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Assessing the Final Clean Power Plan

Key Changes Relative to the Draft Rule and Their Implications for Stringency

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On August 3, 2015, the Environmental Protection Agency released the final Clean Power Plan (CPP), a regulatory action under the Clean Air Act (CAA) that establishes guidelines for states to limit carbon dioxide emissions from existing power-generation units. The plan differs in a number of important ways from a draft version released in June 2014. This research note, the first in a series on the final CPP from CSIS and Rhodium Group, outlines the key changes between the draft and final rules and analyzes the impact of those changes in terms of stringency—that is, the emission reductions required by the rule. A few key takeaways:

- The final rule adheres more closely to traditional regulatory approaches under the CAA's Section 111 and eliminates some of the more novel regulatory proposals of the draft rule.
- The rule retains significant flexibility for states to craft an implementation plan tailored to their specific circumstances.
- In aggregate, the emission-performance targets that states are required to achieve in 2022 are higher than in the draft rule but the 2030 standard is stricter compared to the draft. This may lead to higher cumulative greenhouse gas emissions compared to the draft; however, ultimate emissions reductions and energy-sector impacts are highly dependent on state-level implementation decisions as well as technology and fuel costs.

Key Changes to EPA's Approach to Standard-Setting Methodology

In response to over 4 million comments received on the draft CPP, EPA made a wide variety of changes to the final rule.

Overall, the final rule is simpler and has fewer exceptions and carve-outs than the draft rule. The final rule also adheres more closely to more conventional CAA regulatory approaches and applies a methodical approach that is more consistent across generation sources, especially zero-emitting generators. Table 1 compares key aspects of EPA's proposed and final CPP standard-setting methodology.

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Table 1. Comparison of EPA Proposed and Final CPP Standard-Setting Methodology

		Proposal	Final
Performance Standard		State-specific, annual average adjusted emission rate (lbs./MWh) standards applied to all covered sources in a state	Separate nationally uniform annual adjusted emission rate (lbs./MWh) standards for fossil steam and natural gas combined-cycle (NGCC) units
Compliance Entity		Source or fleet or state	Source
Best System of Emission Reduction (BSER)	**Technology basis**	Four building blocks: 1) improved coal steam heat rate; 2) shift from coal to gas; 3) renewables and some nuclear; 4) energy efficiency	Three building blocks: 1) improved fossil steam heat rate; 2) shift from coal to gas; 3) incremental renewables
	Building block 3 eligible generation	Incremental hydro, existing and incremental non-hydro renewable energy, 6% of existing nuclear, incremental nuclear	Incremental (post-2012) utility scale renewable energy
	Geographic scope	State	Interconnect
	Application to state	Tailored to state circumstances	Uniform

Simplifying the Regulated Entity

The first area of simplification is the compliance entity, that is, the thing being regulated. In the proposal, EPA contemplated allowing states to decide whether individual sources, a utility's entire generation fleet, or a state agency would be on the hook for compliance. The final Clean Power Plan establishes the power-generation facility as the compliance entity. This aspect of the final CPP's regulatory approach is consistent with all other stationary source pollution regulations under the CAA.

Separate Emissions Rate Standards for Fossil Steam and Natural Gas

The proposal set state-specific emission rate standards for all regulated sources in a state regardless of the generator's fuel (source subcategory). This approach had the effect of requiring different levels of performance for the same types of generators depending on where they were located, for example, a natural gas combined-cycle (NGCC) plant in New Hampshire would have faced different levels of stringency than an identical plant in Minnesota. The final rule establishes separate standards for fossil steam and NGCC units and these standards are consistent regardless of location.

Different Building Blocks

The third area of simplification is the approach EPA took to calculating the performance level of the emission-reduction standard. The CAA requires EPA to establish an analytical framework known as the Best System of Emission Reduction (BSER), and apply the BSER to determine the level of emission reductions achievable. EPA interprets the BSER to combine actions, technologies, and strategies already in use in some places to reduce emissions. The

determination of what is included in the BSER and how it is applied both changed under the final rule.

In the draft rule, EPA determined that the BSER consisted of four "building blocks," including supply- and demand-side measures: 1) increasing efficiency at fossil steam units; 2) switching from higher-emitting coal units to lower-emitting NGCC units; 3) switching to non-emitting sources of electricity such as renewables or nuclear; and 4) increasing end-use efficiency. In the final rule, EPA changed the number of building blocks that formed the basis for their calculations of the BSER as well as how they were calculated.

