

Clean Power Plan: Structural Overview

On August 3, 2015, the U.S. Environmental Protection Agency (EPA) released its final rule for the Clean Power Plan (CPP). This is a significant and positive step toward reducing CO₂ emissions from existing electric power plants, while creating billions of dollars in economic benefits and maintaining a reliable and resilient grid.

The structure of the final rule is broadly intact from the proposal, in that the goal-setting is separated from compliance—i.e., the goals set for each state do not dictate how a state must comply to achieve its goals. However, based on more than four million comments received on the proposed rule, EPA made significant and positive changes related to the determination of the Best System of Emission Reduction (BSER), making the final rule more equitable among states, and ensuring more transparent, verifiable and enforceable compliance by states.

Most notably in the final rule, energy efficiency has been removed from the goal-setting. **It is crucial to note that this does nothing to impact the viability of energy efficiency as the fastest, easiest and most cost-effective compliance mechanism available to states.** EPA continues to encourage energy efficiency as a least-cost compliance mechanism: by including it in the proposed federal plan, presenting state economic analyses that conservatively project one percent energy efficiency improvements per year, proposing double-crediting for early implementation of energy efficiency in low-income communities, and providing for expanded flexibility through trading of energy efficiency credits or allowances.

There is still opportunity to strengthen implementation of the final rule, enhancing its ability to support a cleaner environment and a more robust economy. EPA is seeking comments on the proposed federal plans; the proposed model rules; draft evaluation, measurement and verification (EM&V) guidance within the proposed model rule; and the Clean Energy Incentive Program (CEIP). The Alliance will work to ensure that cost-effective energy efficiency is prescribed in the implementation guidance to the fullest extent practicable, and will continue to encourage state and federal policy makers and regulators to encourage cost-effective energy efficiency as a least cost resource for compliance. Comments are due by January 21, 2016. EPA will not accept comments on the BSER or the state goals.

Overview

- With the plan fully implemented, EPA forecasts carbon dioxide (CO₂) emissions from the power sector in 2030 to decline 32 percent relative to a 2005 baseline.
- EPA is setting interim (2022-2029) and final (2030 and onward) carbon dioxide emission performance rates for existing fossil fuel-fired electric generating units (EGUs). The final rates are uniform across the nation, specific to two types of power plants (“subcategories”):
 - 1,305 lbs./MWh by 2030 for fossil-fired steam generating units (coal as well as oil and natural gas), and
 - 771 lbs./MWh by 2030 for natural gas-fired combined cycle turbines (NGCC).
- By establishing these subcategory performance rates in the final plan, EPA has both strengthened the final rule against legal challenges and facilitated interstate trading, since all affected power plants within each subcategory now face the same standard, regardless of their jurisdiction.

- These nationally uniform performance targets are used to set state goals by assessing the base-year (2012) mix of plants in each state. EPA has established interim and final statewide goals in three forms; a state can choose to comply with either:
 - A rate-based state goal measured in pounds per megawatt hour (lbs/MWh),
 - A mass-based state goal measured in total short tons of CO₂, or
 - A mass-based goal with a new source complement measured in short tons of CO₂ (to resolve the potential “leakage” issue in mass-based plans, described in the “Compliance” section below).
- Although the goals set by EPA for each state are no longer open for comment, states retain the flexibility to design their own compliance plans, subject to EPA approval. States face three crucial choices in designing their plans:
 1. Mass-based or rate-based compliance accounting;
 2. “Emission Standards Plan” (including only federally enforceable measures imposed directly upon the EGUs) or “State Measures Plan” (including complementary state-enforceable measures for entities other than EGUs—an option that is available only for mass-based plans); and
 3. Whether a plan is designed and executed as an individual state, in a multi-state agreement, or with the capability to cooperate with other states.

Through the flexibility of these options, EPA has enabled states to utilize lower-cost compliance mechanisms such as energy efficiency.

