



Environmental Energy Technologies Division Lawrence Berkeley National Laboratory

EPA's Clean Power Plan

With a Focus on Energy Efficiency and EM&V

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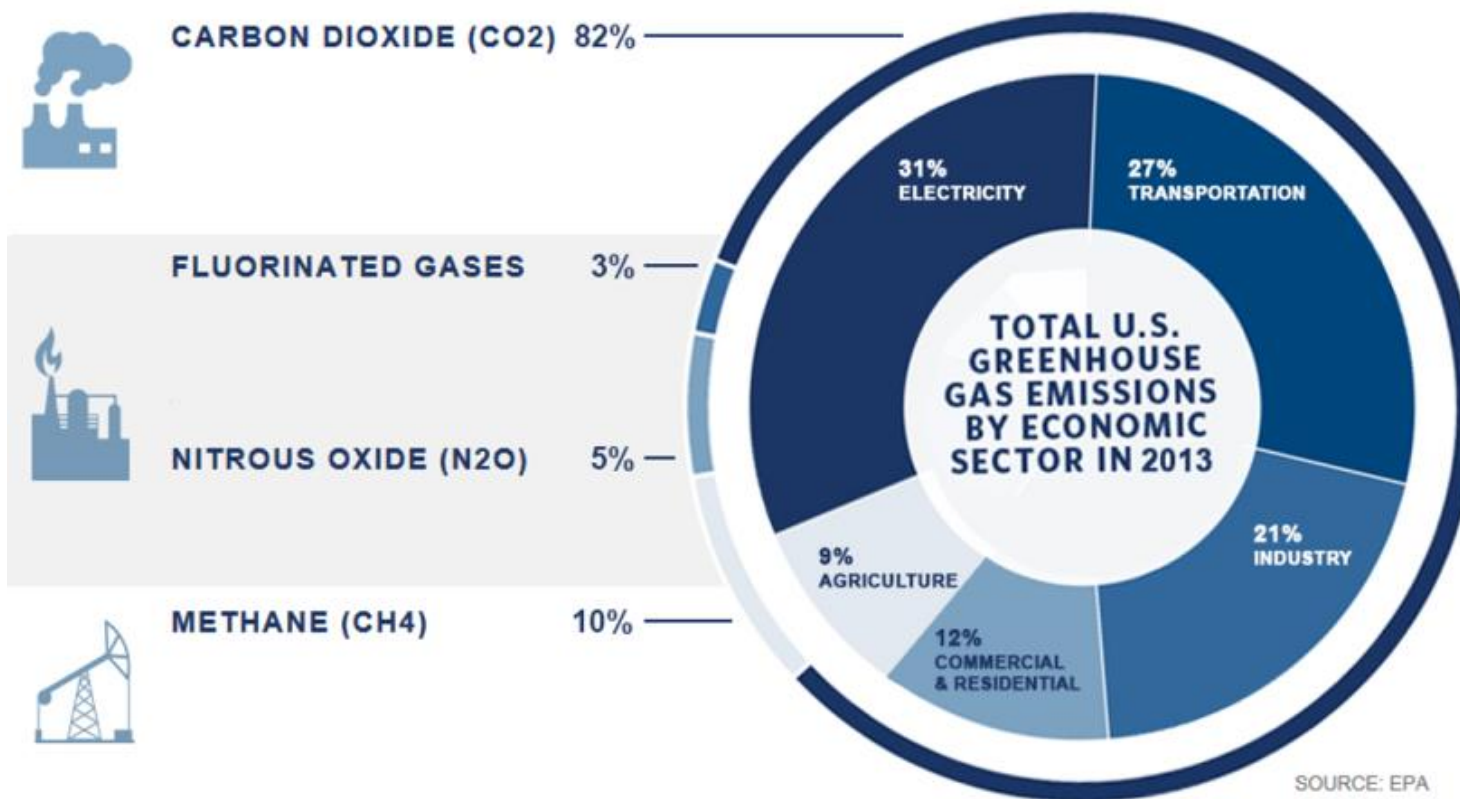
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- This presentation and any comments, information or opinions expressed are those of the presenter and NOT those of the US E.P.A., US D.O.E., or LBNL
- With over 3,000 pages of related documents, this is an initial summary and interpretation.....

