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American Council for an Energy-Efficient Economy

# Opportunities for Water Conservation under EPA's Clean Power Plan

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# Presentation outline

- Overview of the Clean Power Plan (CPP)
- Opportunities for water and wastewater utilities in CPP compliance
- Potential efficiency and water conservation measures for compliance plans

# What is the Clean Power Plan?

Environmental Protection Agency (EPA) is using authority under Section 111(d) of the Clean Air Act to regulate carbon dioxide emissions (the primary greenhouse gas pollutant) from a subset of power plants that generate electricity.

CPP is the name EPA has given this rule which regulates coal and natural gas power plants that have already been built (there is a different rule for new plants).

Rulemaking process involves multiple steps. EPA issued a proposed rule in 2014 which it revised in response to millions of comments. It just released a final rule, draft model rule, draft federal plan and draft EM&V guidance.



# What is the Clean Power Plan?

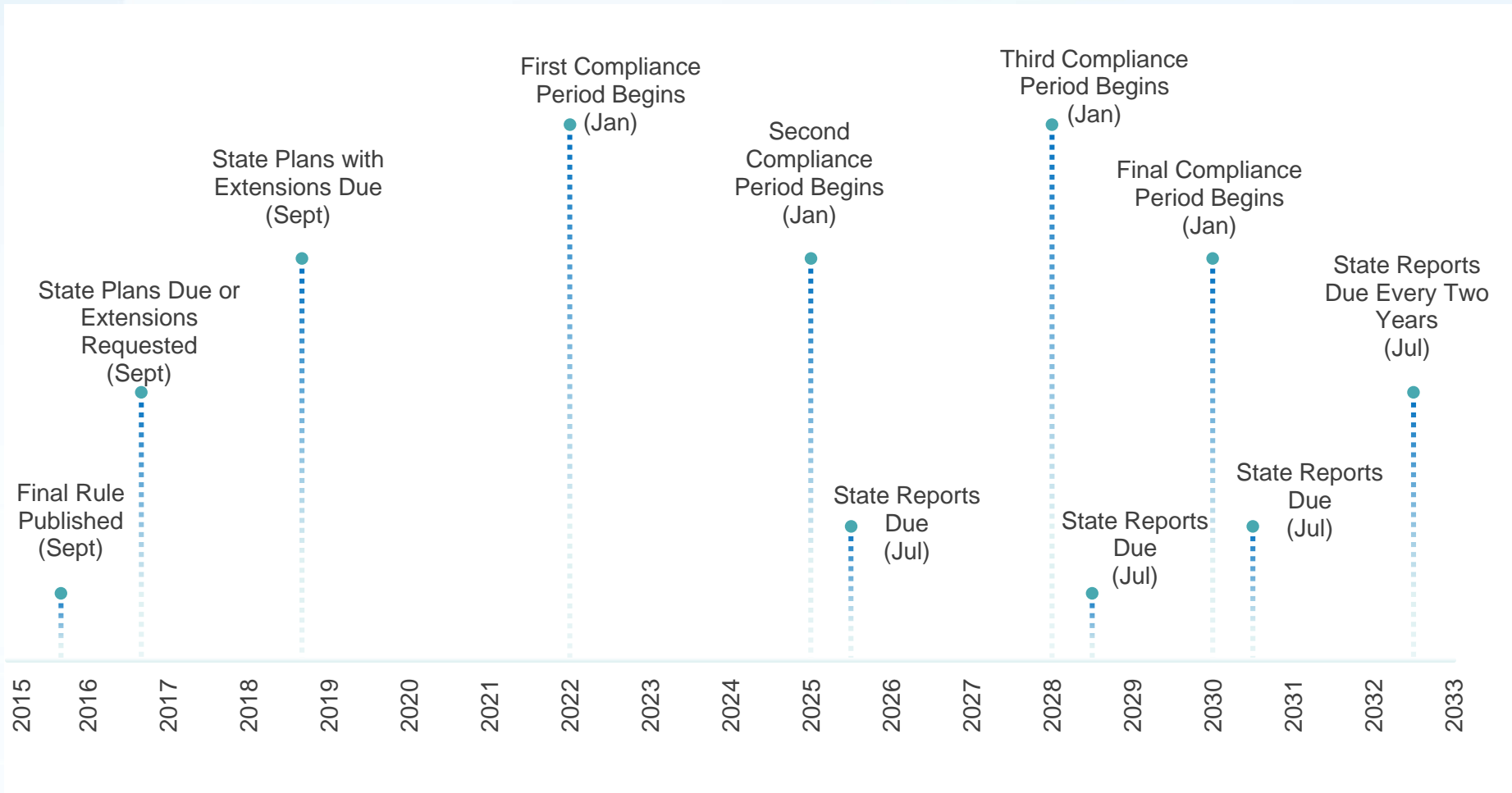
The final rule sets the emissions targets for states, among other things. The draft model rule and draft federal plans will be finalized in the future. They propose what a state plan might look like. The EM&V guidance is draft guidance, complementary to, but separate from the rule.

