Clean Power Plan: Compliance Pathways

106th Annual Conference, Boston MA

Gibson Peters

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Overview

- Overview
- International Implications
- U.S. Carbon Regulations
  - Clean Power Plan
- Clean Power Plan's Impact
  - Price of Natural Gas
  - Price of Electricity
- Clean Power Plan Compliance Pathways with District Energy
- Opportunities

Opportunities for District Energy

Clean Power Plan a great opportunity to expand district energy in the US

District Energy is positioned to take advantage of carbon and energy market inefficiencies created with storage, non-covered resources, and highly efficient energy

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International Carbon Goals

- US 26-28% below 2005 levels by 2025
- China commitment to peak emissions around 2030, and non-fossil energy consumption to ~20% by 2030.
- European Union to cut their emissions 40% by 2030.
- Mexico peak its overall net greenhouse gases by 2026

U.S. CARBON REGULATIONS

U.S. Carbon Reduction Programs

- *Clean Power Plan:* reduce power sector emissions 30% below 2005 levels by 2030.
- *Standards for Cars, Heavy-Duty Engines, and Planes*
- *Regulations to cut:* methane emissions economy

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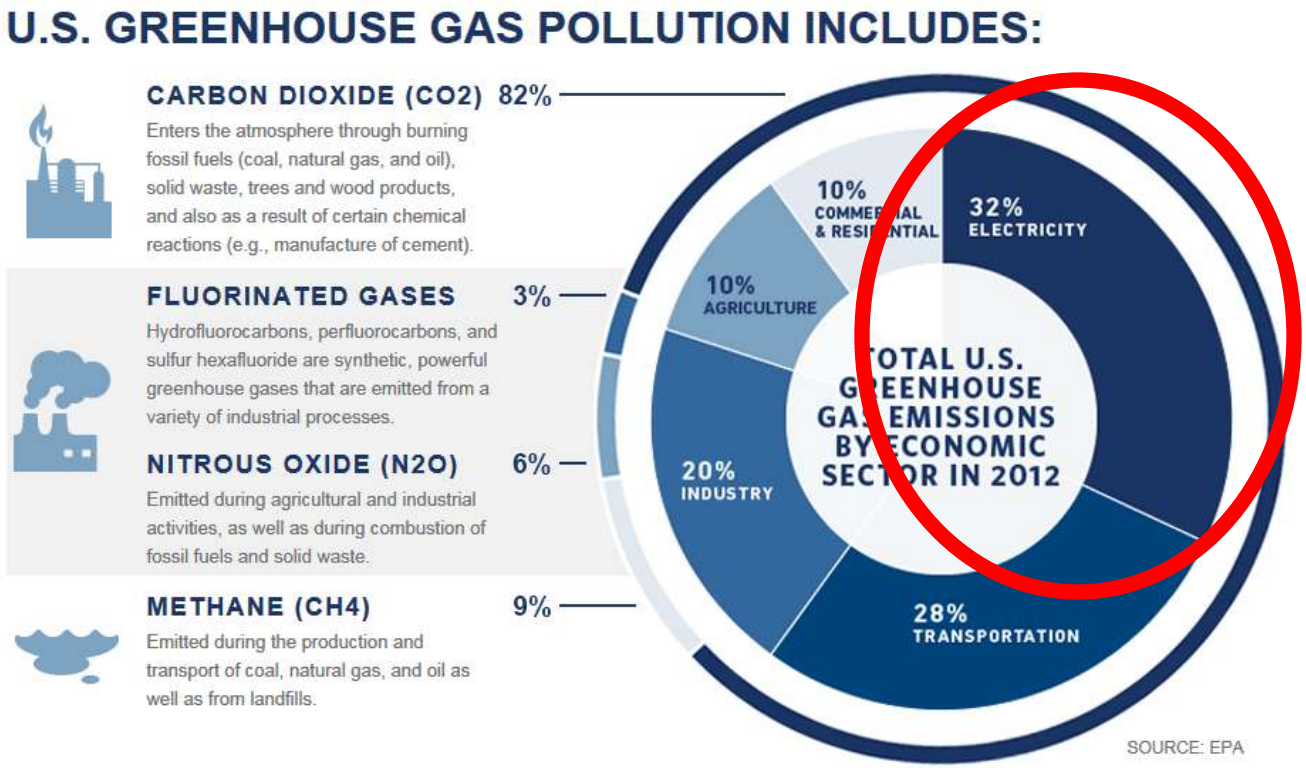
Clean Power Plan Under Clean Air Act

- Existing Power Plants



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Clean Power Plan Covers Existing Electricity Generation Unit

- Nameplate capacity **25 MW** or greater & **33%** capacity factor & **219,000** MWh to any utility power distribution system for sale.