- Introduction
 - Basics of the Clean Power Plan (CPP)
 - Energy efficiency and EM&V in the CPP
 - EPA's questions for stakeholder Input
- Our panel presentations
- Panel and audience discussion

POWER PLANTS ARE THE SINGLE LARGEST SOURCE OF CARBON POLLUTION



- 2007: Supreme Court holds GHGs subject to Clean Air Act regulations; requires EPA to make “Endangerment finding”
- 2009: EPA makes endangerment finding that GHG’s endanger public health and welfare
- 2009+: EPA establishes emission standards for motor vehicles
- 2013: EPA issues a new proposal for reducing carbon pollution from new power plants
 - limits for fossil fuel-generators from 1,000-1,100lb CO₂/MWh
 - under Section 111(b) of the CAA – Best Available Control Technology
- 2014: 111(b) regulations triggers CAA 111(d) to regulate existing sources → the Clean Power Plan

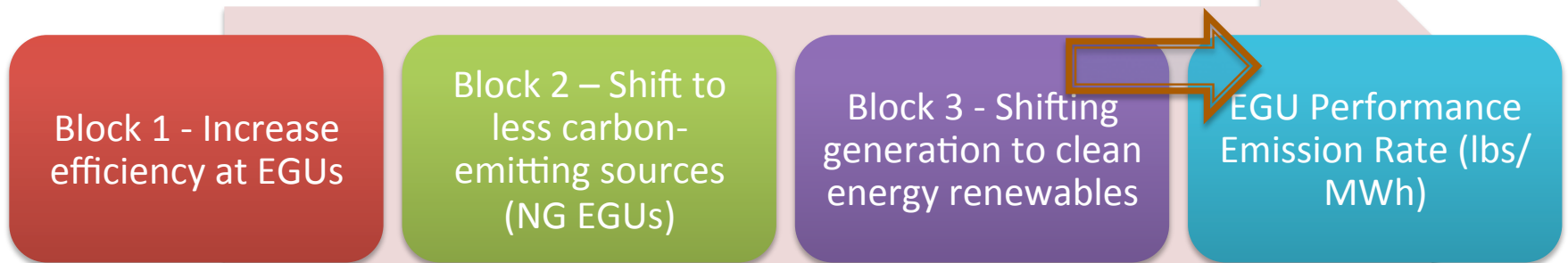
EPA is taking three actions that will significantly reduce carbon pollution from the power sector:

- **Clean Power Plan (CPP) – existing sources**
- **Carbon Pollution Standards – new, modified and reconstructed sources**
- **Federal Plan proposal and model rule**