Under Section 111(d) a state has autonomy to do things differently from what EPA sets out in the final rules and guidance, but if it doesn't submit a plan EPA steps in and creates a federal plan for the state.

# State targets

1. EPA set national emission performance rates for:
  - Fossil steam – 1,305 lbs/MWh
  - Combustion turbines – 771 lbs/MWh
2. Emission performance rates then translated into state goals:
  - Rate-based goal (lb/MWh)
  - Mass-based goal (tons of CO<sub>2</sub>)
  - Mass-based goal with new source complement (tons of CO<sub>2</sub>)

# Timeline for state plans and compliance





# State plans

## Including Energy Efficiency in State Plans:

### Rate-based Plans

EE measures installed after January 1, 2013 that are still saving energy in 2022 are eligible

EM&V plan required for inclusion in state plan

EE MWh savings generate tradeable Emission Rate Credits (ERCs)

### Mass-based Plans

EE savings achieved in a compliance year automatically “count” toward compliance

EM&V not required for inclusion in state plan

States can further incentivize EE through: allowance allocation, using proceeds from allowance auction for EE

# Opportunities for energy efficiency

- Energy efficiency policies and programs that can count toward compliance:
  - **Water and wastewater programs**
  - Combined heat and power
  - Utility and non-utility EE programs
  - Residential, commercial and industrial measures
  - Appliance replacement and recycling programs
  - Behavioral programs
  - Energy savings performance contracts (ESPC)
  - Building energy codes
  - State appliance and equipment standards

Source: [Final CPP rule](#). Section VIII.K, pg. 1244 – 1246

# Opportunity for water/wastewater utilities

*“Commenters identified water and wastewater utilities as particularly well-suited for participating in EE programs and providing a source of electricity savings. Investments such as replacing pumps and other aging equipment and repairing leaks can result in greater EE.”*

What potential water/wastewater energy savings can play a role in compliance?

- Direct energy savings from efficiency measures in water system
- Indirect energy savings through water savings, thereby reducing embedded energy

Source: [Final CPP rule](#). Section VIII.K, pg. 1244 – 1246

# Direct energy savings

## Energy efficiency in water/wastewater utilities

- Energy audits to determine opportunities
- Capital investments (more efficient pumps and motors)
- Operational improvements

## EE in action:

- Efficient blowers for aeration in Green Bay MSD – 2,144,000 kWh/year savings
- Efficient pumps in Trumbull water system – 31,900 kWh/year



Blue Plains wastewater treatment plant



# Indirect energy savings

- Reducing embedded energy reduces energy supply needed to serve customer needs
- Examples
  - Leak detection in water system
  - Installing water saving technologies (water efficient appliances, fixtures, water systems)
  - Water conservation incentives



# Accounting for savings

- EM&V requirements vary depending on compliance pathway
- Quantifying energy savings from water conservation requires data on energy intensity of water system

Table 1. Example of energy intensity of water supply processes

Water service	Mean (kWh/MG)
Water source or conveyance	1,100
Treatment	1,100
Distribution	700
Total	2,300

Source: [A Survey of Energy Use in Water Companies](#), Young 2015



# Calculating water savings from water conservation measure

Water savings from replacing toilet meeting national standard with WaterSense toilet

Metric	Amount
Gallons per flush standard	1.6 gal
Gallons per flush of WaterSense toilet	1.28 gal
Water savings per flush with WaterSense toilet replacement	0.32 gal
Annual household water savings with WaterSense replacement (Per flush savings X average flushes per day X individuals per household X days in year)*	$0.32 \text{ gal} \times 5 \text{ flushes/day} \times 2.5 \text{ individual/households} \times 365 = 1,483 \text{ gal/year}$

\* Ultimately specific values used will have to be backed up with evaluation data

# Calculating embedded energy savings in water conservation measure

What would be the energy savings from a 50,000 toilet retrofit program?

Metric	Amount
Annual household water savings with WaterSense toilet replacement	1,483 gal/year
Energy savings with WaterSense toilet replacement (Annual household water savings X energy intensity of water system)	1,483 gal/year x 0.0023 kWh/gal = 3.4109 kWh*
Energy savings from WaterSense toilet replacement program for 50,000 toilets	3.4109 kWh x 50,000 toilets = 170,545 kWh

\* Used average energy system water intensity from Young 2015.

