluation of the effects of air pollution on water quality, including assessments of the short-term and long-term ecological effects of acid deposition and other atmospherically de-

rived pollutants on surface water (including wetlands and estuaries) and groundwater.

(5) Evaluation of the effects of air pollution on forests, materials, crops, biological diversity, soils, and other terrestrial and aquatic systems exposed to air pollutants.

(6) Estimation of the associated economic costs of ecological damage which have occurred as a result of exposure to air pollutants.

Consistent with the purpose of this program, the Administrator may use the estuarine research reserves established pursuant to section 315 of the Coastal Zone Management Act of 1972 (16 U.S.C. 1461) to carry out this research.

(f) LIQUEFIED GASEOUS FUELS SPILL TEST FACILITY.—(1) The Administrator, in consultation with the Secretary of Energy and the Federal Coordinating Council for Science, Engineering, and Technology, shall oversee an experimental and analytical research effort, with the experimental research to be carried out at the Liquefied Gaseous Fuels Spill Test Facility. In consultation with the Secretary of Energy, the Administrator shall develop a list of chemicals and a schedule for field testing at the Facility. Analysis of a minimum of 10 chemicals per year shall be carried out, with the selection of a minimum of 2 chemicals for field testing each year. Highest priority shall be given to those chemicals that would present the greatest potential risk to human health as a result of an accidental release—

(A) from a fixed site; or

(B) related to the transport of such chemicals.

(2) The purpose of such research shall be to—

(A) develop improved predictive models for atmospheric dispersion which at a minimum—

(i) describe dense gas releases in complex terrain including man-made structures or obstacles with variable winds;

(ii) improve understanding of the effects of turbulence on dispersion patterns; and

(iii) consider realistic behavior of aerosols by including physicochemical reactions with water vapor, ground deposition, and removal by water spray;

(B) evaluate existing and future atmospheric dispersion models by—

(i) the development of a rigorous, standardized methodology for dense gas models; and

(ii) the application of such methodology to current dense gas dispersion models using data generated from field experiments; and

(C) evaluate the effectiveness of hazard mitigation and emergency response technology for fixed site and transportation related accidental releases of toxic chemicals.

Models pertaining to accidental release shall be evaluated and improved periodically for their utility in planning and implementing evacuation procedures and other mitigative strategies designed to minimize human exposure to hazardous air pollutants released accidentally.

(3) The Secretary of Energy shall make available to interested persons (including other Federal agencies and businesses) the use of the Liquefied Gaseous Fuels Spill Test Facility to conduct research and other activities in connection with the activities described in this subsection.

(g) POLLUTION PREVENTION AND EMISSIONS CONTROL.—In carrying out subsection (a), the Administrator shall conduct a basic engineering research and technology program to develop, evaluate, and demonstrate nonregulatory strategies and technologies for air pollution prevention. Such strategies and technologies shall be developed with priority on those pollutants which pose a significant risk to human health and the environment, and with opportunities for participation by industry, public interest groups, scientists, and other interested persons in the development of such strategies and technologies. Such program shall include the following elements:

(1) Improvements in nonregulatory strategies and technologies for preventing or reducing multiple air pollutants, including sulfur oxides, nitrogen oxides, heavy metals, PM–10 (particulate matter), carbon monoxide, and carbon dioxide, from stationary sources, including fossil fuel power plants. Such strategies and technologies shall include improvements in the relative cost effectiveness and long-range implications of various air pollutant reduction and nonregulatory control strategies such as energy conservation, including end-use efficiency, and fuel-switching to cleaner fuels. Such strategies and technologies shall be considered for existing and new facilities.

(2) Improvements in nonregulatory strategies and technologies for reducing air emissions from area sources.

(3) Improvements in nonregulatory strategies and technologies for preventing, detecting, and correcting accidental releases of hazardous air pollutants.

(4) Improvements in nonregulatory strategies and technologies that dispose of tires in ways that avoid adverse air quality impacts.

Nothing in this subsection shall be construed to authorize the imposition on any person of air pollution control requirements. The Administrator shall consult with other appropriate Federal agencies to ensure coordination and to avoid duplication of activities authorized under this subsection.

(h) NIEHS STUDIES.—(1) The Director of the National Institute of Environmental Health Sciences may conduct a program of basic research to identify, characterize, and quantify risks to human health from air pollutants. Such research shall be conducted primarily through a combination of university and medical school-based grants, as well as through intramural studies and contracts.

(2) The Director of the National Institute of Environmental Health Sciences shall conduct a program for the education and training of physicians in environmental health.

(3) The Director shall assure that such programs shall not conflict with research undertaken by the Administrator.

(4) There are authorized to be appropriated to the National Institute of Environmental Health Sciences such sums as may be necessary to carry out the purposes of this subsection.

(i) COORDINATION OF RESEARCH.—The Administrator shall develop and implement a plan for identifying areas in which activities authorized under this section can be carried out in conjunction with other Federal ecological and air pollution research efforts. The plan, which shall be submitted to Congress within 6 months after the date of enactment of this subsection, shall include—

(1) an assessment of ambient monitoring stations and networks to determine cost effective ways to expand monitoring capabilities in both urban and rural environments;

(2) a consideration of the extent of the feasibility and scientific value of conducting the research program under subsection (e) to include consideration of the effects of atmospheric processes and air pollution effects; and

(3) a methodology for evaluating and ranking pollution prevention technologies, such as those developed under subsection (g), in terms of their ability to reduce cost effectively the emissions of air pollutants and other airborne chemicals of concern.

Not later than 2 years after the date of enactment of this subsection, and every 4 years thereafter, the Administrator shall report to Congress on the progress made in implementing the plan developed under this subsection, and shall include in such report any revisions of the plan.

(j) CONTINUATION OF THE NATIONAL ACID PRECIPITATION ASSESSMENT PROGRAM.—

(1) The acid precipitation research program set forth in the Acid Precipitation Act of 1980 shall be continued with modifications pursuant to this subsection.

(2) The Acid Precipitation Task Force shall consist of the Administrator of the Environmental Protection Agency, the Secretary of Energy, the Secretary of the Interior, the Secretary of Agriculture, the Administrator of the National Oceanic and Atmospheric Administration, the Administrator of the National Aeronautics and Space Administration, and such additional members as the President may select. The President shall appoint a chairman for the Task Force from among its members within 30 days after the date of enactment of this subsection.

(3) The responsibilities of the Task Force shall include the following:

(A) Review of the status of research activities conducted to date under the comprehensive research plan developed pursuant to the Acid Precipitation Act of 1980, and development of a revised plan that identifies significant research gaps and establishes a coordinated program to address current and future research priorities. A draft of the revised plan shall be submitted by the Task Force to Congress within 6 months after the date of enactment of this subsection. The plan shall be available for public comment during the 60 day period after its submission, and a final plan shall be submitted by the President to the Congress within 45 days after the close of the comment period.

(B) Coordination with participating Federal agencies, augmenting the agencies' research and monitoring efforts and sponsoring additional research in the scientific community as necessary to ensure the availability and quality of data and methodologies needed to evaluate the status and effectiveness of the acid deposition control program. Such research and monitoring efforts shall include, but not be limited to—

(i) continuous monitoring of emissions of precursors of acid deposition;

(ii) maintenance, upgrading, and application of models, such as the Regional Acid Deposition Model, that describe the interactions of emissions with the atmosphere, and models that describe the response of ecosystems to acid deposition; and

(iii) analysis of the costs, benefits, and effectiveness of the acid deposition control program.