Goal Setting: BSER and Building Blocks

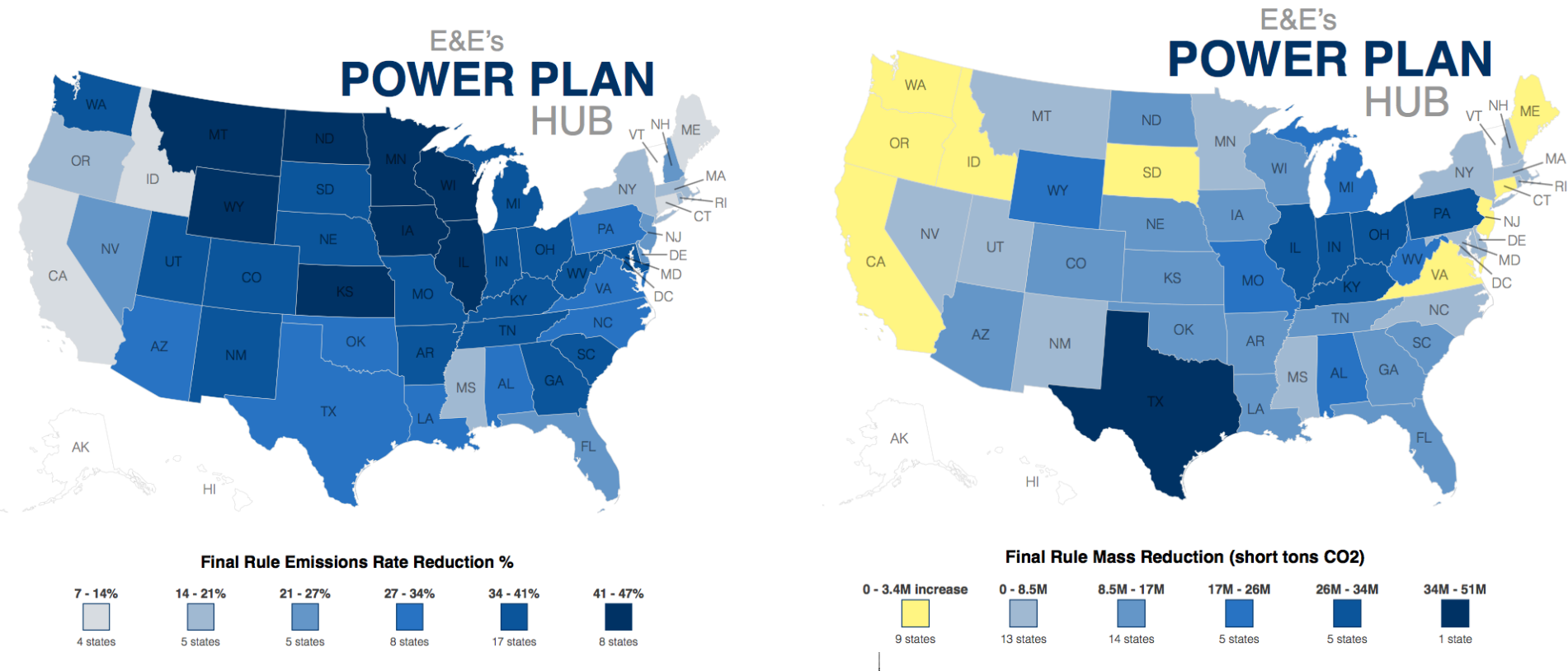
- EPA established CO₂ emission performance rates representing the **Best System of Emission Reduction (BSER)** for existing fossil fuel-fired EGUs
- EPA has established a BSER, in **three building blocks**



- The building blocks – a tool for setting state goals ---
 - Yes, demand side EE was not used to set goals in final CPP
 - However, states are free to meet goal in the way that works best for them
 - States can rely more or less heavily on specific measures such as demand side efficiency or renewable energy

- EGU emission performance rates have been translated into equivalent state goals.
- In order to maximize the range of choices available to states, EPA is providing state goals in three forms:
 - Rate-based goal measured in pounds per megawatt hour (lb CO₂/MWh)
 - Mass-based goal measured in short tons of CO₂
 - Mass-based goal with a new source complement (for states that choose to include new sources)

State by State CO₂ Goals – graphics from E&E Publishing



Graphics accessed on 8/11/15 from http://www.eenews.net/interactive/clean_power_plan#updated_mass_reduction

CPP Schedule – *slide from U.S. EPA*

Submittals	Dates
State Plan OR initial submittal with extension request	September 6, 2016
Progress Update, for states with extensions	September 6, 2017
State Plan, for states with extensions	September 6, 2018
Milestone (Status) Report	July 1, 2021

Interim and Final Goal Periods ¹	Reporting
Interim goal performance period (2022-2029) ²	
- Interim Step 1 Period (2022-2024) ³	July 1, 2025
- Interim Step 2 Period (2025-2027) ⁴	July 1, 2028
- Interim Step 3 Period (2028-2029) ⁵	July 1, 2030
Interim Goal (2022-2029) ⁶	July 1, 2030
Final Goal (2030)	July 1, 2032 and every 2 years beyond

¹ State may choose to award early action credits (ERCs) or allowances in 2020-2021, and the EPA may provide matching ERCs or allowances, through the Clean Energy Incentive Program. See section VIII.B of the final rule preamble for more information.

