The U.S. EPA's Clean Power Plan:

A Comprehensive Summary

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Report No. 14-09
October 2014

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Acknowledgments

I would like to thank **Holly Rachel Smith**, Assistant General Counsel, National Association of Regulatory Utility Commissioners, for our numerous discussions about the Clean Power Plan proposal.

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Executive Summary

The purpose of this paper is to provide the state regulatory community a navigable guide to use as a tool in their understanding of the U.S. Environmental Protection Agency's (EPA) "Clean Power Plan" (CPP) proposal issued June 18, 2014. This paper closely tracks the structure of the EPA's Clean Power Plan as published in the U.S. Federal Register, "Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units", 79 Fed. Reg. 34830-01 (June 18, 2014). The structure of the proposal, i.e., table of contents, section headings and subheadings, is copied here to best enable the reader to track the rule, cite to provisions and more easily locate subject matter. The structure of this paper follows the Table of Contents as published in 79 Fed. Reg. 34830, 34832. All proposal citations are to the version published in the Federal Register on June 18, 2014.

This Executive Summary provides a non-exhaustive list of topics that may be of particular interest to the state regulatory community. The highlighting of these topics in no way suggests that they are the most pressing matters in the proposed rule for each or any state. These topics include:

(1) **Stringency of the building block applications**

EPA proposed state goals which reflect the best system of emission reduction (BSER) comprised of four building blocks to varying degrees of stringency. While the development of these degrees is noted in the body of this paper, the end results are noted here:

- Block 1- improving average heat rate of coal-fired steam EGUs by 6%
- Block 2 - displacing coal generation in each state by increasing generation from existing natural gas combined cycle (NGCC) capacity toward a 70% target utilization rate
- Block 3 - including projected amounts of generation achievable by completing all nuclear units currently under construction, avoiding retirement of about 6% of existing nuclear capacity, and increasing renewable capacity through state renewable generation targets consistent with renewable portfolio standards (RPS's) of states in the same region
- Block 4 - increasing state demand- side energy efficiency (EE) efforts to reach 1.5% annual electricity savings in the 2020–2029 period. (p. 34851)

(2) **Justification for all four building blocks as the BSER**

According to EPA, the BSER is a combination of all four building blocks because:

- Each building block is a proven way to improve emissions rates at affected EGUs or reductions in EGU mass emissions
- Each is in widespread use and is independently capable of supporting significant CO_2 reductions from affected EGUs, either on an emission rate or mass-emissions basis, at a reasonable cost consistent with ensuring system reliability
- The combination of all four building blocks can achieve greater overall CO_2 emission reductions from affected EGUs, at a lower cost per unit of CO_2 eliminated, than the combination of building blocks 1 and 2. (p. 34878).

(3) **Attributes of CO_2 and electric grid enabling a portfolio approach to compliance**

The unique way in which electricity is dispatched presented the EPA an opportunity to set the BSER and establish emission guidelines in a flexible manner unavailable to it for other industries regulated under CAA §111(d). Electricity regulation is distinct due to

> the particular characteristics of carbon pollution, the interconnected nature of the power sector and the manner in which EGUs are currently operated…[s]pecifically, the operators…treat increments of generation as interchangeable between and among sources in a way that creates options for relying on varying utilization levels, lowering carbon generation, and reducing demand as components of the overall method for reducing CO_2 emissions. (p. 34845).

(4) **Regulation under CAA §111(d) is predicated upon CAA§111(b) application**

Regulation under CAA §111(d) is predicated upon affected sources falling under CAA §111(b) *were they new sources*. EPA recognizes that "CAA section 111(d) applies to sources that, if they were new sources, would be covered under a CAA section 111(b) rule." (p. 34852).

(5) **Interactions between §111(d) and §111(b)**

EPA proposes that an existing source that becomes subject to requirements under §111(d) will continue to be subject to those requirements even after it undertakes a modification or reconstruction; and be subject to both §111(d) requirements and modified or reconstructed source standard being promulgated under CAA §111(b). (p. 34903)

(6) **Technical feasibility of increasing NGCC utilization rates to 70%**

EPA examined technical capabilities of the natural gas supply and delivery system and the electric transmission system to accommodate a 70% NGCC unit utilization rate and concluded it would because:

- the natural gas pipeline system already supports NGCC utilization rates of 60% or higher during peak hours;
- even if constraints were placed on NGCC units in certain locations and hours, that would not prevent NGCC generation overall across a region in all hours;
- pipeline and transmission planners have repeatedly demonstrated the ability to relieve bottlenecks and expand capacity. (pp. 34863-34864)

(7) **Resource adequacy**

Referencing the Resource Adequacy and Reliability Analysis TSD, EPA's analysis looked at the types of changes in the generation fleet that were projected to occur through retirements, additional generation and energy efficiency, and did not raise concerns over regional

resource adequacy. The analysis also found that there would be increases in power flows that would raise significant concerns about grid congestion or grid management. (p. 34899).

(8) **Distinction between inside and outside fence line approaches**

EPA proposes that the distinction between "inside" and "outside" the fence measures is artificial because neither the addition of RE nor the reduction of demand directly reduces the atmospheric emission of CO_2; rather, they permit fossil EGUs to reduce their output and emissions, and are therefore "at the unit." The real issue then is whether §111(d) authorizes the EPA to require EGUs to curtail their own output to comply with this rule. (p. 34889, fn. 237).

(9) **State demonstrations of infeasibility**

During the comment period, a state may demonstrate that the application of one of the building blocks to it would not produce the emission reduction target specified by EPA due to technical infeasibility or costs were higher than projected. However, the feasibility of ramping up other building blocks will be considered before accepting such arguments. For example, if a state demonstrates that its coal-fired steam EGUs could only achieve an average 4% heat rate improvement, instead of the 6% that EPA has proposed in Building Block 1, EPA would not adjust the state's goal unless the state also demonstrates that it could not get additional reductions from application of the other Building Blocks, or in related measures. (p. 34893).

(10) **Federal enforceability of state plan**

EPA proposes to interpret CAA §111 to allow state plans to include federally-enforceable measures that are neither standards of performance nor measures that implement or enforce those standards, provided that the measures reduce CO_2 emissions from affected sources. The proposal hinges on EPA's interpretation of the word "for," noting that standards are reasonably considered to be ''for'' affected sources if they would have an effect on affected sources by, for example, causing reductions in affected EGUs' CO_2 emissions by decreasing the amount of generation needed from affected EGUs. (p. 34903).

(11) **Remaining useful life**

CAA §111(d)(1) relieves states from strictly applying a standard of performance by taking into consideration, among other factors, "the remaining useful life of the existing source to which such standard applies." EPA proposes that the flexibility provided in the state plan development process adequately allows for consideration of remaining useful life and therefore a separate application of the provision by states is unnecessary. (p. 34925).

(12) **Federalism**

Under Executive Order 13132, the EPA may not issue an action that has federalism implications, that imposes substantial direct compliance costs, and that is not required by statute, unless the federal government provides the funds necessary to pay the direct compliance costs incurred by state and local governments, or the EPA consults with state and local officials early

in the process of developing the proposed action. EPA relates its early consultation with state and local officials and notes that a detailed Federalism Summary Impact Statement (FSIS) describing the most pressing issues raised in pre- and post-proposal comments will be issued along with the final rule as required by Executive Order 13132 §6(b). (pp. 34947-34948).

As noted above, the Comprehensive Summary, which follows, closely tracks the structure and form of the CPP proposal as published in the Federal Register. While not every subsection is summarized, subsection headings are maintained for purposes of organization. Furthermore, page numbers referencing the Federal Register are provided in the body of the document for each citation and the use of citation shortcuts (i.e., "id") is confined to the footnotes.

The U.S. Environmental Protection Agency's Clean Power Plan:
A Comprehensive Summary

This paper summarizes each substantive section/subsection of the U.S. Environmental Protection Agency (EPA) Clean Power Plan (hereinafter referred to as the "Proposed Rule") published in the Federal Register June 18, 2014.[1] It should be used as a companion to the actual published proposal, a reference tool, and a comprehensive summary that highlights certain portions of the proposal, omits repetitive sections, and ignores portions of the rule that do not relate directly to compliance by states or which might not further the reader's understanding of the requirements of the proposed rule. Nonetheless, all section and subsection headings are retained in order to best follow the structure of the preamble. All references in the body of the text are to Federal Register page numbers.

The Proposed Rule was published in the Federal Register on June 18, 2014. The initial deadline for public comments to the EPA regarding the Proposed Rule was October 16, 2014, but on September 16, 2014, the deadline was extended to December 1, 2014. EPA will issue a Final Rule on June 1, 2015.

I. General Information

A. Executive Summary

1. Purpose of the Regulatory Action

The Executive Summary of the Proposed Rule:

- outlines the Proposed Rule;
- discusses the Proposed Rule's purpose;
- summarizes the Proposed Rule's major provisions, including the EPA's approach to determining each state's carbon dioxide ($CO_{2)}$ emission guidelines;
- describes the broad range of options available to states, including flexibility in timing requirements for plan submission and compliance deadlines under those plans; and
- describes briefly the estimated CO_2 emission reductions, costs and benefits expected to result from full implementation of the Proposed Rule. (79 Fed. Reg. 34830, 34842.)

According to EPA by 2030, if implemented, this rule would achieve CO_2 emission reductions from the power sector of approximately 30% from 2005 levels, resulting in net climate and health benefits of $48 billion - $82 billion. (p. 34842)

EPA states that "the most cost-effective system of emission reduction for greenhouse gas (GHG) emissions from the power sector under Clean Air Act (CAA) section 111(d) entails not only improving the efficiency of fossil fuel-fired electric generating units (EGUs), but also

[1] "Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units", 79 Fed. Reg. 34830-01 (June 18, 2014)

addressing their utilization by taking advantage of opportunities for lower-emitting generation and reduced electricity demand across the electricity system's interconnecting network or grid." (p. 34842). EPA indicates here that it intends to include resources in its Proposed Rule that reduce the utilization of CO_2-emitting EGUs by increasing utilization of lower- and zero-emitting EGUs (renewable energy and nuclear power) and through the use of demand side energy efficiency (EE) measures.

Throughout the Proposed Rule, EPA emphasizes (1) that the Proposed Rule "would continue progress already underway to lower the carbon intensity of power generation in the US;"[2] (2) that the interconnectedness of the network or grid underlies the Best System of Emission Reduction (BSER); and (3) that the components of the BSER have already been "adequately demonstrated" by the states, many of whom have been actively pursuing each building block which provide the bases for EPA's BSER determination.[3]

EPA states that the Proposed Rule allows states to pursue policies that

(1) Continue to rely on a diverse set of energy resources,

(2) Ensure electric system reliability,

(3) Provide affordable electricity,

(4) Recognize investments that states and power companies are already making, and

(5) Can be tailored to meet the specific energy, environmental and economic needs and goals of each state. (p. 34833).

a. Proposed Rule Elements

The two main elements of the Proposed Rule are:

(1) State-specific emission rate-based CO_2 goals and

(2) Guidelines for the development, submission and implementation of state plans.

The Proposed Rule does not prescribe how a state should meet its goal. Rather,

> CAA section 111(d) creates a partnership between the EPA and the states under which the EPA sets these goals and the states take the lead on meeting them by creating plans that are consistent with the EPA guidelines.

[2] The carbon intensity of energy supply is a measure of the amount of carbon dioxide associated with each unit of energy used. It directly links changes in carbon dioxide emissions levels with changes in energy usage. *International Energy Outlook 2013*, US Energy Information Association (http://www.eia.gov/forecasts/ieo/emissions.cfm).

[3] The "Best System of Emission Reduction" (BSER) is discussed at length below in Section VI.C.

(p. 34833)

Regarding timelines, the Proposed Rule offers flexibility with respect to timeframes for plan development and implementation, providing up to two or three years for submission of final plans and providing up to fifteen years for full implementation of all emission reduction measures, after the proposal is finalized. (p. 34833).

b. Policy Context and Industry Conditions

This subsection (Section I.A.1.b) discusses the dangers inherent in climate change and in further emission of GHGs. It notes that one of the President's Climate Action Plan goals is to reduce CO_2 emissions from power plants because fossil fuel-fired EGUs are by far the largest emitters of GHGs (primarily in the form of CO_2) among stationary sources in the US. (p. 34833).

The Proposed Rule notes that "in 2025, the average age of the coal-fired generating fleet is projected to be 49 years old, and 20 percent of units would be more than 60 years old if they remained in operation at that time." (p. 34834). It suggests, therefore, that states are expected to address changes necessitated by the aging fleet even in the absence of environmental regulation.

Regarding utility and ratepayer economic interests, the subsection suggests that states could use the Proposed Rule's flexibility to

(1) Reduce costs to consumers, minimize stranded assets, and spur private investments in renewable energy and energy efficiency technologies and businesses; and

(2) Work with other states on multi-state approaches that reflect the regional structure of electricity operating systems that exist in most parts of the country and are critical to ensuring a reliable supply of affordable energy (p. 34834).

c. CAA Section 111(d) Requirements[4]

Under §111(d) of the CAA, state plans must establish standards of performance that reflect the degree of emission limitation achievable through the application of the "best system of emission reduction" that, taking into account the cost of achieving such reduction and any non-air quality health and environmental impacts and energy requirements, the Administrator determines has been adequately demonstrated.[5] This language defines the BSER, which is the operative legal standard at issue in §111(d) of the CAA and the EPA's proposal.

The use of the term "reflect" indicates that the state's obligation is to establish standards of performance that meet the degree of emission limitation achievable through application of the

[4] In the federal register, this subsection appears to be mislabeled as subsection (a) which would be redundant and ought therefore to be labeled as subsection (c).

[5] 40 CFR 60.22(b)(5)

BSER, which is developed by the EPA. More specifically stated, under CAA section 111(a)(1) and (d), the EPA is authorized to determine the BSER and to calculate the amount of emission reduction achievable through applying the BSER. The state is authorized to identify the standard or standards of performance that reflects that amount of emission reduction. In addition, the state is required to include in its state plan the standards of performance and measures to implement and enforce those standards.[6] The state must submit the plan to the EPA, and the EPA must approve the plan if the standards of performance and implementing and enforcing measures are satisfactory. (p. 34834, fn. 7).

This subsection (Section I.A.1.c) also distinguishes a §111(d) state plan from a state implementation plan (SIP) for a criteria air pollutant national ambient air quality standard (NAAQS) under §110 of the CAA:

- §110 SIP – designed to meet the NAAQS for a criteria air pollutant for a particular area (not for a source category) within a timeframe specified in the CAA; NAAQS is based on the current body of scientific evidence and does not reflect cost considerations.

- §111(d) – designed to achieve a specific level of emission performance established for a particular source category within a timeframe determined by the Administrator (and to some extent by each state); emission level for the source category reflects determination of BSER which incorporates cost considerations, technical feasibility and other factors.

(p. 34834)

EPA notes that each building block has "been amply demonstrated via their current widespread use by utilities and states." (p. 34835). Yet, the building blocks do not comprise requirements themselves as

> a state could choose to achieve more reductions from one measure encompassed by the BSER and less from another, or it could choose to include measures that were not part of the EPA's BSER determination, as long as the state achieves the CO_2 reductions at affected EGUs necessary to meet the goal that the EPA has defined as representing the BSER.

(p. 34835)

2. Summary of the Proposal's Major Provisions

a. Approach

In determining BSER, the courts have interpreted the CAA to require the EPA to consider factors such as (1) technical feasibility, (2) costs, (3) size of emissions reductions, and

[6] The Proposed Rule did not develop rules for Vermont and the District of Columbia because current information indicated those jurisdictions have no affected EGUs. Also the EPA did not propose goals for Native American Territories or U.S. territories at this time. 79 Fed. Reg. 34830, fn. 258.

(4) technology.[7] (p. 34835). In determining BSER for this proposal, the EPA considered the reductions achievable through measures that reduce CO_2 emissions from existing fossil fuel-fired EGUs either by (1) reducing the CO_2 emission rate at those units or (2) reducing the units' CO_2 emission total to the extent that generation can be shifted from higher-emitting fossil fuel-fired EGUs to lower- or zero-emitting options. (p. 34835).

Noting that most states already have programs geared towards reducing unit-specific emissions (e.g., GHG performance standards) or utilization of fossil fuel-fired EGUs (e.g., renewable portfolio standards (RPS), energy efficiency resource standards (EERS), demand-side resource (DSR) programs), the proposal, in quantifying state goals, states that the EPA "assessed what combination of electricity production or energy demand reduction across generation facilities can offer a reasonable-cost, technically-feasible approach to achieving CO_2 emission reductions." (p. 34835).

Put another way, the measures the EPA considered either (1) reduce the carbon intensity of certain affected EGUs by improving the efficiency of their operations or (2) address affected EGUs' mass emissions by varying their utilization levels. (p. 34836).

These two approaches are reflected in the four building blocks that comprise the BSER:

(1) Reducing the carbon intensity of generation at individual affected EGUs through heat rate improvements.

(2) Reducing emissions from the most carbon-intensive affected EGUs in the amount that results from substituting generation at those EGUs with generation from less carbon-intensive affected EGUs (including natural gas combined cycle (NGCC) units under construction).

(3) Reducing emissions from affected EGUs in the amount that results from substituting generation at those EGUs with expanded low- or zero-carbon generation.

(4) Reducing emissions from affected EGUs in the amount that results from the use of demand-side EE that reduces the amount of generation required.[8] (p. 34836).

According to the proposal, the reason that the combination of all four building blocks represents the BSER is because "it achieves greater emission reductions at a lower cost, takes better advantage of the wide range of measures that states, cities, towns and utilities are already using to reduce CO_2 from EGUs, and reflects the integrated nature of the electricity system and the diversity of electricity generation technology." (p. 34836.) Finally, to meet its goal, a state may identify technologies or strategies that are not explicitly mentioned in any of the four building blocks as well as pursue multi-state compliance strategies. (p. 34837).

[7] E.g., whether the system promotes the implementation and further development of technology.

[8] Under the proposed BSER, some building blocks would apply to some, but not all, affected sources. Specifically, building block 1 would apply to affected coal-fired steam EGUs, building block 2 would apply to all affected steam EGUs (both coal-fired and oil/gas-fired), and building blocks 3 and 4 would apply to all affected EGUs. (Id., fn 9)

b. State Goals and Flexibilities

The EPA is proposing state-specific rate-based goals. Interim goals, which reflect both measures that can achieve emissions reductions in the short-term and measures that are longer-term, will apply over a 2020-2029 phase-in period. (p. 34837).

A multi-state approach incorporating either a rate- or mass-based goal would be approvable based upon a demonstration that the state's plan would achieve the equivalent in stringency, including compliance timing, to the state-specific rate-based goal set by the EPA (p. 34837).

In this subsection (Section I.A.2.b), EPA discusses the important balance between "rigor and consistency in calculating emission reductions reflecting the BSER" on one hand and "flexibility [for states] in establishing and implementing the standards of performance that reflect those emission reductions."[9] (p. 34837).

c. State Plans

i. **state plan approach**

State plans must include the following:

- Emission performance levels for its affected EGUs equivalent to the CO_2 goals in the EPA emission guideline
- Measures needed to achieve those emission levels and the overall goal
- A standard, or set of standards, of performance
- Implementing and enforcement measures
- Enforceable CO_2 emission limits that apply to affected EGUs
- A process for reporting on plan implementation, progress towards achieving the CO_2 goals, and implementation of corrective actions
- Beginning January 1, 2022, a comparison of emission performance achieved by affected EGUs with performance projected in the state plan. (p. 34838)

This subsection (Section I.A.2.c.i) introduces the term "portfolio approach," which could include enforceable CO_2 emission limits that apply to affected EGUs as well as other enforceable measures, such as RE and demand-side EE measures, that avoid EGU CO_2 emissions and are

[9] Rigor exists with respect to "the amount of emission reductions" and flexibility is provided with respect to "the range of measures that a state could include in its plan." (id).

implemented by the state or by another entity. (p. 34837). The portfolio approach is considered at length later in the proposal (Section VIII.A.1.b).

ii. **state plan components**

Evaluation and approval of state plans will be based upon:

(1) Enforceable measures that reduce EGU CO_2 emissions

(2) Projected achievement of emission performance equivalent to the goals established by the EPA, on a timeline equivalent to that in the emission guidelines

(3) Quantifiable and verifiable emission reductions and

(4) A process for reporting on plan implementation, progress toward achieving CO_2 goals, and implementation of corrective actions, if necessary. (p. 34838)

State plans must include the following components:

- Identification of affected entities
- Description of plan approach and geographic scope
- Identification of state emission performance level
- Demonstration that plan is projected to achieve emission performance level
- Identification of emission standards
- Demonstration that each emission standard is quantifiable, non-duplicative, permanent, verifiable, and enforceable
- Identification of monitoring, reporting, and recordkeeping requirements
- Description of state reporting
- Identification of milestones
- Identification of backstop measures
- Certification of hearing on state plan
- Supporting material

(p. 34838)

iii. **process for state plan submittal and review**

Under an optional, two-phased submittal process for state plans, each state is required to submit a plan by June 30, 2016 containing certain required components. If applicable, it must also document the reasons the state needs more time and assurances that the state will submit a complete plan by June 30, 2017 (single-state approach) or 2018 (multi-state approach). The components needed include: (1) a description of the plan approach, (2) initial quantification of the level of emission performance that will be achieved in the plan, (3) a commitment to maintain existing measures that limit CO_2 emissions, (4) an explanation of the path to completion, and (5) a summary of the state's response to any significant public comment on the approvability of the initial plan. (p. 34838).

