



America's Aging Power Plants

# Big Profits for Big Polluters

**Clean Air Watch**

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## *Introduction*

On November 1, 2007, the America's Climate Security Act (a.k.a., the Lieberman-Warner bill) was narrowly approved by a Senate subcommittee, moving on to the full Senate Environment and Public Works Committee. Like most climate bills put forward in this Congress, the legislation proposes a "cap-and-trade" approach, whereby the government sets an overall limit on greenhouse gas (GHG) emissions and then auctions or freely distributes an equivalent number of emissions permits or allowances. The "allocation methodology"—as it is known in climate policy jargon—is one of the most controversial aspects of these bills because it determines who ultimately pays for the program. The Lieberman-Warner bill proposes a mixed approach that tilts in favor of coal-burning utilities (i.e., giving out allowances for free based on historic emissions). Our prior report—Senators Lieberman and Warner's Climate Change Proposal: A Windfall for Big Polluters?—provides additional context on this issue.

<http://www.cleanairwatch.org/Documents%20&%20Reports/pdf%20analysis%20of%20lieberman%20and%20warner%20plan.pdf>

In this report, we take a closer look at the primary beneficiaries of a free allocation based on historic emissions—existing coal-fired power plants—which are responsible for more than 80 percent of the electric power industry's GHG emissions.<sup>1</sup>

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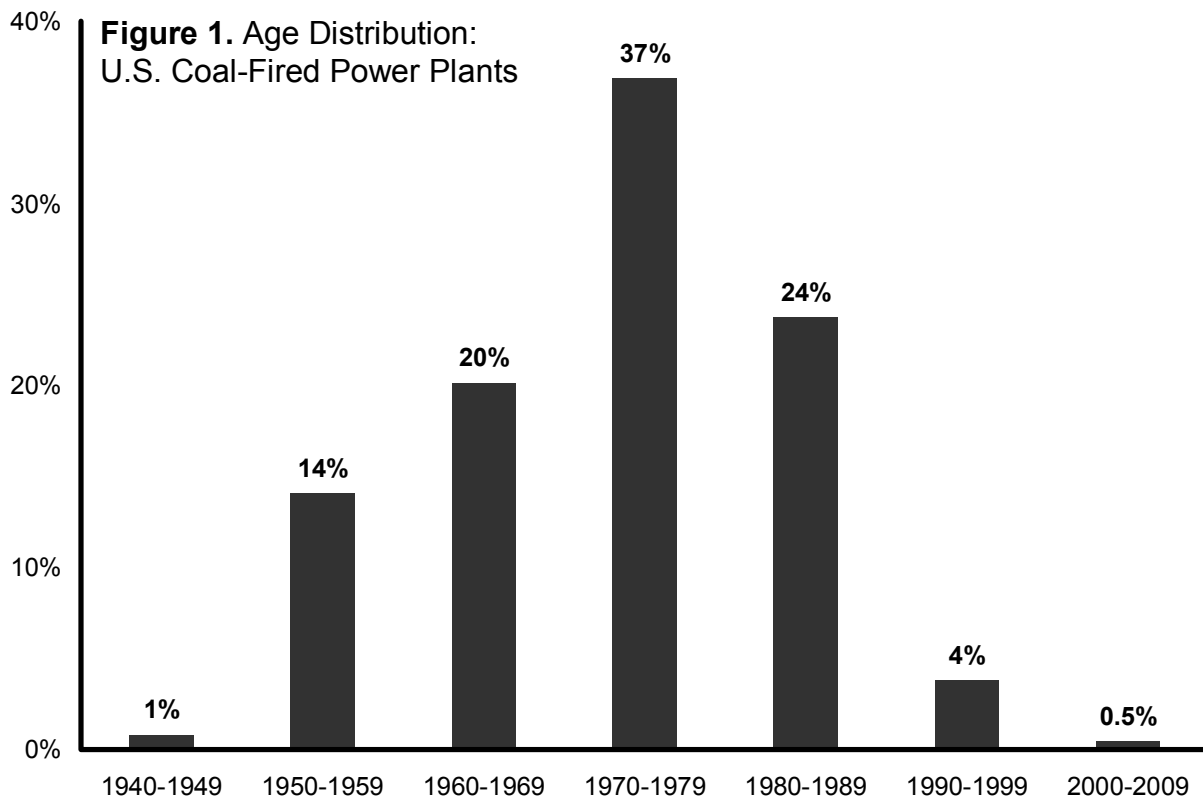
<sup>1</sup> <http://www.epa.gov/climatechange/emissions/downloads06/07CR.pdf>