² The performance rates are phased in over the 2022-2029 interim period, which leads to a glide path of reductions that “steps down” over time. States may elect to set their own milestones for Interim Step periods 1, 2, and 3 as long as they meet the interim and final goals articulated in the emission guidelines.

^{3,4,5} State required to compare EGU emission levels with the interim steps set forth in the state’s plan. For 2022-2024, state must demonstrate it has met its interim step 1 period milestone, on average, over the three years of the period. For 2025-2027, state must demonstrate it has met its interim step 2 period milestone, on average, over the three years of the period. For 2028-2029, state must demonstrate it has met its interim step 3 period milestone, on average, over the two years of the period. See section VIII.B of the final rule preamble for more information.

⁶ State required to compare EGU emission levels with the interim goal set forth in the state’s plan. For 2022-2029, state must demonstrate it has met its interim goal, on average, over the eight years of the period.

Emission Standards Plan – state places federally enforceable emission standards on affected electric generating units (EGUs) that fully meet the emission guidelines

- can be designed to meet the CO₂ emission performance rates or state goal (rate-based or mass-based goal)

State Measures Plan - state includes, at least in part, measures implemented by the state that are not included as federally enforceable emission standards

- designed to achieve the state CO₂ mass-based goal
- includes federally enforceable measures as a backstop