States participating in a multi-state plan may submit a single joint plan on behalf of all of the participating states. (p. 34838). Finally, EPA approval decisions will be extended from four to twelve months.

iv**. timing compliance**

While states must begin to make reductions by 2020, full compliance with the CO_2 emission performance level in the state plan must be achieved by no later than 2030 (p. 34838). Further, a state would need to meet an interim CO_2 emission performance level on average over the 10-year period from 2020–2029, as well as achieve its final CO_2 emission performance level by 2030 and maintain that level subsequently.

This subsection (Section I.A.2.c.iv) also introduces an alternative less-stringent 5-year compliance period option and notes that states with current programs and those who put into place new programs would have those programs apply towards achievement of the state's 2030 CO_2 emission goal.[10] (p. 34839).

v**. resources for states**

The EPA has developed a dedicated website, www2.epa.goc/cleanpowerplantoolbox, to assist states in developing and implementing their plans. (p. 34839).

3. Projected National-Level Emission Reductions

The EPA projects reductions to annual CO_2 levels of 26-30% below 2005 levels depending upon the compliance year. (p. 34839).

4. Costs and Benefits

The EPA determined climate benefits, air pollution health co-benefits compliance costs (using the Integrated Planning Model or "IPM") and net benefits[11] under a multi-state approach and a state-specific approach using discounts rates of 3% and 7%.[12] (p. 34839). This subsection (Section I.A.4) notes additional un-quantified climate and co-benefits and projects employment impacts in terms of job gains. It concludes that "it is clear that the monetized benefits of this proposal are substantial and far outweigh the costs." (p. 34839).

[10] The subsection does not address the question of how existing programs get credited and what the limits are to crediting programs and measures.

[11] The difference between monetized benefits and compliance costs

[12] Discount Rate refers to the interest rate used in discounted cash flow (DCF) analysis to determine the present value of future cash flows. The discount rate in DCF analysis takes into account not just the time value of money, but also the risk or uncertainty of future cash flows; the greater the uncertainty of future cash flows, the higher the discount rate. See http://www.investopedia.com/terms/d/discountrate.asp

B. Organization and Approach for this Proposed Rule

This subsection (Section I.B) offers a description of each section of the preamble and notes that comments regarding issues that overlap between this and the proposed rules on newly constructed sources[13] and modified and reconstructed sources[14] should be made in this docket.[15]

II. Background

A. Climate Change Impacts from GHG Emissions

This subsection (Section II.A) summarizes the adverse public health and welfare impacts from the EPA's 2009 Endangerment Finding.[16]

1. Public Health Impacts Detailed in the 2009 Endangerment Finding

According to the Endangerment Finding, in raising average temperatures, climate change increases the likelihood of heat waves, and thereby death and illness, as increases in heat mortality will be larger than decreases in cold mortality in the United States. (p. 34842). Climate change is also expected to increase ozone pollution and the intensity and frequency of extreme weather (p. 34842).

2. Public Welfare Impacts Detailed in the 2009 Endangerment Finding

Threats to public welfare include reduced water supplies and increased water pollution; flooding damage to property and land loss due to rising sea levels (inundation, erosion, wetland submergence); increases in peak energy demand and threats to public utility infrastructure; and humanitarian and national security issues.

3. New Scientific Assessments

The Endangerment Finding based its scientific conclusions upon assessments from the following groups:

- U.S. Global Change Research Program (USGCRP)
- Intergovernmental Panel on Climate Change (IPCC) of the United Nations
- National Research Council (NRC) of the National Academies

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[13] 79 FR 1430. NGCC units that have commenced construction as of January 8, 2014 are considered "existing" units. See fn. 191.

[14] 79 Fed. Reg. 34960

[15] EPA-HQ-OAR-2013-0602

[16] *Endangerment and Cause or Contribute Findings for Greenhouse Gases Under Section 202(a) of the Clean Air Act*, 74 FR 66, 496 (Dec. 15, 2009).

Assessments released since the closing of the Endangerment Finding used to augment this proposal include:

- IPCC's 2012 ''Special Report on Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation'' (SREX) and the 2013–2014 Fifth Assessment Report (AR5)
- USGCRP's 2014 ''Climate Change Impacts in the United States''
- NRC's 2010 ''Ocean Acidification: A National Strategy to Meet the Challenges of a Changing Ocean''; 2011 ''Report on Climate Stabilization Targets: Emissions, Concentrations, and Impacts over Decades to Millennia''; 2011 ''National Security Implications for U.S. Naval Forces''; 2011 ''Understanding Earth's Deep Past: Lessons for Our Climate Future''; 2012 ''Sea Level Rise for the Coasts of California, Oregon, and Washington: Past, Present, and Future''; 2012 ''Climate and Social Stress: Implications for Security Analysis;'' and 2013 ''Abrupt Impacts of Climate Change.'' (p. 34842).

Taken together, these assessments warn that the climate system may be in one of the most severe increases in radiative forcing of the global climate system in Earth history; and the April 2014 reading of the monthly concentration of CO_2 exceeded 400 parts per million for the first time in the last 800,000 years according to ice core records. (pp. 34842-34843).

B. GHG Emissions from Fossil Fuel-Fired EGUs

This subsection (Section II.B) presents Tables 3 and 4, which take data from the US Inventory of Greenhouse Gas Emissions and Sinks[17] to indicate the relative magnitude of fossil fuel-fired and, within that category, coal-fired contributions to GHG emissions. It reveals that among stationary sources, fossil fuel-fired EGUs are by far the largest emitters and coal-fired units are by far the largest fossil fuel-fired emitters. (p. 34843).

C. The Utility Power Sector

While in 2013, over 67% of power in the US was fossil fuel-fired, over 38% of new generating capacity (over 5 GW out of 13.5 GW) built in 2013 used renewable power generation technologies. (p. 34843).

D. Statutory and Regulatory Requirements

This subsection (II.D) outlines EPA's responsibilities under §111 of the CAA. It states that CAA §111 establishes mechanisms for controlling air pollution emissions from stationary sources. (p. 34844). §111 requires the EPA to promulgate a list of categories of stationary sources that the Administrator finds "causes or contributes significantly to, air pollution which

[17] *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990–2012*, Report EPA 430–R–14–003, United States Environmental Protection Agency, April 15, 2014.

may reasonably be anticipated to endanger public health or welfare."[18] Once it lists a source category, the EPA must establish "standards of performance" for emissions of air pollutants from new sources in the source categories.[19]

These standards are known as new source performance standards (NSPS) and they are national requirements that apply directly to the sources subject to them. The establishment of NSPS for new sources in a source category requires the EPA, under CAA § 111(d)(1), to also issue regulations for states to submit plans regulating existing sources in that source category for any air pollutant that is not already regulated under CAA §109 National Ambient Air Quality Standards (NAAQS) requirements or CAA §112 Hazardous Air Pollutants (HAP) requirements. (p. 34844). The §111(d) mechanism for regulating existing sources differs from the §111(b) NSPS mechanism in that it contemplates states submitting plans that establish "standards of performance" for affected sources. (p. 34844).

Standards of performance are standards for emissions that reflect the emission limitation achievable from the "best system of emission reduction," considering costs and other factors, that "the Administrator determines has been adequately demonstrated."[20] Defining standards of performance as "standards for emissions" does not clarify the form of the standard that states are required to include in their §111(d) plans.

Under CAA §111(d), a state must submit its plan to the EPA for approval, and the EPA must approve plans that are "satisfactory."[21] If a plan is not submitted or not approved, the EPA must establish a plan for the state. Once a state plan is approved, it becomes federally enforceable against the entity responsible for noncompliance. The implementing regulations for §111(d) provide that EPA develop "emission guidelines" which establish binding requirements that states must address when theydevelop their plans.[22]

[18] CAA §111(b)(1)(A)

[19] CAA §111(b)(1)(B). For a list of air emission sources, please visit the EPA's website at http://epa.gov/air/emissions/basic.htm.

[20] CAA §111(a)(1). In applying a standard of performance to particular sources, a state is authorized to take into account the source's remaining useful life and other factors under CAA §111(d)(1).

[21] CAA §111(d)(2)(A)

[22] *Implementing Regulations,* 40 CFR 60.22 (1975). EPA explained that it used the term ''emissions guidelines''—instead of emissions limitations—to make clear that guidelines would not be binding requirements applicable to the sources, but instead are ''criteria for judging the adequacy of State plans.'' 40 FR at 53,343. EPA developed an emission guideline for each state (Table 8).

Notably, this subsection (Section II.D) draws an important distinction between the other industries for which EPA established emission guidelines under CAA §111(d),[23] and the emission guidelines established for the states to address carbon pollution. (p. 34845). The distinction involves

> the particular characteristics of carbon pollution, the interconnected nature of the power sector and the manner in which EGUs are currently operated…[s]pecifically, the operators…treat increments of generation as interchangeable between and among sources in a way that creates options for relying on varying utilization levels, lowering carbon generation, and reducing demand as components of the overall method for reducing CO_2 emissions.

(p. 34845). These statements suggest that the manner in which electricity is dispatched presented the EPA an opportunity to set the BSER and establish emission guidelines in a flexible manner unavailable to it when it established emission guidelines for other industries regulated under CAA §111(d).

III. Stakeholder Outreach and Conclusions

A. Stakeholder Outreach

This subsection discussed the EPA's outreach efforts to various stakeholder groups. Listening session summaries and emails received are available in a non-regulatory docket, EPA Docket No: EPA-HQ-OAR-2014-0020. EPA's summary of engagement will not be restated here.

1. The President's Call for Engagement (No Summary)

2. Educating the Public and Stakeholder Outreach (No Summary)

3. Public Listening Sessions (No Summary)

4. State Officials (No Summary)

5. Tribal Officials (No Summary)

6. Industry Representatives (No Summary)

7. Electric Utility Representatives (No Summary)

[23] (i.e., sulfuric acid plants (acid mist), phosphate fertilizer plants (fluorides), primary aluminum plants (fluorides), Kraft pulp plants (total reduced sulfur), and municipal solid waste landfills (landfill gases)

8. Electricity Grid Operators (No Summary)

9. Representatives from Non-Government Organizations (No Summary)

10. Labor (No Summary)

B. Key Messages from Stakeholders

Stakeholder messages to EPA are summarized at 40 CFR 60, p. 34847

C. Key Stakeholder Proposals

1. Model Rule on Interstate Emissions Credit Trading and Price Ceiling

Some stakeholders suggested that EPA put forward a model interstate emissions credit trading scheme, enabling the state to compensate merchant generators as well as retail rate payers, and a ceiling price (alternative compliance payment) to fund state-directed clean technology investment. (p. 34848).[24]

2. Equivalency Tests

Some stakeholders suggested that states demonstrate:

- Rate-based equivalency – a demonstration that the state program achieves equivalent or better carbon intensity for the regulated sector;
- Mass-based equivalency – a demonstration that the program achieves equal or greater emission reductions relative to what would be achieved by the federal approach; or
- Market price-based equivalency – a demonstration that the program reflects a carbon price comparable to or greater than the cost-effectiveness benchmark used by the EPA in designing the program. (p. 34848)

3. Power Plant Specific Assessments

Some stakeholders suggested an "inside the fence" plan or unit-specific assessment linked to the availability of control at the source for the establishment of carbon reduction goals; and, once established, the source would have flexibility to look "outside the fence" for the means to achieve those goals. (p. 34848)

D. Consideration of the Existing Range of Policies and Programs

State programs provided EPA with important information about best practices to build upon in this proposed rule, and the Presidential Memorandum directed EPA to build upon actions already underway in states and the power sector. (p. 34848).

[24] Facilities whose costs exceeded the ceiling price could opt to pay into the fund as a way of complying.

1. Market-based emission limits

This subsection (Section III.D.1) summarizes the Regional Greenhouse Gas Initiative (RGGI), a nine-state CO_2 emission budget trading program in which,[25] at the end of each three-year compliance period, "affected EGUs must submit CO_2 emission allowances equal to their reported CO_2 emissions." (p. 34848). Emissions may be traded among regulated and non-regulated parties creating a market for emission allowances. The market creates a price signal for CO_2 emissions which factors into the dispatch of affected EGUs. This subsection also summarizes the California Global Warming Solutions Act of 2006, which requires the state to reduce its 2020 GHG emissions to 1990 levels. (p. 34848)

2. GHG Performance Standards

Examples of existing state GHG performance standards includes New York, which requires new or expanded base load plants greater than 25 MW to meet an emission rate of either 925 lbs CO2/MWh or 120 lbs CO_2/MMBtu (p. 34849).[26] California, Oregon and Washington have enacted GHG emission performance standards that set an emission rate for electricity purchased by electric utilities.[27]

3. Utility Planning Approaches

Minnesota and Colorado developed multi-pollutant emission reduction plans on an investor-owned utility-wide basis. (p. 34849). For example, under Colorado's Clean Air, Clean Jobs Act, Xcel Energy submitted a plan projected to reduce its CO_2 emissions from generation in Colorado by 28% by 2020. (p. 34848, fn. 61).

4. Renewable Portfolio Standards

Twenty-five states that have mandatory renewable portfolio standards require retail electricity suppliers to supply a minimum percentage or amount of their retail electricity load with electricity generated from eligible sources of renewable energy. (p. 34848.) This subsection (Section III.D.4) summarizes Minnesota's Renewable Energy Standard (RES) and Oregon's RPS.

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[25] The nine states include Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New York, Rhode Island, and Vermont. See 79 Fed. Reg. 34830, fn. 47.

[26] Similarly, non-base load plants in New York of at least 25 MW or larger must meet an emission rate of either 1450 pounds CO_2/MWh (based on output) or 160 pounds of CO_2/MMBtu (based on input).

[27] In Oregon and Washington, electric utilities may enter into long term power purchase agreements for base load power only if the electric generator supplying the power has a CO_2 emissions rate of 1,100 lbs CO_2 per MWh or less. (id), fn. 59.

5. Demand-side Energy Efficiency Programs

This subsection (Section III.D.5) summarizes demand-side EE programs and notes that electricity savings from EE programs totaled approximately 22.9 million MWh in 2011, a 22% increase from 2010. It highlights efficiency gains from decades of such programs in California and through an "energy efficiency utility" in Vermont which in 2013 achieved an annual electricity savings of 1.66% of the state's electricity sales at about half the cost of comparable electric supply in the same year. (p. 34848).

6. Energy Efficiency Resource Standards

This subsection (Section III.D.6) describes energy efficiency resource standards (EERS's) which are typically multi-year requirements expressed as a percentage of annual retail electricity sales or as specific electricity savings amounts over a long term period relative to a baseline of retail sales. (p. 34848). It highlights Arizona's experience in which its largest utility achieved cumulative energy savings equivalent to 3.2% of retail sales from 2011-2012. (p. 34848, fn. 84).

E. Conclusions

These summaries demonstrate that the EPA considered successful state programs in concluding that the BSER it adopted should be based on emission reduction opportunities outside the fence line, as many states have demonstrated leadership in doing so. EPA also notes encouragement "for multi-state coordination in the development of multi-state and regional programs and policies." (p. 34851).

IV. Rule Requirements and Legal Basis

A. Summary of Rule Requirements

In summary, the EPA is proposing emissions specific guidelines for each state to use in developing plans to address GHG emissions from existing fossil fuel-fired EGUs. The guidelines are based on the EPA's determination of the BSER and include:

- State specific goals,
- General approvability criteria for state plans,
- Requirements for state plan components, and
- Requirements for the process and timing for state plan submittal and compliance.

(p. 34851).

Having reviewed the performance information of both affected EGUs and states' CO_2 emission reduction programs, EPA proposed state goals which reflect the following stringency of application of each building block:

- Block 1- improving average heat rate of coal-fired steam EGUs by six percent;

- Block 2 - displacing coal-fired steam and oil/gas-fired steam generation in each state by increasing generation from existing NGCC capacity in that state toward a 70 percent target utilization rate;

- Block 3 - including the projected amounts of generation achievable by completing all nuclear units currently under construction, avoiding retirement of about six percent of existing nuclear capacity, and increasing renewable electric generating capacity over time through the use of state-level renewable generation targets consistent with renewable generation portfolio standards that have been established by states in the same region;

- Block 4 - increasing state demand- side energy efficiency efforts to reach 1.5 percent annual electricity savings in the 2020–2029 period. (p. 34851)

The EPA states in this subsection (Section IV.A) that "measures that a state takes after the date of this proposal, and that result in CO_2 emission reductions during the plan period, would apply toward the achievement of the state's CO_2 goal." (p. 34851). However, many states question the extent measures that they have undertaken prior to the date of this proposal, and that have already reduced CO_2 emissions, will be credited during compliance evaluations.

The EPA notes in this subsection that for states participating in a multi-state approach, the individual state performance goals in the emission guidelines would be replaced with an equivalent multi-state performance goal. However, whether a single- or multi-state approach, the state may not adjust the stringency of the goals set by the EPA. (p. 34851.)

B. Summary of Legal Basis

EPA contends that it reasonably interprets the provisions of CAA §111(d) identifying which air pollutants are covered to authorize EPA to regulate CO_2 from fossil fuel-fired EGUs. EPA acknowledges that regulation under CAA §111(d) is predicated upon affected sources falling under CAA §111(b) <u>were they new sources</u>. EPA states as much:

> EPA recognizes that CAA section 111(d) applies to sources that, if they were new sources, would be covered under a CAA section 111(b) rule. The EPA intends to complete two CAA section 111(b) rulemakings regulating CO_2 from new fossil fuel-fired EGUs and from modified and reconstructed fossil fuel-fired EGUs before it finalizes this rulemaking, and either of those section 111(b) rulemakings will provide the requisite predicate for this rulemaking.

(p. 34852). EPA does not provide an explanation of the basis for the application of CAA §111(d) on existing EGUs being predicated upon the sources first appropriately falling under the CAA §111(b) regulation were they new.

EPA proposes two alternative BSER's:

(1) The combination of the four building blocks as the BSER – all of the measures are components of a "system of emission reduction" because they either improve the carbon intensity of the affected EGUs in generating electricity or "because of the integrated nature of the electricity system and the fungibility of electricity, they displace or avoid the need for generation from those sources and thereby reduce the emissions from those sources." These measures also constitute the "best" system of emission reduction "because they achieve the appropriate level of reductions, they are of reasonable cost, and they encourage technological development that is important to achieving further emission reductions." (p. 34852).

(2) Alternative Approach: Building block 1 + the reduction of affected fossil fuel- fired EGUs' mass emissions achievable through reductions in generation of specified amounts from those EGUs. Under this approach, the measures in building blocks 2, 3, and 4 would not be components of the system of emission reduction, but instead would serve as bases for quantifying the reduction in emissions resulting from the reduction in generation at affected EGUs. (p. 34852).

EPA is proposing that states be authorized to submit state plans that do not impose legal responsibility on the affected EGUs for the entirety of the emission performance level, but instead, impose requirements on other affected entities (e.g., renewable energy and demand-side energy efficiency measures) that would reduce CO_2 emissions from the affected EGUs. (p. 34853).

Regarding standards of performance, EPA notes that the state has flexibility in assigning the emission performance obligations to its affected EGUs, in the form of standards of performance—and, for the portfolio approach, in imposing requirements on other entities—as long as the required emission performance level is met. (p. 34853).

EPA states that its approach is fully consistent with principles of federalism because the emission performance requirement is achieved through a state plan, and states have flexibility to "take local circumstances and state policy goals into account" in determining how to reduce emissions from its affected sources, as long as the plan meets minimal federal requirements. (p. 34853).

V. Authority to Regulate Carbon Dioxide and EGUs, Affected Sources, and Treatment of Categories

A. Authority to Regulate Carbon Dioxide

EPA claims to have the authority to regulate CO_2 emissions under CAA §111(d) pursuant to its own construction of ambiguous provisions in CAA §111(d)(1)(A)(i) that identify the air pollutants subject to §111(d). During the process of amending the CAA in 1990, the U.S. House of Representatives and U.S. Senate each passed an amendment to CAA § 111(d)(1) (A)(i) which conflicted with each other and were never reconciled during Conference Committee. As a result, both amendments were enacted into law. (p. 34853).

Under the Senate amendment, CAA § 111(d)(1) excluded the regulation of any pollutant which is ''included on a list published under [CAA section] 112(b).''[28] Under the House amendment, CAA § 111(d)(1) excluded the regulation of any pollutant which is ''emitted from a source category which is regulated under § 112.''[29] The House amendment could be read to bar the EPA's ability to limit GHG emissions from existing fossil fuel-fired power plants because coal-fired power plants are "a source category which is regulated under" the air toxics provisions.[30] However, the Senate amendment only bars the regulation of any pollutant that is already regulated under CAA § 112 which regulates toxic air pollutants (GHGs do not fall under this category).

According to EPA, where there is statutory ambiguity, it may reasonably construe the provision to, in this case, authorize regulation of GHGs under CAA §111(d).[31] (p. 34853.) EPA used this interpretation of its authority to issue this proposed regulation.

B. Authority to Regulate EGUs

The language of CAA §111(d) establishes the above-noted CAA §111(b) predicate. Specifically, §111(d)(1) requires the EPA to promulgate regulations under which states must submit state plans regulating ''any existing source'' of certain pollutants to which a standard of performance would apply if such existing source were a new source. A ''new source'' is ''any stationary source, the construction or modification of which is commenced after the publication of regulations (or, if earlier, proposed regulations) prescribing a standard of performance under [CAA § 111] which will be applicable to such source.''

This subsection (Section V.B) notes that a "new source" includes a source that undertakes new construction or modification and that EPA's implementing regulations define "construction" to include "reconstruction." (pp. 34853-34854).[32] Under a strict reading of the language of §111(d)(1), existing sources only become subject to the provision if the EPA promulgates standards of performance under CAA §111(b) to which, if the existing sources were new

[28] Public Law 101-549, §302(a), 104 Stat. at 2574 (Nov. 15, 1990).

