

Report for Congress

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Air Quality: Multi-Pollutant Legislation

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Summary

With the prospect of new layers of complexity being added to air pollution controls and with electricity restructuring putting a premium on economic efficiency, interest is being expressed in finding mechanisms to achieve health and environmental goals in simpler, more cost-effective ways. The electric utility industry is a major source of air pollution, particularly sulfur dioxide (SO₂), nitrogen oxides (NO_x), and Mercury (Hg), as well as suspected greenhouse gases, particularly carbon dioxide (CO₂). At issue is whether a new approach to environmental protection could achieve the Nation's air quality goals more cost-effectively than the current system.

One approach being proposed is a "multi-pollutant" strategy – a framework based on a consistent set of emissions caps, implemented through emissions trading. Just how the proposed approach would fit with the current (and proposed) diverse regulatory regimes remains to be worked out; they might be replaced to the greatest extent feasible, or they might be overlaid by the framework of emissions caps.

Currently, eight bills have been introduced that would impose multi-pollutant controls on utilities. All of the bills control at least NO_x and SO₂; others include CO₂ and Hg. All of these bills involve some form of emission caps, typically taking effect in 2007; and most include a tradeable credit program to implement that cap. On June 27, 2002, the Senate Environment and Public Works Committee reported out an amended version of S. 566. Introduced by Senator Jeffords, the bill would place emission caps on NO_x, SO₂, and CO₂, and emission limitations on Hg.

In February 2002, the Bush Administration announced two air quality proposals. The first would amend the Clean Air Act to place emission caps on electric utility emissions of SO₂, NO_x, and Hg. Implemented through a tradeable allowance program, the emissions caps would be imposed in two phases: 2008 and 2018. The second Bush proposal initiates a new voluntary greenhouse gas reduction program. This plan, rather than capping CO₂ emissions, focuses on improving the carbon efficiency of the economy, reducing current emissions of 183 metric tons per million dollars of GDP to 151 metric tons per million dollars of GDP in 2012.

The Administration's three-pollutant proposal was introduced July 26, 2002, as H.R. 5266 (introduced in the Senate as S. 2815). Its provisions concerning SO₂, NO_x, and Hg are less stringent than the other bills introduced and take effect later. The Administration's proposal concerning CO₂ is difficult to compare with the pending bills because it is voluntary rather than mandatory: Although the Administration's proposal is broader (covering all greenhouse gas emissions rather than just utility CO₂), it appears that actual U.S. greenhouse emissions would be higher than allowed by the other bills.

This report will be updated as warranted.

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Air Quality: Multi-Pollutant Legislation

Introduction

Electric utility generating facilities are a major source of air pollution. The combustion of fossil fuels (petroleum, natural gas, and coal), which account for 67% of U.S. electricity generation, results in the emission of a stream of gases. These gases include several pollutants that directly pose risks to human health and welfare,

including particulate matter (PM),¹ sulfur dioxides (SO₂), nitrogen oxides (NOx), and mercury (Hg). Particulate matter, sulfur dioxide and NOx are currently regulated under the Clean Air Act (CAA), and the Environmental Protection Agency (EPA) has announced its intention to regulate mercury. Other gases may pose indirect risks, notably carbon dioxide (CO₂), which may contribute to global warming.² Table 1 provides estimates of SO₂, NOx, and CO₂ emissions from electric generating facilities. Annual emissions of Hg from utility facilities are more uncertain; current estimates indicate about 48 tons. Utilities are subject to an array of environmental regulations, which affect in different ways both the cost of operating existing generating facilities and of constructing new ones.