(C) Publication and maintenance of a National Acid Lakes Registry that tracks the condition and change over time of a statistically representative sample of lakes in regions that are known to be sensitive to surface water acidification.

(D) Submission every two years of a unified budget recommendation to the President for activities of the Federal Government in connection with the research program described in this subsection.

(E) Beginning in 1992 and biennially thereafter, submission of a report to Congress describing the results of its investigations and analyses. The reporting of technical information about acid deposition shall be provided in a format that facilitates communication with policymakers and the public. The report shall include—

(i) actual and projected emissions and acid deposition trends;

(ii) average ambient concentrations of acid deposition percursors [1] and their transformation products;

(iii) the status of ecosystems (including forests and surface waters), materials, and visibility affected by acid deposition;

(iv) the causes and effects of such deposition, including changes in surface water quality and forest and soil conditions;

(v) the occurrence and effects of episodic acidification, particularly with respect to high elevation watersheds; and

(vi) the confidence level associated with each conclusion to aid policymakers in use of the information.

(F) Beginning in 1996, and every 4 years thereafter, the report under subparagraph (E) shall include—

(i) the reduction in deposition rates that must be achieved in order to prevent adverse ecological [effects; and] *effects, including an assessment of—*

[1] Probably should be "precursors".

(I) acid-neutralizing capacity; and

(II) changes in the number of water bodies in the sensitive ecosystems referred to in subparagraph (G)(ii) with an acid-neutralizing capacity greater than zero; and

(ii) the costs and benefits of the acid deposition control program created by title IV of this Act.

(G) SENSITIVE ECOSYSTEMS.—

(i) IN GENERAL.—Beginning in 2004, and every 4 years thereafter, the report under subparagraph (E) shall include—

(I) an identification of environmental objectives necessary to be achieved (and related indicators to be used in measuring achievement of the objectives) to adequately protect and restore sensitive ecosystems; and

(II) an assessment of the status and trends of the environmental objectives and indicators identified in previous reports under this paragraph.

(ii) SENSITIVE ECOSYSTEMS TO BE ADDRESSED.—Sensitive ecosystems to be addressed under clause (i) include—

(I) the Adirondack Mountains, mid-Appalachian Mountains, Rocky Mountains, and southern Blue Ridge Mountains;

(II) the Great Lakes, Lake Champlain, Long Island Sound, and the Chesapeake Bay; and

(III) other sensitive ecosystems, as determined by the Administrator.

(H) ACID DEPOSITION STANDARDS.—Beginning in 2004, and every 4 years thereafter, the report under subparagraph (E) shall include a revision of the report under section 404 of Public Law 101–549 (42 U.S.C. 7651 note) that includes a reassessment of the health and chemistry of the lakes and streams that were subjects of the original report under that section.

(4) PROTECTION OF SENSITIVE ECOSYSTEMS.—

(A) DETERMINATION.—Not later than December 31, 2010, the Administrator, taking into consideration the findings and recommendations of the report revisions under paragraph (3)(H), shall determine whether emission reductions under titles IV and VII are sufficient to—

(i) achieve the necessary reductions identified under paragraph (3)(F); and

(ii) ensure achievement of the environmental objectives identified under paragraph (3)(G).

(B) REGULATIONS.—

(i) IN GENERAL.—Not later than 2 years after the Administrator makes a determination under subparagraph (A) that emission reductions are not sufficient, the Administrator shall promulgate regulations to protect the sensitive ecosystems referred to in paragraph (3)(G)(ii).

(ii) CONTENTS.—Regulations under clause (i) shall include modifications to—

(I) provisions relating to nitrogen oxide and sulfur dioxide emission reductions;

(II) provisions relating to allocations of nitrogen oxide and sulfur dioxide allowances; and

(III) such other provisions as the Administrator determines to be necessary.

(k) AIR POLLUTION CONFERENCES.—If, in the judgment of the Administrator, an air pollution problem of substantial significance may result from discharge or discharges into the atmosphere, the Administrator may call a conference concerning this potential air pollution problem to be held in or near one or more of the places where such discharge or discharges are occurring or will occur. All interested persons shall be given an opportunity to be heard at such conference, either orally or in writing, and shall be permitted to appear in person or by representative in accordance with procedures prescribed by the Administrator. If the Administrator finds, on the basis of the evidence presented at such conference, that the discharge or discharges if permitted to take place or continue are likely to cause or contribute to air pollution subject to abatement under part A of title I, the Administrator shall send such findings, together with recommendations concerning the measures which the Administrator finds reasonable and suitable to prevent such pollution, to the person or persons whose actions will result in the discharge or discharges involved; to air pollution agencies of the State or States and of the municipality or municipalities where such discharge or discharges will originate; and to the interstate air pollution control agency, if any, in the jurisdictional area of which any such municipality is located. Such findings and recommendations shall be advisory only, but shall be admitted together with the record of the conference, as part of the proceedings under subsections (b), (c), (d), (e), and (f) of section 108.

* * * * * * *

SEC. 193. GENERAL SAVINGS CLAUSE.

Each regulation, standard, rule, notice, order and guidance promulgated or issued by the Administrator under this Act, as in effect before the ⟦date of the enactment of the Clean Air Act Amendments of 1990⟧ *date of enactment of the Clean Power Act of 2002* shall remain in effect according to its terms, except to the extent otherwise provided under this Act, inconsistent with any provision of this Act, or revised by the Administrator. No control requirement in effect, or required to be adopted by an order, settlement agreement, or plan in effect before the ⟦date of the enactment of the Clean Air Act Amendments of 1990⟧ *date of enactment of the Clean Power Act of 2002* in any area which is a nonattainment area for any air pollutant may be modified after such enactment in any manner unless the modification insures equivalent or greater emission reductions of such air pollutant.

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TITLE [IV] *VIII*—NOISE POLLUTION

SEC. [401] *801*. This title may be cited as the "Noise Pollution and Abatement Act of 1970".

SEC. [402] *802*. (a) The Administrator shall establish within the the Environmental Protection Agency an Office of Noise Abatement and Control, and shall carry out through such Office a full and complete investigation and study of noise and its effect on the public health and welfare in order to (1) identify and classify causes and sources of noise, and (2) determine—

(A) effects at various levels;

(B) projected growth of noise levels in urban areas through the year 2000;

(C) the psychological and physiological effect on humans;

(D) effects of sporadic extreme noise (such as jet noise near airports) as compared with constant noise;

(E) effect on wildlife and property (including values);

(F) effect of sonic booms on property (including values); and

(G) such other matters as may be of interest in the public welfare.

(b) In conducting such investigation, the Administrator shall hold public hearings, conduct research, experiments, demonstrations, and studies. The Administrator shall report the results of such investigation and study, together with his recommendations for legislation or other action, to the President and the Congress not later than one year after the date of enactment of this title.

(c) In any case where any Federal department or a agency is carrying out or sponsoring any activity resulting in noise which the administrator determines amounts to a public nuisance or is otherwise objectionable, such department or agency shall consult with the Administrator to determine possible means of abating such noise.