[29] Public Law 101-549, §108(g), 104 Stat. at 2467 (Nov. 15, 1990).

[30] See Weeks, Ann Brewster, *Essay Responding to Brian H. Potts*, 31 Yale J. on Reg. Online 38 (October 20, 2013).

[31] The Proposed Rule references American Electric Power Co. v. Connecticut, 131 S. Ct. 2527, 2537-38 (2011) to support the notion that the EPA actions authorized by the CAA displace any federal common law right to seek abatement of carbon dioxide emissions from fossil fuel-fired power plants because CAA §111 applies to CO_2 emissions from those sources. Id.

[32] The Implementing Regulations define reconstruction as the replacement of components of an existing facility to an extent that (i) the fixed capital cost of the new components exceeds 50 percent of the fixed capital cost that would be required to construct a comparable entirely new facility, and (ii) it is technologically and economically feasible to meet the applicable standards. (id).

sources, they would be subject. The EPA proposal does not provide a policy explanation for Congress' intent of predicating the regulation of existing sources under §111(d) upon the regulation of new sources under §111(b). Nonetheless, the EPA has initiated two rulemakings under CAA §111(b) covering both affected sources undertaking new constructions and affected sources undertaking modifications or reconstructions and will finalize "one or both" of the rulemakings prior to or concurrently with the §111(d) rulemaking to meet the requisite predicate in the language. (p. 34854).

C. Affected Sources

For the existing source rule, EPA proposes to define "affected sources" as any fossil fuel-fired EGU that was in operation or had commenced construction as of January 8, 2014, and is therefore an ''existing source'' for purposes of CAA § 111, "and that in all other respects would meet the applicability criteria for coverage under the proposed GHG standards for new fossil fuel-fired EGUs." (p. 34854.)[33]

For comparison, under the January 8, 2014 proposal for new EGUs (79 Fed. Reg. 1430), EPA defined "affected sources" as "any boiler, integrated gasification combined cycle (IGCC) or combustion turbine (in either simple cycle or combined cycle configuration) that (1) is capable of combusting at least 250 million Btu per hour; (2) combusts fossil fuel for more than 10 percent of its total annual heat input (stationary combustion turbines have an additional criteria that they combust over 90 percent natural gas); (3) sells the greater of 219,000 MWh per year and one-third of its potential electrical output to a utility distribution system; and (4) was not in operation or under construction as of January 8, 2014."[34] (p. 34854.)

D. Implications for Tribes and U.S. Territories

As EPA has yet to develop a proposal for GHG emission reductions for Tribes and U.S. Territories, this subsection requests comments on potential elements of a proposed rule and will not be summarized here.

E. Combined Categories and Codification in the Code of Federal Regulations

EPA states that it is soliciting comments on combining the two existing categories for affected EGUs into a single category for purposes of facilitating emission trading among sources in both categories.[35] (p. 34855). The two categories are fossil fuel-fired steam generating boilers

[33] EPA proposed GHG standards for new EGUs on January 8, 2014.

[34] The minimum fossil fuel consumption condition applies over any consecutive three-year period (or as long as the unit has been in operation, if less). The minimum electricity sales condition applies on an annual basis for boilers and IGCC facilities and over rolling three-year periods for combustion turbines (or as long as the unit has been in operation, if less). (Id).

[35] The creation of emission allowance systems cause market participants and system operators to take account of CO_2 emission rates as an element of their variable operating costs.

and fossil fuel-fired combustion turbines. In the January 8 rulemaking, the EPA co-proposed separate standards of performance for sources in the two categories and combining the two categories into a single category "solely for the purposes of the CO_2 emissions from new construction of affected EGUs." (p. 34855).

In the present rulemaking, the EPA is proposing separate emission guidelines for the two categories and is soliciting comment on combining the two categories into a single category for the purposes of the CO_2 emissions from existing affected EGUs. EPA clarifies that it is soliciting comments on whether combining the two categories would offer additional flexibility, for example, by facilitating implementation of CO_2 mitigation measures, such as shifting generation from higher to lower-carbon intensity generation among existing sources (e.g., shifting from boilers to NGCC units) or facilitating emissions trading among sources.[36] (p. 34855)

EPA also proposes to create a new subpart CFR (UUUU) which would include all GHG emission guidelines for the affected sources – utility boilers, IGCC units and natural gas-fired stationary combustion turbines. (p. 34855).

VI. Building Blocks for Setting State Goals and the Best System of Emission Reduction

A. Introduction

This subsection introduces the proposal's detailed discussion of the building blocks which serve as the basis for the standards of performance that the states must include in their state plans as required by CAA §111(d). (p. 43855). This section of the proposal provides an overview of the building blocks, a detailed discussion of them, possible combinations of the building blocks, and finally, as a legal matter, why the four building blocks taken together comprise the BSER. (p. 34855).

EPA also notes its mindfulness of stakeholder concerns[37] such as the needs to

- achieve meaningful CO_2 emission reductions at the affected facilities;
- recognize and take advantage of the progress already made by existing programs;
- maintain electric system reliability; and
- minimize adverse impacts on electricity and fuel prices and on assets that have already been improved by installation of controls for other kinds of pollution. (p. 34855).

B. Building Blocks for Setting State Goals[38]

[36] EPA emphasizes that combining the two categories would not redefine them or require new findings regarding contributions to air pollution from the categories as they are pre-existing and no additional sources would be subject to regulation.

[37] In addition, EPA notes here its mindfulness of the states having differing access to specific fuel types, dispatch systems and policies.

This subsection summarizes the EPA's analytic approach to determining the BSER for CO_2 emissions from existing EGUs.

1. Overview of Approach

EPA evaluated three basics groupings of strategies for reducing CO_2 emissions from EGUs:

- Reductions achievable through improvements in individual EGUs' emission rates (''building block 1'');
- EGU CO_2 emissions reductions achievable through re-dispatch from affected steam EGUs to affected NGCC units (''building block 2''); and
- EGU CO_2 emissions reductions achievable by meeting demand for electricity or electricity services through expanded use of low- or zero-carbon generating capacity (''building block 3'') and through expanded use of demand-side energy efficiency (''building block 4''). (p. 34856).

EPA states that aside from the first grouping, the other groupings play different roles in the two formulations of the BSER. In its first formulation, each grouping constitutes components of the BSER, while in the second formulation, the second two grouping serves as the basis for why a component of the BSER – reduced utilization of the higher-emitting affected EGUs – is adequately demonstrated. (p. 34856).

EPA explains that it was not appropriate to limit consideration of the BSER to the first grouping for three reasons:

(1) First, some strategies available in the other two groupings can support reduced CO_2 emissions from the fossil fuel-fired EGUs by significant amounts and at lower costs than some of the strategies in the first grouping.

(2) Second, strategies in all three groupings were already being pursued by states and sources taking advantage of the integrated nature of the electricity system, at least in part for the purpose of reducing CO_2 emissions.

(3) Third, if measures from the first grouping that improve heat rates at coal-fired steam EGUs were implemented in isolation, without additional measures that encourage substitution of less carbon- intensive ways of providing electricity services for more carbon-intensive generation, the resulting increased efficiency of coal-fired steam units would provide incentives to operate those EGUs more, leading to smaller overall reductions in CO_2 emissions ("the rebound effect," fn. 93).

[38] This subsection is labeled "Building Blocks for the Best System of Emission Reduction" in the body of the Proposed Rule, p. 34856

2. CO2 Reductions Achievable through Improvements in Individual EGUs' Emissions Rates

The first grouping of CO_2 emission reduction options that EPA evaluated as potential options for the BSER consists of measures that can reduce individual EGUs' CO_2 emission rates.[39] These measures include heat rate improvements,[40] CCS technology, and substituting lower-carbon fuels, such as natural gas, for high-carbon fuels such as coal.[41] (p. 34856).

EPA's assessment of heat rate improvements indicated achievement of CO_2 emission reductions at low costs although limited in quantity relative to other measures. EPA's analysis indicated average CO_2 emission reductions of 1.3 to 6.7 percent could be achieved by coal-fired steam EGUs through adoption of best practices, and that additional average reductions of up to 4 percent could be achieved through equipment upgrades.[42] EPA estimated that CO_2 reductions of between four and six percent from overall heat rate improvements could be achieved on average across the nation's fleet of coal-fired steam EGUs for net costs in a range of $6 to $12 per metric ton. (p. 34856).

While determining that application of CCS at existing EGUs offers a technical potential for CO_2 emission reductions of over 90%, substantial costs of retrofitting a CCS system into existing facilities, space limitations, and the collective costs of including CCS as a component of the BSER affecting costs and supply of energy nationally caused the EPA to not propose CCS as a component of the BSER for existing EGUs.[43] (p. 34857).

EPA also found that natural gas co-firing or conversion at coal-fired steam EGUs offer greater potential CO_2 emission reductions than heat rate improvements,[44] but the higher incremental cost of gas relative to coal would make CO_2 reductions achieved through conversion or co-firing cost approximately $83-$150 per metric ton. (p. 34857).

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[39] Emission rate is the amount of CO_2 emitted per unit of electricity output.

[40] Heat rate improvements involve improving the efficiency with which EGUs convert fuel heat input to electricity output.

[41] Substitution can be done through natural gas co-firing or conversion.

[42] Heat rate improvements pay for themselves at least in part through reductions in fuel costs, generally making this a relatively inexpensive approach for reducing CO_2 emissions. Id.

[43] In the January 8 Proposed Rule for new fossil fuel-fired EGUs, EPA found that CCS was adequately demonstrated, that costs were not unreasonable, and that application of partial CCS is the BSER. (see id, pp. 34856-34857).

[44] The 40% reduction is due to natural gas containing less carbon than coal. CO_2 reductions are generally proportional to the amount of gas substituted for coal.

3. CO_2 Emission Reductions Achievable through Re-Dispatch from Steam EGUs to NGCC Units

The second grouping of CO_2 emission reduction options involves reducing emissions by shifting generation among affected EGUs. Strategies in this grouping include using natural gas to generate electricity at a natural gas combined cycle unit (NGCC) and substituting that electricity for electricity from the coal-fired steam EGU or steam EGUs burning oil or natural gas. Stating that "re-dispatch" of generation is a well-established industry practice,[45] EPA proposes to consider it a basis for the BSER to reduce CO_2 emissions from existing EGUs.

EPA found that NGCC units can produce 46% more electricity from a given quantity of natural gas than can steam EGUs and that the cost of CO_2 reductions from re-dispatch would be approximately $30/metric ton. (p. 34857).

According to EPA, average reported availability of NGCC units exceeds 85%, and even while the ability to increase NGCC utilization rates are affected by infrastructure and system considerations,[46] EPA proposes an average NGCC utilization rate in the range of 65-75% as a reasonable target to be re-dispatched as part of the BSER. (pp. 34857-34858). EPA notes that successful re-dispatch of NGCC as a CO_2 reduction measure has been demonstrated through RGGI and California's Global Warming Solutions Act. (p. 34858).

4. CO_2 Emission Reductions Achievable through Other Actions Underway in the Industry

The third grouping involves two types of measures that support CO_2 emission reductions at affected EGUs:

- ongoing development and use of low- and zero-carbon generating capacity; and
- ongoing development and application of demand-side energy efficiency measures (p. 34858).

Low- and zero-carbon generating capacity provides electricity that can be substituted for generation from more carbon-intensive EGUs. Policies that encourage development of renewable energy capacity and discourage premature retirement of nuclear capacity could be useful elements of CO_2 reduction strategies and are consistent with current industry behavior. EPA has

[45] System operators routinely increase or decrease the electricity output of individual EGUs to respond to changes in electricity demand, equipment availability, and relative operating costs (or bid prices) of individual EGUs while observing reliability-related constraints. It has long been common industry practice for system operators to choose from among multiple EGUs when deciding which EGU to ''dispatch'' to generate the next increment of electricity needed to meet demand (id).

[46] For example, limits on the ability of the natural gas industry to produce and deliver the increased quantities of natural gas, the ability of steam EGUs to reduce generation while remaining ready to supply electricity when needed in peak demand hours, and the ability of the electric transmission system to accommodate the changed geographic pattern of generation.

estimated the costs of CO_2 reductions achievable through these policies to be in a range from $10 to $40 per metric ton. (p. 34858).

Demand-side energy efficiency programs produce electricity-dependent services with less electricity, and thereby support reduced generation from existing fossil fuel-fired EGUs by reducing the demand for that generation. Policies that encourage demand-side energy efficiency could be useful elements of CO_2 reduction strategies and are consistent with current industry behavior. EPA estimates that the costs of CO_2 emission reductions achievable consistent with such policies would be in a range of $16-$24 per metric ton. (p. 34858).

5. Summary of Building Blocks for the BSER

The results of EPA's analysis are the four building blocks that provide the foundation for the BSER. According to EPA, since each building block either results in improved operating efficiency or supports reductions in mass emissions at existing EGUs, each of the four building blocks represents a demonstrated basis for reducing CO_2 emissions from affected EGUs that is already being pursued in the power sector.

C. Detailed Discussion of Building Blocks and Other Options Considered

This subsection discusses

- the technical potential of each building block
- reasonableness of each building block's costs
- development of the data used in computation of the state CO_2 guidelines (and alternate guidelines), and
- measures not considered as part of the BSER

In developing the data inputs to be used in computing state goals, EPA estimated reasonable rather than maximum possible implementation levels for each building block in order to establish overall state goals that are achievable while allowing states to take advantage of the flexibility to pursue some building blocks more extensively, and others less extensively, than is reflected in the goal computations, according to each state's needs and preferences. (p. 34859).

1. Building Block 1 – Heat Rate Improvements

a. Ability of Heat Rate Improvements to Reduce CO_2 Emissions

The heat rate of an EGU[47] is the amount of fuel energy input needed to produce 1 kWh of net electrical energy output (and useful thermal energy in the case of cogeneration units). (p. 34859). Because an EGU's CO_2 emissions are driven primarily by the amount of fuel consumed,

[47] See p. 34859, fn. 109 for definitions of steam, combined cycle and IGCC EGUs

at any fossil fuel-fired EGU there is a strong correlation between potential heat rate improvements and potential reductions in carbon-intensity. (p. 34859). Based upon a 2009 study by the engineering firm Sargent & Lundy, EPA believes that implementation of all identified best practices and equipment upgrades at a facility could provide total heat rate improvements in a range of approximately 4% - 12%.[48] (p. 34859.) In addition to the Sargent & Lundy study, EPA also examined historical heat rate data and identified instances[49] where an EGU's heat rate experienced a substantial improvement in a short time— presumably because of equipment upgrades installed at that point in time—that was then sustained. These heat rate improvements ranged from 3 to 8 percent. (pp. 34859-34860).

b. Amounts of Heat Rate Improvements

EPA pursued two areas of analysis to estimate the technical potential of heat rate improvement opportunities: (1) the reduction of heat rate variability at individual coal-fired EGUs through adoption of best practices for operation and maintenance; and (2) heat rate improvement opportunities that could be achieved through further equipment upgrades. (p. 34860).

EPA's analysis of best practices to reduce heat rate variability involved computing hourly gross heat rates of approximately 900 individual EDUs by examining hourly heat input and hourly gross generation.[50] EPA evaluated the consistency with which individual EGUs maintained their hourly heat rates over time. Controlling for factors beyond the operators' control (hourly ambient air temperatures and hourly load levels), EPA considered the residual variability to indicate technical potential to increase heat rate consistency through adoption of operating and maintenance best practices. (p. 34860).

Best practices could include turning off unneeded pumps at reduced loads, installation of digital control systems, more frequent tuning of existing control systems, or earlier like- kind replacement of worn existing components. EPA estimated a range of 1.3-6.7% technical potential for improvement in the average heat rate of the entire fleet of coal-fired EGUs and settled upon a 4% heat rate improvement for the purpose of developing state-specific goals.[51]

The EPA's equipment upgrade analysis was based upon the aforementioned Sargent & Lundy study. Though the full subset of upgrades could, according to EPA, result in an aggregate heat rate improvement of 4%, EPA recognized that some EGUs have already implemented

[48] This study looked at the types of improvements that can be made at specific types of EGUs.

[49] These are referred to as "data apparent" instances. The data was compiled from EGU data submitted to EPA and EIA.

[50] Using data submitted to EPA by affected EGUs subject to EPA monitoring and reporting requirements.

[51] This estimate corresponds to the elimination, on average across the fleet of affected EGUs, of 30 percent of the deviation from top-decile performance in the hourly heat rate for each EGU not attributable to hourly temperature and load variation.

certain upgrades and settled on a technical potential for heat rate improvements from equipment upgrades of 2%. (p. 34860).

This subsection includes a note on the distinction between net heat rates (fuel used per unit of net energy output sent to the electric gird or used for thermal purposes) and gross heat rates (fuel used per unit of gross energy output). Auxiliary or parasitic load may represent from 4-12% of gross generation at a coal-fired steam EGU; however, the hourly generation data reported to EPA is gross generation and therefore the proposal does not include estimates of achievable parasitic load reductions.[52] (pp. 34860-34861).

The total of the estimated potential heat rate improvements (adding adoption of best practices to reduce heat rate variability to implementation of equipment upgrades) is 6%. Because of the close relationship between an EGU's fuel consumption and its CO_2 emissions, a six percent heat rate improvement would be associated with a reduction in CO2 emissions of approximately six percent. (p. 34861).

EPA's alternate proposal uses a 4% estimate of heat rate improvements from affected coal-fired steam EGUs.

c. Cost of Heat Rate Improvements

EPA estimates the cost of heat rate improvements associated with reducing CO2 emissions from affected EGUs as relatively low because any heat rate improvement made for the purpose of reducing CO2 emissions will also reduce the amount of fuel the EGU consumes to produce its electricity output. Thus, the cost of the heat rate improvements attributable to CO2 reductions would be the net cost to achieve the improvement after any savings from reduced fuel expense. (p. 34861). The cost analysis is summarized on p. 34861 of this subsection.

2. Building Block 2 – Dispatch Changes Among Affected EGU

a. Ability of Re-Dispatch to Reduce CO2 Emissions

This subsection (Section VI.C.2.a) begins with a description of dispatch and re-dispatch. Specifically, reliability – and operationally – constrained grid operators take advantage of the flexibility provided by the interconnected transmission system to decide which EGUs should be called upon to meet demand with generation at any point in time. (p. 34862). Further, dispatch decisions are based upon electricity demand at any point in time, variable costs of available EGUs, and system constraints. This system is called security-constrained economic dispatch and the re-dispatch of units to respond to changes in grid system conditions enables grid operators to provide reliable and affordable energy (p. 34862).

[52] The state-specific goals are expressed in the form of CO_2 emissions per net MWh, and reporting requirements for sources would be in the same form, allowing parasitic load reductions to contribute to improved measured heat rates. Id., fn. 118).

Moreover, SO2 and NOx emission programs as well as CO2 reductions programs such as RGGI have demonstrated the ability of markets to factor allowance costs into economic dispatch decisions. Non-market mechanisms, such as permitting requirements, can be used to impose limits on utilization of CO2 emissions at high-emitting EGUs, in which case demand-side programs or generation from lower-emitting EGUs have been used to meet demand.[53] (p. 34862).

b. Magnitude of Re-Dispatch

This subsection (Section VI.C.2.b) addresses the quantity of replacement generation that may be relied upon at reasonable cost. Fossil fuel-fired EGUs have relatively higher variable costs compared with renewable or nuclear units and are also relatively flexible, and are therefore generally the units that operators use to respond to intra-day and intra-week changes in demand. Thus, the primary re-dispatch opportunities among existing units available to EGU owners and grid operators generally consist of opportunities to shift generation among various fossil fuel-fired units, in particular between coal-fired EGUs (as well as oil- and gas-fired steam EGUs) and NGCC units (p. 34862.)

To estimate the magnitude of the opportunity to reduce CO2 emissions through re-dispatch to NGCC units, EPA examined NGCC design capability and availability and found that they could operate in base-load roles at much higher utilization rates. (pp. 34862-34863). EPA looked at historical data reported to it and determined that "a substantial number of existing NGCC units have proven the ability to sustain 70% utilization rates for extended periods of time, and determined that increasing the average utilization rate of NGCC units to 70% as part of an approach to reduce CO2 emissions from EGUs was technically feasible.[54] (p. 34863).

EPA also examined the technical capabilities of the natural gas supply and delivery system and the electric transmission system to accommodate a 70% NGCC unit utilization rate and concluded it would for the following reasons:

- the natural gas pipeline system is already supporting national average NGCC utilization rates of 60 percent or higher during peak hours and it is therefore reasonable to expect that similar utilization rates should be possible in other hours when constraints are typically less severe, and be reliably sustained for other months of the year. (p. 34863);
- the flexibility of the emission guidelines holds that even if constraints were placed on NGCC units in certain locations and hours, that would not prevent NGCC generation overall across a region in all hours (p. 34864);
- pipeline and transmission planners have repeatedly demonstrated the ability to relieve bottlenecks and expand capacity;

[53] EPA also analyzed net impacts from methane emissions and determined that they are likely to be small compared to CO_2 emissions reduction impacts of re-dispatching from coal-fired steam EGUs to NGCC units. (id).

[54] A 70% NGCC units utilization rate correlates to over 1,440 TWh of generation per year.

To further support its building block 2 proposal, EPA cites to projections of sustained natural gas supply increases and references its Integrated Planning Model (IPM), "a multi-regional, dynamic, deterministic linear programming model used to evaluate the economic and emission impacts of prospective environmental policies.[55] (p. 34864). IPM arrived at solutions for scenarios reflecting average NGCC utilization rates of 65, 70 and 75% even while market, technical and regulatory constraints were embedded in the model. (p. 34864).

c. Cost of Re-Dispatch

The cost of CO2 emission reductions that can be achieved through re-dispatch among existing fossil fuel-fired EGUs depends on the relative variable costs of electricity production at EGUs with different degrees of carbon intensity. (p. 34865). These variable costs are driven by the EGUs' respective fuel costs and by their heat rates. Historically, natural gas has had a higher cost per unit of energy content (e.g., MMBtu) than coal in most locations, but for NGCC units this disadvantage in fuel cost per MMBtu relative to coal-fired EGUs is typically offset in significant part, and sometimes completely, by a heat rate advantage. (p. 34865).