- Individual goals have been set for 47 states. The plan excludes Vermont and the District of Columbia because they have no fossil fuel-fired power plants. Lacking certain data and analytical tools, EPA also has not issued goals for Alaska and Hawaii, or for Guam and Puerto Rico, though they all are home to fossil-fired EGUs. The agency is “committed to obtaining the right information to quantify the emissions reductions that are achievable in these four areas and putting goals in place soon.”¹
- The standards also apply to EGUs on three Indian reservations: Navajo, Fort Mojave, and Ute (Uintah and Ouray). These tribes may submit a plan but are not required to do so; if they do not, federal plans will be implemented.
- Affected units are fossil-fueled EGUs in the two subcategories that were in operation or under construction as of January 8, 2014.

Economic Impacts

- EPA estimates that the Clean Power Plan will produce **public health and climate benefits** ranging between **\$34 billion and \$54 billion** per year in 2030.
- **The Clean Power Plan’s benefits far outweigh estimated costs** of \$8.4 billion nationwide in 2030 for a rate-based approach. The costs of a mass-based approach are estimated to be even lower, \$5.1 billion in 2030.
- **EPA’s Regulatory Impact Analysis (RIA) incorporates increased utilization of energy efficiency**, building up to one percent in energy savings per year. The RIA relies on cost estimates for deploying

¹ Clean Power Plan, Final Rule, 3 August 2015 prepublication version, 848.

energy efficiency (beginning at 9.2 cents per kWh in 2022 and decreasing to 8.1 cents per kWh in 2030) that are extremely conservative when compared with actual state experiences, where the average total cost (program and participant) of saved energy has been found to be 4.4 cents per kWh.² If a state pursues broader deployment of energy efficiency than estimated in the RIA, benefits can be even higher.

- For the average American family, electric bills in 2030 are estimated to decline \$7 per month as a result of the plan.

How the Goals are Derived

- In the final rule, the Best System of Emission Reduction (BSER) comprises three building blocks, rather than four in the proposed rule:
 1. Improved efficiency (i.e., lowered heat rates) at coal-fired steam plants,
 2. Shifts to cleaner fossil generation to be achieved through increased utilization of existing NGCC generating capacity, and
 3. Incremental (post-2012) deployment of utility-scale renewable energy (does not include distributed generation).
- Recognizing the operational realities of the power grid, where electricity flows are not constrained by state or political boundaries, EPA has separately analyzed the potential for emissions reductions within each of the nation’s three regional grids: the Eastern, the Western, and the Texas Interconnections (ERCOT).
- For each year (interim or final), the least stringent (highest emitting) interconnection sets the subcategory-specific emission performance rate for the entire nation. The Eastern Interconnection sets the steam rate in all years. The Texas Interconnection sets the NGCC rate for the years 2022-26, and the Eastern Interconnection does so in subsequent years.
- Each state rate goal is calculated on the basis of the nationwide emission performance rates set for the two subcategories of EGUs, weighted to reflect the state’s mix of plants by subcategory in the baseline year (2012).
- EPA translates each state-specific rate goal into a state-specific mass goal, multiplying the target rate by 2012 baseline generation and then adding a formula-determined amount to account for the ability of affected EGUs to increase generation from baseline levels, as allowed in a rate-based system. Because not all of the renewable generation potentially achievable across the nation under building block #3 is needed (the steam and NGCC subcategory rates are defined by the least stringent interconnection), affected EGUs can increase generation beyond the calculated mass targets. Renewable potential beyond the target would be tradable between rate-based states across the nation in the form of emission rate credits (ERCs). To maintain equivalence between mass and rate-based systems, EPA adjusts state mass goals to account for this excess building block #3 potential. (The formula for this adjustment is contained in the [CO₂ Emission Performance Rate and Goal Computation Technical Support Document](#)).

² Charles Goldman et al. (Lawrence Berkeley National Laboratory), “The Total Resource Cost of Saved Energy for Utility Customer-Funded Energy Efficiency Programs,” presentation at the 2014 NARUC Annual Meeting (17 November 2014), slide 9.