SEC. [403] *803*. There is authorized to be appropriated such amount, not to exceed $30,000,000, as may be necessary for the purposes of this title.

* * * * * * *

SEC. 412. MONITORING, REPORTING, AND RECORDKEEPING REQUIREMENTS.

(a) APPLICABILITY.—The owner and operator of any source subject to this title shall be required to install and operate CEMS on each affected unit at the source, and to quality assure the data for sulfur dioxide, nitrogen oxides, [opacity] *mercury, opacity* and volumetric flow at each such unit. The Administrator shall, by regulations issued not later than eighteen months after enactment of the Clean Air Act Amendments of 1990, specify the requirements for CEMS, for any alternative monitoring system that is demonstrated as providing information with the same precision, reliability, accessibility, and timeliness as that provided by CEMS, and for recordkeeping and reporting of information from such systems. Such regulations may include limitations or the use of alternative compliance methods by units equipped with an alternative monitoring system as may be necessary to preserve the orderly functioning of the allowance system, and which will ensure the emissions reduc-

tions contemplated by this title. Where 2 or more units utilize a single stack, a separate CEMS shall not be required for each unit, and for such units the regulations shall require that the owner or operator collect sufficient information to permit reliable compliance determinations for each such unit.

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Sec. 701. Findings.
Sec. 702. Purposes.
Sec. 703. Definitions.
Sec. 704. Emission limitations.
Sec. 705. Emission allowances.
Sec. 706. Permitting and trading of emission allowances.
Sec. 707. Emission allowance allocation.
Sec. 708. Mercury emission limitations.
Sec. 709. Other hazardous air pollutants.
Sec. 710. Effect of failure to promulgate regulations.
Sec. 711. Prohibitions.
Sec. 712. Modernization of electricity generating facilities.
Sec. 713. Relationship to other law.

SEC. 701. FINDINGS.

Congress finds that—

(1) public health and the environment continue to suffer as a result of pollution emitted by powerplants across the United States, despite the success of Public Law 101–549 (commonly known as the 'Clean Air Act Amendments of 1990') (42 U.S.C. 7401 et seq.) in reducing emissions;

(2) according to the most reliable scientific knowledge, acid rain precursors must be significantly reduced for the ecosystems of the Northeast and Southeast to recover from the ecological harm caused by acid deposition;

(3) because lakes and sediments across the United States are being contaminated by mercury emitted by powerplants, there is an increasing risk of mercury poisoning of aquatic habitats and fish-consuming human populations;

(4)(A) electricity generation accounts for approximately 40 percent of the total emissions in the United States of carbon dioxide, a major greenhouse gas causing global warming; and

(B) the quantity of carbon dioxide in the atmosphere is growing without constraint and well beyond the international commitments of the United States;

(5) the cumulative impact of powerplant emissions on public and environmental health must be addressed swiftly by reducing those harmful emissions to levels that are less threatening; and

(6)(A) the atmosphere is a public resource; and

(B) emission allowances, representing permission to use that resource for disposal of air pollution from electricity generation, should be allocated to promote public purposes, including—

(i) protecting electricity consumers from adverse economic impacts;

(ii) providing transition assistance to adversely affected employees, communities, and industries; and

(iii) promoting clean energy resources and energy efficiency.

SEC. 702. PURPOSES.

The purposes of this title are—

(1) to alleviate the environmental and public health damage caused by emissions of sulfur dioxide, nitrogen oxides, carbon dioxide, and mercury resulting from the combustion of fossil fuels in the generation of electric and thermal energy;

(2) to reduce by 2008 the annual national emissions from electricity generating facilities to not more than—

(A) 2,250,000 tons of sulfur dioxide;

(B) 1,510,000 tons of nitrogen oxides;

(C) 2,050,000,000 tons of carbon dioxide; and

(D) 5 tons of mercury;

(3) to effectuate the reductions described in paragraph (2) by—

(A) requiring electricity generating facilities to comply with specified emission limitations by specified deadlines; and

(B) allowing electricity generating facilities to meet the emission limitations (other than the emission limitation for mercury) through an alternative method of compliance consisting of an emission allowance and transfer system; and

(4) to encourage energy conservation, use of renewable and clean alternative technologies, and pollution prevention as long-range strategies, consistent with this title, for reducing air pollution and other adverse impacts of energy generation and use.

SEC. 703. DEFINITIONS.

In this title:

(1) COVERED POLLUTANT.—The term 'covered pollutant' means—

(A) sulfur dioxide;

(B) any nitrogen oxide;

(C) carbon dioxide; and

(D) mercury.

(2) ELECTRICITY GENERATING FACILITY.—The term 'electricity generating facility' means an electric or thermal electricity generating unit, a combination of such units, or a combination of 1 or more such units and 1 or more combustion devices, that—

(A) has a nameplate capacity of 15 megawatts or more (or the equivalent in thermal energy generation, determined in accordance with a methodology developed by the Administrator);

(B) generates electric energy, for sale, through combustion of fossil fuel; and

(C) emits a covered pollutant into the atmosphere.

(3) ELECTRICITY INTENSIVE PRODUCT.—The term 'electricity intensive product' means a product with respect to which the cost of electricity consumed in the production of the product represents more than 5 percent of the value of the product.

(4) EMISSION ALLOWANCE.—The term 'emission allowance' means a limited authorization to emit in accordance with this title—

(A) 1 ton of sulfur dioxide;

(B) 1 ton of nitrogen oxides; or

(C) 1 ton of carbon dioxide.

(5) ENERGY EFFICIENCY PROJECT.—The term 'energy efficiency project' means any specific action (other than ownership or operation of an energy efficient building) commenced after the date of enactment of this title—

(A) at a facility (other than an electricity generating facility), that verifiably reduces the annual electricity or natural gas consumption per unit output of the facility, as compared with the annual electricity or natural gas consumption per unit output that would be expected in the absence of an allocation of emission allowances (as determined by the Administrator); or

(B) by an entity that is primarily engaged in the transmission and distribution of electricity, that significantly improves the efficiency of that type of entity, as compared with standards for efficiency developed by the Administrator, in consultation with the Secretary of Energy, after the date of enactment of this title.

(6) ENERGY EFFICIENT BUILDING.—The term 'energy efficient building' means a residential building or commercial building completed after the date of enactment of this title for which the projected lifetime consumption of electricity or natural gas for heating, cooling, and ventilation is at least 30 percent less than the lifetime consumption of a typical new residential building or commercial building, as determined by the Administrator (in consultation with the Secretary of Energy)—

(A) on a State or regional basis; and

(B) taking into consideration—

(i) applicable building codes; and

(ii) consumption levels achieved in practice by new residential buildings or commercial buildings in the absence of an allocation of emission allowances.

(7) ENERGY EFFICIENT PRODUCT.—The term 'energy efficient product' means a product manufactured after the date of enactment of this title that has an expected lifetime electricity or natural gas consumption that—

(A) is less than the average lifetime electricity or natural gas consumption for that type of product; and

(B) does not exceed the lesser of—

(i) the maximum energy consumption that qualifies for the applicable Energy Star label for that type of product; or

(ii) the average energy consumption of the most efficient 25 percent of that type of product manufactured in the same year.