# Concluding thoughts

CPP provides an opportunity for energy efficiency and water conservation efforts in W/WW sector to be recognized

Depending on state compliance program, CPP may serve as additional revenue source due to sale of allowances/credits

Engage state air regulators who will be developing compliance plans

# Questions?



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# How Does EE fit in the Clean Power Plan?

Type of Approach	Role of EE/RE in State Plan	How states can advance EE/RE	EM&V Req'd?	Considerations
Emission Standards	<b>Mass</b> <i>EE reduces cost, EE/RE lowers CO<sub>2</sub> emissions but are not enforceable or written into the state plan</i>	<ul style="list-style-type: none"> <li>Allocate CO<sub>2</sub> allowances for EE/RE (e.g. through a set aside)</li> <li>Auction allowances, use \$ for EE/RE</li> <li>Secure matching allowances for solar, wind and low-income EE from Clean Energy Incentive Program (CEIP)</li> </ul>	<input type="checkbox"/> * <input type="checkbox"/> <input checked="" type="checkbox"/>	<ul style="list-style-type: none"> <li>Unlimited flexibility with EE/RE implementation</li> <li>* EM&amp;V generally not required for CPP purposes, except for CEIP and set asides specifically created to meet the leakage requirement</li> </ul>
	<b>Rate</b> <i>Explicitly written into state plan; Used to generate ERCs and directly adjust reported CO<sub>2</sub> emissions rate of affected EGUs</i>	<ul style="list-style-type: none"> <li>Include EE/RE ERC tracking, trading, and issuance provisions in the state plan</li> <li>Issue ERCs for quantified and verified MWhs from eligible EE/RE measures</li> <li>Secure matching ERCs from CEIP for solar, wind, low-income EE</li> </ul>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<ul style="list-style-type: none"> <li>EM&amp;V plans and M&amp;V reports required</li> <li>EE/RE is explicitly tracked &amp; credited</li> <li>Trading-ready plans facilitate broad access to ERCs</li> <li>EE/RE implemented after 2012 can generate credits starting in 2022</li> </ul>
State Measures	<b>State Demonstration Based on Mass</b> <i>Explicitly included as supporting material for state plan – enforceable under state law; State EE/RE policies and measures can be used to help affected EGUs meet mass goal</i>	<ul style="list-style-type: none"> <li>Implement state EE/RE policies and programs (e.g., EERS, RPS, building codes) that are enforceable under state law, either to meet goal or in conjunction with federally enforceable limits</li> <li>Secure matching allowances from CEIP for solar, wind and low-income EE</li> </ul>	<input checked="" type="checkbox"/> * <input checked="" type="checkbox"/>	<ul style="list-style-type: none"> <li>Projection of EE/RE impacts required and EGU CO<sub>2</sub> performance required</li> <li>* EM&amp;V Plan for EE/RE measures must be included as supporting material for state plan</li> <li>Backstop emission standards for affected EGUs if CO<sub>2</sub> reductions don't materialize</li> </ul>

# Compliance paths

## Rate-based Compliance (lbs/MWh)

## Mass-based Compliance (tons CO<sub>2</sub>)

Model Rules

R1

### Subcategorized CO<sub>2</sub> Emission Rates

*Two specific nationwide emission rate limits for coal plants and NGCC plants*

M1

### CO<sub>2</sub> Mass Goal for Existing Units

*A statewide emission cap is applied to existing fossil units. States must demonstrate that there is no "leakage" of generation to new fossil units*

R2

### State CO<sub>2</sub> Emission Rates

*Each power plants must meet the single state average (derived using the nationwide emission rate limits and the share of these resources in a given state)*

M2

### CO<sub>2</sub> Mass Goal for Existing Units with New Unit Complement

*A statewide emission cap is applied to all fossil units, existing or new.*

R3

### Different CO<sub>2</sub> Emission Rates

*The state allows some flexibility in individual power plant's emission rates, as long as the total rate matches the one created by EPA*

M3

### State Measures: CO<sub>2</sub> Mass Goal for Existing Units

*A statewide portfolio of strategies is used to meet the EPA goal for emissions from existing units*

M4

### State Measures: CO<sub>2</sub> Mass Goal for Existing and New Units

*A statewide portfolio of strategies is used to meet the EPA goal for emissions from existing and new units*



# State Plans – What EE Can Count?

EPA leaves it open for states to decide the types of EE that might be included in a plan. Probably the biggest hurdle is EM&V.

## Rate-based approach

- Detailed guidance is provided for most types of EE
- Emission rate credits or “ERCs” are awarded for EE that meets EM&V criteria
- States can develop their own approaches

## Mass-based approach

- EPA doesn't require a showing of EM&V because compliance is measured via tons emitted at the plant
- Very little guidance for states
- States must develop their own methods to ensure EE plays a role