A Closer Look at the Building Blocks

- **Energy efficiency is no longer a building block**, unlike in the June 2014 proposal. This does nothing to limit the role energy efficiency can play in achieving the required emissions reductions. In fact, by deploying energy efficiency as a compliance strategy, states can reach their compliance goals faster, more easily, and more cost effectively than through any other tool.
- **Building Block 1: heat rate improvements at coal-fired facilities.** Potential for improvement has been adjusted downward compared with the proposal, which identified the opportunity for 6 percent heat rate improvements at all coal-fired EGUs (4 percent from adoption of best practices and 2 percent from equipment upgrades). In the final rule, EPA groups coal-fired plants by interconnection (average age and size differ significantly across the three regions) and then identifies average improvement potential of between 2.1 percent and 4.3 percent depending on the interconnection. This building block no longer specifically expects improvements from equipment upgrades and is derived using a statistical approach that reduces the chances of “double counting” gains from already implemented equipment upgrades. Because of the possibility that a “rebound” effect would cause more efficient coal-fired plants to be dispatched more often absent other changes affecting dispatch, this building block alone cannot meet system-wide emissions reduction targets; it must be implemented with either one or both of the other building blocks.
- **Building Block 2: shifting from higher-emitting steam units to NGCC.** The target for natural gas combined cycle turbines is now 75 percent of net summer capacity, not 70 percent of nameplate capacity as in the proposal. Only combined cycle gas turbine plants are covered; other gas turbines and gas reciprocating engines are left out of the building block and remain free to act as peak-shaving units and to augment intermittent renewable generation. New NGCC plants (i.e., those that begin operations after January 8, 2014) are not included.
- **Building Block 3: incremental utility-scale renewable generation (excludes distributed generation).** Compared with the proposal, the potential in this building block is now seen to be greater, driven by actual historical deployment data as well as modeling incorporating recent cost declines for eligible technologies, which are explicitly defined as onshore wind, utility-scale photovoltaics, concentrating solar power, geothermal, and hydropower. Only incremental (post-2012) deployments are counted in the building block. A regional averaging of Renewable Portfolio Standard (RPS) targets no longer figures in the determination of potential, a notable departure from the proposal, not least of all because some RPS systems credit CO₂-emitting energy technologies with zero-emissions status even in the main “tiers” previously analyzed by EPA. In another major change from the proposal, the finalized building block excludes nuclear capacity under-construction or previously deemed by EPA to be “at risk” of retirement. (All new or updated nuclear generation will be available for compliance.)
- To determine the subcategory rates within each interconnection, EPA:
 - Identifies baseline rates for the two EGU subcategories, steam and NGCC, using 2012 data (lbs CO₂/MWh), subject to several adjustments. In particular, since the final rule includes EGUs that enter service before January 8, 2014, adjustments are made for relevant units that were not in operation during part or all of 2012;
 - Applies a regionally specific heat rate improvement (**building block #1**) to coal-fired steam plants and then recalculates the aggregate steam rate for all steam EGUs, including oil and natural gas-fired steam plants;

- Assigns potential incremental renewable generation (**building block #3**) to the steam-rate and NGCC-rate equations, based on their respective shares of baseline generation. For example, if 40 percent of a state’s baseline generation was from NGCC plants, then 40 percent of the incremental renewable generation would be subtracted from baseline NGCC generation. Incremental renewable generation ramps upward during the 2022-30 period. (Building block #3 is applied before building block #2, which results in greater utilization of NGCC);
- Incorporates the shift to cleaner fossil generation (**building block #2**) available through 75 percent utilization of the net summer capacity of existing NGCC (2012 baseline data). The escalation to 75 percent utilization ramps during 2022-30 period. NGCC generation potential (some of which has in effect been freed up by the assignment of renewables in the previous step) displaces steam generation; and
- Calculates final subcategory rates, as follows:

Steam:

$$\frac{(\text{remaining steam generation} * \text{lowered steam rate}) + (\text{incremental NGCC generation over 2012 baseline} * \text{2012 NGCC rate})}{(\text{remaining steam generation} + \text{incremental renewable generation assigned to steam} + \text{incremental NGCC generation})} = \text{new steam rate}$$

NGCC:

$$\frac{(\text{NGCC generation after increase to 75\% utilization} * \text{2012 NGCC rate})}{(\text{NGCC generation after increase to 75\% utilization} + \text{incremental renewable generation assigned to NGCC})} = \text{new NGCC rate}$$