EPA states that it conducted two sets of analyses, using IPM, to help inform the development of the state-specific emission goals. The first set was a dispatch-only set to help understand the economic and emission implications of shifting generation to NGCC units without considering emission reduction measures contained in the other building blocks. The second set included additional refinements and reflected all characteristics of the proposed goals that were used as a basis for assessing the costs and benefits of the overall proposal. (p. 34865).

The purpose of the dispatch-only analysis was to understand the extent that existing NGCC units could increase their dispatch at a reasonable cost and without impacting the prices of natural gas and electricity. (p. 34865). The analysis evaluated how grid operators might respond to state plans that include requirements, incentives or signals to re-dispatch to NGCC units at specified annual utilization rates. The 70% utilization rate scenario (compared to a business-as-usual case) indicated that the average cost of CO2 reductions achieved over the 2020-2029 compliance period was $30/metric ton of CO2.[56]

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[55] IPM incorporates representations of constraints related to fuel supply, transmission, and unit dispatch; includes a detailed representation of the natural gas pipeline network and the capability to project economic expansion of the network based on pipeline load factors; and at the EGU level, includes detailed representations of key operational limitations such as turn-down constraints, which are designed to account for the cycling capabilities of EGUs to ensure that the model properly reflects the distinct operating characteristics of peaking, cycling, and base load units. (id).

[56] However, the 70 percent utilization rate in the scenario exaggerates the stringency with which building block 2 is actually reflected in each of the state goals: While the goal computation procedure uses 70 percent as a target NGCC utilization rate for all states, for only 29 states do the goals actually reflect reaching that target NGCC utilization, with the result that the average NGCC utilization rate reflected in the computed state goals is only 64 percent. Also, in practice, states would have flexibility to choose among alternative CO_2 reduction strategies that were part of the BSER, instead of relying on re-dispatch to the maximum extent.

EPA's alternate state goal under building block 2 is a 65% NGCC utilization rate at a cost of CO2 emission reduction of $21/metric ton.

3. Building Block 3 – Using an Expanded Amount of Less Carbon-Intensive Generating Capacity

a. Renewable Generating Capacity

In 2012, electricity generated from renewable technologies, including conventional hydropower, represented 12 percent of total U.S. electricity generation, up from 9 percent in 2005. More than half the states have established renewable portfolio standards (RPS) that require minimum proportions of electricity sales to be supplied with generation from renewable generating resources.[57] (p. 34866).

i. **Proposed Quantification of Renewable Energy Generation**[58]

To estimate the CO_2 emission reductions from affected EGUs achievable based on increases in renewable generation, the EPA developed a ''best practices'' scenario for renewable energy generation based on the RPS requirements already established by a majority of states. EPA believes use of existing state RPS requirements as a foundation upon which to develop its building block is reasonable for two reasons: (1) states have already assessed their requirements for feasibility and costs; and (2) the state RPS' reflect consideration of the states' own respective regional contexts.[59]

EPA grouped the states into six regions to develop its best practices scenario. (pp. 34866-34867). EPA states that it was able to take regional variation into account by comparing each state to a set of neighbors rather than to a single national standard. It states further that this structure accounts for similar power system characteristics as well as geographic similarities in RE potential. The groupings are presented in Table 5. (p. 34867).

To develop its best practice scenario, EPA:

- Quantified the amount of renewable generation in 2012 in each state and summed the amounts in each region to determine a "regional starting level of renewable generation."[60]

[57] It should be noted that the definition of renewable generating sources may differ in each state.

[58] These subsections are labeled with Arabic numbers in the Proposed Rule but use lower case roman numerals here for consistency.

[59] EPA believes the regional structure of this estimation exercise supports a broad interpretation of RPS requirements across states within a region as a proxy for reasonable-cost RE generation potential within the same region. See id, fn. 150.

[60] Hydropower generation was excluded so that regional targets were not distorted.

- Estimated the aggregate target level of RE generation in each region by averaging the existing RPS percentage requirements applicable in 2020 multiplied by total 2012 generation for each region;

- Computed the regional RE growth factor necessary to increase regional RE generation from the regional starting level to the regional target through investments in new RE beginning in 2017;

- Developed the annual RE generation levels for each state by applying the regional growth factor to each state's initial RE generation level (beginning in 2017) and stopping at the point when additional growth would cause the state to exceed its RE generation target.

Table 6 (p. 34868) shows the cumulative RE amounts for each state as percentages of total generation.[61] EPA notes that RE generation levels represent total amounts rather than incremental amounts above a particular baseline, and as such, the date of RE capacity installations is irrelevant. (p. 34869).[62]

ii. **Cost of CO_2 Emission Reductions from RE Generation**

According to an EPA analysis based on EIA levelized costs, the cost to reduce CO_2 emissions through RE ranges from $10-$40 per metric ton. The proposal cites to additional studies that have found other cost figures even lower than the EIA estimates.[63]

iii. **Alternate Approach to Quantification of RE Generation**

EPA's alternative approach to quantification of RE to support the BSER relies on a state-by-state assessment of RE technical and market potential, and uses two sources of analysis:

(1) A metric measuring realization of RE technical potential based upon technology type as assessed by NREL,[64] and yielding for each state and each RE technology a proportion of RE

[61] Under this approach, some states have final RE generation targets less than the amounts reported in 2012 (Iowa, Maine, Minnesota, South Dakota). Also, Washington's target RE would exceed its 2012 fossil-fuel based generation.

[62] States in a given region where a higher proportion of total generation has already been achieved from renewable resources are assumed to have less opportunity for deployment of additional renewable generation as part of the BSER framework informing state goals, in comparison to states in that region where the proportion of total generation achieved from renewable resources to date has been lower. (id).

[63]Chen et al., ''Weighing the Costs and Benefits of State Renewable Portfolio Standards: A Comparative Analysis of State-Level Policy Impact Projections,'' Lawrence Berkeley National Laboratory, March 2007; Galen Barbose, ''Renewables Portfolio Standards in the United States: A Status Update,'' Lawrence Berkeley National Lab, November 2013.

[64] Lopez et al., NREL, ''U.S. Renewable Energy Technical Potentials: A GIS-Based Analysis,'' (July 2012).

technical potential that has been achieved and is represented as a development rate;[65] (p. 34869) and

(2) IPM modeling of RE deployment at the state level which reflects a reduced cost of building new RE generating capacity based upon "the avoided cost of other actions that could be taken instead to reduce CO_2 emissions from the power sector. (p. 34870).

Under the alternative approach, EPA would quantify RE generation for each technology in each state as the lesser of (1) the technology's benchmark rate multiplied by its in-state technical potential or (2) The IPM-modeled technical potential for that technology. (p. 34870). Finally, EPA would determine for each state a total level of RE generation that equals the sum of the generation quantified for each of the assessed RE technologies in that state. (p. 34870).

b. New and Preserved Nuclear Capacity

Nuclear generating capacity facilitates CO_2 emission reductions at fossil fuel- fired EGUs by providing carbon-free generation that can replace generation at those EGUs. (p. 34870). Re-dispatching to increase nuclear generation, according to EPA, is a technically-viable approach to support reducing CO_2 emissions from affected EGUs. (p. 34870).

i. **Proposed Quantification of Nuclear Generation**

Due to expense, quantification of nuclear generation will not be based upon projected new nuclear capacity, but rather on five nuclear EGUs currently under construction[66] and the preservation of existing nuclear capacity that might otherwise be retired.[67] EIA has projected an additional 5.7 GW of capacity reductions to the nuclear fleet,[68] which comprises about 6% of nuclear capacity and which EPA considers a reasonable proxy for the amount of nuclear capacity at risk of retirement. (pp. 34870-34871).

[65] For example, a given state has 500 MWh of solar generation in 2012 while NREL assesses that state's solar generation technical potential at 5,000 MWh/year, then that state's solar RE development rate would be ten percent. (id., pp. 34869-34870)

[66] Watts Bar 2 in Tennessee, Vogtle 3–4 in Georgia, and Summer 2– 3 in South Carolina. The EPA believes that since the decisions to construct these units were made prior to this Proposed Rule, it is reasonable to view the incremental cost associated with the CO_2 emission reductions available from completion of these units as zero for purposes of setting states' CO_2 reduction goals (id).

[67] The EPA is aware of six nuclear EGUs at five plants that have retired or whose retirements have been announced since 2012: San Onofre Units 2–3 in California, Crystal River 3 in Florida, Kewaunee in Wisconsin, Vermont Yankee in Vermont, and Oyster Creek in New Jersey.

[68] Jeffrey Jones and Michael Leff, EIA, ''Implications of accelerated power plant retirements,'' (April 2014).

ii. **Cost of CO_2 Emission Reductions from Nuclear Generation**

EPA cites a recent report indicating that nuclear units may experience up to a $6/MWh shortfall in covering their operating costs with electricity sales and estimates that the value of offsetting the revenue loss at these units is $12-$17 per metric ton of CO_2.[69] EPA proposes that the emissions reductions supported by retaining 6% of each state's historical nuclear capacity should be factored into the state goals.[70] (p. 34871).

4. Building Block 4 – Demand-Side Energy Efficiency

a. Benefits of Demand-Side Energy Efficiency

This subsection (Section VI.C.4.a) references state-based examples of reductions to demand through successful demand-side programs and provides a case for including demand-side EE programs into a comprehensive approach to reducing power sector CO2 emissions. (p. 34871).

b. Best Practices for Demand-Side Energy Efficiency

To estimate the potential CO2 reductions at affected EGUs that could be supported by implementation of demand-side energy efficiency policies as a part of state goals, the EPA developed a ''best practices'' demand- side energy efficiency scenario. (p. 34872). This subsection describes a number of successful EE programs and, based upon the achievements of twelve states, considers a 1.5% annual incremental savings rate to be a reasonable estimate of the EE policy performance that "can be achieved by all states given adequate time."[71] (p. 34872).

For the best practices scenario, EPA estimated that each state's annual incremental savings rate increases from its 2012 annual savings rate to a rate of 1.5% over a period of years starting in 2017.[72] The pace at which states are estimated to increase their savings rate level is .2% per year, a rate consistent with past performance and future requirements of the leading

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[69] ''Nuclear * * * The Middle Age Dilemma?'' Eggers, et al., Credit Suisse, February 2013. See FR, fn. 168.

[70] IPM estimates that retaining the estimated six percent of nuclear capacity that is at risk for retirement could support avoiding 200 to 300 million metric tons of CO_2 over an initial compliance phase-in period of ten years.

[71] This incremental savings rate and all others discussed in this subsection represent net, rather than gross, energy savings. Gross savings are the changes in energy use (MWh) that result directly from program-related actions taken by program participants, regardless of why they participated in a program. Net savings refer to the changes in energy use that are directly attributable to a particular energy efficiency program after accounting for free-ridership, spillover, and other factors. See id, fn. 180.

[72] The goal for each state differs to reflect the assumption that in a state already close to a 1.5 percent annual incremental savings rate, energy efficiency programs can be expanded to reach that rate sooner than in a state that is further from that rate.

states. For states already at or above the 1.5% rate, EPA estimates that they would realize a 1.5% rate in 2017 and maintain that rate through 2029. (pp. 34872-34873). For all states EPA assumes the initial savings rate (the lower of their 2012 value or 1.5 percent) is realized in 2017 and increases each year by 0.2 percent until the target rate of 1.5 percent is achieved and is then maintained at that level through 2029.[73] (p. 34873).

For example, a state with a reported savings rate of 0.5% in 2012 is assumed to realize a 2017 savings rate of 0.5% and their savings rates for 2018, 2019, 2020, 2021 and 2022 are calculated to be 0.7%, 0.9%, 1.1%, 1.3%, and 1.5%, respectively. By this method, all states have reached the 1.5% target rate by 2017 at the earliest. (p. 34873, fn. 183).

Under the EPA's alternative approach for setting state CO_2 reduction goals, the demand-side EE requirement uses 1.0% rather than 1.5% annual incremental savings as representative of the best practices level of performance. The pace at which incremental savings increase is relaxed from .2% to .15%. Table 7 (FR, p. 34873) summarizes the proposal and alternate proposal.

c. Costs of Demand-Side EE

EPA states that it expects demand-side EE policies to be implemented at reasonable costs for two reasons: (1) the specific savings levels were developed based upon the experience and success of states for the purpose of providing economic benefits to electric consumers; and (2) EPA's analysis indicates that costs are reasonable even with conservative estimates. (p. 34873).

Pursuant to the main proposal, state-based cost effectiveness tests, independent studies and bill reductions over the life of the EE measure indicate the reasonableness of costs. Under the second perspective, which compared demand-side EE costs with avoided power system costs, EPA found a levelized cost of saved energy range of $85/MWh to $90/MWh over the 2020-2030 period.[74] (p.34873) EPA also suggests that these cost savings are conservative compared to most utility and state analyses. (p. 34873).

Pursuant to the alternative approach, and using IPM, EPA compared the results of the above scenario with a business as usual scenario and found that the average costs of the CO_2 reductions achieved ranged from $16 - $24/metric ton CO_2. (p. 34875)

[73] The savings from energy efficiency programs are cumulative, meaning that, in simplified terms, a state in which a sustained program is implemented with a 1.5 percent annual incremental savings rate could expect cumulative annual savings of approximately 1.5 percent after the first year, 3.0 percent after the second year, 4.5 percent after the third year, and so on. (id).

[74] Factors in the analysis include the average energy efficiency program costs per unit of first-year energy savings ($/MWh), the ratio of program to participant costs, and the lifetimes of energy efficiency measures across the full portfolio of programs. In addition, the EPA has included a cost escalation factor to represent the possibility of increased costs associated with higher levels of incremental energy savings rates and the national scope of the best practices scenario.

5. Potential Emission Reduction Measures not used to Set Proposed Goals

Four potential measures that EPA did not propose to be part of the BSER adequately demonstrated for EGUs and therefore did not use for state goal-setting purposes include:

- Fuel-switching at individual EGUs
- CCS
- Using expanded amounts of new NGCC capacity as replacement generation and
- Heat rate improvements at affected EGUs other than coal-fired steam EGUs.

a. Fuel Switching at Individual Units

While replacing coal with natural gas at individual plants is technically feasible and would reduce CO_2 emissions, plant modifications (equipment or pipeline infrastructure) and increased fuel costs suggest that there are more cost-effective opportunities for coal-fired utility boilers to reduce CO_2 emissions than through natural gas conversion or co-firing (p. 34875).

While EPA did not propose fuel-switching to natural gas at existing EGUs in the setting of state carbon reduction goals, it nonetheless recognizes that (1) some utilities have undertaken certain levels of switching already; (2) there may be economic reasons to burn natural gas rather than coal such as avoiding pollution control installations or operating at lower loads; and (3) co-health benefits exist from burning natural gas instead of coal. (p. 34876).

b. Carbon Capture and Storage

In EPA's proposal for standards of performance for new fossil-fuel EGUs, EPA proposed that partial CCS was the BSER because "partial CCS has been adequately demonstrated, it is technically feasible, it can be implemented at costs that are not unreasonable, it provides meaningful emission reductions, and its implementation will serve to promote further development and deployment of the technology."[75] (p. 34876)). EPA did not propose CCS as the BSER for new NGCC units noting technical challenges and greater price impacts due to the majority of new units projected to be NGCC. (p. 34876).

While EPA notes that partial CCS has been demonstrated at existing EGUs, the costs of integrating a retrofit CCS system into an existing facility would be substantial and would affect the nationwide cost and supply of electricity on a national basis. (p. 34876). Therefore, CCS is not proposed as part of the BSER or in the setting of state goals for this rule.

c. New NGCC Capacity

While EPA views the opportunity to reduce CO_2 emissions at affected EGUs by adding new NGCC capacity as feasible, this approach is more costly than increasing utilization rates of existing NGCC plants due to the following reasons: (1) the costs of CO_2 reductions increase at

[75] EPA also noted in the Proposed Rule that most of the relatively few new boiler and IGCC EGU projects currently under development are already planning to implement CCS, and, as a result, the proposed standard would not have a significant impact on nationwide energy prices. (id).

higher NGCC utilization rates; (2) capital investment costs; and (3) uneven pipeline infrastructure expansion costs. (pp. 34876-34877). Therefore, re-dispatch to new NGCC capacity is not proposed as part of the BSER and in the setting of state goals.

d. Assessment of Heat Rate improvement Opportunities at Oil- or Gas-Fired Steam EGUs, NGCC Units and Simple-Cycle Combustion Turbines

EPA determined that the total additional potential CO_2 reductions achievable through heat rate improvements for non-coal technologies appear relatively small compared to the potential CO_2 reductions achievable through heat rate improvements at coal-fired steam EGUs, and therefore, EPA did not propose to include heat rate improvements at non-coal fossil fuel-fired units as an element of the BSER. (p. 34877).

D. Potential Combinations of the Building Blocks as Components of the Best System of Emission Reduction

1. Reasons for Considering Combinations of Building Blocks

EPA initially considered a BSER comprising only of strategies within building block 1, but decided to combine building block 1 with the other building blocks for the following reasons:

- additional strategies can be utilized in combination with building block 1 that are technically feasible, can be implemented at reasonable cost, and result in greater emission reductions than would be achieved through building block 1 strategies alone;

- if the measures that improve heat rates at coal-fired steam EGUs in building block 1 are implemented in isolation, without additional measures that reduce overall electricity demand or encourage substitution of less carbon-intensive generation for more carbon-intensive generation, the resulting increased efficiency of coal-fired steam units would provide incentives to operate those EGUs more, leading to smaller overall reductions in CO_2 emissions (the "rebound effect"); and

- states and other sources were already implementing strategies in the other building blocks for the purpose of reducing CO_2 emissions. (p. 34877).

2. A Combination of Building Block 1 and 2 as the BSER

In this system, emission reductions at the most carbon-intensive individual affected EGUs would occur through a combination of heat rate improvements (resulting in a decrease in emission rates) and substitution of generation at less carbon-intensive affected EGUs, notably

existing NGCC units. One reason for considering a BSER comprising these two building blocks is that it involves only affected EGUs and generation from affected EGUs. (p. 34878).[76]

However, EPA rejects this approach as the BSER because it deems the combination of all four building blocks capable of achieving greater CO_2 reductions from affected EGUs at reasonable costs than an approach combining only building blocks 1 and 2.

3. A Combination of all Four Building Blocks as the BSER

EPA proposes that the BSER is a combination of all four building blocks because (1) each building block is a proven way to support either improvement in emissions rates at affected EGUs or reductions in EGU mass emissions; (2) each is in widespread use and is independently capable of supporting significant CO_2 reductions from affected EGUs, either on an emission rate or mass-emissions basis, at a reasonable cost consistent with ensuring system reliability; and (3) the combination of all four building blocks can achieve greater overall CO_2 emission reductions from affected EGUs, at a lower cost per unit of CO_2 eliminated, than the combination of building blocks 1 and 2. (p. 34878).

E. Determination of the Best System of Emission Reduction

1. Overview

This subsection explains the EPA's interpretation of the term "best system of emission reduction…adequately demonstrated." The EPA proposes two alternative formulations of the BSER, each based upon the four building blocks. Under the first approach, emission rate improvements and mass emission reductions at affected EGUs facilitated through the adoption of the four building blocks themselves meet the criteria for the BSER because they will amount to substantial reductions in CO_2 emissions achieved while maintaining fuel diversity and a reliable, affordable electricity supply for the United States.

Under the second approach, the BSER consists of building block 1 coupled with reduced utilization in specified amounts from higher emitting affected EGUs. Under this latter approach, the measures in building blocks 2, 3, and 4 serve to justify those amounts and the ''adequate[ ] demonstrat[ion]'' because they are proven measures that are already being pursued by states and the industry for the purpose of reducing CO_2 emissions from affected EGUs. (p. 34878).

[76] EPA notes that in combination, the need to achieve the level of emission reductions achievable through use of building block 2 can mitigate the concern that building block 1, implemented alone, would make coal-fired EGUs more economically competitive and lead to increased generation that would offset the emission reduction benefits of the carbon-intensity improvements. (id).

2. Statutory and Regulatory Provisions Related to Determination and Application of the BSER

In this subsection, (Section VI.E.2) the proposal notes that the courts have interpreted the term "standards of performance," in a manner requiring EPA to determine BSER based upon:

(1) technical feasibility
(2) amount of emissions reductions
(3) reasonable costs; and
(4) development and implementation of technology.

(p. 34879).

The subsection then turns to flexibility, asserting that EPA has flexibility to weigh various considerations (and vary the weighting) and the state has flexibility to adopt emission reduction measures provided it achieves the required level of emission performance for affected sources. (p. 34879). It concludes by listing the five other source categories EPA has regulated under CAA §111(d)[77] and indicating that regulation of the electric industry is unique from the preceding examples due to its larger scale, "central importance to the economy," and highly interconnected nature. (pp. 34879-34880).

3. The Interconnected Nature of the US Electricity Sector

The proposal describes the U.S. electricity system as "a highly interconnected, integrated system in which large numbers of EGUs using diverse fuels and generating technologies are operated in a coordinated manner to produce fungible electricity services for customers." (p. 34880). This subsection (Section VI.E.3) provides examples of advantages that the integrated electric system offers when the goal is pollution reduction. Each program, according to the proposal, was designed to

> take advantage of the fact that in an integrated electricity system, some EGUs can reduce emissions at lower costs than others, and that by allowing the industry to determine through market mechanisms which EGUs to control and which to leave uncontrolled, and which EGUs to potentially operate more and which to potentially operate less, overall compliance costs can be reduced.[78]

(p. 34880.)