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EPA CPP State Goal

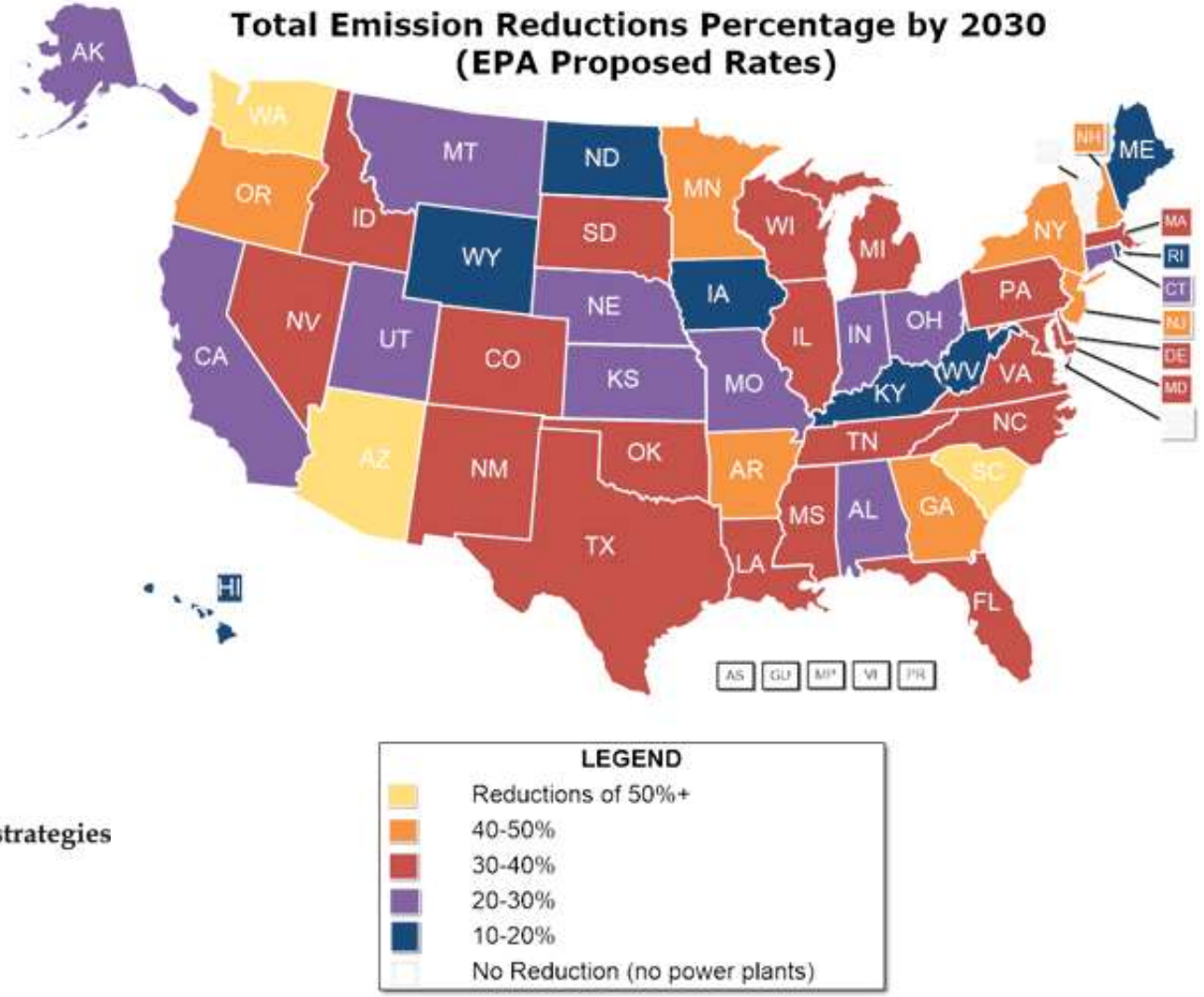
4 Building Blocks (2012 Baseline)

1. **Reducing emissions rates of affected facilities**
2. **Changing the dispatch order from coal to NGCC**
3. **Increasing RE Generation**
4. **Increase Energy Efficiency**

$$\text{rate} = \frac{State\ CO2\ emissions\ from\ covered\ fossil\ fuel\ fired\ power\ plants\ (lbs)}{State\ electricity\ generation\ from\ covered\ fossil\ plants + RE + nuclear* + EE\ (MWh)}$$