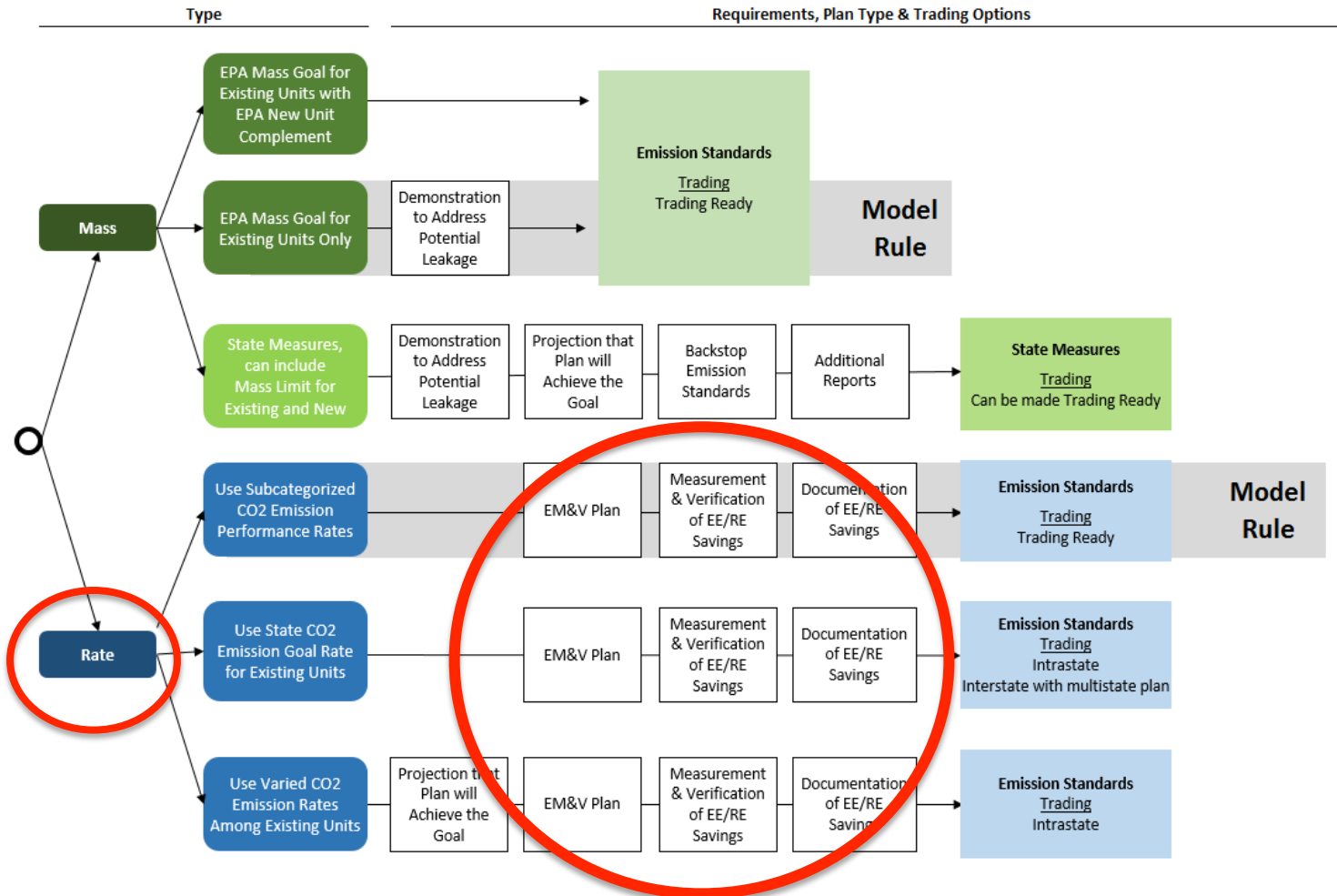
Several Pathways – slide from U.S. EPA

- This chart shows some of the compliance pathways available to states under the final Clean Power Plan. Ultimately, it is up to the states to choose how they will meet the requirements of the rule
- EPA's illustrative analysis shows that nationwide, in 2030, a **mass-based approach is less-expensive** than a rate-based approach (\$5.1 billion versus \$8.4 billion)

Under a mass-based plan, states that anticipate continuing or expanding investments in energy efficiency have unlimited flexibility to leverage those investments to meet their CPP targets. EE programs and projects do not need to be approved as part of a mass-based state plan, and EM&V will not be required

For states currently implementing mass-based trading programs, the “state measures” approach offers a ready path forward

Demand-side energy efficiency is an important, proven strategy that states are already widely using and that can substantially and cost-effectively lower CO2 emissions from the power sector



Many CO₂ Reduction Opportunities

- Heat rate improvements
- Fuel switching to a lower carbon content fuel
- Integration of renewable energy into EGU operations
- Combined heat and power
- Qualified biomass co-firing and repowering
- Renewable energy (new & capacity uprates) - wind, solar, hydro
- Nuclear generation (new & capacity uprates)
- Electricity transmission and distribution improvements
- Carbon capture and utilization/sequestration for existing sources
- Carbon capture and sequestration for existing sources
- ***Demand-side energy efficiency measures, programs and policies – Energy efficiency improvements are expected to be an important part of state compliance across the country and under all state plan types, providing energy savings that reduce emissions, lower electric bills, and lead to positive investments and job creation***

Energy Efficiency in the CPP – Rate Based Approach

- From CPP
 - “..a state may implement a **market-based emission trading program**, which enables EGUs to generate and procure **ERCs**, a tradable compliance unit representing **one MWh of electric generation (or reduced electricity use)** with zero associated CO₂ emissions.”
 - “...These ERCs may then be used to adjust the reported CO₂ emission rate of an affected EGU when demonstrating compliance with a rate-based emission standard. **For each submitted ERC, one MWh is added to the denominator of the reported CO₂ emission rate, resulting in a lower adjusted CO₂ emission rate.**“
- Only emission rate plans use rate-based approaches (not state measure plans)

EE can be used to generate “ERCs” that are used to help meet the rate target. Rate based approaches are where there are EM&V and tracking requirements for EE.