Compliance

- States may submit **state-specific plans, multi-state compliance plans, or trading-ready plans.**
- **Energy efficiency projects that enter service after 2012 and remain in service in 2022 can contribute toward interim and final compliance with the Clean Power Plan on the basis of savings achieved from 2022 and onward.**
- States must submit their initial plans by September 6, 2016 but **will be granted extensions though September 6, 2018 if they submit a satisfactory initial plan** by the former deadline. A satisfactory initial plan must include:
 - Identification of the final plan approach or approaches under consideration, including a description of progress already made;
 - An explanation of the need for an extension; and
 - A demonstration of proposed public engagement, including “vulnerable communities,” and a plan for stakeholder engagement during the extension period.
- **Mandatory reductions begin on January 1, 2022.** Required emissions reductions are phased in over multi-year stages (2022-24, 2025-27, and 2028-29), although EPA will also accept an average attainment over the 8-year interim period.
- Under an **Emission Standards Plan Type**, all requirements are placed on affected EGUs and are federally enforceable. **Either the mass-based or rate-based approach may be taken.** Federal plans put in place for states that choose not to submit their own plans will be of this type.

- Under a **State Measures Plan Type**, a state can apply measures to affected EGUs and also to other entities that can contribute to emissions reductions. The requirements applied directly to affected EGUs are federally enforceable, whereas other complementary measures (such as programs to increase residential energy efficiency) would be enforceable by the state. This type of plan must include a **“backstop”** of federally enforceable measures applied directly to EGUs and triggered if state measures do not demonstrate reductions. **This type of plan is only available for mass-based plans.** (This approach was called the “portfolio” approach in the 2014 proposal.)
- EPA has established interim and final **statewide goals in three forms**:
 - A rate-based state goal measured in pounds per megawatt hour (lbs./MWh),
 - A mass-based state goal measured in total short tons of CO₂, and
 - A mass-based goal with a new source complement measured in short tons of CO₂ (to provide states with a presumptively approvable solution to the “leakage” issue in mass-based plans).
- To calculate mass-based state goals, EPA begins by multiplying the subcategory-specific rate (steam generating units or NGCC) by the MWh generated in the historical base year of 2012. Next, EPA increases the mass-based totals to provide the potential for increased generation at affected EGUs. This step ensures that mass-based plans provide the same flexibility as rate-based plans.
- **Mass-based plans must account for “leakage”**—the potential for the shift of generation from affected EGUs to new, non-affected fossil-fired EGUs. (EPA denies the potential for leakage in rate-based states, since existing NGCC EGUs will be economically incentivized to increase generation in order to produce ERCs.) Mass-based states can address leakage in one of three ways:
 - **1. Regulate (under state law) new, non-affected fossil-fired EGUs to the same standards** set by the Clean Power Plan. (Presumptively approvable if the state plan includes the mass total with new source complement set by EPA. Alternatively and not presumptively approvable, states may submit their own estimates for a new source complement); or
 - **2. Use allocation methods to counteract incentives to shift generation from CPP affected sources to new fossil-fired sources not regulated under the CPP.** (Adoption of the set-aside mechanisms as they are eventually finalized in the federal trading rule that is now open for comment would be presumptively approvable); or
 - **3. Demonstrate in the state plan that leakage is unlikely** to occur because of state characteristics or plan design elements.
- **The final plan includes a “reliability safety valve” that will provide states with flexibility to deal with potential threats to reliability** through temporary (90-day) and, where necessary, lasting modification of state plans. States must demonstrate they have considered reliability in their plan development, and will be permitted to amend approved plans if reliability issues emerge. **The proposed federal plan does not include a reliability safety valve**, stating that is not necessary given that the proposed federal plan does not place targets on specific EGUs (as might be possible under a state plan); the EPA is seeking comment on whether the reliability safety valve should be included in the federal plan.

Trading

- States may submit and adopt state-specific plans, multi-state compliance plans, or trading-ready plans that can be adopted from the proposed federal trading rules.