While EPA has allowed energy-efficiency (EE) measures to count as part of compliance plans under previous air-pollution rules, it had never used demand-side measures to set the stringency of a regulation. Building block 4 was therefore legally controversial. EE is no longer included as a building block in the BSER calculation for the final rule (i.e., not used to set the standards), although states can still pursue energy-efficiency policies to comply with the CPP.

How the three remaining building blocks were calculated changed as well. EPA was more conservative about the gains that could be made via efficiency upgrades (heat rate improvements) at power plants, impacting building block 1. In contrast, EPA made more optimistic assumptions about fuel-switching in building block 2, assuming higher maximum utilization of natural gas units. Under building block 3, EPA declined to include specific carve-outs for any particular fuels such as different treatment for existing nuclear generators and existing renewables. EPA took a simpler approach by only considering incremental renewable generation sources. Specifically, only generation from renewables built after 2012 are considered in the BSER. The impact of all of these changes to the structure of the building blocks on the overall emission-reduction requirements cannot be assessed independently, but must be evaluated cumulatively and in conjunction with the changes to how the BSER calculation was applied (i.e., at the interconnect level and not the state level). See below for more detail on how these changes affect the rule's stringency.

Systems Approach to Emissions Reductions

EPA also changed the geographic application of the BSER. In the initial draft, EPA applied the BSER framework to each state individually. In response to comments, EPA recognized that it made more sense to apply the BSER to the three distinct regional grid interconnects (East, West, and Texas). Rather than setting expectations about what a state could accomplish within its own borders, EPA sought to capture the cost and systems advantages of what they considered possible on an interconnect level. EPA used the interconnect-level information to set source (e.g., NGCC and fossil steam plant) category standards. This effectively allowed EPA to calculate emissions-reduction rates that took into consideration emission-reduction opportunities available to generators within the confines of their regional interconnect rather than just within state boundaries. After assessing what level of emission reductions was possible for all generators in each interconnect, EPA established national targets for NGCC and fossil steam generators based on the least stringent of the three emissions-performance rates achieved through the interconnect calculations.

Key Changes to State Requirements

EPA was also careful to respond to commenter concerns about maximizing state flexibility. This is true not only with regard to maximizing state options for demonstrating compliance, but also for timing. Table 2 compares key state requirements under the proposed and final CPP.

Table 2. Comparison of State Requirements under Proposed and Final CPP

	Proposal	Final
Start Year	2020	2022
State Plan Deadlines	June 2016, extensions up to 2018 if constructing a multistate plan	September 2016, extensions to 2018 by state request
Consequences for Disapproved or Absent State Plan	Federal plan (no details provided)	Two proposed federal plan approaches, to be finalized if and when needed
Cooperation	Requires joint construction and submission of a multistate plan	Multistate plan or states can implement "trading ready" plans allowing recognition of out-of-state credits if specific EPA requirements are met
Backstop Requirements	None	Must have federally enforceable standards on affected units
State Plan Options	Rate-based tradable performance standard; mass-based standard; rate or mass "portfolio" approach (federally enforceable, may require backstop)	Rate-based tradable performance standard; mass-based standard; mass-based "state measures" approach (not federally enforceable, requires backstop)
Evaluation, Monitoring, and Verification (EM&V)	Required for renewable energy and energy efficiency to count in rate-based and portfolio plans; state can use its own EM&V standards	Required for rate-based plans; standards must meet minimum EPA requirements or follow model rule EM&V
Model Rule	None	Proposed rate-based and mass-based model rules; can act as backstops or as presumptively approvable state plans
Early Action Incentives	None	Clean Energy Incentive Program for renewable energy deployment in 2020 and 2021

Timing

States are given more time to prepare their plans, more time after a plan is submitted before compliance is required, and more discretion on timing to reach goals along the compliance pathway than in the draft CPP. State plans are now due in September 2016 (compared with June 2016 in the draft). States are able to apply for extensions to 2018 for submitting their state plans. Second, the first year that states must demonstrate compliance has been pushed back from 2020 to 2022, providing states with longer lead times to meet initial compliance targets. Finally, EPA addressed concerns over the so-called emissions cliff in the draft rule, a sharp drop from business as usual in 2019 to the required emission-performance standards in 2020. While

different states have different requirements, aggregated nationally, the final rule has a much less precipitous decline in emissions required in the initial compliance year (2022). The so-called glide path now breaks down emission-rate targets into two-year increments to ensure a smoother phase-in of emission-reduction measures. Both the draft and the final rule also allow states to set their glide paths, as long as they meet the interim and final performance rate goals.