Note: RE denotes renewable; * small fraction of nuclear generation covered

Clean Power Plan Proposed Emission Rate lbs-CO2/MWH by State



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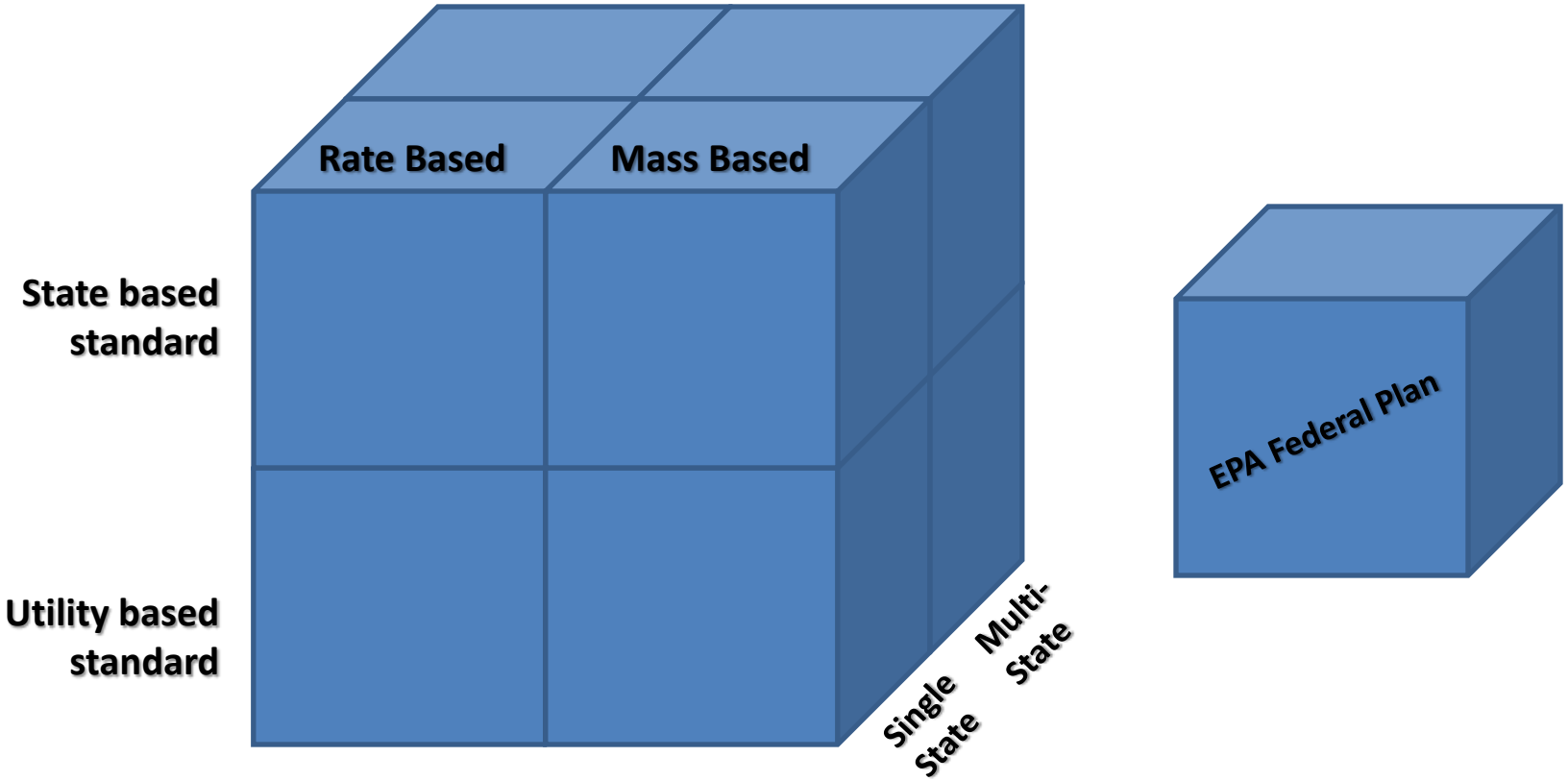
Many regulatory paths and compliance measures to evaluate



EPA's "flexibility" impacts emission targets, compliance approaches, and resource mix, creating numerous possible scenarios

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CPP – "Compliance Cliff"

- 2012 Baseline
- Proposed Rule 2020-2030
- Building Block 1 & 2
  - 2020
- Building Block 3 &4
  - 2020-2030

