CRS Insights

EPA's Clean Power Plan Proposal: Are the Emission Rate Targets Front-Loaded?
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On June 18, 2014, the Environmental Protection Agency (EPA) proposed regulations (the "Clean Power Plan") addressing carbon dioxide (CO_2) emissions from existing fossil fuel-fired electric generating units. Carbon dioxide is the primary human-related greenhouse gas that contributes to climate change, and these electric generating units, as a group, account for the largest source of CO_2 emissions in the United States.

The proposal would establish state-specific CO_2 emission rate targets measured in pounds of CO_2 emissions per megawatt-hour (MWh) of electricity generation. The targets include both a 2030 goal and an interim goal to be achieved "on average" between 2020 and 2029. States would prepare and submit to EPA implementation plans describing the state-specific activities that would achieve the emission rate targets.

Assuming the proposal becomes a final rule in June 2015, states would then have until June 30, 2016, to submit their implementation plans. However, states could request an additional year for submission of a complete plan, provided that they have taken "meaningful steps" toward completion by the 2016 deadline. Alternatively, states participating in a multistate plan would have until June 30, 2018, to submit a plan. For more background on EPA's proposal, see this CRS report.

Some industry stakeholders and state agencies have characterized EPA's proposed CO_2 emission rate targets for existing power plants as "front-loaded," with a disproportionate percentage of emission rate reductions required in the early years of the program (2020-2024). The following analysis provides data consistent with this observation.

In its proposal, EPA identified four categories of opportunities for states to reduce their CO_2 emission rates. EPA refers to these categories as "building blocks," and they include:

- 1. efficiency improvements at coal-fired, steam electric generating units;
- 2. displacement of more carbon-intensive electricity generation, particularly coal-fired generation, with natural gas combined cycle (NGCC) generation;
- 3. increased use of renewable energies sources (e.g., wind and solar) and continued use of existing nuclear power; and
- 4. energy efficiency improvements.

For more details on EPA's four building blocks, see this CRS report.

Using 2012 baseline data as its starting point, EPA applied a formula with the four building blocks to establish state-specific CO_2 emission rate goals for each year, starting in 2020 and ending in 2029. These annual emission rates can be found in EPA's "Goal Computation" spreadsheet. States are not specifically required to meet these annual emission rates. However, states would likely need to reduce their emission rates on a pathway that is similar to the 2020-2029 annual emission rates, because the state-specific interim targets were constructed by taking the average of the 2020-2029 annual emission rates.

As an illustrative example, assume a state's 2012 baseline emission rate is 2,000 pounds of CO_2 per MWh and its 2029 Interim target is 1,750 pounds per MWh. If this state maintained its 2012 emission rate in the early years (2020-2024), decreased its rate to 1,750 pounds per MWh in 2025, and held this rate through 2029, the average annual rate (2020-2029) would be 1,875 pounds per MWh, well above

its 2029 target. Thus, assuming a state does not intend in the latter years (2025-2029) to reduce its emission rate to a level below its 2029 interim target (say, 1,500 pounds per MWh in this example), the mathematics of EPA's 2029 interim target effectively require states to make emission rate reductions in the early years, which some have described as "front-loading."

This outcome is a result of EPA's building block emission rate formula. Although EPA's application of building blocks 3 and 4 produce incremental effects (starting in 2020) that gradually reduce the state emission rates, the full effects of building blocks 1 and 2 apply to the 2020 emission rate. Building block 1 applies a 6% heat rate (i.e., efficiency) improvement to coal-fired, steam units. Building block 2 shifts a state's electric generation from high-carbon units, namely coal-fired units, to NGCC units.

The impacts of the building blocks on the 2020 emission rate may be expressed in several ways. One could compare the 2020 emission rate calculated by EPA with the 2012 baseline. For example, Washington's 2020 emission rate is 56% lower than its 2012 emission rate baseline (the largest decrease by this measure). This measure ranges from this 56% decrease to a 4% decrease (Rhode Island), with a median decrease of 21%.

One could also compare the emission rate reduction in 2020 (from the 2012 baseline) to the final emission rate reduction required by 2030. For example, 90% of Arizona's total emission rate reductions occur between its 2012 baseline and its 2020 emission rate (the largest decrease by this measure). This measure ranges from 90% to 32% (Rhode Island), with a median of 66%. Arguably, this comparison provides further support for the contention that the emission rate requirements are "front-loaded."

The 10 states with the largest percentage of emission rate reductions in 2020 (compared to the total rate reductions) are listed in **Table 1**. Although each state's electricity generation profile is unique, building block 2—shifting from coal-fired generation to NGCC generation—has a considerable impact on the emission rates in these states. **Table 1** identifies the percentage decrease in coal generation and the corresponding increase in NGCC generation between 2012 and 2020. In some cases (Arizona, Washington, and Mississippi), EPA's emission rate formula results in a 100% decrease in coal generation.

Table 1. States with the Largest Percentage of Total 2030 Emission Rate Reductions Effectively Required by 2020 and Coal and NGCC Impacts from Building Block 2

State	2012 Baseline	2020 "Calculated" Emission Rate	2030 Final Emission Rate Goal	Percent of 2030 Final Emission Rate Reductions *Estimated* in 2020	Percent *Decrease* in Coal-Fired Electricity (2012-2020) from Building Block 2	Percent *Increase* in NGCC Electricity (2012-2020) from Building Block 2
Arizona	1,453	778	702	90%	100%	95%
Minnesota	1,470	965	873	84%	51%	198%
Arkansas	1,634	1,028	910	84%	64%	120%
South Carolina	1,587	921	772	82%	22%	56%
Georgia	1,500	966	834	80%	34%	37%
Oklahoma	1,387	996	895	80%	52%	65%
Washington	756	334	215	78%	100%	66%
Colorado	1,714	1,244	1,108	78%	34%	134%
Mississippi	1,093	783	692	77%	100%	37%
Louisiana	1,455	1,015	883	77%	53%	102%

Source: Prepared by CRS; data from EPA Technical Support Document, Goal Computation Spreadsheet.

Notes: The "2020 Calculated Emission Rate" is not a required target. EPA generated annual emission rates between 2020 and 2029 to produce the Interim emission rate target, which is an average of the 2020-2029 annual rates.

Emission rates in pounds of CO_2 emissions per megawatt-hour.