State Options for Compliance

When it comes to state options for compliance, EPA provides states considerable latitude to tailor their plans to their own circumstances. Similar to the draft rule, states are in the driver's seat when it comes to designing and implementing their compliance pathway. EPA has offered six suggested potential pathways to guide state decisionmaking, although the states determine the contours of the pathways. While states maintain flexibility to pursue whatever approach they see fit, the type of plan that states choose will dictate how many administrative requirements states will need to meet to make their plan acceptable to EPA. Ease of implementation and certainty of EPA approvability may be considerations for states as they decide what type of plan to implement.

The first decision states will need to make is whether to select a rate-based plan or a mass-based plan.

Under a mass-based approach, states set a firm cap on the total emissions from regulated units. EPA has provided a "fast-track" pathway to an approvable mass-based plan where states establish a cap on emissions from all existing and new fossil generators. This approach guarantees that emission reductions achieved by existing plants won't be canceled out by potential increases in emissions at new power plants. If states choose to establish a cap just on existing plants, then there is an additional administrative requirement that they include measures that maintain the environmental integrity of EPA's emission-reduction requirements. More administrative requirements are added if a state pursues what EPA calls a "state measures" approach, where a portfolio of state policies achieves the mass-based target. Such plans will require a federally enforceable backstop standard to guarantee the emission reductions will be achieved.

A rate-based plan allows states to grow their overall emissions, as long as the emissions rates meet EPA's targets. If states decide to pursue a rate-based target, EPA requires that states demonstrate to EPA's satisfaction that they have programs in place to measure, monitor, and verify emission reductions. EPA has provided states with off-the-shelf ways to meet these standards, but states may also choose another path, as long as they persuade EPA that their plan achieves emission reductions that are at least as stringent as EPA's targets.

Trading Ready Options

The final CPP makes it easier for states to engage in emissions trading as a compliance mechanism. Trading provides generators with a much broader pool of compliance options than would otherwise be available within the confines of a single state. This can substantially lower compliance costs. It can also help to set consistent incentives to shift toward low-carbon-

generating sources in wholesale power markets. The final rule allows states to design plans (mass or rate based) that are "trading ready" and allow plants to trade emission-compliance credits with out-of-state entities without establishing formal, up-front state agreements. This is a less onerous approach to multistate cooperation than in the proposal, where the only pathway to interstate trading was through formal, multistate implementation plans.

Federal Implementation Plan

Finally, if a state does not submit an implementation plan or EPA deems that a submitted plan is not approvable, EPA has proposed two Federal Implementation Plan (FIP) approaches that could be implemented in place of a state plan. The draft CPP contemplated the imposition of a federal plan but provided no details as to what the plan might look like. EPA is taking comment on rate-based and mass-based approaches to a FIP but will only finalize a federal plan if it must impose one.

Implications for Emission-Reduction Requirements

All of the changes in the final rule lead to likely differences in state choices and differences in cumulative national emission reductions. EPA projects that in 2030 the final rule will result in greater emission reductions nationally than the draft (32 vs. 30 percent) relative to 2005. These projections are only an estimate, as the ultimate scope and pace of emission reductions will be determined by the contours of state choices.

One way to compare stringency between the proposal and the final CPP is to compare their emission-rate performance goals. This sidesteps the need for modeling and assumptions around the design of a state plan and simply assesses how much of a reduction in emission rates is required in each state. Table 3 compares the proposal and final CPP national average emission rates for the years 2022 and 2030.[1] (For a state-by-state comparison, see the appendix.)

Table 3. Comparison of Normalized National Average Emission Rate Goals

Performance Levels (lbs./MWh)				Change from 2012 (%)			
2022		2030		2022		2030	
Proposal	Final	Proposal	Final	Proposal	Final	Proposal	Final
1225	1405	1138	1092	-28%	-17%	-33%	-35%

Source: RHG analysis, EPA. Note: Proposal values have been adjusted to match the final CPP's accounting and eligibility requirements.

As seen in Table 3, the CPP final rule starts out with a national average emission rate target of 1,405 lbs./MWh, or 17 percent below 2012 levels. This is more lenient than the 1,225 lbs./MWh requirement under the proposal. However, by 2030 relative stringency shifts with the final CPP requiring a 35 percent reduction from 2012, compared to 33 percent under the proposal. In other