EPA Missouri Emission Target

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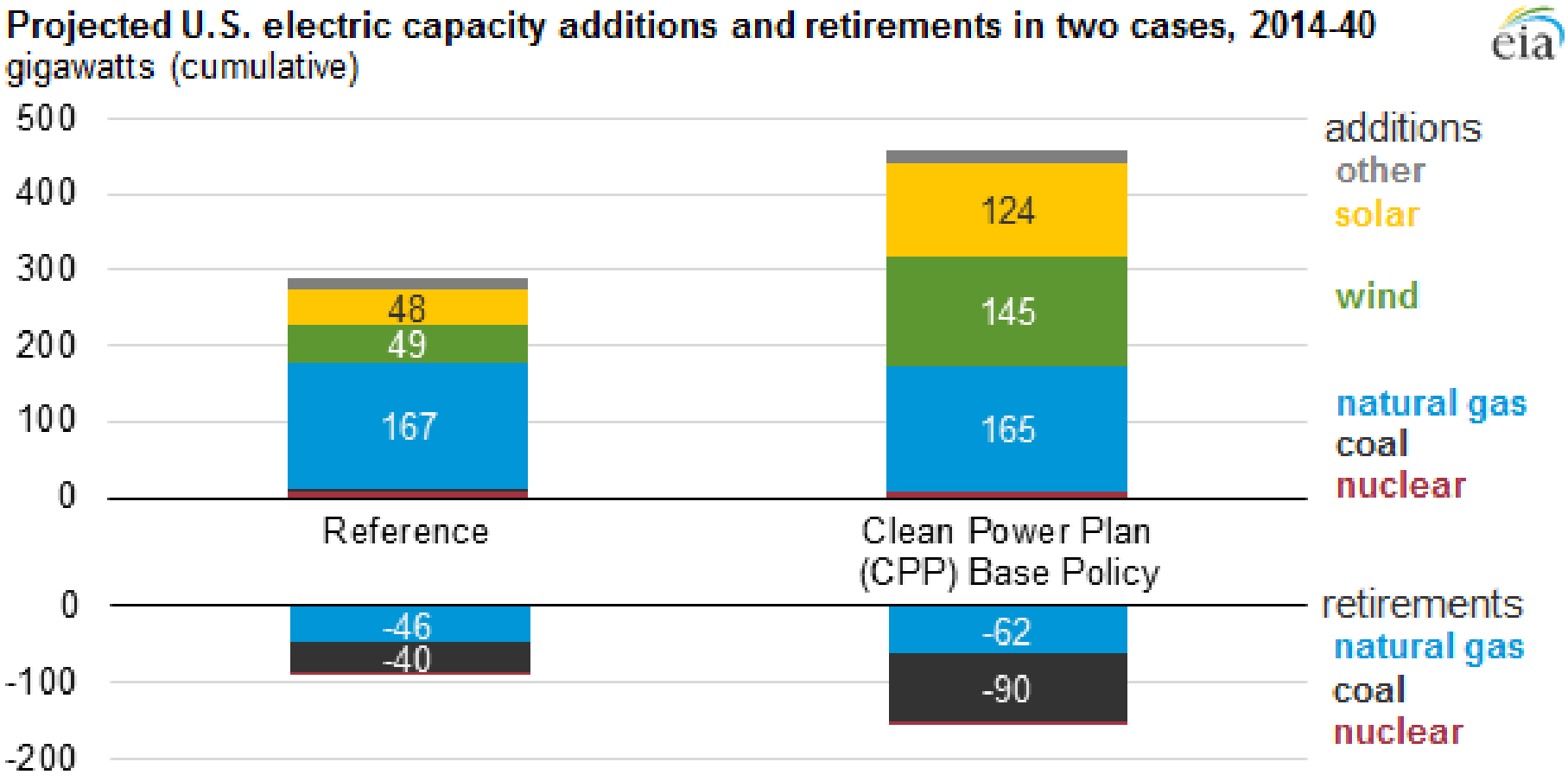