(8) LIFETIME.—The term 'lifetime' means—

(A) in the case of a residential building that is an energy efficient building, 30 years;

(B) in the case of a commercial building that is an energy efficient building, 15 years; and

(C) in the case of an energy efficient product, a period determined by the Administrator to be the average life of that type of energy efficient product.

(9) MERCURY.—The term 'mercury' includes any mercury compound.

(10) NEW CLEAN FOSSIL FUEL-FIRED ELECTRICITY GENERATING UNIT.—The term 'new clean fossil fuel-fired electricity generating unit' means a unit that—

(A) has been in operation for 10 years or less; and

(B) is—

(i) a natural gas fired generator that—

(I) has an energy conversion efficiency of at least 55 percent; and

(II) uses best available control technology (as defined in section 169);

(ii) a generator that—

(I) uses integrated gasification combined cycle technology;

(II) uses best available control technology (as defined in section 169); and

(III) has an energy conversion efficiency of at least 45 percent; or

(iii) a fuel cell operating on fuel derived from a nonrenewable source of energy.

(11) NONWESTERN REGION.—The term 'nonwestern region' means the area of the States that is not included in the western region.

(12) RENEWABLE ELECTRICITY GENERATING UNIT.—The term 'renewable electricity generating unit' means a unit that—

(A) has been in operation for 10 years or less; and

(B) generates electric energy by means of—

(i) wind;

(ii) biomass;

(iii) landfill gas;

(iv) a geothermal, solar thermal, or photovoltaic source; or

(v) a fuel cell operating on fuel derived from a renewable source of energy.

(13) SMALL ELECTRICITY GENERATING FACILITY.—The term 'small electricity generating facility' means an electric or thermal electricity generating unit, or combination of units, that—

(A) has a nameplate capacity of less than 15 megawatts (or the equivalent in thermal energy generation, determined in accordance with a methodology developed by the Administrator);

(B) generates electric energy, for sale, through combustion of fossil fuel; and

(C) emits a covered pollutant into the atmosphere.

(14) WESTERN REGION.—The term 'western region' means the area comprising the States of Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming.

SEC. 704. EMISSION LIMITATIONS.

(a) IN GENERAL.—Subject to subsections (b) and (c), the Administrator shall promulgate regulations to ensure that, during 2008 and each year thereafter, the total annual emissions of covered pol-

lutants from all electricity generating facilities located in all States does not exceed—

(1) in the case of sulfur dioxide—

(A) 275,000 tons in the western region; or

(B) 1,975,000 tons in the nonwestern region;

(2) in the case of nitrogen oxides, 1,510,000 tons;

(3) in the case of carbon dioxide, 2,050,000,000 tons; or

(4) in the case of mercury, 5 tons.

(b) EXCESS EMISSIONS BASED ON UNUSED ALLOWANCES.—The regulations promulgated under subsection (a) shall authorize emissions of covered pollutants in excess of the national emission limitations established under that subsection for a year to the extent that the number of tons of the excess emissions is less than or equal to the number of emission allowances that are—

(1) used in the year; but

(2) allocated for any previous year under section 707.

(c) REDUCTIONS.—For 2008 and each year thereafter, the quantity of emissions specified for each covered pollutant in subsection (a) shall be reduced by the sum of—

(1) the number of tons of the covered pollutant that were emitted by small electricity generating facilities in the second preceding year; and

(2) any number of tons of reductions in emissions of the covered pollutant required under section 705(h).

SEC. 705. EMISSION ALLOWANCES.

(a) CREATION AND ALLOCATION.—

(1) IN GENERAL.—For 2008 and each year thereafter, subject to paragraph (2), there are created, and the Administrator shall allocate in accordance with section 707, emission allowances as follows:

(A) In the case of sulfur dioxide—

(i) 275,000 emission allowances for each year for use in the western region; and

(ii) 1,975,000 emission allowances for each year for use in the nonwestern region.

(B) In the case of nitrogen oxides, 1,510,000 emission allowances for each year.

(C) In the case of carbon dioxide, 2,050,000,000 emission allowances for each year.

(2) REDUCTIONS.—For 2008 and each year thereafter, the number of emission allowances specified for each covered pollutant in paragraph (1) shall be reduced by a number equal to the sum of—

(A) the number of tons of the covered pollutant that were emitted by small electricity generating facilities in the second preceding year; and

(B) any number of tons of reductions in emissions of the covered pollutant required under subsection (h).

(b) NATURE OF EMISSION ALLOWANCES.—

(1) NOT A PROPERTY RIGHT.—An emission allowance allocated by the Administrator under subsection (a) is not a property right.

(2) NO LIMIT ON AUTHORITY TO TERMINATE OR LIMIT.—Nothing in this title or any other provision of law limits the au-

thority of the United States to terminate or limit an emission allowance.

(3) TRACKING AND TRANSFER OF EMISSION ALLOWANCES.—

(A) IN GENERAL.—Not later than 1 year after the date of enactment of this title, the Administrator shall promulgate regulations to establish an emission allowance tracking and transfer system for emission allowances of sulfur dioxide, nitrogen oxides, and carbon dioxide.

(B) REQUIREMENTS.—The emission allowance tracking and transfer system established under subparagraph (A) shall—

(i) incorporate the requirements of subsections (b) and (d) of section 412 (except that written certification by the transferee shall not be necessary to effect a transfer); and

(ii) permit any entity—

(I) to buy, sell, or hold an emission allowance; and

(II) to permanently retire an unused emission allowance.

(C) PROCEEDS OF TRANSFERS.—Proceeds from the transfer of emission allowances by any person to which the emission allowances have been allocated—

(i) shall not constitute funds of the United States; and

(ii) shall not be available to meet any obligations of the United States.

(c) IDENTIFICATION AND USE.—

(1) IN GENERAL.—Each emission allowance allocated by the Administrator shall bear a unique serial number, including—

(A) an identifier of the covered pollutant to which the emission allowance pertains; and

(B) the first year for which the allowance may be used.

(2) SULFUR DIOXIDE EMISSION ALLOWANCES.—In the case of sulfur dioxide emission allowances, the Administrator shall ensure that the emission allowances allocated to electricity generating facilities in the western region are distinguishable from emission allowances allocated to electricity generating facilities in the nonwestern region.

(3) YEAR OF USE.—Each emission allowance may be used in the year for which the emission allowance is allocated or in any subsequent year.

(d) ANNUAL SUBMISSION OF EMISSION ALLOWANCES.—

(1) IN GENERAL.—On or before April 1, 2009, and April 1 of each year thereafter, the owner or operator of each electricity generating facility shall submit to the Administrator 1 emission allowance for the applicable covered pollutant (other than mercury) for each ton of sulfur dioxide, nitrogen oxides, or carbon dioxide emitted by the electricity generating facility during the previous calendar year.

(2) SPECIAL RULE FOR OZONE EXCEEDANCES.—

(A) IDENTIFICATION OF FACILITIES CONTRIBUTING TO NONATTAINMENT.—Not later than December 31, 2007, and the end of each 3-year period thereafter, each State, con-

sistent with the obligations of the State under section 110(a)(2)(D), shall identify the electricity generating facilities in the State and in other States that are significantly contributing (as determined based on guidance issued by the Administrator) to nonattainment of the national ambient air quality standard for ozone in the State.