Table 1: Emissions From U.S. Fossil-fuel Electric Generating Plants
(thousands of short tons)

Emissions	1994	1995	1996	1997	1998	1999
SO ₂	14,211	11,437	12,053	12,317	12,432	11,968
NOx	6,790	6,737	6,996	7,227	7,221	7,051
CO ₂	1,986,079	1,995,471	2,065,339	2,142,118	2,209,286	2,191,576

Source: Energy Information Administration, *Electric Power Annual 1999*, vol. II, p. 40

The evolution of air pollution controls over time and as a result of growing scientific understanding of health and environmental impacts has led to a multilayered and interlocking patchwork of controls. Moreover, additional controls are in the process of development, particularly with respect to NOx as a precursor to ozone, to both NOx and SO₂ as contributors to PM_{2.5}, and to Hg as a toxic air pollutant. Also, under the United Nations Framework Convention on Climate Change (UNFCCC), the United States agreed to voluntary limits on CO₂ emissions. The current Bush Administration has rejected the Kyoto Protocol, which would impose mandatory limits, in favor of a voluntary reduction program. Thus, mandatory federal CO₂ controls in the United States appear unlikely in the near term.

For many years the complexity of the air quality control regime has caused some observers to call for a simplified approach. Now, with the potential both for additional control programs on SO₂ and NOx and for new controls directed at Hg and CO₂ intersecting with the technological and policy changes affecting the electric

¹Particulate matter is regulated depending on the particle size; current regulations address particles less than 10 microns in diameter (PM₁₀); EPA has promulgated regulations for particles less than 2.5 microns in diameter (PM_{2.5}) which have not been implemented. SO₂ and NOx emissions could be affected by regulations of PM_{2.5}. Current concerns about emissions from fossil-fuel electric generating plants do not explicitly address PM, but could indirectly do so through attention to SO₂ and NOx.

²Steam-electric utilities produce minor amounts of volatile organic compounds (VOCs), carbon monoxide (CO), and lead — on the order of 2% or less of all sources.

utility industry, such calls for simplification have become more numerous and insistent. One focus of this effort is the “multi-pollutant” or “four pollutant” approach. This approach involves a mix of regulatory and economic mechanisms that would apply to utility emissions of up to four pollutants in various proposals – SO₂, NO_x, Hg, and CO₂. The objective would be to balance the environmental goal of effective controls across the pollutants covered with the industry goal of a stable regulatory regime for a period of years.³

Proposed Legislation and Legislative Action in the 107th Congress

Currently, eight bills have been introduced in the 107th Congress to reduce emissions by increasing pollution controls on electric generating facilities. They are summarized in Appendix 1. All of the bills control at least NO_x and SO₂; others include CO₂ and Hg. All of these bills involve some form of emission caps, and most include a tradeable credit program to implement that cap.

Two bills, H.R. 25 and S. 588, are companion legislation focused on SO₂ and NO_x, with a mandate to EPA to regulate Hg by 2005. The bills build on the SO₂ allowance trading scheme contained in title IV of the 1990 Clean Air Act Amendments (CAAA); under this program utilities are given a specific allocation of permitted emissions (called allowances) and may choose to use those allowances at their own facilities, or, if they do not use their full quota, to bank them for future use or to sell them to other utilities needing additional allowances.

Two other bills, H.R. 1256 and S. 556 as originally introduced, are the same except for minor wording differences. The bills would control SO₂, NO_x, Hg, and CO₂, but provide considerable flexibility to EPA in developing implementation strategies. Specifically, EPA implementing regulations are required to allocate reductions equitably and may consider market-oriented mechanisms, except for Hg.

The fifth bill introduced, H.R. 1335, controls SO₂, NO_x, Hg, and CO₂, but with individual unit-by-unit requirements for SO₂ and NO_x based on output-based emission rates and average 1998-2000 fuel consumption⁴; a percentage reduction requirement for Hg; and an allowance-based system for CO₂.

The next two bills introduced, H.R. 5266 and S. 2815, are the Administration’s proposal to control SO₂, NO_x, and Hg. It is discussed in the next section along with the Administration’s voluntary CO₂ initiative.

The final bill, S. 3135, controls SO₂, NO_x, Hg, and CO₂ with an allowance-based trading system that includes a new source reserve to allocate allowances to

³Larry Parker and John Blodgett, *Electricity Generation and Air Quality: Multi-pollutant Strategies*, CRS Report RL30878, March 13, 2001.