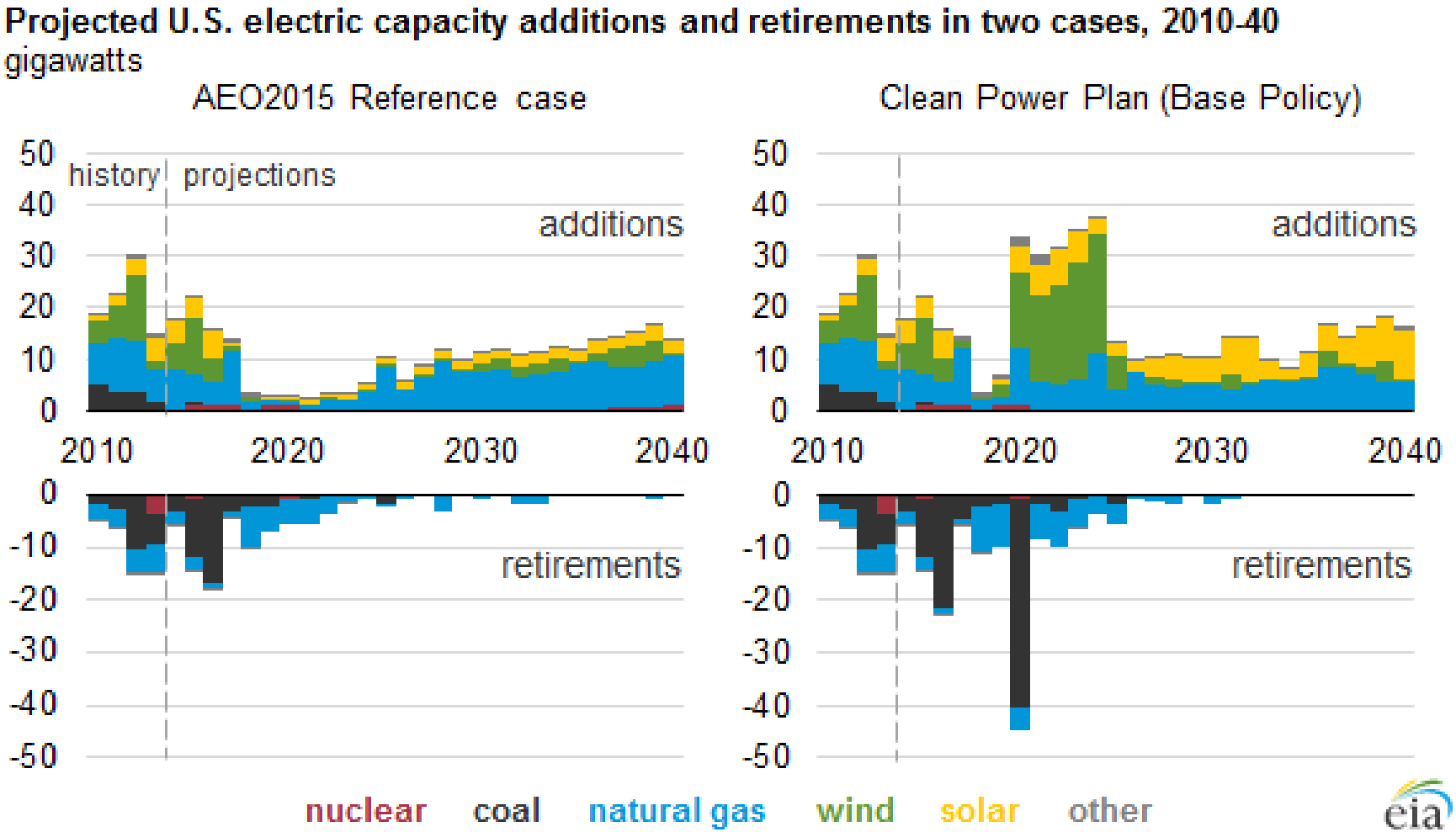
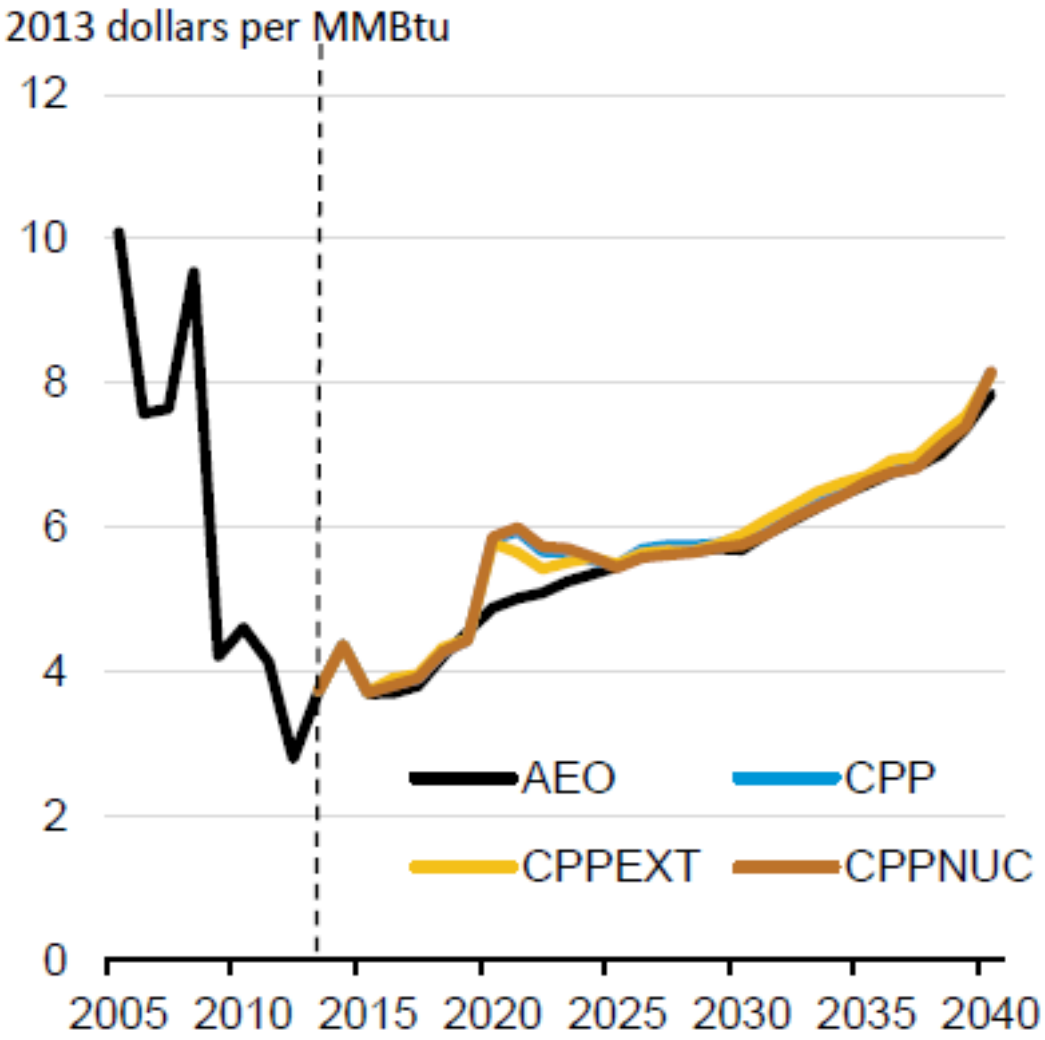
CPP and Projected Capacity Additions 2014-2040