Public interest groups (as well as leading presidential candidates) have argued that Congress should avoid giving away free allocations to coal-burning power companies based on past emissions on the grounds that this could produce windfall profits at the expense of consumers. In the Senate subcommittee debate, Senator Bernie Sanders (I-VT) also argued in favor of making sure that low or zero-carbon renewable energy received greater incentives. It is unclear how Congress intends to proceed, but one thing is very clear: giving away free permits or allocations will not only boost the profits of coal-burning companies, but will have the perverse effect of extending the lives of old coal-burning power plants, one of the greatest sources of global warming emissions in the United States.

### ***Coal-Fired Power Plants in America***

There are roughly 500 coal-fired power plants in the U.S. that generate and sell electricity as their primary business.<sup>2</sup> Most of these facilities were built in the 1960s and 1970s though some date from as long ago as the 1940s. (Figure 1). Indeed, nearly three-quarters of these plants were built before 1980. The average coal plant is close to 35 years old. Even assuming that Congress begins regulating power plant CO<sub>2</sub> emissions by 2012, as proposed by the Lieberman-Warner bill, the average coal plant will be closer to 40 years old when the program gets underway. As a result,

**The average coal plant will be close to 40 years of age when the Lieberman-Warner bill is implemented.**



<sup>2</sup> U.S. Energy Information Administration, [http://tonto.eia.doe.gov/ask/electricity\\_faqs.asp#coal\\_plants](http://tonto.eia.doe.gov/ask/electricity_faqs.asp#coal_plants)

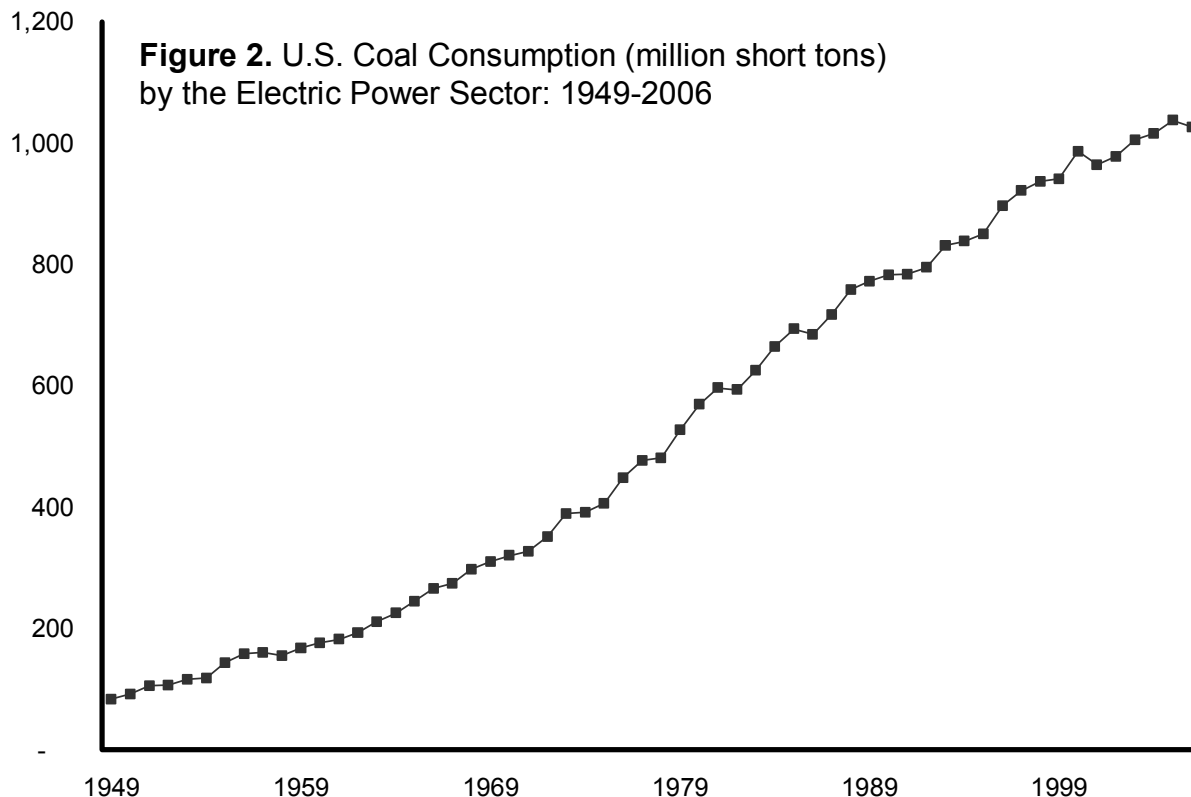
many of these aging plants are largely paid off and generating enormous profits. As one Goldman Sachs analyst put it, coal plants are the gift that keeps on giving, they pour out money.<sup>3</sup>