(B) SUBMISSION OF ADDITIONAL ALLOWANCES.—In 2008 and each year thereafter, on petition from a State or a person demonstrating that the control measures in effect at an electricity generating facility that is identified under subparagraph (A) as significantly contributing to nonattainment of the national ambient air quality standard for ozone in a State during the previous year are inadequate to prevent the significant contribution described in subparagraph (A), the Administrator, if the Administrator determines that the electricity generating facility is inadequately controlled for nitrogen oxides, may require that the electricity generating facility submit 3 nitrogen oxide emission allowances for each ton of nitrogen oxides emitted by the electricity generating facility during any period of an exceedance of the national ambient air quality standard for ozone in the State during the previous year.

(3) REGIONAL LIMITATIONS FOR SULFUR DIOXIDE.—The Administrator shall not allow—

(A) the use of sulfur dioxide emission allowances allocated for the western region to meet the obligations under this subsection of electricity generating facilities in the nonwestern region; or

(B) the use of sulfur dioxide emission allowances allocated for the nonwestern region to meet the obligations under this subsection of electricity generating facilities in the western region.

(e) EMISSION VERIFICATION, MONITORING, AND RECORDKEEPING.—

(1) IN GENERAL.—The Administrator shall ensure that Federal regulations, in combination with any applicable State regulations, are adequate to verify, monitor, and document emissions of covered pollutants from electricity generating facilities.

(2) INVENTORY OF EMISSIONS FROM SMALL ELECTRICITY GENERATING FACILITIES.—On or before January 1, 2004, the Administrator, in cooperation with State agencies, shall complete, and on an annual basis update, a comprehensive inventory of emissions of sulfur dioxide, nitrogen oxides, carbon dioxide, and particulate matter from small electricity generating facilities.

(3) MONITORING INFORMATION.—

(A) IN GENERAL.—Not later than 180 days after the date of enactment of this title, the Administrator shall promulgate regulations to require each electricity generating facility to submit to the Administrator—

(i) not later than April 1 of each year, verifiable information on covered pollutants emitted by the electricity generating facility in the previous year, expressed in—

(I) tons of covered pollutants; and

(II) tons of covered pollutants per megawatt hour of energy (or the equivalent thermal energy) generated; and

(ii) as part of the first submission under clause (i), verifiable information on covered pollutants emitted by the electricity generating facility in 1999, 2000, and 2001, if the electricity generating facility was required to report that information in those years.

(B) SOURCE OF INFORMATION.—Information submitted under subparagraph (A) shall be obtained using a continuous emission monitoring system (as defined in section 402).

(C) AVAILABILITY TO THE PUBLIC.—The information described in subparagraph (A) shall be made available to the public—

(i) in the case of the first year in which the information is required to be submitted under that subparagraph, not later than 18 months after the date of enactment of this title; and

(ii) in the case of each year thereafter, not later than April 1 of the year.

(4) AMBIENT AIR QUALITY MONITORING FOR SULFUR DIOXIDE AND HAZARDOUS AIR POLLUTANTS.—

(A) IN GENERAL.—Beginning January 1, 2004, each coal-fired electricity generating facility with an aggregate generating capacity of 50 megawatts or more shall, in accordance with guidelines issued by the Administrator, commence ambient air quality monitoring within a 30-mile radius of the coal-fired electricity generating facility for the purpose of measuring maximum concentrations of sulfur dioxide and hazardous air pollutants emitted by the coal-fired electricity generating facility.

(B) LOCATION OF MONITORING POINTS.—Monitoring under subparagraph (A) shall include monitoring at not fewer than 2 points—

(i) that are at ground level and within 3 miles of the coal-fired electricity generating facility;

(ii) at which the concentration of pollutants being monitored is expected to be the greatest; and

(iii) at which the monitoring shall be the most frequent.

(C) FREQUENCY OF MONITORING OF SULFUR DIOXIDE.—Monitoring of sulfur dioxide under subparagraph (A) shall be carried out on a continuous basis and averaged over 5-minute periods.

(D) AVAILABILITY TO THE PUBLIC.—The results of the monitoring under subparagraph (A) shall be made available to the public.

(f) EXCESS EMISSION PENALTY.—

(1) IN GENERAL.—Subject to paragraph (2), section 411 shall be applicable to an owner or operator of an electricity generating facility.

(2) CALCULATION OF PENALTY.—

(A) IN GENERAL.—Except as provided in subparagraph (B), the penalty for failure to submit emission allowances for covered pollutants as required under subsection (d) shall be equal to 3 times the product obtained by multiplying—

(i) as applicable—

(I) the number of tons emitted in excess of the emission limitation requirement applicable to the electricity generating facility; or

(II) the number of emission allowances that the owner or operator failed to submit; and

(ii) the average annual market price of emission allowances (as determined by the Administrator).

(B) MERCURY.—In the case of mercury, the penalty shall be equal to 3 times the product obtained by multiplying—

(i) the number of grams emitted in excess of the emission limitation requirement for mercury applicable to the electricity generating facility; and

(ii) the average cost of mercury controls at electricity generating units that have a nameplate capacity of 15 megawatts or more in all States (as determined by the Administrator).

(g) SIGNIFICANT ADVERSE LOCAL IMPACTS.—

(1) IN GENERAL.—If the Administrator determines that emissions of an electricity generating facility may reasonably be anticipated to cause or contribute to a significant adverse impact on an area (including endangerment of public health, contribution to acid deposition in a sensitive receptor area, and other degradation of the environment), the Administrator shall limit the emissions of the electricity generating facility as necessary to avoid that impact.

(2) VIOLATION.—Notwithstanding the availability of emission allowances, it shall be a violation of this Act for any electricity generating facility to exceed any limitation on emissions established under paragraph (1).

(h) ADDITIONAL REDUCTIONS.—

(1) PROTECTION OF PUBLIC HEALTH OR WELFARE OR THE ENVIRONMENT.—If the Administrator determines that the emission levels necessary to achieve the national emission limitations established under section 704 are not reasonably anticipated to protect public health or welfare or the environment (including protection of children, pregnant women, minority or low-income communities, and other sensitive populations), the Administrator may require reductions in emissions from electricity generating facilities in addition to the reductions required under the other provisions of this title.

(2) EMISSION ALLOWANCE TRADING.—

(A) STUDIES.—

(i) IN GENERAL.—In 2011 and at the end of each 3-year period thereafter, the Administrator shall complete a study of the impacts of the emission allowance trading authorized under this title.

(ii) REQUIRED ASSESSMENT.—The study shall include an assessment of ambient air quality in areas surrounding electricity generating facilities that participate in emission allowance trading, including a comparison between—

(I) the ambient air quality in those areas; and

(II) the national average ambient air quality.

(B) LIMITATION ON EMISSIONS.—If the Administrator determines, based on the results of a study under subparagraph (A), that adverse local impacts result from emission allowance trading, the Administrator may require reductions in emissions from electricity generating facilities in addition to the reductions required under the other provisions of this title.

(i) USE OF CERTAIN OTHER EMISSION ALLOWANCES.—

(1) IN GENERAL.—Subject to paragraph (2), emission allowances or other emission trading instruments created under title I or IV for sulfur dioxide or nitrogen oxides shall not be valid for submission under subsection (d).