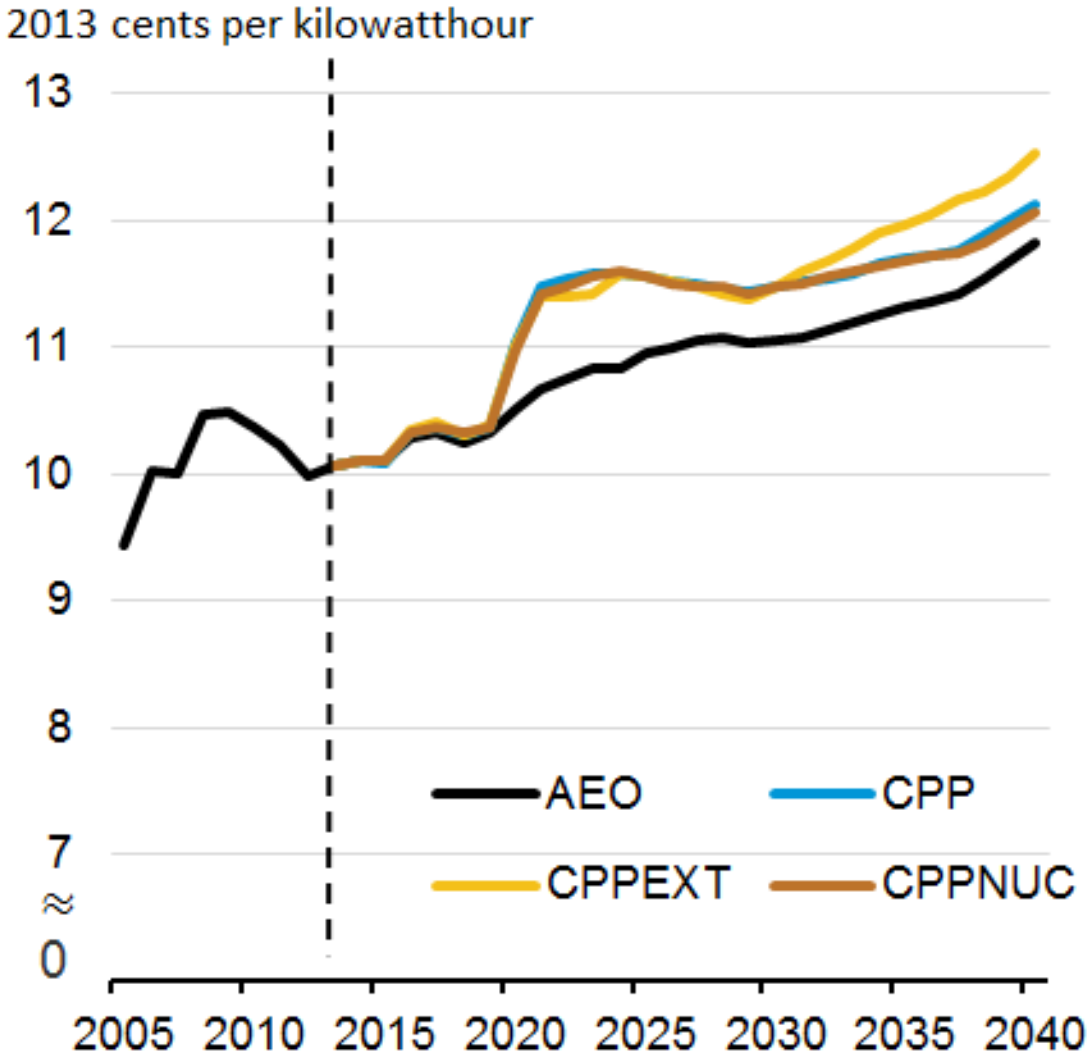
CPP and Annual Capacity Addition 2010-2040



CPP Impact on Natural Gas (Henry Hub)



CPP and Electricity Prices



Summary of EIA Report

- **3-7%** higher national electricity price
- **10%** higher electricity prices in certain regions including by 2030 (Florida and the Southeast, the Southern Plains, and the Southwest)
- By 2040, total electricity expenditures in the CPP case are slightly below those in the AEO2015 Reference case.