Energy Efficiency in the CPP

Mass Based Approach

- From CPP
 - “....incentivizes the use of strategies such as RE and demand-side EE as complementary measures that reduce CO₂ emissions.
 - “The EPA believes the state measures plan type will provide states with additional latitude in accommodating existing or planned programs such as EERS, and utility- and state-administered incentive programs for the deployment of RE and demand-side EE technologies and practices.
 - “.... unlike under a rate-based approach, for this latter set of measures there is no need to address and describe these state measures in a state plan submission or quantify and verify ...EE MWh of ... savings...”
- State measure plans are “mass plans”, emission standard plans can also be “mass plans”

EE reduces emissions mass “indirectly”. No EE EM&V or tracking required for CPP. EE is implemented with complementary programs, which may very well need their own EM&V and tracking requirements to help (indirectly) comply

- **Broadly** – emission standards must be **quantifiable, verifiable, enforceable, non- duplicative and permanent**.
- “**Demand-side EE** may include a range of eligible measures, provided that the measures can be **quantified and verified** in accordance with the EM&V requirements in the emission guidelines...” ,
- Examples of demand-side EE measures include, but are not limited to:
 - EE measures that reduce electricity use in residential and commercial buildings, industrial facilities, and other **grid-connected equipment**
 - **Water efficiency programs** that improve EE at water and wastewater treatment facilities
 - EE measures installed as the result of individual projects such as those implemented by **energy service companies (ESCOs)**
 - Multiple EE measures installed through an EE deployment program (e.g. appliance replacement and recycling programs, and behavioral programs) **administered by electric utilities, state entities, and other private and non-profit entities**
 - State or local requirements that result in electricity savings, such as **building energy codes and state appliance and equipment standards**

- EPA is providing the Clean Energy Incentive Program (CEIP) to incentivize early investments that generate wind and solar power **or reduce end-use energy demand during 2020 and 2021**
- The CEIP is an optional, “matching fund” program states may choose to use to incentivize early investments in wind or solar power, as well as **demand-side energy efficiency measures that are implemented in low-income communities**
- EPA will provide matching allowances or Emission Rate Credits (ERCs) to states that participate in the CEIP, up to an amount equal to the equivalent of 300 million short tons of CO₂ emissions. The match is larger for low-income EE projects, targeted at removing historic barriers to deployment of these measures. Also, states with more challenging emissions reduction targets will have access to a proportionately larger share of the match
- In addition to the CEIP, states may also offer credit for early investments in RE and demand-side EE according to the provisions of section VIII.K.1 of this final rule: a state may **award ERCs** to qualified providers that **implement projects from 2013 onward** that realize quantified and verified MWh results in 2022 and subsequent years.

- For the CPP, EM&V is associated with successfully **quantifying and verifying savings** for purposes of generating emission rate credits (ERCs) and adjusting an emission rate
- EM&V is described in three documents:
 - *Requirements*
CPP Emissions Guidelines – see Section VIII.K
 - *Presumptively approvable EM&V approaches*
Proposed model (federal) trading rule - see Section IV.D.8.
 - *Applicable guidance*
EM&V Guidance for Demand-Side EE

Emissions Guidelines (EG) requirements are general and relatively limited, including (see EG for complete list and description):

- State plan would include EM&V plan for quantifying and verifying electricity savings on a retrospective (ex-post) basis using industry best-practice EM&V protocols and methods that yield accurate and reliable measurements of electricity savings.
- Assessment of the independent factors that influence the electricity savings and the expected life of the savings
- Baseline that represents what would have happened in the absence of the demand-side EE activity
- Periodic M&V reports
- Skill certification is also discussed

- Cover wide range of EM&V topics, including the following list from Guidance:

- EM&V Methods
- Electricity savings metrics and baselines
- Reporting timeframes and considerations
- Deemed savings
- Independent factors
- Accuracy and reliability
- Avoiding double counting
- Persistence of savings
- Savings quantification/verification cycles
- T&D savings adders
- Interactive effects
- EE EM&V Protocols and Guidelines

- Also Covered in one or both documents:

- Tracking and compliance systems (ATCS)
- Independent verification and review
- Additional EM&V guidance for several common EE program and project types
 - Programs implemented using utility customer funds (“utility EE programs”)
 - Individual or aggregated EE projects, such as those implemented by ESCOs or at industrial facilities
 - Building energy codes
 - Appliance energy standards
- Glossary of key terms
- Templates for program and project EM&V plans.
- Examples for several common measure types

- The EM&V Guidance and Model Rule documents are ‘proposed’
- EM&V is seeking feedback during a 90-day comment period
 - See Model Rule for requested topics for feedback
 - See EM&V Guidance (page v) for specific questions (copied here)
- Does the guidance provide enough information to help EE providers determine what EM&V methods (i.e., project-based measurement and verification, comparison group methods, and deemed savings) to use for purposes of quantifying savings from specific EE programs, projects, and measures?
- Does the guidance include sufficient information about the appropriate circumstances and safeguards for the use of deemed savings values? For project-based measurement and verification and comparison group methods?
- Should the guidance specifically encourage greater use of comparison group approaches? Under what circumstances is the application of such empirical methods practical and cost-effective? Would additional guidance be useful on “top-down” econometric EM&V methods, and the ways in which such methods can be used to verify savings at a high level of aggregation?
- Is the guidance in Section 3 on particular EE program types (consumer-funded EE programs, project-based EE, building energy codes, and appliance standards) helpful, clearly presented, and sufficient/complete? Can this guidance be reasonably implemented, considering data availability, cost effectiveness, accuracy of results, and other factors?
- Is the guidance on important technical topics (e.g., common practice baselines, accuracy and reliability, verification) helpful, clearly presented, and sufficient/complete? Can this guidance be reasonably implemented, considering data availability, cost effectiveness, accuracy of results, and other factors?
- How useful and usable is the guidance, overall? Does the relationship between the component parts (i.e., Sections 1-3 and Appendices A-C) clear and relatively easy to follow? Is each of these sections and appendices helpful, clearly presented, and sufficient/complete? What specific examples, graphics, or other visual elements would help illustrate concepts described in the
- Does the guidance not cover any important EM&V topics relevant to fulfilling the EM&V related requirements of the emission guidelines? Is additional guidance needed to support the implementation of other eligible zero- and low-emitting measures that are directly metered? What topics, if any, are unnecessarily included?
- How can the guidance most effectively anticipate the expected changes and evolution in quantification and verification approaches over time (given the time horizon for the emission guidelines)?

- **Clean Power Plan website:**
<http://www2.epa.gov/carbon-pollution-standards>
- **Specific Documents:**
 - **CPP Emission Guidelines:** <http://www.epa.gov/airquality/cpp/cpp-final-rule.pdf>
 - **Federal Model Plan:** <http://www.epa.gov/airquality/cpp/cpp-proposed-federal-plan.pdf>
 - **EM&V Guideline:**
<http://www2.epa.gov/cleanpowerplantoolbox/draft-evaluation-measurement-and-verification-guidance-demand-side-energy>
- **For additional resources to help states develop plans, visit the CPP Toolbox for States:** <http://www2.epa.gov/cleanpowerplantoolbox>
- **EPA Overview presentation from which some of the slides in this presentation were taken:**
<http://www2.epa.gov/cleanpowerplan/clean-power-plan-overview-webinar>

Topic

*States And
Regions Prepare
For The Clean
Power Plan*

Panelists

- Ken Colburn, Regulatory Assistance Project
- Kevin Cooney, Navigant Consulting
- Deborah Reynolds, Washington Utilities and Transportation Commission
- Hossein Haeri, Cadmus Group
- David Rosenheim, The Climate Registry

Panel Discussion Questions

1. *What are your initial reactions to the CPP documents – will CPP be a driver for more EE?*
2. *What infrastructure developments do you see as needed to implement substantial EE under the CPP?*
3. *Do you have initial feedback on the EM&V requirements and guidance provided by EPA?*