⁴ Plants built after 2000 appear to be in an anomalous position; as their historical fuel consumption would be zero, the bill would seem to imply they can emit no SO₂ or NO_x.

newly constructed sources. The bill includes provisions that would revise Clean Air Act (CAA) provisions with respect to the New Source Review (NSR) trigger for modified or reconstructed boilers, and include a cost threshold for the Lowest Available Emission Rate (LAER) requirement in non-attainment areas. In addition, S. 3135 would eliminate the CAA's offset requirement for new electric generating facilities constructed in non-attainment areas beginning in 2008.

On June 27, 2002, the Senate Environment and Public Works Committee reported out an amended version of S. 556. As indicated in Appendix 1, in comparison with the bill as introduced, the amended S. 566's compliance deadlines for its reduction requirements have been extended one year to 2008. In addition, the reported bill elaborates on provisions with respect to excess emissions penalties and protections for possible local ambient air impacts. In particular, the reported bill has detailed provisions for allocating SO₂, NO_x and CO₂ allowances to various economic sectors and interests. In most cases, these interests (or their trustees in the case of households and dislocated workers and communities) would auction off (or otherwise sell) their allowances to the affected utilities, and use the collected funds for their designated purposes.

The Bush Administration's Proposals

In February 2002, the Bush Administration announced two air quality proposals.⁵ The first would amend the Clean Air Act to place emission caps on electric utility emissions of SO₂, NO_x, and Hg. Implemented through a tradeable allowance program, the emissions caps would be imposed in two phases: 2010 (2008 in the case of NO_x) and 2018. It was introduced as part of a complete rewrite of Title IV of the Clean Air Act on July 26 as H.R. 5266. It was introduced in the Senate on July 29 as S. 2815.

As indicated in Appendix 1, H.R. 5266/S. 2815's NO_x cap is significantly less stringent for 2008 than the requirements for 2005 or 2007 in most of the bills discussed above, and remains less stringent even through the second phase beginning in 2018. The situation is similar for SO₂, except that its 2010 cap is similar to the H.R. 25/S. 588 cap for 2007 (and S. 3135 for 2008), and its 2018 cap is similar to the H.R. 1335 cap for 2005. On mercury, H.R. 5266/S. 2815's caps are similar to those in S. 3135 but come into effect later. H.R. 5266/S. 2815's 2018 Hg emissions goal allows about 3 times more emissions than those allowed by S. 556, H.R. 1256, and H.R. 1335 for 2005, 2007, or 2008. (It is not really possible to compare H.R. 25/S. 588, which do not specify an Hg emissions goal, leaving regulation up to EPA, except that the bills set a regulatory deadline of 2005 while the Administration proposal would begin regulating Hg in 2010.)

In addition to the emissions caps, H.R. 5266/S.2815 would substantially modify or eliminate several provisions in the Clean Air Act with respect to electric

⁵Papers outlining the Administration's proposals are available from the White House web site: [<http://www.whitehouse.gov/news/releases/2002/02/clearskies.html>] for the three pollutant proposal and, for the climate change initiative: [<http://www.whitehouse.gov/news/releases/2002/02/climatechange.html>].

generating facilities. The New Source Performance Standards (Section 111) would be eliminated and replaced with standards for SO₂, NO_x, particulate matter, and Hg for new sources, and modified sources that opt to comply with them in lieu of Best Available Control Technology (BACT) determinations under Prevention of Significant Deterioration (PSD) provisions (CAA, Part C) or Lowest Achievable Emissions Rate (LAER) determination under non-attainment provisions (CAA, Part D). Compliance with these provisions exempts such facilities from New Source Review (NSR), PSD-BACT requirements, visibility (Best Available Retrofit Technology) BART requirements, and non-attainment LAER requirements. The exemption does not apply to PSD-BACT requirements if facilities are within 50 km of a PSD Class 1 area.

Existing sources can also receive these exemptions if they agree to meet a particulate matter standard specified in the bill along with good combustion practices to minimize carbon monoxide emissions within 3 years of enactment.

Other exemptions provided by H.R. 5266/S. 2815 include an exemption for steam electric generating facilities from regulation under Section 112 of the CAA, and relief from enforcement of any Section 126 petition before 2012. As discussed earlier, S. 3135 is the only other bill that contains any regulatory relief provisions.

