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P201 Back Pocket Insights

KEY INSIGHTS

• **The rules could reduce power sector CO_2 emissions and narrow their range**—73-86% below 2005 levels in 2040 (compared to 60-83% without the rules).

• **Model results show that the rules may be met with relatively small costs** due to compliance flexibilities and cost-effectiveness of coal retirements, which also have local air quality co-benefits.

• Although the rules are based in part on the application of carbon capture, **the analysis finds limited carbon capture deployment**.

• Scenarios with higher electricity demand (e.g., from data centers) do not greatly impact emissions reductions under the rules.

This brief is based on the paper "Impacts of EPA's Finalized Power Plant Greenhouse Gas Standards" published in *Science* (2025)

Impacts of EPA's Power Plant Greenhouse Gas Standards

by Bistline, Bergman, Blanford, Brown, Burtraw, Domeshek, Fawcett, Hamilton, Iyer, Jenkins, King, Kolus, Levin, Luo, Rennert, Robertson, Roy, Russell, Shawhan, Steinberg, van Brummen, Van Horn, Venkatesh, Weyant, Wiser, and Zhao

New nine-model study compares potential impacts of EPA's finalized power plant greenhouse gas rules.

Though their future is uncertain, the U.S. Environmental Protection Agency's (EPA's) finalized power plant rules are one of the most high-profile climate policies to date, but the complexity of these regulations makes their effects unclear. This analysis quantifies potential impacts of EPA's rules on emissions, generation, and costs using nine models of the power sector and energy systems.

Model results suggest that the rules could reduce power sector CO_2 emissions and narrow their range—73-86% below 2005 levels in 2040 compared to 60-83% without the rules (Fig. 1)—highlighting their potential to reduce risks of emissions rebounds if load growth or other factors increase the competitiveness of fossil generation. The rules could lower CO_2 emissions by 68-390 million metric tons annually in 2040 compared to current trends without the rules.

Model results indicate several technology-specific impacts of the rules (Fig. 1):

- Although carbon capture and storage (CCS) is expected to play an important role in achieving economy-wide net-zero emissions, **the analysis finds limited CCS generation with the rules (0.7-3.0% in 2040)**, due to lower cost compliance pathways that the technology-neutral rules allow.

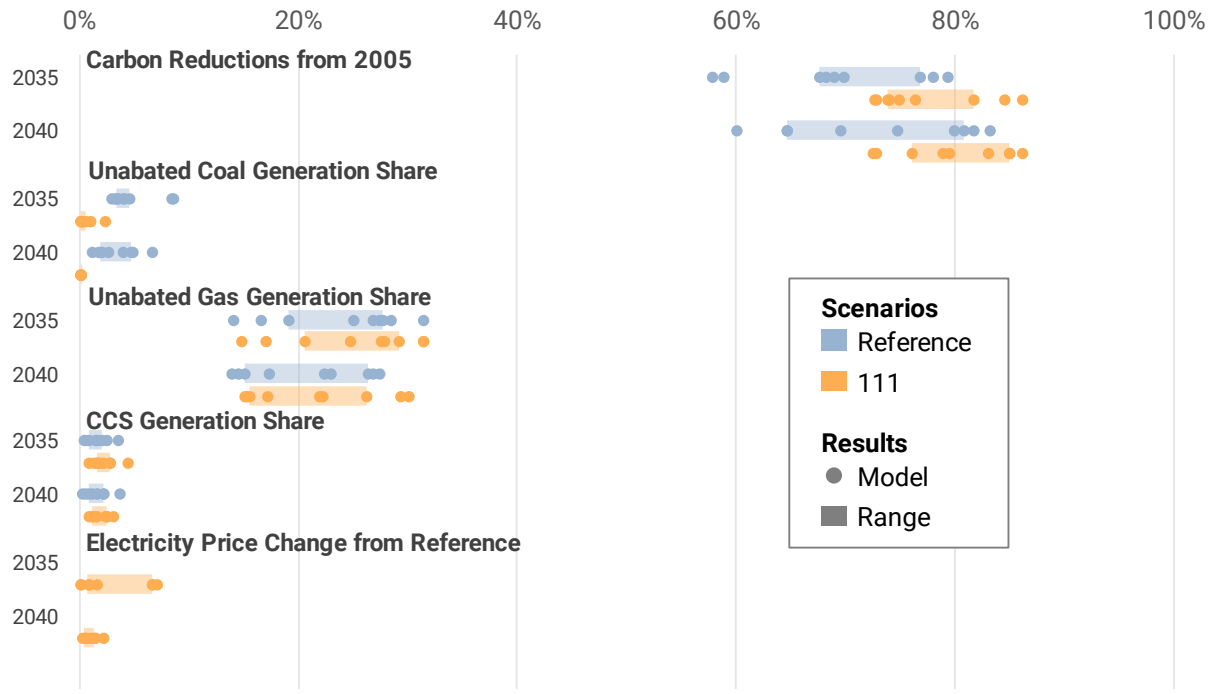

Figure 1. Cross-model comparison of key indicators for 111 and reference scenarios across models. For each metric and scenario, values are shown for individual models (dots) and interquartile range (bars). Based on Bistline, et al. (2025).

- The rules could accelerate coal retirements relative to current trends. Coal capacity is likely replaced by a portfolio of resources that varies by model.
- Natural gas capacity additions can increase with the rules, though models suggest smaller generation shares from gas-fired resources (15-31% with the rules) compared to 42% in 2023.

Model results indicate that the rules may be met with relatively small costs due to compliance flexibilities and the cost-effectiveness of coal retirements, which also have local air quality co-benefits. Total bulk power system costs increase 0.5-3.7% with the rules relative to the reference over time, while wholesale electricity prices are less than 2.2% above the reference in 2040 across models (Fig. 1).

Abatement costs of these rules ($6-44/t-$CO_2$) are lower than many recent estimates of the social cost of CO_2 (mean values from $120-420/t-$CO_2$). **The rules also accelerate reductions of conventional air pollutants**: 88-98% reduction in SO_2 by 2035 from 2015 and 84-94% NO_x reduction.

Scenarios with higher electricity demand (e.g., from data centers and end-use electrification) achieve similar incremental CO_2 reductions under the rules (2-16 percentage points in 2040 with reference demand and 3-16 with higher demand). Gas-fired resources are responsive to new loads in the near term, but the CO_2 intensity of power generation likely declines over time (clean resources make up 55-83% of increased generation by 2040) and is less than the CO_2 intensity of the current grid mix, especially under the rules.

FOR MORE INFORMATION

Read the full paper: Bistline, et al. (2025), "Impacts of EPA's Finalized Power Plant Greenhouse Gas Standards." *Science*.

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