(2) EMISSION ALLOWANCES PLACED IN RESERVE.—

(A) IN GENERAL.—Except as provided in subparagraph (B), an emission allowance described in paragraph (1) that was placed in reserve under section 404(a)(2) or 405 or through regulations implementing controls on nitrogen oxides, because an affected unit emitted fewer tons of sulfur dioxide or nitrogen oxides than were permitted under an emission limitation imposed under title I or IV before the date of enactment of this title, shall be considered to be equivalent to 1/4 of an emission allowance created by subsection (a) for sulfur dioxide or nitrogen oxides, respectively.

(B) EMISSION ALLOWANCES RESULTING FROM ACHIEVEMENT OF NEW SOURCE PERFORMANCE STANDARDS.—If an emission allowance described in subparagraph (A) was created and placed in reserve during the period of 2000 through 2007 by the owner or operator of an electricity generating facility through the application of pollution control technology that resulted in the achievement and maintenance by the electricity generating facility of the applicable standards of performance required of new sources under section 111, the emission allowance shall be valid for submission under subsection (d).

SEC. 706. PERMITTING AND TRADING OF EMISSION ALLOWANCES.

(a) IN GENERAL.—Not later than 1 year after the date of enactment of this title, the Administrator shall promulgate regulations to establish a permitting and emission allowance trading compliance program to implement the limitations on emissions of covered pollutants from electricity generating facilities established under section 704.

(b) EMISSION ALLOWANCE TRADING WITH FACILITIES OTHER THAN ELECTRICITY GENERATING FACILITIES.—

(1) IN GENERAL.—Subject to paragraph (2) and section 705(i), the regulations promulgated to establish the program under subsection (a) shall prohibit use of emission allowances

generated from other emission control programs for the purpose of demonstrating compliance with the limitations on emissions of covered pollutants from electricity generating facilities established under section 704.

(2) EXCEPTION FOR CERTAIN CARBON DIOXIDE EMISSION CONTROL PROGRAMS.—The prohibition described in paragraph (1) shall not apply in the case of carbon dioxide emission allowances generated from an emission control program that limits total carbon dioxide emissions from the entirety of any industrial sector.

(c) METHODOLOGY.—The program established under subsection (a) shall clearly identify the methodology for the allocation of emission allowances, including standards for measuring annual electricity generation and energy efficiency as the standards relate to emissions.

SEC. 707. EMISSION ALLOWANCE ALLOCATION.

(a) ALLOCATION TO ELECTRICITY CONSUMERS.—

(1) IN GENERAL.—For 2008 and each year thereafter, after making allocations of emission allowances under subsections (b) through (f), the Administrator shall allocate the remaining emission allowances created by section 705(a) for the year for each covered pollutant other than mercury to households served by electricity.

(2) ALLOCATION AMONG HOUSEHOLDS.—The allocation to each household shall reflect—

(A) the number of persons residing in the household; and

(B) the ratio that—

(i) the quantity of the residential electricity consumption of the State in which the household is located; bears to

(ii) the quantity of the residential electricity consumption of all States.

(3) REGULATIONS.—Not later than 1 year after the date of enactment of this title, the Administrator shall promulgate regulations making appropriate arrangements for the allocation of emission allowances to households under this subsection, including as necessary the appointment of 1 or more trustees—

(A) to receive the emission allowances for the benefit of the households;

(B) to obtain fair market value for the emission allowances; and

(C) to distribute the proceeds to the beneficiaries.

(b) ALLOCATION FOR TRANSITION ASSISTANCE.—

(1) IN GENERAL.—For 2008 and each year thereafter through 2017, the Administrator shall allocate the percentage specified in paragraph (2) of the emission allowances created by section 705(a) for the year for each covered pollutant other than mercury in the following manner:

(A) 80 percent shall be allocated to provide transition assistance to—

(i) dislocated workers (as defined in section 101 of the Workforce Investment Act of 1998 (29 U.S.C. 2801)) whose employment has been terminated or who have

been laid off as a result of the emission reductions required by this title; and

(ii) communities that have experienced disproportionate adverse economic impacts as a result of the emission reductions required by this title.

(B) 20 percent shall be allocated to producers of electricity intensive products in a number equal to the product obtained by multiplying—

(i) the ratio that—

(I) the quantity of each electricity intensive product produced by each producer in the previous year; bears to

(II) the quantity of the electricity intensive product produced by all producers in the previous year;

(ii) the average quantity of electricity used in producing the electricity intensive product by producers that use the most energy efficient process for producing the electricity intensive product; and

(iii) with respect to the previous year, the national average quantity (expressed in tons) of emissions of each such pollutant per megawatt hour of electricity generated by electricity generating facilities in all States.

(2) SPECIFIED PERCENTAGES.—The percentages referred to in paragraph (1) are—

(A) in the case of 2008, 6 percent;

(B) in the case of 2009, 5.5 percent;

(C) in the case of 2010, 5 percent;

(D) in the case of 2011, 4.5 percent;

(E) in the case of 2012, 4 percent;

(F) in the case of 2013, 3.5 percent;

(G) in the case of 2014, 3 percent;

(H) in the case of 2015, 2.5 percent;

(I) in the case of 2016, 2 percent; and

(J) in the case of 2017, 1.5 percent.

(3) REGULATIONS FOR ALLOCATION FOR TRANSITION ASSISTANCE TO DISLOCATED WORKERS AND COMMUNITIES.—

(A) IN GENERAL.—Not later than 1 year after the date of enactment of this title, the Administrator shall promulgate regulations making appropriate arrangements for the distribution of emission allowances under paragraph (1)(A), including as necessary the appointment of 1 or more trustees—

(i) to receive the emission allowances allocated under paragraph (1)(A) for the benefit of the dislocated workers and communities;

(ii) to obtain fair market value for the emission allowances; and

(iii) to apply the proceeds to providing transition assistance to the dislocated workers and communities.

(B) FORM OF TRANSITION ASSISTANCE.—Transition assistance under paragraph (1)(A) may take the form of—

(i) grants to employers, employer associations, and representatives of employees—

(I) to provide training, adjustment assistance, and employment services to dislocated workers; and

(II) to make income-maintenance and needs-related payments to dislocated workers; and

(ii) grants to States and local governments to assist communities in attracting new employers or providing essential local government services.