The second Bush administration proposal (for which no legislation has been introduced) initiates a new voluntary greenhouse gas reduction program, similar to ones introduced by the earlier Bush and Clinton Administrations.⁶ Developed in response to the U.S. ratification of the 1992 UNFCCC, these previous plans projected U.S. compliance, or near compliance, with the UNFCCC goal of stabilizing greenhouse gas emissions at their 1990 levels by the year 2000 through voluntary measures. The new proposal introduced by the Bush Administration does not make that claim, only projecting a 100 million metric ton reduction in emissions from what would occur otherwise in the year 2012. Instead, the plan focuses on improving the carbon efficiency of the economy, reducing current emissions of 183 metric tons per million dollars of GDP to 151 metric tons per million dollars of GDP in 2012. It proposes several voluntary initiatives, along with increased spending and tax incentives, to achieve this goal. However, the Administration states that three-quarters of the projected reduction would be achieved through current efforts underway, not by the new initiatives.

It is difficult to compare the Administration's proposal to the bills that have been introduced, as it is a voluntary, not mandatory program. S. 556, H.R. 1256, and H.R. 1335 set their caps at 1990 levels. S. 3135 sets its final cap at 2001 levels. In contrast, the Administration's proposal contains no cap or other limits on emissions. Rather, following general climate change approaches of the earlier Bush Administration and the Clinton Administration, the Administration's proposal relies on various voluntary programs and incentives to encourage reductions in greenhouse gases from diverse sources, including CO₂ from electric generation.

⁶For a discussion of those previous plans, see Larry Parker and John Blodgett, *Climate Change Action Plans*, CRS Report 94-404 ENR, May 9, 1994. (archived, available from the author)

Based on the estimate provided by the Administration's climate change proposal, and using the 2002 *Climate Action Report*⁷ (CAR) for projections to 2010, table 2 presents estimates of U.S. greenhouse gas emissions in 2010, assuming the Administration's voluntary program reaches its goals.⁸ This should not be taken as a given, as neither the former Bush Administration's program nor the Clinton Administration's program achieved their stated goals. Thus, in one sense, comparing a mandatory reduction program, such as those proposed in legislation, with the Administration's voluntary program is comparing apples to oranges. The first is legally binding, the second is an exhortation.

While S. 556, H.R. 1256, and H.R. 1335 address only electric utility emissions, their mandated reductions would result in lower greenhouse gas emissions in 2010 than those projected to occur under the Administration's initiative that includes all sources of all greenhouse gases.⁹ Likewise, S. 3135 CO₂ control requirement, while less stringent than S. 556, H.R. 1256, and H.R. 1335, is also estimated to achieve more reductions than the Administration's initiative. However, neither S. 556, H.R. 1256, H.R. 1335, S. 3135 nor the Administration's initiative would be sufficient to bring U.S. emissions anywhere near the level committed to at Rio with the UNFCCC.

Indeed, discussion in the CAR suggests that a high economic growth scenario would significantly increase energy use and related carbon emissions. For example, under a high economic growth scenario, greenhouse emissions in 2010 would increase 37.7% above those in 1990, based on energy growth alone. This increase would represent an additional 53 million metric tons of emissions.¹⁰ However, S. 556, H.R. 1256, and H.R. 1335 would cap emissions from increased electricity generation at 1990 levels, which would reduce the 53 million metric tons by 16 million metric tons, or 30% of the high growth increase. The Administration's initiative is voluntary, and contains no such mandatory caps on emissions growth.

Table 2: Comparison of Administration Voluntary Program with Proposed Legislation

	Percentage Change v. Business as Usual (2010)	Percentage Change v. 1990 levels per UNFCCC
S. 556, H.R. 1256, H.R. 1335	-7.5%	+24.2%

⁷This is the U.S. report to the UNFCCC Secretariat on U.S. emissions and measures taken to reduce them. The *Climate Action Report -- 2002*, available at: <http://www.epa.gov/globalwarming/publications/car/index.html>

⁸For a discussion of emission projections and trends, see John Blodgett and Larry Parker, *Global Climate Change: U.S. Greenhouse Gas Emissions – Status, Trends, and Projections*, CRS Report 9-235 ENR (February 28, 2002).