[77] Phosphate fertilizer plants, sulfuric acid mist, Kraft pulp mills. Primary aluminum plants, and Municipal solid waste landfills. Fn. 200.

[78] Further, the integrated electricity system plays the important function of allowing some EGUs to reduce their generation while ensuring that overall demand for electricity services can be reliably met. (id).

This subsection next summarizes California's Global Warming Solutions Act of 2006 (AB32), the Colorado Clean Air, Clean Jobs Act of 2010 and the Northeastern Regional Greenhouse Gas Initiative (RGGI) and notes the advantages that the integrated nature of the grid affords when meeting pollution reduction requirements with policies or resources that are outside the fence.

The proposal states that the California law has put in place mechanisms that through market dynamics affect both companies' longer-term planning decisions and their short-term dispatch decisions. The need to hold emissions allowances and the reduced demand from demand-side energy efficiency programs impact longer-term decisions companies make about investment in both existing and new EGUs. The price of emission allowances also impacts hourly dispatch decisions; where emission allowance requirements are in effect, EGU owners routinely recognize the costs of emission allowances as components of the variable operating costs that are relied on for these decisions.[79] (pp. 34880-34881).

Similarly, the proposal states that the Colorado law focused more on impacting companies' longer-term planning decisions than on affected short-term dispatch decisions, and Colorado utilities have adopted measures such as retrofits, natural gas conversions, coal retirements and new NGCC construction. (p. 34881). Referring to RGGI, the proposal notes its flexibility in multi-year compliance periods, allowance banking, offsets, auction reserve price, and cost-containment reserve of allowance, and also allowing trading between regulated and non-regulated parties. (p. 34881).

4. Evaluation of Individual Building Blocks Against the BSER Criteria

These subsections restate the EPA's reasons for including each building block as a component of the BSER and include discussion of the non-air health and environmental benefits of each building block. (pp. 38881-34884). They will not be re-summarized here.

a. Building Block 1 – Heat Rate Improvements (No Summary)

b. Building Block 2 – Re-dispatch (No Summary)

c. Building Block 3 – Use of Expanded Low- and Zero – Carbon Generating Capacity (No Summary)

d. Building Block 4 – Increased Demand-Side Energy Efficiency (No Summary)

5. Evaluation of Building Block Combinations against the BSER Criteria

[79] In this manner, allowance prices constitute market signals encouraging reduced use of higher-emitting EGUs and increased use of lower-emitting EGUs. (id).

These subsections compare the relative values of setting the BSER as a combination of building blocks 1 and 2 versus setting the BSER using all four building blocks. EPA determines that even while combining building blocks 1 and 2 mitigates the "rebound effect" of basing a BSER on building block 1 alone, the combination of all four building blocks yield the greatest cost and environmental benefits. (p. 34885). The following subsections again restate the cases for the two building block proposals and will not be re-summarized here.

a. Combination of Building Blocks 1 and 2 (No Summary)

b. Combination of all Four Building Blocks (No Summary)

6. Additional Considerations Related to Inclusion of Building Blocks 2, 3, and 4 as Part of the Basis Supporting the BSER

a. System of Emission Reduction

In further defining "system of emission reduction," EPA explains that the affected sources must be subject to emissions standards, but the basis for those standards—the ''system of emission reduction''—may be any method that reduces the affected sources' emissions, as long as that method is a ''system'' that meets the criteria for being the ''best'' that is ''adequately demonstrated.'' (p. 34885).

Under "*Chevron* Step 1 and Step 2,"[80] EPA interpreted "system" broadly to mean "a set of things working together as parts of a mechanism or interconnecting network."[81] EPA concludes that because anything that reduces the emissions of affected sources may be considered a "system of emission reduction" for those sources, the measures in building blocks 2, 3, and 4 "must be considered components of such a system." (p. 34886). EPA also lists the array of academics and stakeholders that support its broad interpretation of the term "system."[82]

[80] Under application of Chevron U.S.A. Inc. v. NRDC, 467 U.S. 837 (1984), the courts ask whether the agency's construction of the statute is permissible on the merits, in light of the tools and principles of statutory interpretation. Under Step One of the inquiry, the court asks whether it is evident that "Congress has directly spoken to the precise question at issue;" and if so, the statute is unambiguous. If, however, the court decides that the statute is ambiguous, it then proceeds to Step Two, wherein the court must uphold the agency's interpretation of the statute "so long as it is based upon a permissible construction of the statute." See id pp. 842-843. See Stephenson, Mathew and Adrian Vermeule, *Chevron has Only One Step*, 95 Va. L. Rev. 597 (May 2009).

[81] Id., fn. 220 (Oxford Dictionary of English (3rd ed.) (published 2010, online version 2013), http:// www.oxfordreference.com.mutex.gmu.edu/view/ 10.1093/acref/9780199571123.001.0001/acref-9780199571123.)

[82] See fn. 224 and 225.

b. "Best" System that is "Adequately Demonstrated"

i. Actions by Affected EGUs

EPA states that owners of units operating across a wide range of corporate, institutional and market structures (e.g., vertically integrated utilities in regulated markets, independent power producers, municipal utilities, and rural cooperatives) can take advantage of a broad range of reduction opportunities included in the building blocks. (p. 34886).

Vertically-integrated utilities with diverse generation fleets have opportunities to reduce CO_2 emissions through fuel-switching, heat rate improvements, or co-firing and can invest in new RE or EE. (pp. 34886-34887). Municipal utilities and rural coops can implement unit-specific improvements, re-dispatch to lower emitting sources and investments in RE and EE. Where muni's and coops are vertically integrated but operate in a deregulated region where they do not control dispatch, the timing of the proposal allows them to consider longer-term capacity planning strategies such as building or contracting for electric supply from lower-emitting sources, use of distributed renewable technologies or use of demand-side EE measures. Independent power producers (IPPs) can implement efficiency improvements, co-firing or fuel switching or invest in renewable and demand-side options. (p. 34887).

ii. **Actions by States**

The proposal states that the outside-the-fence building blocks have been adequately demonstrated due to many state actions incorporating RE and EE measures into their SIPS for meeting NAAQS. (p. 34887). This subsection (Section VI.E.6.b.ii) emphasizes that the proposal ensures policy flexibility for all types of markets and considers different fuel mixes and regulatory structures. (p. 34888).

iii. **Regional Organizations**

According to the proposal, ISOs and RTOs can seek solutions such as capacity markets and transmission upgrades to preserve resource adequacy and ensure the continued reliable operation of the grid. Further, regions not covered by ISOs/RTOs have regional groups such as ColumbiaGrid, Northern Tier Transmission Group and WestConnect in the west, and system operators such as Southern Company in the southeast that can provide these functions. (p. 34888).

In shifting to lower-emitting units, grid operators across the country factor environmental costs into their economic dispatch through a variety of mechanisms, including allowance costs, variable costs associated with operating environmental controls, and operating limits for high-emitting units. (p. 34888).

iv. **Concerns from Stakeholders; Solicitation of Comment**

Certain stakeholders argue as a legal matter that the BSER is limited to measures that may be undertaken at the affected units, and not measures that are beyond the affected units; the measures in building blocks 2, 3, and 4 are ''beyond-the-unit'' or ''beyond-the-fence line'' measures because they are implemented outside of the affected units and outside their control; and as a result, those measures cannot be considered components of the BSER. EPA welcomes comment. EPA responds to this concern by suggesting that the distinction between building block 1 as "inside the fence" and the remaining building blocks as "outside the fence" is artificial[83] and notes that its alternative proposal limits emission reductions to affected sources. (p. 34889).

7. Alternate Approach to the BSER

EPA's alternative approach for determining BSER involves in addition to building block 1, the reduction of affected fossil fuel-fired EGUs' mass emissions achievable through reductions in generation of specified amounts from those EGUs. (p. 34889). Under this approach, blocks 2, 3, and 4 would not be components of the system of emission reduction but instead would serve as bases for quantifying the reduced generation (and therefore emissions) at affected EGUs, and assuring that the amount of reduced generation meets the criteria for the ''best'' system that is ''adequately demonstrated'' because, among other things, the reduced generation can be achieved while the demand for electricity services can continue to be met in a reliable and affordable manner.[84]

EPA argues that emitting sources could comply with pollution control requirements by reducing production including retiring. Further, reduced utilization has been used to settle disputes with the EPA and is a well-established means of reducing emission of pollutants in the electric sector (p. 34889). Reduced generation is an available option because the operation of the grid through integrated generation, transmission, and distribution networks creates fungibility for electricity and electricity services, which allows decreases in generation at affected fossil fuel-fired steam EGUs to be replaced by increases in generation at affected NGCC units (building block 2) and allows decreases in generation at all affected EGUs to be replaced by increased generation at low- or zero-carbon EGUs (building block 3) or by decreased demand (building block 4). (p. 34890).

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[83] See fn. 237. Because neither the addition of RE nor the reduction of end-user demand directly reduces the atmospheric emission of CO_2, but rather permit fossil EGUs to reduce their own output and emissions, that these measures are at-the-unit systems of emission reduction. Therefore, the real issue is whether §111(d) authorizes the EPA to require EGUs to curtail their own output to comply with this rule. Citing Nordhaus R., Gutherz I., ''Regulation of CO_2 Emissions from Existing Power Plants Under §111(d) of the Clean Air Act: Program Design and Statutory Authority,'' Environmental Law Reporter, 44: 10366, 10383 n. 133 (May 2014).

[84] Specifically, the amount of generation from the increased utilization of NGCC units would determine a portion of the amount of the generation reduction component of the BSER for affected fossil fuel-fired steam EGUs, and the amount of generation from the use of expanded low- and zero- carbon generating capacity that could be provided, along with the amount of generation from fossil fuel-fired EGUs that could be avoided through the promotion of demand-side energy efficiency, would determine a portion of the amount of the generation reduction component of the BSER for all affected EGUs.

8. EPA's Discretion in Applying Criteria for the BSER

This subsection (Section VI.E.8) re-states that EPA's discretion in applying criteria for the BSER and will not be re-summarized here.

9. State-wide Application of the BSER; Appropriateness of Standards of Performance

In this subsection (Section VI.E.9), EPA describes how the state-wide approach and the standards of performance the states establish are consistent with the CAA §§111(d) and 111(a)(1) provisions.[85] (p. 34891). As the provisions do not constrain how the BSER is to be applied, EPA may apply the BSER to all of the affected EGUs in the state as a group. Similarly, the implementing regulations give the EPA broad discretion to identify the group of sources to which the BSER is applied.[86] (p. 34891)

In applying the BSER, EPA calculates the emission limitation achievable through its application and refers to this amount as the state goal, expressed as an emission rate. The state must, in turn, develop a state plan that achieves this rate or as a mass-based version of the rate-based goal. The state plan must establish standards of performance for its affected EGUs.[87] (p. 34891).

This approach entails applying the BSER on a state-wide basis and, based on the BSER, identifying the emission performance level for each state's affected EGUs that each state must achieve, so that each state may then assign the emission limitation obligations among its sources. (p. 34892).

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[85] The state-wide approach both harnesses the efficiencies of emission reduction opportunities in the interconnected electricity system and is fully consistent with the principles of federalism that underlie the Clean Air Act generally and CAA section 111(d) particularly. That is, this provision achieves the emission performance requirements through the vehicle of a state plan, and provides each state significant flexibility to take local circumstances and state policy goals into account in determining how to reduce emissions from its affected sources, as long as the plan meets minimum federal requirements. (id).

[86] The regulations provide that the EPA ''will specify different emission guidelines or compliance times or both for different sizes, types, and classes of designated facilities when costs of control, physical limitations, geographical location, or similar factors make sub-categorization appropriate.'' Id.

[87] To do so, the state may consider the measures the EPA identified as part of the BSER or other measures that reduce emissions from the affected EGUs. Moreover, the state has the flexibility to establish emission standards in the degree of stringency that the state considers appropriate. The primary limitation on the state's flexibility is that the emission standards applied to all of the state's affected EGUs—and, in the case of states that adopt the portfolio approach, the requirements imposed on other affected entities—taken as a whole, must be demonstrated to achieve the required emission performance level. Id.

10. Combined Categories

This section restates information and will not be re-summarized.

11. Severability

EPA considers its findings of the BSER with respect to the various building blocks to be severable, such that in the event a court were to invalidate finding with respect to any particular building block, the BSER would consist of the remaining building blocks. (p. 34892).

12. Solicitation of Comment (No Summary)

VII. State Goals

A. Overview

The proposed state goals reflect the EPA's quantification of each state's average emission rate from affected EGUs that could be achieved by 2030 and sustained thereafter, with interim goals that would apply over a 2020–2029 phase-in period, through reasonable implementation, considering the unique circumstances of each individual state, of the BSER adequately demonstrated (based on all four building blocks). (p. 34892). The proposed goals are expressed in the form of state-specific, adjusted[88] output-weighted-average CO_2 emission rates for affected EGUs, which the states can translate into a mass-based form as long as the translated goal achieves the same degree of emission limitation.[89]

During the comment period, a state may demonstrate that the application of one of the building blocks to that state would not be expected to produce the level of emission reduction quantified by EPA because implementation of the building block at the levels envisioned by EPA was technically infeasible, or because the costs of doing so were significantly higher than projected by the EPA. (p. 34893). However, the feasibility of ramping up other building blocks will be considered. For example, if a state demonstrates during that the state's coal- fired steam EGUs could only achieve an average four percent heat rate improvement, instead of the six percent that EPA is proposing to determine is achievable from application of building block 1, EPA would not adjust the state's goal to reflect that change unless the state also demonstrates

[88] The emission rate goals include adjustments to incorporate the potential effects of emission reduction measures that address power sector CO_2 emissions primarily by reducing the amount of electricity produced at a state's affected EGUs (associated with, for example, increasing the amount of new low- or zero-carbon generating capacity or increasing demand-side energy efficiency) rather than by reducing their CO_2 emission rates per unit of energy output produced. Id., fn. 250.

[89] A method for translating from a rate-based goal to a mass-based goal is discussed in the Projecting CO_2 Emission Performance in State Plans TSD.

that it could not get additional reductions from application of building blocks 2, 3 or 4, or in related, comparable measures. (p. 34893).

Further, because the building blocks each establish a reasonable level of emission reduction rather than the maximum possible level of reduction, the EPA expects that, for any particular state, even if the application of the measures in one building block to that state would not produce the level of emission reductions reflected in the EPA's quantification for that state, the state will be able to reasonably implement measures in other of the building blocks more stringently, so that the state would still be able to achieve the proposed goal.

B. Form of Goals

Goals are presented in the form of adjusted output-weighted-average CO_2 emission rates (quantity of CO_2 produced per MWh of electricity generated). (pp. 34893-34894). Important aspects of this form include:

- Use of a rate-based form with the opportunity of a state to adopt a mass-based form (Cap on tonnage of CO_2 emissions);
- Use of output-weighted-average emission rates in a state rather than nationally uniform emission rates for all EGUs of a particular type;
- Use of adjustments to accommodate measures that reduce CO_2 emissions by reducing the quantity of fossil fuel-fired generation rather than by reducing the CO_2 emission rate per MWh generated by affected sources;
- Use of emission rates expressed in terms of net rather than gross energy output; and
- Adjustability of the goals based on the severability of the underlying building blocks.

(p. 34894).

Both the rate-based and mass-based approaches offer advantages. EPA proposes to enable states to consider which approach best suits them. Defining emission performance levels in a rate-based form provides flexibility to accommodate changes in the overall quantities of electricity generated in response to increases in electricity demand. Defining emission performance levels in a mass-based form provides relative certainty as to the absolute emission levels that would be achieved as well as relative simplicity in accommodating and accounting for the emission impacts of a wide variety of emission reduction strategies. (p. 34894).

Regarding state-specific versus national goals, EPA proposes that opportunities to shift generation from EGUs with higher CO_2 emission rates to those with lower CO_2 emission rates vary across states and those decisions ought to be made at the state level. This approach also reflects CAA §111(d)'s requirement that standards of performance be established in state plans rather than at the national level. (p. 34894).

Regarding the use of adjustments to accommodate measures in building blocks 2-4, EPA notes that reduced overall CO_2 mass emissions result, under this approach, through reductions in the quantity of generation from affected EGUs rather than from reductions in the weighted-average CO_2 emission rates of affected EGUs. A state choosing a rate-based form of the goal would be able to make analogous adjustment when assessing monitored emission performance so that measures that support avoided generation at affected EGUs could be used to help the state meet the rate-based state goal.[90] These types of adjustments are not required under a mass-based approach because the emission-reducing effects of reduced generation at affected EGUs are evident in the EGUs' reported mass emissions. (p. 34894).

Regarding the use of "net" rather than "gross" energy output,[91] EPA explains that it proposes to state the goals in terms of net output because improvements in the efficiency of EGU devices[92] represent opportunities to reduce carbon intensity at existing affected EGUs that would not be captured in measurements of emissions per gross MWh. (p. 34894).

Regarding severability, because the building blocks can be implemented independently of one another and the goals are the sum of the emission reductions from all of the building blocks, if any of the building blocks is found to be an invalid basis for the BSER, the goals would be adjusted to reflect the emissions reductions from the remaining building blocks. (p. 34895).

C. Proposed Goals and Computation Procedure

As noted above, the state goals represent CO_2 emission rates achievable by 2030 after a 2020– 2029 phase-in period on an output- weighted-average basis collectively by all of a state's affected EGUs, with certain computation adjustments to reflect the potential to achieve mass emission reductions by avoiding fossil fuel-fired generation.[93] (p. 34895).

The adjustment made to reflect mass emission reductions from the increased use of low- or zero-carbon generating capacity or demand side resources is made by estimating the annual net generation associated with an achievable amount of qualifying new low-carbon and zero-carbon generating capacity, as well as the annual avoided generation associated with an achievable portfolio of demand-side energy efficiency measures, and adding those MWh

[90] EPA notes that even under a mass-based approach, adjustments may be appropriate in some circumstances to address interstate effects, such as when measures undertaken pursuant to one state's plan are expected to be associated with decreases in fossil fuel-fired generation and CO_2 emissions in another state. This issue is discussed in Section VIII (State Plans). See fn. 254.

[91] I.e., energy output encompassing net MWh of generation measured at the point of delivery to the transmission grid rather than gross MWh of generation measured at the EGU's generator.

[92] I.e., auxiliary equipment such as fans, pumps, motors, and pollution control devices.

[93] See p. 34895, Table 8 – "Proposed State Goals"

amounts to the energy output from affected units that would have been used in an unadjusted output-weighted-average emission rate computation.[94]

Mathematically, this adjustment has the effect of spreading the measured CO_2 emissions from the state's affected EGUs over a larger quantity of energy output, thus resulting in an adjusted emission rate lower than the unadjusted emission rate. (p. 34895). EPA used a 7-step process to compute each state's proposed goal. Briefly, the process included:

Step 1 – To compile baseline data, EPA obtained total annual quantities, on a state-by-state basis, of CO2 emissions, net generation (MWh) and capacity (MW) from 2012 data for all affected EGUs. EPA then aggregated 2012 data into four different groups based upon generation type (coal, oil and gas-fired steam, NGCC, and qualified IGCC and simple-cycle combustion turbines).[95] (pp. 34895-34896).

Step 2 – To apply building block 1, the total CO_2 emissions amount for the coal-fired steam EGU group in each state from Step 1 was reduced by six percent. (p. 34896)

Step 3 – To apply building block 2, generation and emission figures from the NGCC group in Step 1 was increased, and correspondingly decreased for coal and oil-gas-fired steam EGU groups from Step 2 to reflect an estimated potential increase in utilization of the NGCC group to a maximum of 70 percent.

Step 4 – To apply building block 3, EPA estimated the total quantities of generation from RE generation capacity and under-construction or preserved nuclear capacity for each state.

Step 5 – To apply building block 4, EPA estimated the total MWh amount by which generation from each state's affected EGUs would be cumulatively reduced in each year of the plan period associated with implementation in that state of demand-side energy efficiency programs resulting in annual incremental reductions in the state's electricity usage (relative to usage absent those programs) of 1.5 percent each year.[96]

Step 6 – To compute annual rates for each state, EPA used the following formula:
[(Coal gen. × Coal emission rate) + (OG gen. × OG emission rate) + (NGCC gen. × NGCC emission rate) + ''Other'' emissions]/[Coal gen. + OG gen. + NGCC gen. + ''Other'' gen. +

[94] In the case of new capacity that is not zero- carbon, an adjustment would also be required to the emissions value used in computing the weighted- average emission rate. See id., fn. 259.

[95] EPA added estimates for other EGUs not yet in operation. Generation data inputs were based on average 2012 utilization rates.

[96] For states that are net importers of electricity, the estimated reduction in the generation by the state's affected EGUs was scaled down to reflect an expectation that a portion of the generation avoided by the demand-side energy efficiency would occur at EGUs in other states. (id).

Nuclear gen. + RE gen. + EE gen.][97] The 2030 final goal is the annual rate computed for 2029 using the formula above.

Step 7 – EPA computed the 2020-2029 interim goals as the simple average of the annual rates computed for each of the years from 2020 to 2029 for the state from Step 6 above. (p. 34896).

D. State Flexibilities

According to this subsection (Section VII.D), states' ability to achieve emission performance levels consistent with the binding goals is enhanced by several distinct types of flexibility: (i) choices as to the measures employed, including the timing of their implementation; (ii) the ability to translate from a rate-based form of goal to a mass-based form of goal; and (iii) the opportunity to pursue multi-state plan approaches. (p. 34897).