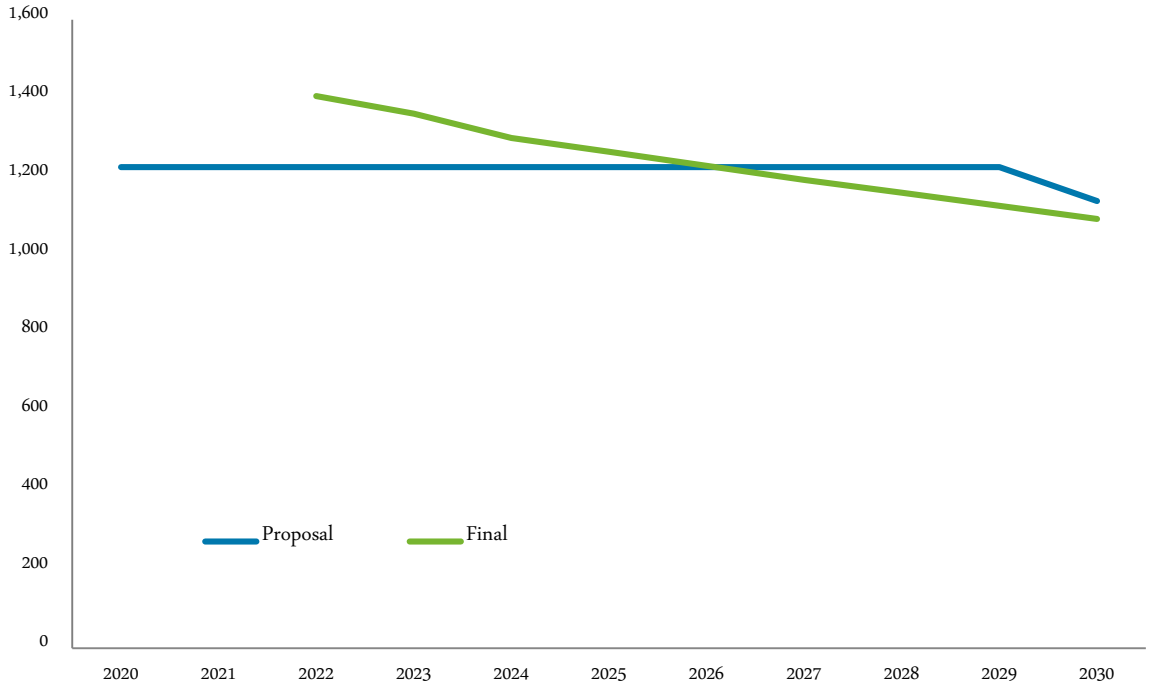
[1] The proposal emission rates look a little different from EPA's reported values because we've normalized them to match the final CPP's BSER assumptions (e.g., removing proposal components from the goal computations that aren't eligible under the final CPP including existing renewables and "at risk" nuclear generation). This normalization allows for a consistent comparison between the proposed and final CPP.

words, nationally, the final rule requires more modest reductions in the early years but a heavier lift than the CPP proposal in the later years (Figure 1). While the final target is more stringent than the draft, cumulatively, the final CPP may result in fewer emission reductions between 2020 and 2030 than the draft.

Nonetheless, the final CPP is ultimately (mandatory) guidance, and does not in itself determine any emission outcome aside from setting a minimum level of performance that states must meet. Rather, the CPP should be thought of as a framework for states to achieve emission reductions. However, while EPA sets the minimum bounds for what states must achieve, actual state implementation decisions will determine what level of abatement is ultimately realized under the CPP.

We will be exploring some of the factors that will affect the ultimate emission and energy-market impacts of the final rule via scenario-based analyses in future research notes, to appear this fall. We plan to explore the possible range of emission outcomes and highlight energy-market impacts such as the potential role of natural gas and renewables, as well as nuclear, energy efficiency, and the outlook for coal.

Figure 1. Annual Normalized Emission Rate Goals, 2020–2030



Source: RHG analysis, EPA. Note: CPP proposal values have been adjusted to match the final CPP's accounting and eligibility requirements.

Summary

The final CPP rule offers more flexibility to states in terms of timing and compliance options, and its overall approach adheres more closely with previous regulations under the CAA. The performance targets that EPA set for 2022 allow a higher rate of emissions than in the draft rule, whereas the 2030 standard is stricter than the draft. This could lead to higher cumulative emissions over the compliance period, but ultimate emissions reductions and energy-sector impacts are highly dependent on state-level decisions, as well as fuel costs and technology cost performance levels.