The profitability of existing coal plants is reflected in the fact that coal plant operators are often running their facilities at full throttle. Coal consumption by the electric power industry has increased 30 percent since 1990 (Figure 2), while utility coal burning capacity has increased by only 1 percent. In other words, existing coal burning plants are working more – and burning more coal in the process.<sup>4</sup> Operating data, compiled by EPA’s Clean Air Markets Division, confirms that pre-1980 coal plants operate more than 6,000 hours per year on average (70 percent utilization).<sup>5</sup>

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**In allocating allowances based on historic emissions, Congress provides a strong financial incentive to extend the life of highly polluting, low efficiency power plants.**

Coal plants have long enjoyed a cost advantage relative to other forms of power production because of their low fuel costs (Figure 3), and according to analysts, they are expected to largely retain their cost advantage long after Congress imposes a price on carbon emissions. According to the Electric Power Research Institute (EPRI), for existing coal-fired power plants, their profits are not very sensitive to CO<sub>2</sub> costs, even at prices as high as \$50 per metric ton of CO<sub>2</sub>.<sup>6</sup> The November issue of the Economist



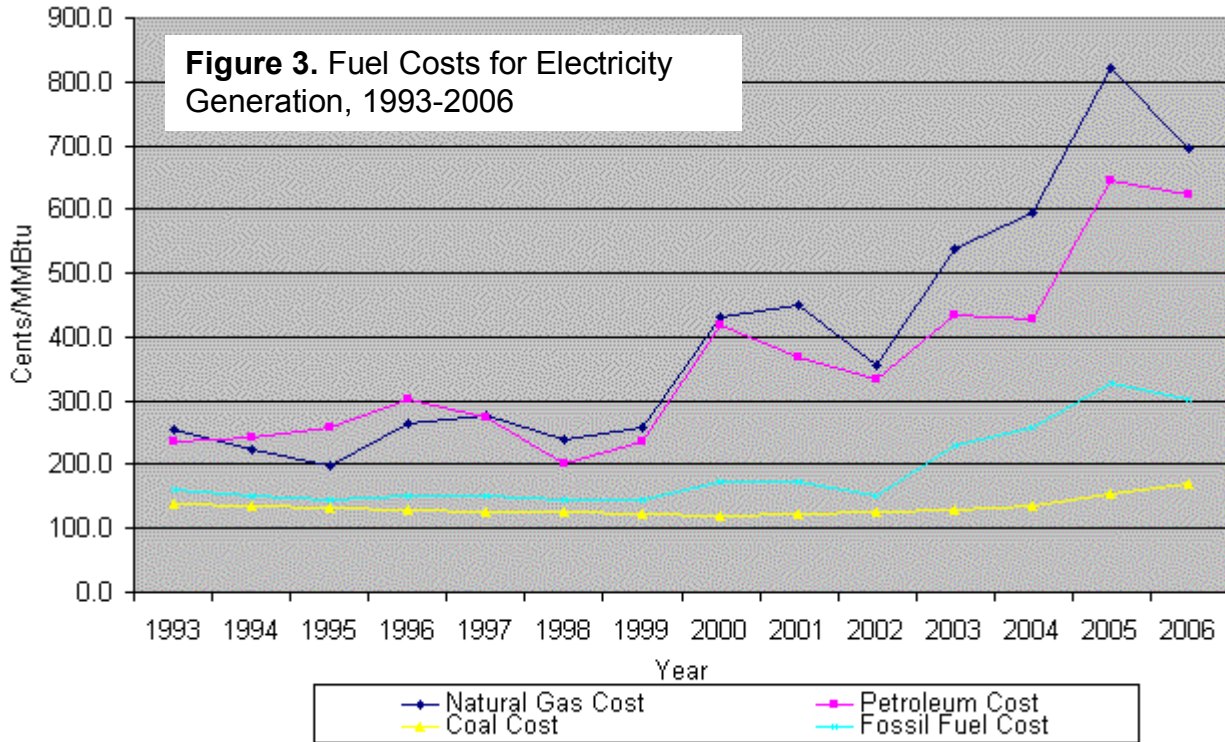
<sup>3</sup> <http://www.chron.com/disp/story.mpl/business/steffy/4599206.html>