(c) ALLOCATION TO RENEWABLE ELECTRICITY GENERATING UNITS, EFFICIENCY PROJECTS, AND CLEANER ENERGY SOURCES.—For 2008 and each year thereafter, the Administrator shall allocate not more than 20 percent of the emission allowances created by section 705(a) for the year for each covered pollutant other than mercury—

(1) to owners and operators of renewable electricity generating units, in a number equal to the product obtained by multiplying—

(A) the number of megawatt hours of electricity generated in the previous year by each renewable electricity generating unit; and

(B) with respect to the previous year, the national average quantity (expressed in tons) of emissions of each such pollutant per megawatt hour of electricity generated by electricity generating facilities in all States;

(2) to owners and operators of energy efficient buildings, producers of energy efficient products, and entities that carry out energy efficient projects, in a number equal to the product obtained by multiplying—

(A) the number of megawatt hours of electricity or cubic feet of natural gas saved in the previous year as a result of each energy efficient building, energy efficient product, or energy efficiency project; and

(B) with respect to the previous year, the national average quantity (expressed in tons) of emissions of each such pollutant per, as appropriate—

(i) megawatt hour of electricity generated by electricity generating facilities in all States; or

(ii) cubic foot of natural gas burned for a purpose other than generation of electricity in all States;

(3) to owners and operators of new clean fossil fuel-fired electricity generating units, in a number equal to the product obtained by multiplying—

(A) the number of megawatt hours of electricity generated in the previous year by each new clean fossil fuel-fired electricity generating unit; and

(B) with respect to the previous year, ½ of the national average quantity (expressed in tons) of emissions of each such pollutant per megawatt hour of electricity generated by electricity generating facilities in all States; and

(4) to owners and operators of combined heat and power electricity generating facilities, in a number equal to the product obtained by multiplying—

(A) the number of British thermal units of thermal energy produced and put to productive use in the previous year by each combined heat and power electricity generating facility; and

(B) with respect to the previous year, the national average quantity (expressed in tons) of emissions of each such pollutant per British thermal unit of thermal energy generated by electricity generating facilities in all States.

(d) TRANSITION ASSISTANCE TO ELECTRICITY GENERATING FACILITIES.—

(1) IN GENERAL.—For 2008 and each year thereafter through 2017, the Administrator shall allocate the percentage specified in paragraph (2) of the emission allowances created by section 705(a) for the year for each covered pollutant other than mercury to the owners or operators of electricity generating facilities in the ratio that—

(A) the quantity of electricity generated by each electricity generating facility in 2000; bears to

(B) the quantity of electricity generated by all electricity generating facilities in 2000.

(2) SPECIFIED PERCENTAGES.—The percentages referred to in paragraph (1) are—

(A) in the case of 2008, 10 percent;

(B) in the case of 2009, 9 percent;

(C) in the case of 2010, 8 percent;

(D) in the case of 2011, 7 percent;

(E) in the case of 2012, 6 percent;

(F) in the case of 2013, 5 percent;

(G) in the case of 2014, 4 percent;

(H) in the case of 2015, 3 percent;

(I) in the case of 2016, 2 percent; and

(J) in the case of 2017, 1 percent.

(e) ALLOCATION TO ENCOURAGE BIOLOGICAL CARBON SEQUESTRATION.—

(1) IN GENERAL.—For 2008 and each year thereafter, the Administrator shall allocate, on a competitive basis and in accordance with paragraphs (2) and (3), not more than 0.075 percent of the carbon dioxide emission allowances created by section 705(a) for the year for the purposes of—

(A) carrying out projects to reduce net carbon dioxide emissions through biological carbon dioxide sequestration in the United States that—

(i) result in benefits to watersheds and fish and wildlife habitats; and

(ii) are conducted in accordance with project reporting, monitoring, and verification guidelines based on—

(I) measurement of increases in carbon storage in excess of the carbon storage that would have occurred in the absence of such a project;

(II) comprehensive carbon accounting that—

(aa) reflects net increases in carbon reservoirs; and

(bb) takes into account any carbon emissions resulting from disturbance of carbon reservoirs in existence as of the date of commencement of the project;

(III) adjustments to account for—

(aa) emissions of carbon that may result at other locations as a result of the impact of the project on timber supplies; or

(bb) potential displacement of carbon emissions to other land owned by the entity that carries out the project; and

(IV) adjustments to reflect the expected carbon storage over various time periods, taking into account the likely duration of the storage of the carbon stored in a carbon reservoir; and

(B) conducting accurate inventories of carbon sinks.

(2) CARBON INVENTORY.—The Administrator, in consultation with the Secretary of Agriculture, shall allocate not more than 1/3 of the emission allowances described in paragraph (1) to not more than 5 State or multistate land or forest management agencies or nonprofit entities that—

(A) have a primary goal of land conservation; and

(B) submit to the Administrator proposals for projects—

(i) to demonstrate and assess the potential for the development and use of carbon inventorying and accounting systems;

(ii) to improve the standards relating to, and the identification of, incremental carbon sequestration in forests, agricultural soil, grassland, or rangeland; or

(iii) to assist in development of a national biological carbon storage baseline or inventory.

(3) REVOLVING LOAN PROGRAM.—The Administrator shall allocate not more than 2/3 of the emission allowances described in paragraph (1) to States, based on proposals submitted by States to conduct programs under which each State shall—

(A) use the value of the emission allowances to establish a State revolving loan fund to provide loans to owners of nonindustrial private forest land in the State to carry out forest and forest soil carbon sequestration activities that will achieve the purposes specified in paragraph (2)(B); and

(B) for 2009 and each year thereafter, contribute to the program of the State an amount equal to 25 percent of the value of the emission allowances received under this paragraph for the year in cash, in-kind services, or technical assistance.

(4) USE OF EMISSION ALLOWANCES.—An entity that receives an allocation of emission allowances under this subsection may use the proceeds from the sale or other transfer of the emission allowances only for the purpose of carrying out activities described in this subsection.

(5) RECOMMENDATIONS CONCERNING CARBON DIOXIDE EMISSION ALLOWANCES.—

(A) IN GENERAL.—Not later than 4 years after the date of enactment of this title, the Administrator, in consultation with the Secretary of Agriculture, shall submit to Congress recommendations for establishing a system under which entities that receive grants or loans under this section may be allocated carbon dioxide emission allowances created by section 705(a) for incremental carbon sequestration in forests, agricultural soils, rangeland, or grassland.

(B) GUIDELINES.—The recommendations shall include recommendations for development, reporting, monitoring, and verification guidelines for quantifying net carbon sequestration from land use projects that address the elements specified in paragraph (1)(A).

(f) ALLOCATION TO ENCOURAGE GEOLOGICAL CARBON SEQUESTRATION.—

(1) IN GENERAL.—For 2008 and each year thereafter, the Administrator shall allocate not more than 1.5 percent of the carbon dioxide emission allowances created by section 705(a) to entities that carry out geological sequestration of carbon dioxide produced by an electric generating facility in accordance with requirements established by the Administrator—

(A) to ensure the permanence of the sequestration; and

(B) to ensure that the sequestration will not cause or contribute to significant adverse effects on the environment.

(2) NUMBER OF EMISSION ALLOWANCES.—For 2008 and each year thereafter, the Administrator shall allocate to each entity described in paragraph (1) a number of emission allowances that is equal to the number of tons of carbon dioxide produced by the electric generating facility during the previous year that is geologically sequestered as described in paragraph (1).

(3) USE OF EMISSION ALLOWANCES.—An entity that receives an allocation of emission allowances under this subsection may use the proceeds from the sale or other transfer of the emission allowances only for the purpose of carrying out activities described in this subsection.

SEC. 708. MERCURY EMISSION LIMITATIONS.

(a) IN GENERAL.—

(1) REGULATIONS.—

(A) IN GENERAL.—Not later than 1 year after the date of enactment of this title, the Administrator shall promulgate regulations to establish emission limitations for mercury emissions by coal-fired electricity generating facilities.

(B) NO EXCEEDANCE OF NATIONAL LIMITATION.—The regulations shall ensure that the national limitation for mercury emissions from each coal-fired electricity generating facility established under section 704(a)(4) is not exceeded.