- In rate-based approaches, regulated EGUs may trade ERCs within states and between trading-ready states to adjust the CO₂ emission rate of an affected EGU, regardless of where the emission reductions occur. In this manner, energy efficiency savings may be “traded” between states.
- In mass-based approaches, regulated EGUs may trade within states and between trading-ready states for allowances; these must be paired with each emitted short ton of CO₂ and surrendered for compliance.
- In mass-based approaches, states may allocate allowances as they see fit, including to incentivize energy efficiency projects. For instance, allowances may be directly allocated to EGUs, auctioned, or set aside for particular types of projects.
- **Rate-based states may trade ERCs with other rate-based states, and mass-based states may trade allowances with other mass-based states.** Additionally, renewable generation located in mass-based states may be credited toward rate-based states if it can be documented that the generation is used to meet load in a rate-based state, e.g., through a power purchase agreement.
- For unrestricted interstate ERC trading, rate-based states must employ the subcategory-specific emissions performance standards. If states employ a blended rate, interstate trading is only possible within a multi-state arrangement that identifies a single blended rate weighted to reflect the generation shares of the participating states.
- Renewable energy projects located in Vermont and DC as well as on tribal land without affected EGUs are eligible to create ERCs, provided they meet load in a ratebased state. Energy efficiency projects on tribal land without affect EGUs can also create ERCs, if they are located within the borders of a rate-based state.
- EPA will work with states adopting rate-based plans to make possible international trading.

Evaluation, Measurement & Verification (EM&V)

- **In mass-based plans, energy efficiency programs and projects need not be subject to a federally approved EM&V plan.** In these plans, each state administers and documents its own EM&V. The states demonstrate compliance by measuring emissions at affected EGUs, not by measuring demand reduction. States can adopt measures to incentivize efficiency through various measures, including allowance set-asides or the investment of allowance auction proceeds.
- **In rate-based plans, energy efficiency programs must be quantified and verified by practices acceptable to EPA in order to generate ERCs.** EPA has issued and seeks comments upon [draft EM&V guidance](#) and indicated that a wide variety of programs and projects will be eligible (including those attributable to energy service companies).

Key Changes Between the June 2014 Proposal and the Final Rule

- The overall CO₂ emissions reduction target is more stringent—32 percent below 2005 levels in 2030, from 30 percent in the proposal (a 9 percent increase).

- **Building block 4, the energy efficiency component, has been removed from target-setting, but energy efficiency remains eligible as the most cost-effective, simplest, and fastest tool for compliance.** Consistent with previous Clean Air Act Section 111 actions, EPA no longer intends to regulate how much electricity is consumed, just how cleanly the good is produced. EPA's RIA for the Clean Power Plan does incorporate increased utilization of energy efficiency, using very conservative deployment and cost assumptions.
- The final rule includes **source-specific emissions standards that are the same across the entire nation** for two subcategories of EGUs: steam plants and NGCC. In contrast, the 2014 proposal included only state-level targets, an approach that was pointed out by commenters as inconsistent with previous EPA actions under Section 111 of the Clean Air Act, and which imposed different performance standards on similar facilities location in different states. By opting for source-specific standards, EPA has strengthened the rule against legal challenges and facilitated interstate trading, since all affected power plants within each subcategory face the same standard, regardless of their jurisdiction.
- **EPA has allowed more time for states to prepare.** States will have two additional years to submit plans (2018, instead of 2016), although they must still submit a preliminary plan in 2016 along with a request for extension to 2018. Mandatory reductions now commence in 2022, not 2020. Required emissions reductions are phased in over multi-year stages. **The year for final compliance, 2030, remains unchanged.**
- The final rule provides **more parity among the state goals.**
 - For example, the lowest rate target faced by any state in 2030 is 701 lbs./MWh (Rhode Island and Idaho), while the highest is 1,305 lbs./MWh (Montana, North Dakota, and West Virginia. This range reflects 100 percent weighting for one or the other of the EGU subcategories.)
 - Under the 2014 proposal, the range extended from 215 lbs./MWh (Washington) to 1,783 lbs./MWh (North Dakota).
- **Baseline performance data from 2012 now include several state-level adjustments** to account for
 - Atypically high hydro output,
 - Significantly impactful single-unit outages, and
 - Steam and NGCC EGUs under construction or not fully operational in the base year.
- The final rule includes **specific mass-based targets for states.**
- The final rule provides **reliability safeguards through the reliability safety valve.**
- The BSER in the final rule takes account of the regional operating structure of the electric power sector. **Emissions reductions are estimated at level of the three interconnections.** The least stringent interconnection, by subcategory, then sets the rate for the entire nation.
- All of the **building blocks were revised** between the proposal and the final rule:
 - # 1: The potential heat-rate improvements at coal-fired steam plants was identified at the interconnection level and are less stringent than in the proposal;
 - # 2: Re-dispatch of NGCC was set at 75 percent of net summer capacity, not 70 percent of nameplate capacity;