<sup>4</sup> <http://www.eia.doe.gov/emeu/aer/txt/stb0811c.xls>

<sup>5</sup> U.S. Environmental Protection Agency, <http://camddataandmaps.epa.gov/gdm/>

<sup>6</sup> Argus Air Daily. EPRI: Current Fleet Not Hit by CO<sub>2</sub> Cost. Volume 14, 177, September 13, 2007.

suggests that the threat of CO<sub>2</sub> regulation in the U.S. has done little to moderate the enthusiasm for coal and many utilities are betting that the disparity in fuel prices will outweigh the cost of the emissions permits that a coal plant operator might need to acquire under a CO<sub>2</sub> cap-and-trade program.<sup>7</sup>



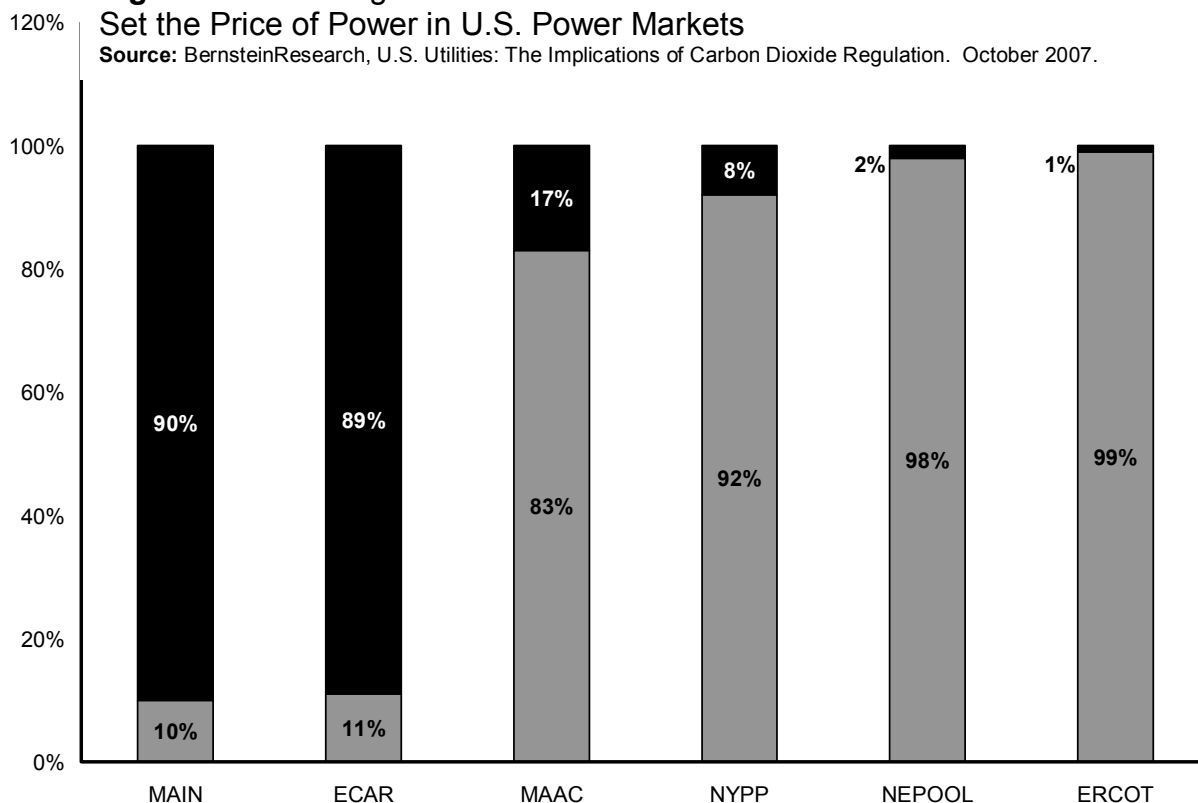
Source: <http://www.eia.doe.gov/cneaf/electricity/epa/figes4.html>