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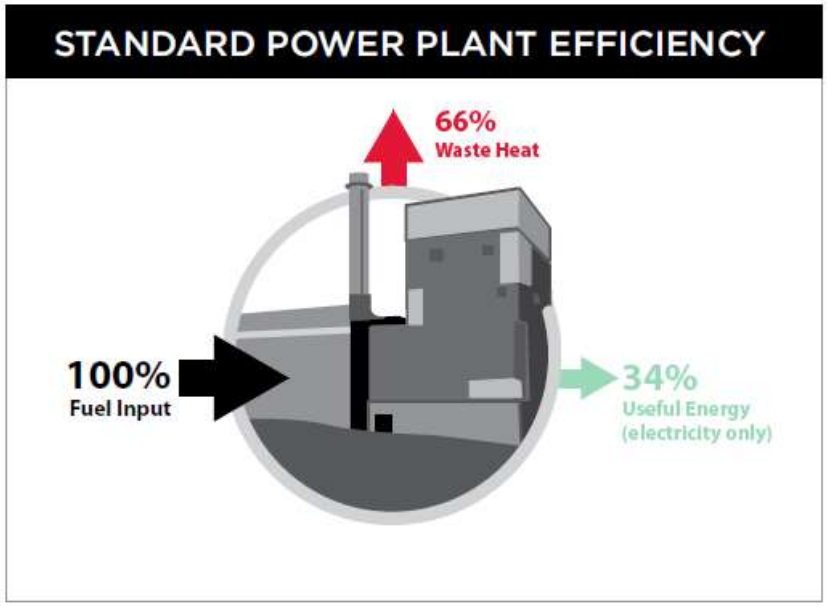
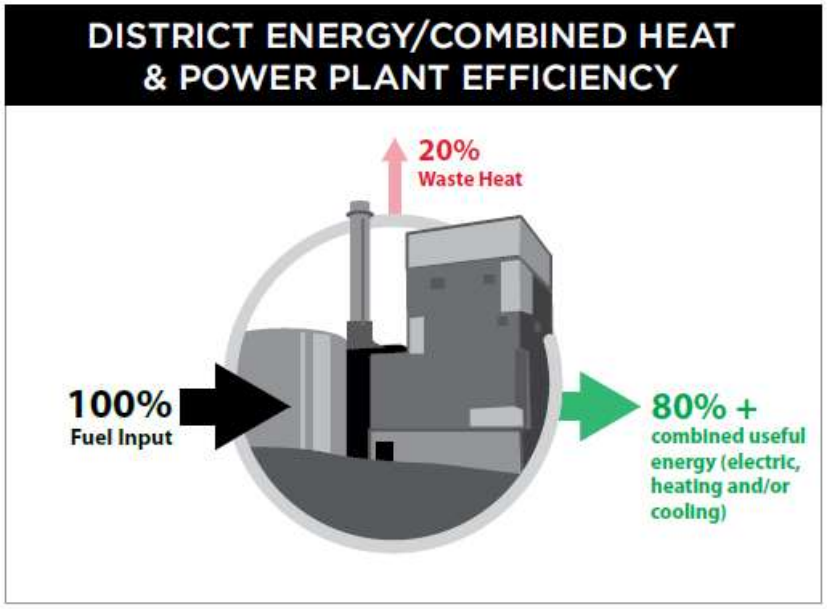
DISTRICT ENERGY AND CLEAN POWER PLAN