Appendix: Differences in State Targets between Proposal and Final CPP

The methodological changes to the BSER result in different requirements on states. Of the 47 states covered by the final CPP, 9 have more stringent 2022 requirements than under the proposal. (The three states not covered by the final CPP are Alaska, Hawaii, and Vermont.) By 2030, nearly half of covered states have more stringent goals than under the proposal while the remainder have more relaxed targets. Table 4 compares proposal and final CPP goals for each of the 47 states. Red values indicate that the final goal is less stringent than the proposal, while green values indicate that the final goal is more stringent than the proposal.[2]

Table 4. Comparison of Normalized State Emission Rate Goals

State	Performance Levels (lbs./MWh)				Change from 2012 (%)			
	2022		2030		2022		2030	
	Proposal	Final	Proposal	Final	Proposal	Final	Proposal	Final
Alabama	1171	1288	1079	1018	-23%	-15%	-29%	-33%
Arizona	772	1308	736	1031	-50%	-16%	-53%	-34%
Arkansas	1089	1465	1026	1130	-39%	-18%	-42%	-37%
California	664	988	639	828	-31%	3%	-34%	-14%
Colorado	1307	1534	1245	1174	-34%	-23%	-38%	-41%
Connecticut	627	921	565	786	-26%	9%	-33%	-7%
Delaware	901	1127	842	916	-28%	-10%	-33%	-27%
Florida	834	1131	779	919	-33%	-9%	-38%	-26%
Georgia	1313	1337	1191	1049	-22%	-21%	-29%	-38%
Idaho	467	898	433	771	-44%	8%	-48%	-8%
Illinois	1540	1647	1429	1245	-29%	-24%	-34%	-43%
Indiana	1684	1642	1606	1242	-17%	-19%	-21%	-39%
Iowa	1648	1706	1586	1283	-25%	-22%	-28%	-42%
Kansas	1748	1722	1650	1293	-25%	-26%	-29%	-44%
Kentucky	1832	1711	1752	1286	-15%	-21%	-19%	-41%
Louisiana	1023	1451	950	1121	-37%	-10%	-41%	-31%
Maine	436	910	417	779	-50%	4%	-52%	-11%
Maryland	1407	1712	1232	1287	-31%	-16%	-39%	-37%
Massachusetts	665	982	584	824	-34%	-2%	-42%	-18%
Michigan	1330	1526	1257	1169	-31%	-21%	-35%	-39%
Minnesota	1156	1596	1096	1213	-43%	-21%	-46%	-40%

[2] The proposal emission rates look a little different from EPA's reported values because we've normalized them to match the final CPP's BSER assumptions (e.g., removing proposal components from the goal computations that aren't eligible under the final CPP including existing renewables and "at risk" nuclear generation). This normalization allows for a consistent comparison between the proposed and final CPP.

Mississippi	736	1173	695	945	-38%	-1%	-41%	-20%
Missouri	1654	1688	1574	1272	-18%	-16%	-22%	-37%
Montana	2080	1741	1947	1305	-16%	-30%	-22%	-47%
Nebraska	1713	1727	1580	1296	-21%	-20%	-27%	-40%
Nevada	765	1030	706	855	-31%	-7%	-36%	-22%
New Hampshire	581	1035	513	858	-48%	-7%	-54%	-23%
New Jersey	791	962	684	812	-27%	-12%	-37%	-26%
New Mexico	1232	1490	1159	1146	-31%	-17%	-36%	-36%
New York	703	1129	603	918	-38%	-1%	-47%	-20%
North Carolina	1263	1473	1166	1136	-29%	-17%	-34%	-36%
North Dakota	2146	1741	2100	1305	-9%	-26%	-11%	-45%
Ohio	1488	1560	1370	1190	-22%	-18%	-28%	-38%
Oklahoma	1030	1367	986	1068	-34%	-13%	-37%	-32%
Oregon	517	1056	462	871	-53%	-3%	-58%	-20%
Pennsylvania	1221	1410	1091	1095	-27%	-16%	-35%	-35%
Rhode Island	822	898	782	771	-10%	-2%	-15%	-16%
South Carolina	1773	1505	1483	1156	-1%	-16%	-17%	-35%
South Dakota	1013	1522	933	1167	-55%	-32%	-58%	-48%
Tennessee	1907	1593	1707	1211	-10%	-25%	-20%	-43%
Texas	1004	1325	927	1042	-36%	-15%	-41%	-33%
Utah	1460	1542	1404	1179	-22%	-18%	-25%	-37%
Virginia	953	1156	879	934	-34%	-20%	-39%	-35%
Washington	405	1233	310	983	-74%	-21%	-80%	-37%
West Virginia	1784	1741	1651	1305	-14%	-16%	-20%	-37%
Wisconsin	1341	1537	1256	1176	-33%	-23%	-37%	-41%
Wyoming	1986	1731	1872	1299	-15%	-26%	-20%	-44%

Source: RHG analysis, EPA. Note: CPP proposal values have been adjusted to match the final CPP's accounting and eligibility requirements.

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