⁹ The assessment assumes that the Administration's proposal actually achieves its goal in 2010, rather than 2012.

¹⁰Energy Information Administration, *Annual Energy Outlook 2000*, Washington D.C., DOE/EIA-0383 (2002), December 2001. p. 177.

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S. 3135*	-5.1%	+27.5%
Administration Voluntary Program*	-4.4 to -4.5%	+28.3%
Business as Usual	0	+34.4%

*Assumes requirement (S. 3135) or goal (Administration Voluntary Program) is achieved in 2010, rather than 2012.

Source: CRS calculations based on projections contained in 2002 CAR.

Appendix 1: Comparison of Multi-Pollutant Control Proposals

Provisions	H.R. 25 (Sweeney)/ S. 588 (Schumer)	S. 556 (as reported) (Jeffords)	H.R. 1256 (Waxman)/ S. 556 (as introduced) (Jeffords)	H.R. 1335 (Allen)	H.R. 5266/S. 2815 (Administration's Proposals)	S. 3135 (Carper)
Emissions Cap on NO_x	estimated at 1.5 million tons in 2007 with interim reductions	estimated at 1.5 million tons in 2008	estimated at 1.5 million tons in 2007	estimated at 1.6 million tons in 2005, declining with plant retirements	2.1 million tons in 2008, declining to 1.7 million tons in 2018	1.87 million tons in 2008, declining to 1.7 million tons in 2012
Emissions Cap on SO₂	4.45 million tons in 2007	2.25 million tons in 2008	2.23 million tons in 2007	estimated at 3.2 million tons in 2005, declining with plant retirements	4.5 million tons in 2010, declining to 3.0 million tons in 2018	4.5 million tons in 2008, declining to 2.25 million tons in 2015
Emission Cap on CO₂	not covered	estimated at 2.05 billion tons in 2008	estimated at 1.914 billion tons in 2007	1.914 billion tons in 2005	none, program is voluntary	estimated at 2.6 billion tons in 2008, declining to an estimated 2.3 billion tons in 2012
Emissions Cap on Mercury	EPA to regulate by 2005	estimated at 5 tons in 2008	estimated at about 4-5 tons in 2007	estimated at about 4-5 tons in 2005	26 tons in 2010, declining to 15 tons in 2018	24 tons in 2008, declining to 5-16 tons by 2012 according to an EPA determination
Scope	48 contiguous states and DC	50 states and DC	50 states and DC	50 states and DC	50 states, DC, and territories	50 states and DC

Provisions	H.R. 25 (Sweeney)/ S. 588 (Schumer)	S. 556 (as reported) (Jeffords)	H.R. 1256 (Waxman)/ S. 556 (as introduced) (Jeffords)	H.R. 1335 (Allen)	H.R. 5266/S. 2815 (Administration's Proposals)	S. 3135 (Carper)
Affected Units	electric generating facilities 25 Mw or greater	electric generating facilities 15 Mw or greater	electric generating facilities 15 Mw or greater	electric generating facilities 15 Mw or greater (50 Mw for CO ₂)	for existing SO ₂ , NO _x , and Hg, electric generating facilities 25 Mw or greater; no size minimum on new facilities; voluntary CO ₂ program is economy-wide	fossil fuel-fired electric generating facilities greater than 25 Mw (coal-fired facilities in the case of Hg controls)
Penalties for non-compliance	<p>NO_x: \$6,000 per excess ton plus one-for-one offset from future emission allocations</p> <p>SO₂: same as CAA, title IV</p>	<p>NO_x and SO₂: same as CAA, title IV except excess emission penalty is three times the average market price for allowances</p> <p>CO₂: three times the average market price per excess metric ton of CO₂ emissions</p> <p>Hg: three times the average Hg control costs per gram of excess emission</p>	determined by EPA	<p>NO_x, SO₂, Hg: no special penalties specified – CAA penalties would apply</p> <p>CO₂: \$100 per ton plus one-for-one offset from future emission allocations</p>	<p>NO_x, SO₂, Hg: reduces the excess emissions penalties under CAA, title IV to the lowest EPA auction price for allowances plus one-for-one offset from future emission allocations</p> <p>CO₂: none – voluntary program</p>	<p>NO_x: \$5,000 per ton plus one-for-one offset from future emission allocations</p> <p>SO₂: same as CAA, title IV</p> <p>Hg: \$10,000 per lb. plus one-for-one offset from future emission allocations</p> <p>CO₂: \$100 per ton plus one-for-one offset from future emission allocations</p>