Why do coal facility profits remain stable despite imposing a cost on carbon emissions? Revenues remain stable because power prices and revenues will also increase in response to carbon prices. Here's how it works technically: In wholesale power markets, the price of power is set by the last unit dispatched, typically, a natural gas-fired unit. Natural gas-fired generation prices increase 40-60¢/MWh for every dollar increase in CO<sub>2</sub> costs. These price increases will flow through to a baseload coal plant, allowing coal plant operators to recoup *most* of their CO<sub>2</sub> emissions costs. In some regions of the country, coal plants set the price of power (Figure 4), in which case power prices will increase by \$1/MWh for every dollar increase in CO<sub>2</sub> costs. In this case, coal plants will recoup *all* of their CO<sub>2</sub> emissions costs. The net result is stable or rising profitability and a strong financial incentive to extend the life of highly polluting, low efficiency power plants.

<sup>7</sup> The Economist. "Coal Power: Still Going Strong". November 17, 2007.

**Figure 4. Percentage of Hours Coal and Natural Gas Set the Price of Power in U.S. Power Markets**

Source: BernsteinResearch, U.S. Utilities: The Implications of Carbon Dioxide Regulation. October 2007.



### *Environmental Performance*

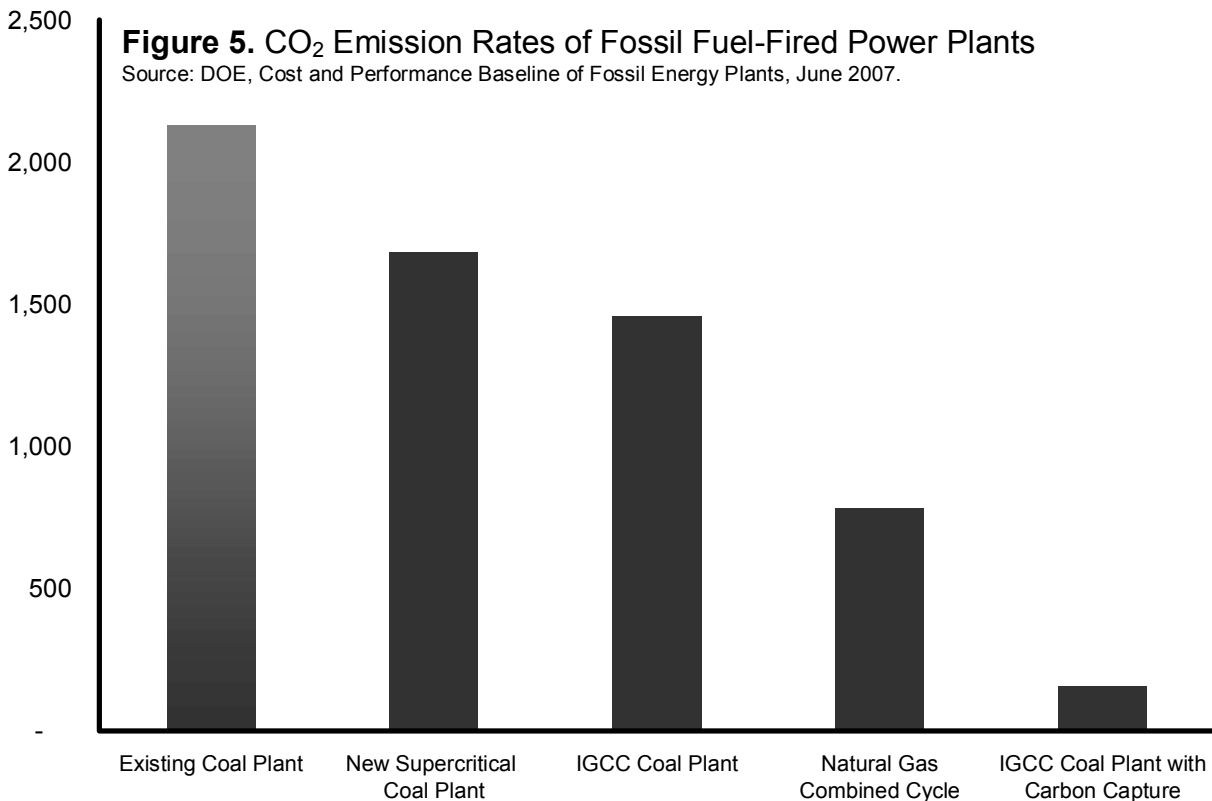
In the process of producing electricity, coal plants also spew out significant quantities of air pollutants. A 500 megawatt (MW) coal plant will emit more than 3 million tons of CO<sub>2</sub> annually, upwards of 100 million tons of CO<sub>2</sub> over the course of 30 years, and roughly twice the emissions of a similarly sized natural gas-fired power plant (Figure 5). And older coal-fired power plants generate more CO<sub>2</sub> per unit of electricity output than other alternatives because of their lower fuel efficiency (Figure 5). An older coal plant produces more than 2,100 pounds of CO<sub>2</sub> per megawatthour, compared to a new, so-called “supercritical” coal plant that generates about 1,700 pounds of CO<sub>2</sub> per megawatthour of electricity (21% lower). More advanced processes would produce even less pollution.