Regarding measure choices, states do not need to mandate the particular control measures the EPA identified as the basis for its BSER and can include measures outside of the building blocks in their state plans. In addition, states can demonstrate emission performance on an average basis over a multi-year interim plan period, increasing flexibility to choose among plan measures.

Regarding conversion of the rate-based goal to the mass-based goal, states interested in having emission performance requirements measured in absolute tons (as is done in RGGI) would be accommodated. Because the use of mass-based plans can simplify the process of accounting for the CO_2 reduction impacts of a variety of measures, the EPA believes the flexibility to adopt mass-based emission performance levels can facilitate plan development and could be attractive to states that do not already participate in mass-based emission reduction programs.

Regarding multi-state plans, EPA expects that this flexibility will reduce the cost of achieving the state goals and therefore expects it to be attractive to states.[98]

E. Alternate Goals and Other Approaches Considered

EPA's alternate final goals represent emission performance that would be achievable by 2025, after a 2020–2024 phase-in period, with interim goals that would apply during the 2020–2024 period on a cumulative or average basis as states progress toward the final goals. (p. 34898).

The alternate goals reflect several differences in data inputs from the proposed goals. Specifically, a value of four percent (instead of six percent) was used for the potential

[97] This formula is further explained in the Goal Computation TSD.

[98] For example, the RGGI- participating states could choose to submit a multi-state mass-based plan that demonstrates emission performance by affected EGUs on a multi-state basis. Additional states may also choose to join a multi-state plan.

improvement in carbon intensity of coal-fired EGUs in Step 2; a value of 65 percent (instead of 70 percent) was used for the potential annual utilization rate of NGCC units in Step 3; and a value of one percent (instead of 1.5 percent) was used for the annual incremental electricity savings achievable through a portfolio of demand-side energy efficiency programs in Step 5.[99]

F. Reliable Affordable Electricity

EPA states that in determining the BSER, it looked specifically at the reasonableness of the costs of control options in part to ensure that the options would not have a negative effect on system reliability. EPA refers to the ISO/RTO Council proposal which encourages states to utilize the analytic support of system operators to determine cost and reliability impacts in the development of its state plans. It also references state flexibility in determining which measures to include in their plans as a check on cost and reliability concerns.[100] (p. 34899).

Referring to the Resource Adequacy and Reliability Analysis TSD, EPA states that its analysis looked at the types of changes in the generation fleet that were projected to occur through retirements, additional generation and energy efficiency. The analysis did not raise concerns over regional resource adequacy. The analysis also looked at how policy options impacted the flows and transfers of electricity that occur to meet reserve margins, and found that none of the interregional changes in the policy cases suggested that there would be increases in flows that would raise significant concerns about grid congestion or grid management. (p. 34899).

VIII. State Plans

A. Overview

Based upon the EPA-established rate-based CO_2 goals, each state must develop, adopt and submit a state plan under CAA §111(d). To do so, the state must:

- Determine the emission performance level it will adopt in its plan
- Establish an emission standard or set of standards that will achieve the performance level (as well as implementing and enforcement measures)
- Adopt the state plan through certain procedures including a hearing

EPA will then determine whether to approve or disapprove the plan, and if the latter (or if a state does not submit a plan), then the EPA must establish a plan for that state.

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[99] See Table 9 p. 34898. The alternate goals also reflect a shortening of the proposed phase-in period from ten years (2020– 2029) to five years (2020–2024) to reflect an expectation that less stringent goals could be achieved in less time.

[100] Many market-based approaches which states may choose reduce the costs of compliance. They can allow certain units that are seldom used to remain in operation if they are needed for reliability purposes. Multi- state approaches also reduce costs and stress on the grid and so can help to reduce any concern about electricity reliability. (id).

B. Approach

EPA states that its proposed plan guidelines provide states with options for establishing emission standards in a manner that accommodates a diverse range of state approaches. As a demonstration of this flexibility, EPA notes that it:

> anticipates—and supports— states' commitments to a wide range of policy preferences that could encompass those of states like Kentucky, West Virginia and Wyoming seeking to continue to feature significant reliance on coal-based generation; states like Minnesota, Colorado, California and the nine RGGI states seeking to build on actions and policies they have already undertaken; and states like Washington and Oregon seeking to integrate sustainable forestry and renewable energy strategies.

(p. 34900).

1. State Plan Approaches

a. Overview

This subsection discusses three issues related to the design of state plans:

(1) Whether the plan should require the affected EGUs to be subject to emission limits that assure that the emission performance level is achieved, or instead, whether the plan could rely on measures, such as renewable energy (RE) or demand-side energy-efficiency (EE), to assure the achievement of part of the emission performance level;

(2) whether the responsibility for all of the measures other than emission limits should fall on the affected EGUs, or, instead, could fall on entities other than affected EGUs; and

(3) whether the fact that requiring all measures relied on to achieve the emission performance level to be included in the state plan renders those measures federally enforceable.

(p. 34901).

EPA proposes that all measures relied on to achieve the emission performance level be included in the state plan and that inclusion in the state plan renders those measures federally enforceable. EPA also proposes to authorize states either to submit plans that hold the affected EGUs fully and solely responsible for achieving the emission performance level, or to submit plans that rely in part on measures imposed on entities other than affected EGUs to achieve at least part of that level, as well as on measures imposed on affected EGUs to achieve the balance of that level.

b. Portfolio Approach

EPA proposes to authorize a "portfolio approach" by which the plan would include emission limits for affected EGUs along with other enforceable measures, such as RE and demand-side EE measures, that reduce CO_2 emissions from affected EGUs. All of the measures combined would be designed to achieve the required emission performance level for affected EGUs as expressed in the state goal. Further, the emission limits enforceable against the affected EGUs would not, on their own, assure, or be required to assure, achievement of the emission performance level; rather, the state plan would include measures enforceable against other entities that support reduced generation by, and therefore CO_2 emission reductions from, the affected EGUs.

The portfolio approach could be either "utility-driven" or "state-driven". Under a utility-driven approach, a state plan may include measures implemented consistent with a utility integrated resource plan and include measures that apply directly to affected EGUs as well as RE and DSR measures that avoid CO_2 emissions. Under a state-driven approach, measures would include emission standards for affected EGUs and requirements that apply to other entities, such as RPS or EERS which apply to electric distribution utilities. (p. 34901).

c. Obligations on Affected EGUs

The RGGI program, which imposes ultimate responsibility on fossil fuel-fired EGUs to achieve the required emission reductions but integrates EE and RE programs, can serve as a model for a type of §111(d) state plan. Such a plan could rely on emission standards enforceable against affected EGUs but also include enforceable or complementary RE and demand-side EE measures that lower cost and otherwise facilitate EGU emission reductions. (pp. 34901-34902).

The RE and demand-side EE measures could either be enforceable components of the plan (that is, the states could require affected EGUs or other affected entities to invest in RE or in demand-side EE programs) or be complementary to the plan. In this manner, RE and demand-side EE measures could be a major component of a state's overall strategy for reducing EGU CO_2 emissions at a reasonable cost.[101]

d. Federal Enforceability

Opponents of the federal enforceability of traditionally state programs propose that EE and RE programs be complementary to, and outside of, state plans. Under this approach, the EGU emissions limit would be federally enforceable but RE and demand-side EE measures would remain enforceable under state law.

e. Plans with State Commitments

[101] A state that adopts a rate-based emission limit could incorporate enforceable RE and demand-side EE measures by adjusting an EGU's CO_2 emission rate when demonstrating compliance through either an administrative adjustment by the state or use of a tradable credit approach. These actions would need to be enforceable components of a state plan to facilitate EGU compliance with emission rate limits and ensure that actions are properly quantified, monitored, and verified. (id, p. 34902).

Under a "state commitments approach", the state requirements for entities other than affected EGUs would not be components of the state plan and therefore would not be federally enforceable. Instead, the state plan would include an enforceable commitment by the state itself to implement state-enforceable (but not federally enforceable) measures that would achieve a specified portion of the required emission performance level on behalf of affected EGUs.[102]

In a variant of this approach, the state plan would shift a portion of the affected EGU's responsibility to the state in that the state would credit the EGUs with the amount of emission reductions expected to be achieved from RE and demand-side EE measures. The state would then assume responsibility for that credited amount of remission reductions. EPA seeks comment on these approaches. (p. 34902).

f. Legal Issues

EPA notes that while CAA §§'s 111(d)(1) and 111(a)(1) make clear that emission limits enforceable against affected EGUs belong in state plans because they qualify as "standards of performance", it is less clear whether state plans may include other measures for achieving the emission performance level or whether other entities may be subject to the requirement.

According to the proposal, under *Chevron U.S.A. v. NRDC,* where the statute leaves a gap, the agency has discretion to fashion a reasonable interpretation. (pp. 34902-34903). Based on this precedent, EPA proposes to interpret the phrases ''standards of performance for any existing source'' and ''the implementation and enforcement of such standards of performance'' to encompass and allow the various components of the portfolio approach. To the extent that a portfolio approach contains measures that are not standards of performance or do not implement or enforce such standards, the EPA is proposing to interpret CAA section 111 as allowing state CAA section 111(d) plans to include federally-enforceable measures that are neither standards of performance nor measures that implement or enforce those standards, provided that the measures reduce CO_2 emissions from affected sources. (p. 34903).

The proposal hinges on EPA's interpretation of the word "for," noting that standards are reasonably considered to be ''for'' affected sources if they would have an effect on affected sources by, for example, causing reductions in affected EGUs' CO_2 emissions by decreasing the amount of generation needed from affected EGUs. Under this interpretation, renewable energy and demand-side energy efficiency requirements would be ''for'' fossil fuel- fired EGUs where such standards result in reduced CO_2 emissions from fossil fuel-fired EGUs, even if the standards do not apply directly to fossil fuel-fired EGUs. (p. 34903).

EPA raises a number of legal interpretations required of the portfolio approach and seeks comment on them. These include:

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[102] Under this approach, the state programs upon which the state bases its commitment may, in turn, rely on compliance by third parties, and if those state programs fail to achieve the expected emission reductions, the state could be subject to challenges— including by citizen groups—for violating CAA requirements and, as a result, could be held liable for CAA penalties. EPA seeks comment on this policy ramification.

(1) Whether ‘‘standards of performance for [affected sources]’’ is reasonably read to include the emission performance level (i.e., the state goal) on grounds that the level is ‘‘a standard for emissions’’ because it is in the nature of a requirement that concerns emissions and it is ‘‘for’’ the affected sources because it helps determine their obligations under the plan;

(2) The extent to which measures such as RE and demand-side EE may be considered ‘‘implement[ing]’’ measures in state plans if they are not directly tied to emission reductions that affected sources are required to make through emission limits, and if they are requirements on entities other than the affected sources;

(3) Whether EPA can interpret CAA section 111(d)(1) to allow state plans to include components of the portfolio approach that are measures that would reduce emissions from affected sources, even if those measures are neither ‘‘standards of performance for existing sources’’ nor measures ‘‘for the implementation and enforcement of such standards of performance.’’[103]

According to EPA, opponents of the portfolio approach, requires strict interpretations of CAA §111(d), which would include:

(1) A determination that CAA section 111(d)(1) must be read as precluding a state plan from including measures that are neither standards of performance nor measures for the implementation or enforcement of such standards;

(2) An interpretation that the state’s obligation to set performance standards ‘‘for’’ existing sources means that the standards must apply to affected EGUs and not to other entities; and

(3) An interpretation that measures ‘‘for the implementation and enforcement of such performance standards’’ do not include measures that are not intended or designed to assist affected EGUs in meeting the performance standards.

g. Ongoing Applicability of CAA §111(d) State Plan

EPA proposes that an existing source that becomes subject to requirements under CAA section 111(d) will continue to be subject to those requirements even after it undertakes a modification or reconstruction. Under this interpretation, a modified or reconstructed source would be subject to both (1) the CAA section 111(d) requirements that it had previously been subject to and (2) the modified source or reconstructed source standard being promulgated under CAA section 111(b) simultaneously with this rulemaking. (p. 34903).

An “existing source” that commences construction of a modification or reconstruction after the EPA has proposed or finalized a CAA section 111(b) standard of performance

[103] EPA notes that there is no specific language in CAA section 111(d) or elsewhere in the Act that prohibits states from including measures other than performance standards and implementation and enforcement measures, provided that they reduce emissions from affected EGUs.

applicable to it becomes a "new source." It is unclear however whether requirements imposed under a CAA section 111(d) plan continue for a source that ceases to be an existing source because it modifies or reconstructs. (p. 34904).

Because the CAA is unclear in this question, EPA proposes to use its authority under *Chevron* to propose that the source remains subject to the CAA § 111(d) plan even if it modifies or reconstructs for two reasons: (1) to preserve the integrity of the state §111(d) plan as uncertainty about whether units would remain in the program could be disruptive to the program; and (2) to avoid creating incentives to seek to avoid obligations under the §111(d) plan by undertaking modifications.

2. Timing for Implementation and Achievement of Goals

EPA notes that timing flexibility in implementing measures will allow states to reduce costs, address reliability concerns, and address concerns about stranded assets. (p. 34904). Therefore EPA proposes to allow states flexibility to define the trajectory of emission performance between 2020 and 2029, as long as the interim emission performance level is met on a 10-year average or cumulative basis and the 2030 emission performance level is achieved.

a. Performance Demonstrations and Timing of Emission Reductions

The proposal does not require quantitative projections of emission performance by affected EGUs beyond 2030; rather, the state plan would be considered to provide for maintenance of the emission performance consistent with the final goal if the plan measures used to demonstrate achievement of the final goal by 2030 will continue in force and not sunset. (pp. 34904-34905).

State plans must also contain requirements for tracking actual plan performance during implementation.[104] Continued tracking of emission performance after 2030 is required as well as corrective measures if a state does not continue to meet the 2030 goal during any three year period.

b. Start Date for Performance Period for Interim Goal

EPA proposes an interim performance period[105] start date of January 1, 2020 and states that such date is achievable because:

- Existing state goals will help achieve emission performance levels;

[104] For plans that do not include enforceable requirements for affected EGUs that ensure achievement of the full level of required emission performance and interim progress, the state plans would be required to include periodic program implementation milestones and emission performance checks, and include corrective measures to be implemented if mid-course corrections are necessary.

[105] A performance period is a period for which the state plan must demonstrate that the required emission performance level will be met.

- Many states have already contemplated strategies that would achieve emission reductions; and

- Only measures that were deemed technically feasible, broadly applicable and reasonable cost were included in the building blocks. (p. 34905).

This subsection (Section VIII.B.2.b) discusses the feasibility of achieving the measures in each building block by 2020 due to market conditions and demonstrated success by states and EGUs.[106]

c. Duration of Performance Periods for Final and Interim Goals

EPA's "preferred option" for final and interim performance goal periods reflect three main objectives:

(1) Provide states with timing flexibility during the interim goal period to accommodate differences in state adoption processes and types of state programs,

(2) Ensure that state plans are designed to achieve the final goal no later than 2030, and

(3) Provide flexibility for year-to-year variation in actual emission performance that may occur as the electricity system responds to economic fluctuations. (p. 34906).

State plans must demonstrate:

(1) Interim goal projected plan performance – that the interim performance level will be met on average over the 2020-2029 period;

(2) Interim goal actual plan performance – in 2030, actual performance over the interim period will be compared with the interim goal;

(3) Final goal projected plan performance; and

(4) Final goal actual plan performance check – at the end of 2032, actual emission performance must be compared against the final goal on a three-year rolling average basis.

For a rate-based plan, 2020–2029 emission performance is an average CO_2 emission rate for affected EGUs representing cumulative CO_2 emissions for affected EGUs over the course of the 10-year performance period divided by cumulative MWh energy output from affected EGUs over the 10-year performance period, with rate adjustments for qualifying measures. For a mass-

[106] For example, based upon the power sector's extensive experience with heat rate improvement (HRI) methods "and the many existing supply chains already supporting those methods," EPA expects implementation of building block by 2020 is feasible. (p. 34095).

based plan, 2020–2029 emission performance is total tons of CO_2 emitted by affected EGUs over the 10-year performance period. (p. 34906).

d. Program Implementation Milestones and Tracking of Emission Performance

EPA is proposing that certain types of state plans be required to have program implementation milestones to ensure interim progress, as well as periodic checks on overall emission performance leading to corrective measures if necessary. (p. 34906).

This subsection (Section VIII.B.2.d) describes two types of "self-correcting" state plans, i.e., they would inherently assure interim performance and full achievement of the required level of emission performance through requirements that are enforceable against affected EGUs. Examples include (1) a state plan with a rate-based emission performance level that requires affected EGUs collectively to meet an emission rate and allows EGUs to comply through an emission rate averaging system, and (2) a state plan that includes measures or actions that take effect automatically if the plan's required emission performance level is not met in accordance with a specified milestone.[107] (p. 34907).

For plans that are not self-correcting, EPA proposes that state plans must identify periodic program implementation milestones.[108] If, during plan implementation, a state were to miss program implementation milestones in its plan, it would need to report the delay to the EPA, explain the cause, and describe the steps the state will take to accelerate subsequent implementation to achieve the planned improvements in emission performance. (p. 34907).

Further, EPA proposes that states report performance data annually by July 1, provide annual comparisons of actual versus projected performance, and provide reports and corrective measures if performance deviated from plans by greater than 10%.[109] (p. 34907).

e. Consequences if Actual Emission Performance Does not Meet State Goal

In instances where actual emissions do not meet state goals, (due for example to planned retirements of EGUs being postponed because severe weather produced greater-than-expected electric generation needs or affected EGUs (or states) did not fulfill their responsibilities), EPA

[107] EPA proposes that self-correcting plans need not contain interim milestones consisting of program implementation steps, because these state plans inherently require both interim progress and achievement of the full level of required emission performance in a manner that is federally enforceable against affected EGUs. Id.

[108] Start of an end-use energy efficiency program, retirement of an affected EGU, or increase in portfolio requirements under a renewable portfolio standard.

[109] However, if a state elects to wait to adopt a corrective measure until a deficiency is discovered, then the deviation can be no greater than 8%.

proposes state plans should specify consequences as CAA §111(d) is not specific on consequences for noncompliance. (p. 34908).

EPA seeks comment on specific consequences and notes two program approaches as examples. First, pursuant to the Acid Rain Program under CAA Title IV, a source that exceeds its sulfur dioxide emissions allowances is required to obtain additional emission reductions to offset its excess.[110] Second, under the SIP Call mechanism under CAA §110, after making a finding of the plan's failure to achieve the state goal, EPA requires the state to cure the deficiency with a new plan within a specified period of time, or else promulgate a federal plan. (p. 34908).

f. Out-Year Requirements: Maintaining or Improving the Level of Emission Performance Required by the Final Goal

EPA proposes that states must maintain the required level of performance in the out years and requests comment on whether states should be required to improve upon the final goal. (p. 34908). Specifically, the emission level set by the final goal would be maintained permanently.[111]

g. State Flexibility to Choose Mass-based and Rate-based Goals After 2029

EPA proposes that states can choose between a rate- and mass-based performance level for each performance period.[112] (pp. 34908-34909).

h. Planning Approach for Alternative State Goals

As noted in Section VII of the proposal, EPA requests comment on an alternative five-year sate emission performance goal for affected EGUs (Table 9) which represents emission rates achievable on average during the 2020-2024 time frame. (p. 34909).

C. Criteria for Approving State Plans

EPA proposes to use the combination of the twelve plan components noted above and four general criteria to determine whether a state plan is satisfactory under CAA §111(d)(2)(A).

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[110] CAA §411(b).

[111] EPA considers this to be straightforward for plans with EGU emission limits that ensure the full level of performance required. For renewable energy programs, EPA suggests that the state could continue to require the renewable portfolio percentage level that was relied upon to demonstrate projected achievement of the final goal performance level in 2030. For plans that rely in part on end-use energy efficiency programs and measures, EPA requests comment on what a state would need to require in its plan to show that performance will be maintained after 2030. (fn. 281).

[112] Thus, if a state plan used a mass- based performance level for the 2020– 2029 period, the state plan may still use a rate-based performance level for final goal performance periods.

The four general criteria are:

(1) A state plan must contain enforceable measures that reduce EGU CO_2 emissions;

(2) The enforceable measures must be projected to achieve emission performance equivalent to or better than the applicable state-specific CO_2 goal on a timeline equivalent to that in the emission guidelines;

(3) EGU CO_2 emission performance under the state plan must be quantifiable and verifiable; and

(4) The state plan must include a process for state reporting of plan implementation (at the level of the affected entity), CO_2 emission performance outcomes, and implementation of corrective measures, if necessary. (p. 34909).

1. Enforceable Measures

A state must ensure that its plan is enforceable and in conformance with the CAA. Existing EPA Guidances[113] provide the foundation for the types of emission limits EPA has found to be enforceable and notes that enforceability requires that the emission limit is "quantifiable, verifiable, straightforward, and calculated over as short a term as reasonable." (p. 34909). EPA seeks comment on whether enforceability should extend to entities other than affected EGUs.

Importantly, EPA acknowledges that a portfolio approach may result in enforceable state plan obligations accruing to a diverse range of affected entities beyond affected EGUs, and that there may be challenges to practically enforcing against some such entities in the event of noncompliance. (p. 34909). EPA seeks comment on all aspects of enforceability.

