

Investment in Air Pollution Controls at Coal-Fired Power Plants

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The U.S. power industry has made significant capital investment in air pollution control technologies to remove sulfur dioxide (SO₂), particulate matter and nitrogen oxide (NO_x) emissions at coal-fired power plants. When tallied from the 1960's through 2008, total capital investments at existing coal plants have reached roughly \$90 billion (nominal dollars). Of this, \$32 billion has been in SO₂ controls, \$31 billion in particulate controls, and \$27 billion in NO_x control equipment. In addition, coal fired utilities invested in low-NO_x burners as part of the Clean Air Act-Acid Rain program requirements.

The bulk of these capital investments were made after the coal plants were built and placed online, in order to comply with evolving environmental regulations. In addition, coal plant operators typically spend more than half of their annual non-fuel operating and maintenance budgets to operate these environmental control systems.

For new plants under construction and those that are permit ready, almost \$7 billion in emission controls investments will be required to meet future carbon and mercury control regulations. As shown in Figure 1, a new coal plant will spend about \$400 per kW or 16 percent of the total plant investment on environmental controls. The 29 new coal plants currently under construction (16,415 MW) are expected to spend \$5.1 billion on air pollution controls systems alone. The seven coal plants, ready to commence construction within the next two years, will spend \$1.7 billion on environmental controls.

Figure 1. Emission Controls as an Estimated Percentage of Total Cost for a New Pulverized Coal Plant

	Percent of Total Cost	
	Plant Capital Cost	Plant O&M Cost
SO ₂ Controls	12%	29%
NO _x Controls	2%	12%
Mercury Controls	1%	9%
Total for Emission Controls	16%	51%

Source: Calculated by Congressional Research Service from MIT, *The Future of Coal*, 2007, Tables A-3.D.3. and Tables A-3.D.4. Calculations were made for the point estimates in the report; the tables have cost ranges for capital costs and for mercury control O&M costs.

Notes: SO₂ = sulfur dioxide; NO_x = nitrogen oxides; O&M = operations and maintenance.

Federal climate change legislation is expected to increase a new coal plant's environmental control costs to more than \$1,850 per kW, or 47 percent of the total capital investment. Also roughly 51 percent of total non-fuel operating expenditures will be on air pollution control operations, about \$4.75 per MWh.

Methodology

Energy Ventures Analysis, Inc. developed these estimates through various sources of information including the Department of Energy's Energy Information Administration - Form EIA-767,¹ the Environmental Protection Agency's Continuous Emissions Monitoring System,² and public announcements from electric facility owners.

¹ <http://www.eia.doe.gov/cneaf/electricity/page/eia767.html>

² <http://camddataandmaps.epa.gov/gdm/>