Coal-fired power plants also emit significant quantities of “conventional” air pollutants: nitrogen oxides (NO<sub>x</sub>), sulfur dioxide (SO<sub>2</sub>), and mercury; and U.S. EPA data report that older coal-fired power plants are less likely to be equipped with advanced pollution control equipment, like SO<sub>2</sub> scrubbers and post-combustion NO<sub>x</sub> controls (Figures 6 and 7). For example, only 15 percent of coal plants built in the 1950s are reported to be equipped with advanced SO<sub>2</sub> controls, while 65 percent of coal plants built in the 1980s onward are reported to be equipped with SO<sub>2</sub> controls.

## Policy Implications

Most existing coal burning power plants in the U.S. have been operating for three decades or more, producing significant quantities of air pollution, including CO<sub>2</sub>. Now, as Congress moves forward with its effort to regulate CO<sub>2</sub> emissions from power plants, the owners of these aging coal plants are seeking not only to preserve their profits, but to expand their profitability by advocating a free hand out of allowances -- essentially free passes to continue operating old, inefficient facilities.<sup>8</sup> However, by giving out allowances at no cost to old coal plants, we would also encourage their owners to keep these dirty coal plants running longer. We may also diminish the opportunity to encourage the development and use of renewable energy technologies.

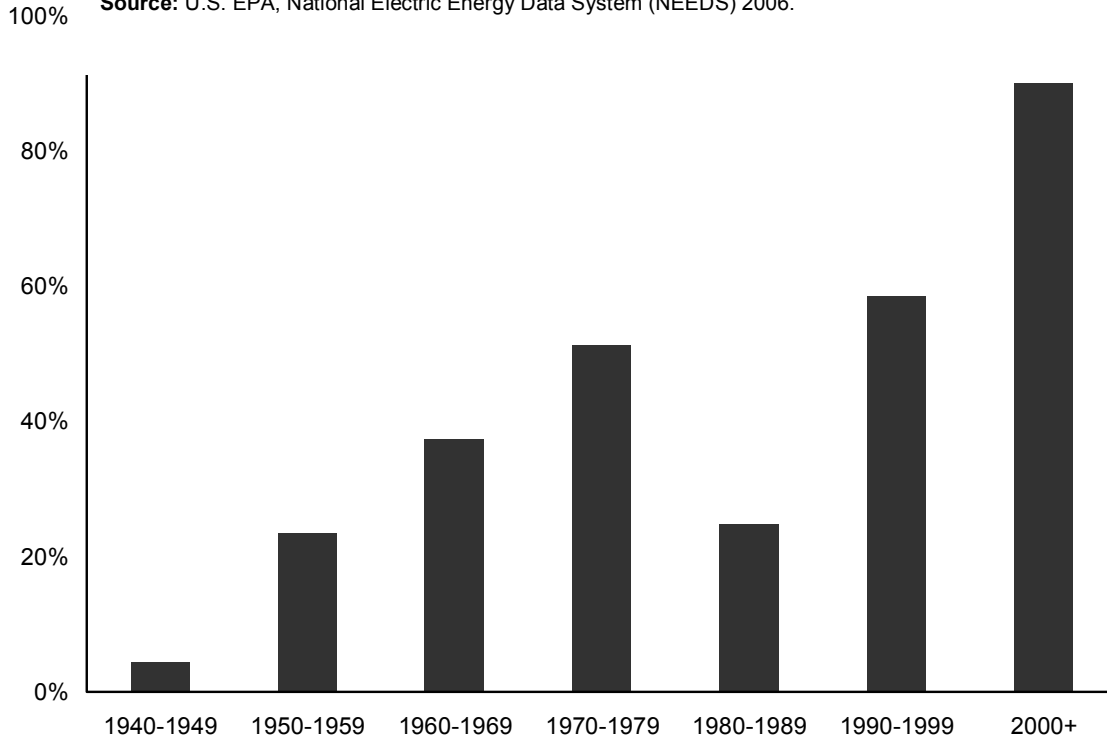
Public interest groups have argued that Congress should resist calls by coal burners for free permits or allocations. Instead, they have urged that allowances should be distributed through an auction system with the proceeds used to promote such things as investment in clean energy technologies, to defray energy-cost impacts on low- and middle-income residents, to protect wildlife and to promote demand-side energy efficiency. That could help avoid the perverse impact of encouraging old coal-burning power plants to continue polluting for additional decades in the future.