2. Emission Performance

Because all of the emission reduction measures included in the agency's determination of the BSER reduce CO_2 emissions from affected EGUs, the EPA is not proposing that out-of-sector GHG offsets could be applied to demonstrate CO_2 emission performance by affected EGUs in a state plan. However, emission limits for affected EGUs that are included in state plans could still include provisions that provide the ability to use GHG offsets for compliance

[113] Enforceability guidance includes: (1) September 23, 1987 memorandum and accompanying implementing guidance, ''Review of State Implementation Plans and Revisions for Enforceability and Legal Sufficiency,'' (2) August 5, 2004 ''Guidance on SIP Credits for Emission Reductions from Electric-Sector Energy Efficiency and Renewable Energy Measures,'' and (3) July 2012 ''Roadmap for Incorporating Energy Efficiency/ Renewable Energy Policies and Programs into State and Tribal Implementation Plans, Appendix F.'' See fn. 283.

with the emission limits, provided those emission limits would achieve the required level of emission performance for affected EGUs.[114] (p. 34910).

All existing state emission budget trading programs addressing GHG emissions include out-of-sector emission offsets and EPA references the ISO/RTO Council proposal, in which ISOs and RTOs play a facilitative role in coordinating individual state plans or multi-state plans within a region.[115] (p. 34910).

3. Quantifiable and Verifiable Emission Performance

EPA proposes that all plans (both mass- and rate-based) specify how CO_2 emissions from affected EGUs are monitored and reported. A rate-based plan must also include monitoring, reporting, and recordkeeping requirements for useful energy output from affected EGUs (electricity and useful thermal output).[116] (p. 34910).

4. Reporting and Corrective Actions

EPA proposes that a state plan must specify a process for annual reporting of overall plan performance and implementation and include a plan and schedule for implementing corrective measures if the plan is not achieving the projected level of emission performance. (p. 34910). EPA also proposes that a state plan specify appropriate periodic reporting requirements for each affected entity in a state plan that will be reported at least annually, electronically, and disclosed on a state database accessible by the public and the EPA. (p. 34910).

D. State Plan Components

Plan components were listed in Section I of the Preamble to the proposed rule. Plan components are only summarized here where the Preamble adds notable detail. At the outset, EPA seeks comments on the submittal of multi-state plans. First, EPA seeks comment on whether states participating in a multi-state plan should be given the option of providing a single submittal signed by each participating state that addresses common plan elements. Individual state submittals that provide state-specific elements of the multi-state plan would also be required but could be accomplished through cross reference. (p. 34911). Second, EPA seeks

[114] EPA notes that inclusion of such provisions would create a degree of uncertainty about the level of emission performance that would be achieved by affected EGUs when complying with the emission limit, and as such, would not be considered "self-correcting." Id.

[115] The question of how to address GHG offsets included in EGU emission limits when projecting emission performance under a state plan is addressed in the Projecting EGU CO_2 Emission Performance in State Plans TSD.

[116] Unlike in the Proposed Rule for EBU Carbon Standards for New Power Plants (79 FR 1430-1519, January 8, 2014), EPA proposes in this rule that useful energy output be measured in terms of net output rather than gross output. Id.

comment on an approach where all states participating in a multi-state plan separately make individual submittals that address all elements of the multi- state plan.

1. Identification of Affected Entities (Affected EGUs and Other Responsible Parties)

(No Summary)

2. Description of Plan Approach and Geographic Scope (No Summary)

3. Identification of State Emission Performance Level

State plans must identify the rate- or mass-based level of emission performance that must be met and expressed in numeric values including the units of measurement for the level of performance, such as pounds of CO_2 per net MWh of useful energy output or tons of CO_2. If the plan adopts a mass-based goal, the plan must include a description of the analytic process, tools, methods, and assumptions used to translate from the rate-based goal to the mass-based goal. (p. 34911).

Multiple states could jointly demonstrate emission performance by affected EGUs. States taking a rate-based approach would demonstrate that all affected EGUs subject to the multi-state plan achieve a weighted average CO_2 emission rate that is consistent, in aggregate, with an aggregation of the state-specific rate-based CO_2 emission performance goals established in the emission guidelines that apply to each of the participating states. States taking a mass-based approach would demonstrate that all affected EGUs subject to the multi-state plan emit a total tonnage of CO_2 emissions consistent with a translated multi-state mass-based goal. (p. 34911).

EPA also seeks comment in this subsection (Section VIII.D.4) on options for calculating a weighted average, rate-based CO_2 emission performance goal for multiple states. Under one option, the weighted average emission rate goal for a group of participating states could be computed using each state's emission rate goal and the quantity of electricity generated by affected EGUs in each of those states during the 2012 base year. (pp. 34911-34912).[117] Under the second option, the weighted average emission rate goal for a group of participating states could be computed using each state-specific emission rate goal and the quantity of projected electricity generation by affected EGUs in each state. The calculation would be performed for the 2020 through 2029 period to produce a multi-state interim goal, and for 2030 to produce a multi-state final goal.[118] (p. 34912).

[117] This option does not address the fact that the weighted average emission rate performance goal for multiple states may be influenced significantly by the weighting of electricity generation from affected EGUs in different states. This mix of generation among affected EGUs in different states could differ significantly during the plan performance periods from that during the 2012 base year. Id.

[118] This approach addresses the fact that the mix of generation among affected EGUs in different states could differ significantly during the plan performance periods from that during the 2012 base year. As a result, it would base the weighted average goal in part on the anticipated business-as-usual mix of generation by affected EGUs across the multiple states during the plan performance period. However, this

It is clear from the proposal that methods of conversion from the rate-based state goals to mass-based goals are still under consideration. In fact, EPA seeks comment on whether it should provide translations of rate-based into mass-based goals, including information about acceptable analytical methods and tools and default input assumptions for key parameters that will influence projections (i.e., electricity load forecasts and projected fuel prices).[119] (p. 34912).

4. Demonstration that the Plan is Projected to Achieve the State's Emission Performance Level

This demonstration will include a detailed description of the analytic process, tools, and assumptions used to project future CO_2 emission performance by affected EGUs under the plan and the results of the analysis. (p. 34912).

5. Milestones

As noted above, beginning in 2022 the state must compare the collective emission performance achieved by affected entities in the state during the previous two-year period with performance projected in the state plan. If actual emission performance is not within 10 percent of original projections, the state must submit a report by the July 1 following the end of the two-year period to explain the deviation. (p. 34912).

6. Corrective Measures (No Summary)

7. Identification of Emission Standards and Any Other Measures

EPA proposes that the appropriate averaging time for any rate-based emission standard for affected EGUs and/or other affected entities be no longer than 12 months within a plan performance period and no longer than 3 years for a mass-based standard.[120]

8. Demonstration that Each Emission Standard is Quantifiable, Non-Duplicative, Permanent, Verifiable and Enforceable

An emission standard is:

(1) **quantifiable** if it can be reliably measured, using technically sound methods, in a manner that can be replicated;

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approach could also significantly alter the weighted average performance goal based on projected retirements of affected EGUs in one or more states. Id.

[119] The agency is seeking comment on the process for establishing mass-based emission goals.

[120] The same averaging period was proposed in the January 8th 2014 Proposed Rule (79 FR 1430-1519).

(2) **non-duplicative**, with respect to an affected entity if it is not already incorporated in another state plan, except in instances where incorporated in another state as part of a multi-state plan;[121]

(3) **permanent** if the standard must be met for each applicable compliance year or period, or replaced by another emission standard in a plan revision, or the state demonstrates in a plan revision that the emission standard is no longer necessary for the state to meet its required emission performance level for affected EGUs; and

(4) **verifiable** if adequate monitoring, recordkeeping and reporting requirements are in place to enable the state and the Administrator to independently evaluate, measure, and verify compliance with it. (p. 34913).

9. Identification of Monitoring, Reporting, and Recordkeeping Requirements

State plans with a rate-based form of the emission performance level must require affected EGUs to report hourly net energy output (including net MWh generation, and where applicable, useful thermal output) to the EPA on an annual basis.[122] (p. 34913). A state plan that contains other emission standards, in addition to emission limits applicable to affected EGUs, must include additional reporting and recordkeeping requirements related to these other measures. This could include, for example, reporting of MWh electricity savings under an end-use energy efficiency resource standard and renewable energy certificates (RECs) held, or renewable energy purchased or generated, under a renewable energy portfolio standard, and compliance with the standard. (p. 34914).

10. Description of State Reporting

In the case of a rate-based state plan that calls for adjusting the actual emission rate of the state's affected EGUs based on emissions avoided through renewable energy or end-use energy efficiency programs, the requirement for comparing actual plan performance against projected plan performance requires the state to incorporate information on results achieved by those programs each year. This emission performance comparison serves as the basis for showing either that a state plan is on track or that corrective measures are needed. (p. 34914).

11. Certification of State Plan Hearing (No Summary)

12. Supporting Material (No Summary)

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[121] An example of a duplicative emission standard would occur where recognition of avoided CO_2 emissions from, for example, a wind farm, could be applied in more than one state's CAA section 111(d) plan, except in the case of a multi-state plan where recognition is assigned among states or emission performance is demonstrated jointly for all affected EGUs subject to the multi- state plan.

[122] Most affected EGUs already monitor CO_2 emissions under 40 CFR Part 75 and report the data using the EPA's Emission Collection and Monitoring Plan System (ECMPS), which would generally satisfy CO_2 emission reporting requirements under the proposed guidelines. Id.

E. Process for State Plan Submittal and Review

1. Overview

Despite concerns from states regarding the 13-month timeline within which to make their initial submittals, EPA states that this concern is weighted against the urgency to address carbon emissions and notes the opportunity for additional time with justification. (p. 34915).

2. State Plan Submittal and Timing

States must submit either a complete or initial plan to EPA by June 30, 2016. To qualify for an extension, the state must submit an initial plan that demonstrates the state is on track to develop a complete plan and that includes meaningful steps that clearly commit the state to complete an approvable plan. (p 34915). Approvable justifications for an extension include: (1) a state's required schedule for legislative approval and administrative rulemaking; (2) the need for multi-state coordination in the development of an individual state plan; or (3) the process and coordination necessary to develop a multi-state plan.

3. Components of an Initial State Plan Submittal and Approvability Criteria

To be approvable, a state plan must include the following:

- A description of the plan approach and progress to date in developing a complete plan
- Initial quantification of the level of emission performance that will be achieved through the plan
- A commitment to maintain existing measures that limit or avoid CO_2 emissions (e.g., renewable energy standards, unit-specific limits on operation or fuel utilization), at least until the complete plan is approved.
- A comprehensive roadmap for completing the plan, including process, analytical methods, and schedule (with milestones) specifying when all necessary plan components will be complete (e.g., demonstration of projected plan performance; implementing legislation, regulations and agreements; any necessary approvals)
- Identification of existing programs, if any, the state intends to rely on to meet its emission performance level.
- Identification of executed agreements with other states (e.g., memorandum of understanding (MOU)), if a multi-state approach is being pursued[123]

[123] This subsection summarizes the elements of the RGGI MOU as an example, signed December 20, 2005. See id, fn. 289.

- A commitment to submit a complete plan by no later than the applicable required date and explanation of actions the state will take to show progress in addressing incomplete plan components

- A description of all steps the state has already taken in furtherance of actions needed to finalize a complete plan (e.g., copies of draft or proposed regulations, draft or introduced legislation, or draft implementation materials)

- Evidence of an opportunity for public comment and a response to any significant comments received on issues relating to the approvability of the initial plan.

(p. 34915-34916).

4. Process for EPA Review of State Plans

If a state plan meets the minimum requirements for an initial state plan, the state's request for a deadline extension will be deemed granted and the complete plan must be submitted by June 30, 2017 or June 30, 2018 as appropriate. Within 12 months, EPA will approve or disapprove the plan through a notice-and-comment rule making process.[124] (p. 34916).

5. Failure to Submit a Complete Plan

EPA will notify states of their failure to submit a complete plan by letter and by publication of a notice in the Federal Register.

6. Modification of an Approved State Plan

EPA proposes that the state may revise its state plan provided that the revision does not result in reducing the required emission performance for affected EGUs specified in the original approved plan. (p. 34917). Further, EPA proposes that the state must submit the revised enforceable measures to the EPA and demonstrate that the revised set of enforceable measures in the modified plan will result in emission performance at affected EGUs that is equivalent to or better than the level of emission performance required by the original state plan.

If modifications are substantive, new projections of emission performance under the modified plan would be needed to demonstrate that the modified plan will meet the required level of emission performance for affected EGUs specified in the original approved plan.

7. Plan Template and Electronic Submittal

[124] EPA seeks comment on whether to use a partial approval/partial disapproval mechanism in which approvable portions of state plan are severable from unapproved portions; or whether to adopt a conditional approval mechanism under which minor deficiencies must be corrected within one year. See id.

EPA seeks comments on whether to create a template for initial and complete plan submittals and whether to allow electronic submittals. (p. 34917).

F. State Plan Considerations

This subsection (Section VIII.F) identifies "key decision points and factors" state should consider when developing their plans.

1. Affected Entities Other than Affected EGUs

EPA proposes that affected entities in an approvable state plan may include an owner or operator of an affected EGU, other affected entities with responsibilities assigned by a state (e.g., an entity that is regulated by the state, such as an electric distribution utility, or a private or public third-party entity), and a state agency, authority or entity. (p. 34917). Further, a state will need to demonstrate that it has the legal authority to subject each entity listed in the state plan to the plan's federally-enforceable requirements.

2. Treatment of Existing State Programs

a. Framing Considerations

According to EPA, the proposed state-specific goals reflect actions that states have already taken to reduce or avoid EGU CO2 emissions. (p. 34918). CO_2 emission reductions due to shifts to lower CO_2-emitting power generation are also represented in the 2012 base period that was used to assess certain building blocks that are applied in calculating a state emission performance goal.[125]

As noted in the proposal,

> states where significant shifts in generation to NGCC units have already occurred would be closer to the generation mix reflected in the state goals than states where NGCC capacity is not yet being operated to the same degree. Likewise, states with relatively well-established demand-side EE programs would be able to build on those programs more quickly than states with less established programs, and would be closer to, or in some cases already achieving, the level of demand- side energy efficiency reflected in the state goals.

(p. 34918).

[125] For example, in such instances a significant shift to NGCC generation prior to 2012 may result in a lower potential for further re-dispatch to these units, as witnessed in the 2012 base period data. This would influence the calculated rate-based emission goal for the state, reducing the percentage improvement required relative to the base period CO_2 emission rate. Id, fn. 291.

b. Proposed Approach for Treatment of Existing State Programs and Measures in an Appropriate State Plan

EPA proposes that existing state programs may qualify for use in demonstrating that a state plan will achieve the required level of emission performance, provided they meet the approvability requirements in the emission guidelines; and specifically, that these existing programs may apply toward towards the state's required emission performance level as a result of actions taken after the date of the proposal. (p. 34918). According to EPA, this option ensures that actions taken after proposal of the emission guidelines and prior to 2020 as a result of requirements in a state plan could be recognized as contributing toward meeting a state's required emission performance level for affected EGUs.

EPA seeks comment on other starting dates to begin counting emission reductions (i.e., initial plan performance period, date of promulgation of emission guidelines, end date of base period) and specifically asks whether the emission effects of actions that are taken after proposal or promulgation of the emission guidelines or the approval of a state plan, but which occur prior to the beginning of the initial state plan performance period, could be applied toward meeting the required level of emission performance in a state plan. (p. 34919).

c. Application of Options Under Rate-Based and Mass-Based Plan Approaches

Under a rate-based approach, new demand-side EE measures installed in 2015 or later to meet an existing, on-the- books energy efficiency resource standard (EERS) would be a qualifying measure. However, only MWh savings beginning in 2020 and related avoided CO_2 emissions could be applied toward meeting a required rate-based performance level. (p. 34919).

Under a mass-based approach, demand-side EE measures after a respective eligibility date would not be included in the scenario that is used to project CO_2 emissions from affected EGUs when establishing a translated mass-based emission goal. This could be achieved by not including the incremental requirements of an end-use EERS requirement in a reference case projection, beginning at a specified date. (p. 34919).

3. Incorporating RE and Demand-Side EE Measures under a Rate-Based Approach

EPA proposes that RE and demand-side EE measures may be incorporated into a rate-based approach through an adjustment or tradable credit system applied to an EGU's reported CO_2 emission rate. Under this approach, measures that avoid CO_2 emissions from affected EGUs, such as end-use energy savings and renewable energy generation, could be credited toward a demonstrated CO_2 emission rate for EGU compliance purposes or used by the state to administratively adjust the average CO_2 emission rate of affected EGUs when demonstrating achievement of the required rate-based emission performance level in a state plan. Further, credits for actions that avoid CO_2 emissions could be used to comply, in part, with the emission rate limit. (p. 34919).

Credits or adjustment might represent avoided MWh of electric generation or avoided tons of CO_2 emissions. If adjustments or credits represent avoided MWh, they would be added to the denominator when determining an adjusted lbs. CO_2/MWh emission rate. If adjustment or credits represent avoided CO_2 emissions, they would be subtracted from the numerator when determining an adjusted lbs. CO_2/MWh emission rate. (p. 34919).

This subsection also notes that avoided CO_2 emissions from EE or RE could differ significantly depending upon whether they are based upon the assumption that the emission-free MWh is being produced by an individual EGU or the assumption that the avoided CO_2 emission comes from electric power pool or other identified region as a whole. (p. 34920).

4. Quantification, Monitoring and Verification of RE and Demand-Side EE Measures

EPA proposes that a state plan that includes enforceable RE and demand-side EE measures must include an evaluation, measurement, and verification (EM&V) plan that explains how the effect of these measures will be determined in the course of plan implementation. An EM&V plan will specify the analytic methods, assumptions, and data sources that the state will employ during the state plan performance periods to determine the energy savings and energy generation related to RE and demand-side EE measures, and would be subject to approval by EPA as part of the state plan. (p. 34920).

EPA notes in this subsection that differences in state practices with respect to EM&V result in significantly different claims of energy savings values for similar EE measures. (p. 34920). To address this, EPA states the intention to establish guidance for acceptable quantification, monitoring, and verification of RE and demand-side EE measures for an approvable EM&V plan. (p. 34921). Certain well-established RE and EE measures may be eligible for a streamlined EPA review, but other measures such as those seeking to alter customer and building occupant behavior, EE appliance standards and building codes, while potentially having substantial impacts, are less established and may require the development of quantification, monitoring and verification protocols. (p. 34921).

5. Reporting and Recordkeeping for Affected Entities Implementing RE and Demand-Side EE Measures

Affected entities could entail an electric distribution utility, vertically integrated utility who also owns and operates the EGU, a state agency or entity, or a private or public third-party entity that is implementing programs. (p. 34921).

6. Treatment of Interstate Effects

EPA recognizes that the electricity system and wholesale electric markets are interstate in nature; EGUs in one state provide electricity to customers in neighboring states; power companies often own EGUs in more than one state and manage them as a system; and EGUs are dispatched both within and across state borders. (p. 34921). In a similar vein, RE and EE

programs may affect the electricity system beyond a state border as many state programs allow actions in a neighboring state to meet in-state requirements.[126]

EPA proposes that a state could take into account in its plan only those CO_2 emission reductions occurring in the state that result from EE measures implemented in the state. (p. 34922). For states participating in a multi-state plan, the participating states would have the flexibility to distribute the CO_2 emission reductions among states in the multi-state area, as long as the total CO_2 emission reductions claimed are equal to the total of each state's in-state emissions reductions that result from demand-side EE measures implemented in those states. Further, states could jointly demonstrate CO_2 emission performance by affected EGUs through a multi-state plan in a contiguous electric grid region, in which case attribution of emission reductions from demand-side EE measures would not be necessary. (p. 34922).

EPA also proposes that a state could take into account all CO_2 emission reductions from RE measures implemented by the state whether they occur within the state or in other states. This approach acknowledges renewable energy certificates (RECs) that allow for interstate trading of RE attributes and the fact that a given state's RPS requirements often allow for the use of qualifying RE located in another state to be used to comply with that state's RPS.

Similar to its proposal concerning EE described above, EPA proposes that

(1) states participating in multi-state plans could distribute the CO_2 emission reductions among states in the multi-state area, as long as the total CO_2 emission reductions claimed are equal to the total of each state's in-state emission reductions from RE measures; and

(2) states could jointly demonstrate CO_2 emission performance by affected EGUs through a multi-state plan in a contiguous electric grid region, in which case attribution among states of emission reductions from renewable energy measures would not be necessary.

(p. 34922).

7. Projecting Emission Performance

Each state plan must include a projection of CO_2 emission performance from affected EGUs during the multi-year plan period that will result from implementation of the plan. Depending on the type of plan approach, this will include either a projection of the average CO_2 emission rate achieved by affected EGUs or total CO_2 emissions from affected EGUs.[127]

[126] For example, many state renewable portfolio standards allow for generation by qualifying renewable energy sources in other states to count toward meeting the state portfolio requirement. Some states also apply CO_2 emission requirements related to the generation of power purchased by regulated utilities, including power imported from out of state. Id.

[127] According to EPA, the credibility of state plans under CAA section 111(d) will depend in large part on ensuring credible and consistent emission performance projections in state plans. Id.

Projections of emission performance under a state plan could be conducted using historical data and parameters for estimating the future impact of individual state programs and measures. Alternatively, a projection could include modeling, such as use of a capacity planning and dispatch model. (pp. 34922-34923). This subsection (Section VIII.F.7) discusses the ISO/RTO Council proposal which suggested that ISOs and RTOs could provide analytical support to model the system-wide effects of individual state plans, assuring that the state plans are consistent with region-wide system reliability. (p. 34923).

8. Potential Emission Reduction Measures not Used to Set Proposed Goals

In this subsection (Section VIII.F.8), EPA notes that states may include measures in their plans beyond those that EPA included in its BSER determination. Further, under a mass-based approach, any measure that reduces CO_2 emissions – even if not included in the state plan – will help to achieve actual emissions performance that meets the required level if implemented during the plan performance period. (p. 34923).