(C) EMISSION LIMITATIONS FOR 2008 AND THEREAFTER.—In carrying out subparagraph (A), for 2008 and each year thereafter, the Administrator shall not—

(i) subject to subsections (e) and (f) of section 112, establish limitations on emissions of mercury from coal-fired electricity generating facilities that allow

emissions in excess of 2.48 grams of mercury per 1000 megawatt hours; or

(ii) differentiate between facilities that burn different types of coal.

(2) ANNUAL REVIEW AND DETERMINATION.—

(A) IN GENERAL.—Not later than April 1 of each year, the Administrator shall—

(i) review the total mercury emissions during the 2 previous years from electricity generating facilities located in all States; and

(ii) determine whether, during the 2 previous years, the total mercury emissions from facilities described in clause (i) exceeded the national limitation for mercury emissions established under section 704(a)(4).

(B) EXCEEDANCE OF NATIONAL LIMITATION.—If the Administrator determines under subparagraph (A)(ii) that, during the 2 previous years, the total mercury emissions from facilities described in subparagraph (A)(i) exceeded the national limitation for mercury emissions established under section 704(a)(4), the Administrator shall, not later than 1 year after the date of the determination, revise the regulations promulgated under paragraph (1) to reduce the emission rates specified in the regulations as necessary to ensure that the national limitation for mercury emissions is not exceeded in any future year.

(3) COMPLIANCE FLEXIBILITY.—

(A) IN GENERAL.—Each coal-fired electricity generating facility subject to an emission limitation under this section shall be in compliance with that limitation if that limitation is greater than or equal to the quotient obtained by dividing—

(i) the total mercury emissions of the coal-fired electricity generating facility during each 30-day period; by

(ii) the quantity of electricity generated by the coal-fired electricity generating facility during that period.

(B) MORE THAN 1 UNIT AT A FACILITY.—In any case in which more than 1 coal-fired electricity generating unit at a coal-fired electricity generating facility subject to an emission limitation under this section was operated in 1999 under common ownership or control, compliance with the emission limitation may be determined by averaging the emission rates of all coal-fired electricity generating units at the electricity generating facility during each 30-day period.

(b) PREVENTION OF RE-RELEASE.—

(1) REGULATIONS.—Not later than January 1, 2005, the Administrator shall promulgate regulations to ensure that any mercury captured or recovered by emission controls installed at an electricity generating facility is not re-released into the environment.

(2) REQUIRED ELEMENTS.—The regulations shall require—

(A) daily covers on all active waste disposal units, and permanent covers on all inactive waste disposal units, to prevent the release of mercury into the air;

(B) monitoring of groundwater to ensure that mercury or mercury compounds do not migrate from the waste disposal unit;

(C) waste disposal siting requirements and cleanup requirements to protect groundwater and surface water resources;

(D) elimination of agricultural application of coal combustion wastes; and

(E) appropriate limitations on mercury emissions from sources or processes that reprocess or use coal combustion waste, including manufacturers of wallboard and cement.

SEC. 709. OTHER HAZARDOUS AIR POLLUTANTS.

(a) IN GENERAL.—Not later than January 1, 2004, the Administrator shall issue to owners and operators of coal-fired electricity generating facilities requests for information under section 114 that are of sufficient scope to generate data sufficient to support issuance of standards under section 112(d) for hazardous air pollutants other than mercury emitted by coal-fired electricity generating facilities.

(b) DEADLINE FOR SUBMISSION OF REQUESTED INFORMATION.—The Administrator shall require each recipient of a request for information described in subsection (a) to submit the requested data not later than 180 days after the date of the request.

(c) PROMULGATION OF EMISSION STANDARDS.—The Administrator shall—

(1) not later than January 1, 2005, propose emission standards under section 112(d) for hazardous air pollutants other than mercury; and

(2) not later than January 1, 2006, promulgate emission standards under section 112(d) for hazardous air pollutants other than mercury.

(d) PROHIBITION ON EXCESS EMISSIONS.—It shall be unlawful for an electricity generating facility subject to standards for hazardous air pollutants other than mercury promulgated under subsection (c) to emit, after December 31, 2007, any such pollutant in excess of the standards.

(e) EFFECT ON OTHER LAW.—Nothing in this section or section 708 affects any requirement of subsection (e), (f)(2), or (n)(1)(A) of section 112, except that the emission limitations established by regulations promulgated under this section shall be deemed to represent the maximum achievable control technology for mercury emissions from electricity generating units under section 112(d).

SEC. 710. EFFECT OF FAILURE TO PROMULGATE REGULATIONS.

If the Administrator fails to promulgate regulations to implement and enforce the limitations specified in section 704—

(1)(A) each electricity generating facility shall achieve, not later than January 1, 2008, an annual quantity of emissions that is less than or equal to—

(i) in the case of nitrogen oxides, 15 percent of the annual emissions by a similar electricity generating facility that has no controls for emissions of nitrogen oxides; and

(ii) in the case of carbon dioxide, 75 percent of the annual emissions by a similar electricity generating facility that has no controls for emissions of carbon dioxide; and

(B) each electricity generating facility that does not use natural gas as the primary combustion fuel shall achieve, not later than January 1, 2008, an annual quantity of emissions that is less than or equal to—

(i) in the case of sulfur dioxide, 5 percent of the annual emissions by a similar electricity generating facility that has no controls for emissions of sulfur dioxide; and

(ii) in the case of mercury, 10 percent of the annual emissions by a similar electricity generating facility that has no controls included specifically for the purpose of controlling emissions of mercury; and

(2) the applicable permit under this Act for each electricity generating facility shall be deemed to incorporate a requirement for achievement of the reduced levels of emissions specified in paragraph (1).

SEC. 711. PROHIBITIONS.

It shall be unlawful—

(1) for the owner or operator of any electricity generating facility—

(A) to operate the electricity generating facility in noncompliance with the requirements of this title (including any regulations implementing this title);

(B) to fail to submit by the required date any emission allowances, or pay any penalty, for which the owner or operator is liable under section 705;

(C) to fail to provide and comply with any plan to offset excess emissions required under section 705(f); or

(D) to emit mercury in excess of the emission limitations established under section 708; or

(2) for any person to hold, use, or transfer any emission allowance allocated under this title except in accordance with regulations promulgated by the Administrator.

SEC. 712. MODERNIZATION OF ELECTRICITY GENERATING FACILITIES.

(a) IN GENERAL.—Beginning on the later of January 1, 2013, or the date that is 40 years after the date on which the electricity generating facility commences operation, each electricity generating facility shall be subject to emission limitations reflecting the application of best available control technology on a new major source of a similar size and type (as determined by the Administrator) as determined in accordance with the procedures specified in part C of title I.

(b) ADDITIONAL REQUIREMENTS.—The requirements of this section shall be in addition to the other requirements of this title.

SEC. 713. RELATIONSHIP TO OTHER LAW.

(a) IN GENERAL.—Except as provided in this title, nothing in this title—

(1) limits or otherwise affects the application of any other provision of this Act; or

(2) precludes a State from adopting and enforcing any requirement for the control of emissions of air pollutants that is more stringent than the requirements imposed under this title.

(b) REGIONAL SEASONAL EMISSION CONTROLS.—Nothing in this title affects any regional seasonal emission control for nitrogen oxides established by the Administrator or a State under title I.

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