Provisions	H.R. 25 (Sweeney)/ S. 588 (Schumer)	S. 556 (as reported) (Jeffords)	H.R. 1256 (Waxman)/ S. 556 (as introduced) (Jeffords)	H.R. 1335 (Allen)	H.R. 5266/S. 2815 (Administration's Proposals)	S. 3135 (Carper)
Special Provisions	<p>NO_x allowance value halved during ozone season;</p> <p>reserve of allowances for new sources</p>	<p>all powerplants 30-years or older must meet current New Source Performance Standard (NSPS) requirements</p> <p>SO₂ cap divided by region (West and East)</p> <p>other provisions to protect local air quality</p>	<p>all powerplants 30-years or older must meet current New Source Performance Standard (NSPS) requirements</p>	<p>permanent CO₂ and NO_x reductions through plant retirements should be credited in any future climate change implementation program enacted by Congress</p>	<p>new performance standards for new sources replace current NSPS for new sources. Compliance exempts such facilities from New Source Review (NSR), PSD-BACT requirements, visibility BART requirements, and non-attainment LAER requirements. The exemption does not apply to PSD-BACT requirements if facilities is within 50 Km of Class 1 area. Existing sources can opt in by meeting a particulate standard</p> <p>Exempts utility units from regulation under CAA, Section 112</p> <p>Prevents EPA from</p>	<p>tonnage limitations in effect for 20 years; EPA to reassess after 15 years</p> <p>CO₂ limitations include provisions providing CO₂ allowances for renewable energy, sequestration, and other greenhouse gas emission reduction projects</p> <p>revises the trigger for New Source Review (NSR) to modifications that exceed 50% of new construction costs; and Lowest Achievable Emission Rate (LAER) to include a cost threshold; in 2008, eliminates the offset requirement in non-attainment areas for new electric generating facilities</p>

Provisions	H.R. 25 (Sweeney)/ S. 588 (Schumer)	S. 556 (as reported) (Jeffords)	H.R. 1256 (Waxman)/ S. 556 (as introduced) (Jeffords)	H.R. 1335 (Allen)	H.R. 5266/S. 2815 (Administration's Proposals)	S. 3135 (Carper)
Implementation Strategy	tradeable allowance system	tradeable allowance system for SO ₂ (restricted between East and West regions), NO _x and CO ₂ . Allowances allocated to various sectors and interests, including households, dislocated workers and communities, electricity intensive industries, affected utilities, energy efficiency and renewable energy activities, and sequestration activities Hg compliance on a unit-by-unit basis	to be determined by EPA — market mechanisms permitted (except for Hg)	unit-by-unit compliance with SO ₂ , NO _x , Hg provisions; tradeable allowance system for CO ₂	tradeable allowance system for SO ₂ , NO _x , and Hg. Allocation formulas in the bill initially provide most allowances to affected sources free, with a small percentage sold at auction. Over time, an increasing percentage of the allocation is sold at auction with affected sources receiving fewer allowances free	tradeable allowance system for SO ₂ , NO _x , Hg, and CO ₂ . Allocations formulas for NO _x , Hg, and CO ₂ based on generating efficiency; SO ₂ allocations based on current CAA, title IV provisions. Allocations formulas for all four pollutants include a new source reserve to provide allowances to newly constructed sources

Unless otherwise noted, estimates by CRS using Department of Energy and Environmental Protection Agency data