The subsection then discusses the array of measures that states may consider including to meet their emission goal. These include:

- Transmission and distribution efficiency improvements
- Retrofitting affected EGUs with partial CCS
- Use of biomass-derived fuels at affected EGUs
- EGU-specific co-firing, partial CCS-retrofit or integrated renewable energy (concentrating solar power)
- New nuclear or uprating of existing nuclear
- Construction of new NGCC
- Electricity storage
- Industrial combined heat and power
- Sustainable forestry and agriculture and biomass derived fuels

(pp. 34923- 34925).

9. Consideration of a Facility's "Remaining Useful Life" in Applying Standards of Performance

CAA §111(d)(1) permits states in applying a standard of performance to any particular source under a §111(d) plan "to take into consideration, among other factors, the remaining useful life of the existing source to which such standard applies." EPA proposes that the flexibility provided in the state plan development process adequately allows for consideration of remaining useful life and that therefore a separate application of the remaining useful life provision by states in the development and implementation of their plan is unnecessary. (p. 34925).

a. Legal Background

EPA's 1975 implementing regulations contemplated deviations from the strict standards of performance required to be included in state plans by the EPA when

> (1) Unreasonable cost of control resulting from plant age, location, or basic process design; (2) Physical impossibility of installing necessary control equipment; or (3) Other factors specific to the facility (or class of facilities)…make application of a less stringent standard or final compliance time significantly more reasonable.[128]

According to EPA, while the reference to unreasonable cost resulting from plant age "implements" the statutory provision on remaining useful life, the opening clause of the implementing regulation ("unless otherwise specified in the applicable subpart") makes clear that EPA has discretion to alter the extent to which states may authorize relaxations to standards of performance that would otherwise apply. (p. 34925).

b. Implications for Implementation of these Emission Guidelines

EPA explains that provisions for remaining useful life are relevant for emission guidelines in which the EPA specifies a standard of performance that must be fully implemented by each individual existing source within a source category, and as such, as much more like a CAA §11(b) standard. In those cases, some individual sources, by virtue of their age or other unique circumstances, may warrant special accommodation. (p. 34925).

EPA's proposed guidelines under CAA §111(d) however contain no emission standards that the state must apply directly to a specified EGU; therefore no relief for individual facilities is needed. Rather, because of the flexibility for states to design their own standards, the states have the ability to address the issues involved with ''remaining useful life'' and ''other factors'' in the initial design of those standards, which would occur within the framework of the CAA section 111(d) plan development process.[129]

c. Relationship to State Emission Performance Goals and Timing of Achievement

According to EPA, of the four building blocks considered by the EPA in developing state goals, only the first block, heat rate improvements, involves capital investments at the affected EGUs which, if mandated by a state rule, might give rise to remaining useful life considerations at a particular facility. The other building blocks—re-dispatch among affected sources, addition of new generating capacity, and improvement in end-use energy efficiency—do not generally involve capital investments by the owner/operator at an affected EGU. (p. 34926).

In the case of heat rate improvements at affected EGUs, states can choose whether to require a greater or lesser degree of heat rate improvement than the 6 percent improvement assumed in the EPA's proposed BSER determination, either because of the remaining useful life

[128] 40 CFR 60.24(f)

[129] States are free to specify requirements for individual EGUs that are appropriate considering remaining useful life and other facility-specific factors. Id.

of one or more EGUs, other source-specific factors that the state deemed appropriate to consider, or any other relevant reasons.

Due then, to the fact that states can take advantage of the flexibility to pursue some building blocks more aggressively and other less aggressively, EPA proposes that remaining useful life of affected EGUs should not be considered a basis for adjusting a state emission performance goal. (p. 34926).

10. Design, Equipment, Work Practice or Operational Standards

EPA seeks comment on whether, pursuant to CAA §111(h)(1), which authorizes the Administrator to promulgate "a design, equipment, work practice, or operational standard" if" it is not feasible to prescribe or enforce a standard of performance," such standards can replace "standards of performance" in state plans. (pp. 34926-34927).

11. Emission Averaging and Trading

EPA proposes that the definition of ''standard of performance'' is broad enough to incorporate emissions averaging and trading provisions, including both emission rate programs, in which sources may average or trade those rates, and mass emission limit programs, in which sources may buy and sell mass emission allowances (and, under certain circumstances, offsets).

Based upon a 2004 Supreme Court decision,[130] EPA considers a tradable emission rate or a tradable mass limit to be a ''standard for emissions of air pollutants'' because it establishes an emissions limit for a source's air pollutants, and as a result, qualifies as a ''criterion'' or ''test'' for those air pollutants. Moreover, an averaging or trading requirement qualifies as a ''continuous emission reduction'' because, in the case of a tradable emission rate, the rate is applicable at all times, and, in the case of a tradable mass limit, the source is always under the obligation that its emissions be covered by allowances. (p. 34927).

G. Additional Factors That Can Help States Meet Their CO_2 Emission Performance Goals

This subsection briefly discusses resources EPA can offer states to help them meet their emission performance goals including the Ozone Transport Commission trading program and the "Accounting Framework for Biogenic CO_2 Emissions from Stationary Sources." (p. 34927).

H. Resources for States to Consider in Developing Plans

EPA has developed a toolbox of decision support resources and is making that available at a dedicated Web site: http://www2.epa.gov/ www2.epa.gov/cleanpowerplantoolbox. Current

[130] A ''standard'' is simply ''that which 'is established by authority, custom, or general consent, as a model or example; criterion; test.''' Engine Mfrs. Ass'n v. South Coast Air Quality Mgmt. Dist., 541 U.S. 246, 252–53 (2004) (quoting Webster's Second International Dictionary, at 2455 (1945)). See fn. 311.

resources on the site focus on approaches states and other entities have already taken that reduce CO_2 emissions from the electric utility sector. (p. 34928).

IX. Implications for Other EPA Programs and Rules

A. Implications for NSR Program

While a state §111(d) plan could trigger the EPA's New Source Review (NSR) program, particularly if, as part of the state plan, affected EGUs are required to modify and increase their dispatch (and correspondingly their emissions) exceeding the NSR threshold.[131] However, EPA suspects few instances in which a Prevention of Significant Deterioration (PSD) would be required due to state flexibility in selecting measures to comply with the state plan.[132] (p. 34928).

B. Implications for Title V Program

EPA proposes to exempt GHGs from fee rates in effect for other pollutants and replace it with a "much lower" fee sufficient to cover the costs of addressing GHGs in operating permits under Title V of the Clean Air Act. (p. 34929).

C. Interactions with Other EPA Rules

In this subsection (Section IX.C), EPA discusses a series of concurrent or pending EPA rules including:

- Mercury and Air Toxics Standards (MATS)[133]
- Clean Water Act §1326(b)[134]
- Steam Effluent Limitation Guidelines (SE ELG)[135]

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[131] As a general matter, a modifying major stationary source would trigger PSD permitting requirements for GHGs if it emits GHGs in excess of 100,000 tons per year (tpy) of carbon dioxide equivalents (CO_2e), and it undergoes a change or change in the method of operation (modification) resulting in an emissions increase of 75,000 tpy CO_2e as well as an increase on a mass basis.

[132] States could, for example, adjust its demand-side or renewable energy programs or limit a unit's ability to move up in the dispatch order. Id.

[133] The MATS rule will reduce emissions of heavy metals, including mercury (Hg), arsenic (As), chromium (Cr), and nickel (Ni); and acid gases, including hydrochloric acid (HCl) and hydrofluoric acid (HF).

[134] This rule establishes new standards to reduce injury and death of fish and other aquatic life caused by cooling water intake structures at existing power plants and manufacturing facilities.

[135] This Proposed Rule would strengthen the controls on discharges from certain steam electric power plants by revising technology-based effluent limitations guidelines and standards for the steam electric power generating point source category.

- Coal Combustion Residuals (CCR)[136]
- National Ambient Air Quality Standards (NAAQS) State Implementation Plans (SIPS)[137]

(pp. 34929 – 34931). In each case, EPA believes due to the flexibility afforded states in their CAA §111(d) plans with respect to adopting rate- or mass-based performance goals, and their reliance on a wide variety of measures and timeframes,

> states will have ample opportunity, when developing and implementing their CAA section 111(d) plans, to coordinate their response to this requirement with source and state responses to any obligations that may be applicable to affected EGUs as a result of the MATS, 316(b), SE ELG and CCR rules—all of which are or will be final rules before this rulemaking is finalized—and to do so in a manner that will help reduce cost and ensure reliability, while also ensuring that all applicable environmental requirements are met.

(p. 34930).[138]

X. Impacts of the Proposed Action

A. What are the air impacts?

Tables 10 and 11 show expected CO_2 and other air pollutant emission reductions in the base case, with the proposed Option 1 for 2020, 2025, and 2030 and regulatory alternative Option 2, for 2020 and 2025. (pp. 34931 – 34932).

B. Comparison of Building Block Approaches

This subsection compares impacts of combining Building Blocks 1 and 2 against a combination of all four Building Blocks in the categories of CO_2 emission reductions, coal-fire retirements (GW), coal production, coal prices, natural gas production, natural gas price, construction of NGCC capacity, new renewable energy capacity (GW), annual incremental compliance costs, combined climate benefits and health co-benefits. (pp. 34932-34933).

C. Endangered Species Act[139] (No Summary)

[136] This Proposed Rule would regulate the disposal of coal combustion residuals (CCRs) generated by electric utilities and independent power producers.

[137] SIPS proposed include §110 (infrastructure), §182 (ozone non-attainment), particulate matter, and SO2.

[138] Similarly, regarding the proposed NAAQS SIPS, EPA believes that states will have "ample opportunity to design §111(d) plans that use innovative, cost-effective regulatory strategies and that spark investment and innovation across a wide variety of clean energy technologies." (p. 34931).

[139] For discussion, see pp. 34933-34934.

D. What are the energy impacts?[140] (No Summary)

E. What are the compliance costs?[141] (No Summary)

F. What are the economic and employment impacts?[142] (No Summary)

G. What are the benefits of the proposed goals?[143] (No Summary)

XI. Statutory and Executive Order Reviews[144] (No Summary)

A. Executive Order 12866, Regulatory Planning and Review, and Executive Order 13563, Improving Regulation and Regulatory Review[145] (No Summary)

B. Paperwork Reduction Act[146] (No Summary)

C. Regulatory Flexibility Act[147] (No Summary)

D. Unfunded Mandates Reform Act of 1995[148] (No Summary)

E. Executive Order 13132, Federalism

Under Executive Order 13132, the EPA may not issue an action that has federalism implications, that imposes substantial direct compliance costs, and that is not required by statute,

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[140] The next four subsections discuss costs and impacts nationally and were developed using EPA modeling software. This paper does not critique the EPA modeling analysis used in attaining these figures and thus, rather than summarizing these subsection, page numbers to their discussion are listed. The discussion of energy impacts is found on p. 34934 of the Federal Register.

[141] See pp. 34934-34935.

[142] See pp. 34935-34936.

[143] See pp. 34936-34942.

[144] This paper will list page numbers where Executive Orders are discussed in the Proposed Rule and will only offer a summary of Subsection E – Executive Order 13132, Federalism.

[145] See pp. 34942-34946.

[146] See p. 34946.

[147] See pp. 34946-34947.

[148] See p. 34947

unless the federal government provides the funds necessary to pay the direct compliance costs incurred by state and local governments, or the EPA consults with state and local officials early in the process of developing the proposed action. (p. 34947).

EPA has concluded that this action may have federalism implications, because it may impose substantial direct compliance costs on state or local governments, and the federal government will not provide the funds necessary to pay those costs. As discussed in the Supporting Statement found in the docket for this rulemaking, the development of state plans will entail many hours of staff time to develop and coordinate programs for compliance with the proposed rule, as well as time to work with state legislatures as appropriate, and develop a plan submittal. (p. 34947).

EPA relates its early consultation with state and local officials in the process of developing the proposed action and notes its engagement with 10 national organizations representing state and local elected officials, offering a pre-proposal update on emission guidelines for existing EGUs. EPA notes that a detailed Federalism Summary Impact Statement (FSIS) describing the most pressing issues raised in pre- and post-proposal comments will be issued along with the final rule as required by Executive Order 13132 §6(b). (pp. 34947-34948).

F. Executive Order 13175, Consultation and Coordination with Indian Tribal Governments[149] (No Summary)

G. Executive Order 13045, Protection of Children from Environmental Health Risks and Safety Risks[150] (No Summary)

H. Executive Order 13211, Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use[151] (No Summary)

I. National Technology Transfer and Advancement Act[152] (No Summary)

J. Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations[153] (No Summary)

[149] See p. 34948.

[150] See p. 34948.

[151] See p. 34948.

[152] See pp. 34948-34949.

[153] See pp. 34949-34950.

XII. Statutory Authority

The final section of this proposal lists the statutory authority for the actions as Clean Air Act §§'s 111, 301, 302, 307(d)(1)(V) and 307(d).

National Regulatory Research Institute Next Steps

This paper is the first in a series that NRRI will publish over the course of 2014-2015 leading up to EPA's publication of the Final Rule on June 1, 2015. While this paper provides a comprehensive summary of the Proposed Rule, future papers will consider:

(1) Interactions between CAA §111(d) requirements under the Clean Power Plan and the two Proposed Rules issued under §111(b) on New EGUs (79 Fed. Reg. 1430) and Modified or Reconstructed EGUs (79 Fed. Reg. 34960)

(2) Interactions between the Clean Power Plan and the Federal Power Act (FPA)

(3) An analysis of comments submitted in response to the Clean Power Plan and

(4) A legal analysis of the EPA's proposed carbon dioxide emission limitations on new, existing and modified & reconstructed electric generating units.

Bibliography

(1) *Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units*, 79 Fed. Reg. 34830-01 (June 18, 2014)

(2) *Discount Rate*, http://www.investopedia.com/terms/d/discountrate.asp

(3) *International Energy Outlook 2013*, US Energy Information Association (http://www.eia.gov/forecasts/ieo/emissions.cfm)

(4) Weeks, Ann Brewster, *Essay Responding to Brian H. Potts*, 31 Yale J. on Reg. Online 38 (October 20, 2013)

Appendix

Presentation at EISPC Meeting, October 2014

EISPC Meeting

The US EPA Clean Power Plan: Outcomes and a Comprehensive Summary

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October 2, 2014

Outcomes from Atlanta Meeting

Unclear at This Point

- Session titled "New EPA Regulations: Is there a Role for Regional Organizations in the Implementation of Section 111(d)?"
- Date of Session: May 2014
- Four Perspectives:
  - Great River Energy – Carbon Adder would alter dispatch order
  - ISO/RTO Council – Reliability Safety Valve
  - Georgetown Climate Center – Multi-state Approach
  - Advanced Energy Economy – opportunity for grid modernization

Overview

I. Comprehensive Summary of "Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units," 79 Fed. Reg. 34830.

II. Reference Tool for state regulatory community
   A. Reference for drafting of Comments
   B. Tool to familiarize staff with proposed rule
   C. NRRI's institutional knowledge

III. Notable EPA Proposals (NRRI Perspective)

IV. Future NRRI Analyses

Notable Proposals in CPP

(1) Stringency of Building Block Applications
(2) Justification for All Four Building Blocks as BSER
(3) State Demonstrations of Infeasibility
(4) NGCC Utilization Rate of 70% Possible
(5) Attributes of CO2 & Electricity and the Portfolio Approach
(6) Interactions Between CAA § § 's 111(d) and 111(b)
(7) EPA Construction of Ambiguous CAA Provisions
(8) Artificiality of Inside/Outside Fence Proposal
(9) Federal Enforceability and Portfolio Approach
(10) Cost of Application of Each Building Block Measure
(11) Remaining Useful Life

Stringency of Building Block Applications

- Block 1- improving average heat rate of coal-fired steam EGUs by 6%
- Block 2 - displacing coal generation in each state by increasing generation from existing natural gas combined cycle (NGCC) capacity toward a 70% target utilization rate
- Block 3 - including projected amounts of generation achievable by completing all nuclear units currently under construction, avoiding retirement of about 6% of existing nuclear capacity, and increasing renewable capacity through state renewable generation targets consistent with renewable portfolio standards (RPS's) of states in the same region
- Block 4 - increasing state demand- side energy efficiency (EE) efforts to reach 1.5% annual electricity savings in the 2020–2029 period. (p. 34851)

Justification for All Four Building Blocks as BSER

- Each building block is a proven way to improve emissions rates at affected EGUs or reductions in EGU mass emissions
- Each is in widespread use and is independently capable of supporting significant CO2 reductions from affected EGUs, either on an emission rate or mass-emissions basis, at a reasonable cost consistent with ensuring system reliability
- The combination of all four building blocks can achieve greater overall CO2 emission reductions from affected EGUs, at a lower cost per unit of CO2 eliminated, than the combination of building blocks 1 and 2. (p. 34878).

State Demonstrations of Infeasibility

- During comment period, a state may demonstrate that application of one of the building blocks to it would not produce the emission reduction target specified by EPA due to technical infeasibility or costs were higher than projected.
- However, the feasibility of ramping up other building blocks will be considered before accepting such arguments.
- For example, if a state demonstrates that its coal- fired EGUs could only achieve an average 4% heat rate improvement, instead of the 6% that EPA has proposed in Building Block 1, EPA would not adjust the state's goal unless the state also demonstrates that it could not get additional reductions from application of the other Building Blocks, or in related measures. (p. 34893).

NGCC Utilization Rate of 70% Possible

- the natural gas pipeline system already supports NGCC utilization rates of 60% or higher during peak hours
- even if constraints were placed on NGCC units in certain locations and hours, that would not prevent NGCC generation overall across a region in all hours
- pipeline and transmission planners have repeatedly demonstrated the ability to relieve bottlenecks and expand capacity; (pp. 34863-34864)

Attributes of CO2 & Electricity and the Portfolio Approach

Electricity regulation is unique due to

"the particular characteristics of carbon pollution, the interconnected nature of the power sector and the manner in which EGUs are currently operated…[s]pecifically, the operators…treat increments of generation as interchangeable between and among sources in a way that creates options for relying on varying utilization levels, lowering carbon generation, and reducing demand as components of the overall method for reducing CO2 emissions." (p. 34845).

Interactions Between CAA § § 's 111(d) and 111(b)

- An existing source subject to CAA 111(d) will continue to be subject to those requirements even after it undertakes a modification (p. 34903)
- An "existing source" that commences modification after the EPA has proposed or finalized a CAA 111(b) standard of performance applicable to it becomes a "new source."
- It is unclear whether requirements imposed under CAA 111(d) continue for a source that ceases to be an existing source because it modifies
- Regulation under CAA §111(d) is predicated upon affected sources falling under CAA §111(b) *were they new sources*. (p. 34852)
- Treatment of new NGCC in state plans.

EPA Construction of Ambiguous CAA Provisions

- Senate amendment - CAA section 111(d)(1) excluded the regulation of any pollutant which is "included on a list published under [CAA section] 112(b).'
- House amendment - CAA section 111(d)(1) excluded the regulation of any pollutant which is "emitted from a source category which is regulated under section 112." (p. 34853)
- Under Chevron U.S.A. Inc. v. NRDC, the courts ask whether the agency's construction of the statute is permissible on the merits
- Step One - whether it is evident that "Congress has directly spoken to the precise question at issue;" and if so, the statute is unambiguous.
- Step Two – if ambiguous, court must uphold the agency's interpretation of the statute "so long as it is based upon a permissible construction of the statute.

Artificiality of Inside/Outside Fence Proposal

Artificiality of Inside/Outside Fence Proposal

EPA suggests artificiality of distinction because

- Neither the addition of RE nor the reduction of demand directly reduces the atmospheric emission of CO2
- Rather, they permit fossil EGUs to reduce their output and emissions, and are therefore "at the unit."
- The real issue then is whether §111(d) authorizes the EPA to require EGUs to curtail their own output to comply with this rule. (p. 34889, fn. 237).

Federal Enforceability and Portfolio Approach

- All measures relied on to achieve emission performance level should be included in state plan and inclusion in state plan renders those measures federally enforceable (p. 34901)
- "Portfolio Approach" – Allow state plans to include federally-enforceable measures that are not standards of performance, provided they reduce CO2 emissions from affected sources. (p. 34903).
- Hinges on EPA's interpretation of the word "for" - standards are reasonably considered to be "for" affected sources if they would decrease the amount of generation needed from affected EGUs.
- Renewable energy and demand-side EE requirements would be "for" fossil fuel-fired EGUs where such standards result in reduced CO2 emissions from fossil fuel-fired EGUs, even if the standards do not apply directly to the EGUs. (p. 34903).

Cost of Application of Each Building Block Measure

- Cost of application of each Building Block in BSER is in terms of the cost of CO2 reductions in $/metric ton of CO2.
- heat rate improvement = $7.75/metric ton (t) CO2 (p. 34861)
- Re-dispatch to NGCC = $30/t CO2 (p. 34865)
- Renewable generation = $10-$40/t CO2 (p. 34869)
- Nuclear generation = $12-$17/t CO2 (p. 34871)
- Demand-side EE = $16-$24/t CO2 (p. 34875).

Remaining Useful Life

- CAA §111(d)(1) relieves states from strictly applying a standard of performance by taking into consideration, among other factors, "the remaining useful life of the existing source to which such standard applies."
- EPA proposes that the flexibility provided in the state plan development process adequately allows for consideration of remaining useful life and therefore a separate application of the provision by states is unnecessary. (p. 34925).
- EPA's 1975 implementing regulations contemplated deviations from the strict standards of performance when unreasonable cost of control resulting from plant age made less stringent standard more reasonable

Future NRRI CPP Analyses

November/December 2014

- Interaction of §111(b) proposals and §111(d) proposal
- Interaction of Federal Power Act provisions and CPP

February/March 2015

- Examination of comments from States and Stakeholder groups
- Update on Survey of state actions on compliance

May/June 2015

- Legal Analysis of CPP proposal