<sup>8</sup> See, for example, the testimony of James E. Rogers, Duke Energy Corporation. [http://energycommerce.house.gov/cmte\\_mtgs/110-eaq-hrg.032007.Rogers-testimony.pdf](http://energycommerce.house.gov/cmte_mtgs/110-eaq-hrg.032007.Rogers-testimony.pdf)

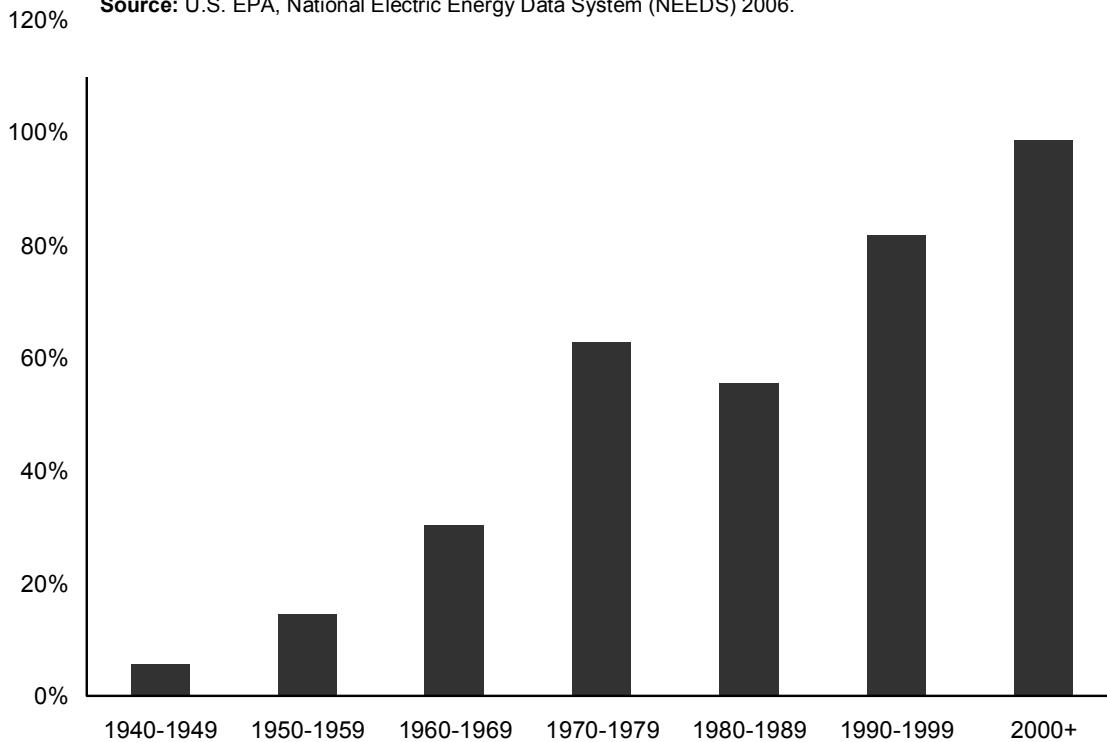
**Figure 6. Percent of Coal Capacity with Post-Combustion NOx Controls by Unit Age**

Source: U.S. EPA, National Electric Energy Data System (NEEDS) 2006.



**Figure 7. Percent of Coal Capacity with SO<sub>2</sub> Scrubbers or Reagent Injection by Unit Age**

Source: U.S. EPA, National Electric Energy Data System (NEEDS) 2006.



**Appendix: NERC Regions**