- # 3: Utility-scale renewable energy potential was pegged at higher levels accounting for updated historical deployment rates and declines in cost, while at-risk and under-construction nuclear generation (as well as existing renewables) were removed from this building block; and
 - # 4: Although allowed and even encouraged as a compliance mechanism, the energy efficiency building block was removed to conform the rule to previous regulations issued under Section 111 of the Clean Air Act.
- Energy efficiency remains available, and indeed encouraged, as a compliance mechanism. The newly proposed Clean Energy Incentive Program singles out energy efficiency as the most valuable compliance mechanism on a per MWh basis (see “Incentives for Early Action” section below).

Proposed Federal Plan and Model Trading Rules

- EPA is proposing two federal plans, one mass-based and one rate-based. **In its finally adopted rules, EPA will select a single plan (i.e., either mass-based or rate-based)** to all states that eventually require a federal plan. EPA is seeking comments on whether to select a mass- or rate-based federal plan.
- EPA has also **proposed two model trading rules**, one rate-based and one mass-based. States may incorporate either model into their plans.
- EPA is **seeking comments on the proposed federal plans** (mass- and rate-based), the proposed trading rules (mass- and rate-based) and the Clean Energy Incentive Program (as implemented in connection with mass- or rate-based plans). Comments are due by January 21, 2016. EPA will not accept comments on the BSER or the state goals.

Incentives for Early Action – Clean Energy Incentive Program

- **Under the newly proposed Clean Energy Incentive Program (CEIP), the federal government will provide matching ERCs or allowances to incentivize early deployment of energy efficiency projects in low-income communities and renewable generation.**
- To be eligible for matching, projects must commence construction (renewables) or implementation (energy efficiency in low-income communities) after a state submits a final plan or, for those states not offering their own, after a state is assigned a federal Plan.
- **Wind and solar renewable projects will receive one ERC or an equivalent allowance amount for each MWh generated in 2020 and 2021**, with half of the credit coming from the state and half from EPA.
- In proper recognition of their social, economic and environmental benefits, **energy efficiency projects implemented in low-income communities will receive two ERCs or two equivalent allowance amounts for each MWh of generation avoided in 2020 and 2021**, with half of credit coming from the state and half from EPA. This rate of crediting is double the rate for eligible renewables.
- Efficiency investments made outside of low-income communities are not slated for credit under the proposed CEIP.

- States that choose to participate in this voluntary CEIP program will **borrow “early action” ERCs or “early action” allowances from their Clean Power Plan compliance periods (2022 and beyond)**. In rate-based states, this drawing forward of ERCs is intended to have “no impact on the aggregate emission performance of the sources required to meet rate-based emission standards during the compliance period,” though how this will be effected is still to be determined.³ In mass-based states, allowances shifted to CEIP projects will count against their CPP mass budgets.
- The federal government will **create a matching pool of ERCs or allowances**, not to exceed the total of 300 million short tons of CO₂ in allowance of ERCs. These ERCs/allowances would be incremental to the CPP and apportioned to all CEIP-participating states (whether they are under a federal plan or a state plan). States facing larger emissions reductions goals relative to the 2012 baseline would be in line to receive more of these matching ERCs/allowances.
- For the federal matching pool, **EPA is proposing to create reserves for wind/solar as well as for energy efficiency in low-income communities**.
- **EPA is seeking comments on the CEIP. Comments are due by January 21, 2016.**

Last Updated: December 7, 2015

³ Proposed Federal Plan, 3 August 2015 unofficial version, 178.