More Efficient = Less Carbon





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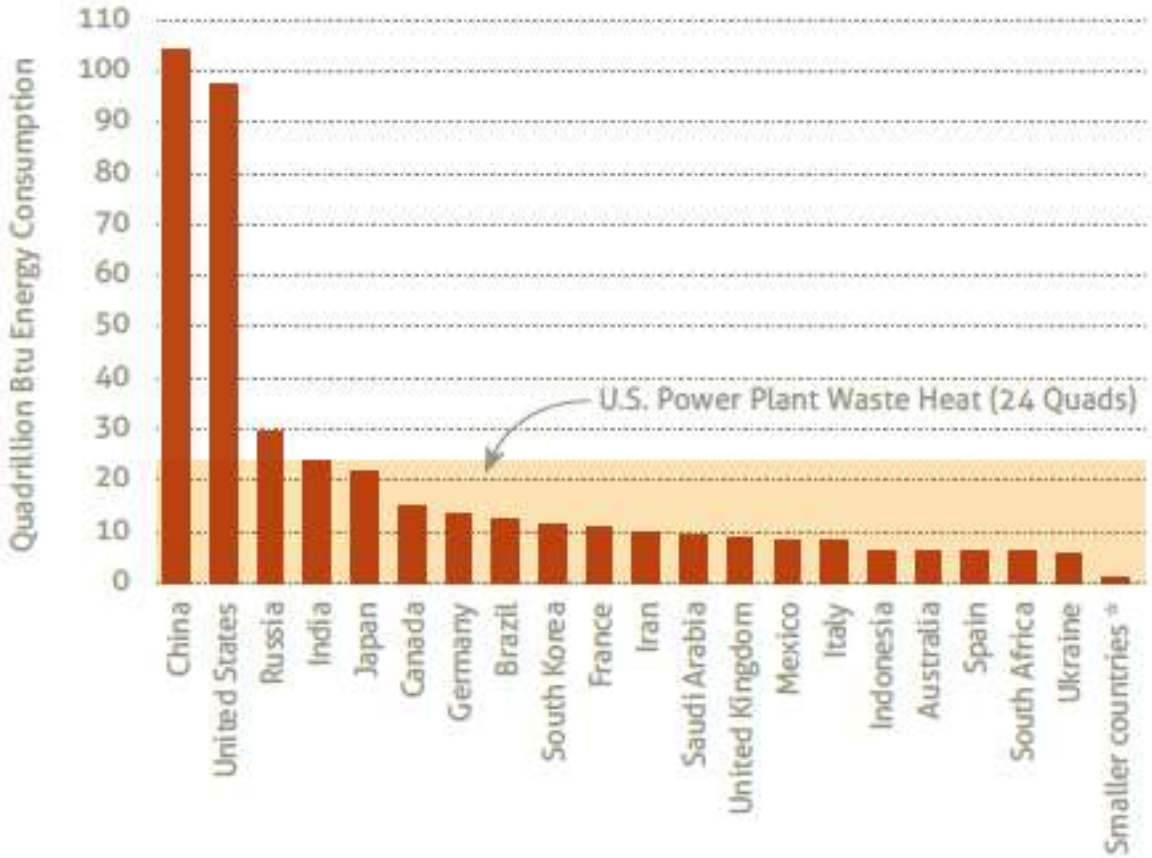
DE Opportunities – Waste Heat

FIGURE 1. Comparison of U.S. Power Plant Waste Heat to Total Energy Use in Other Countries.



The U.S. power industry is only about 34 percent efficient and rejects around 24 quadrillion Btus of waste heat annually (25 percent of total U.S. energy use). This waste heat from U.S. power generation exceeds the total national energy use in all but three of the world's 216 countries.

* Per country average for remaining 196 countries

District Energy Opportunities

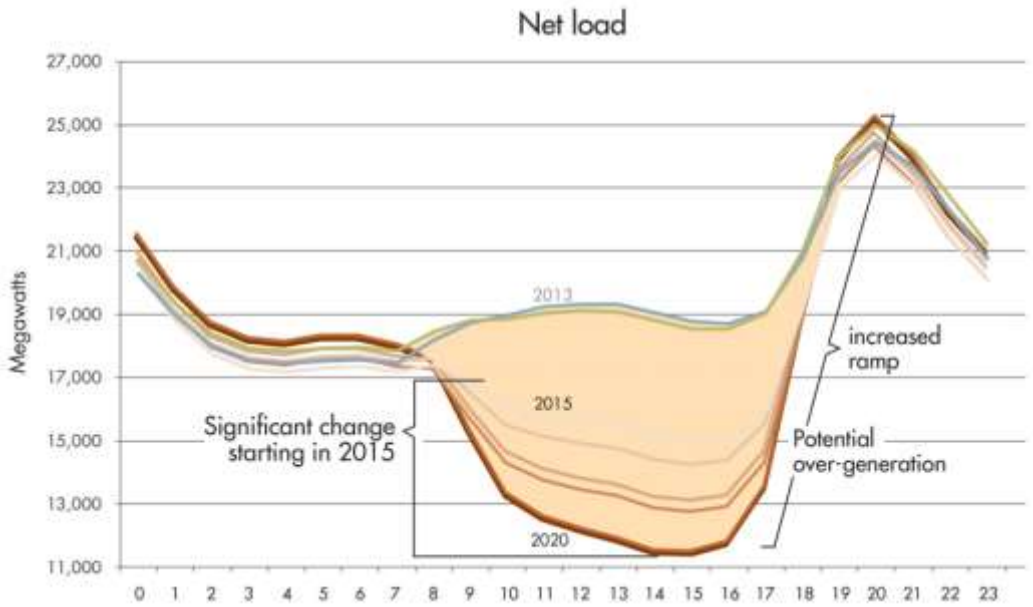
- foster fuel-switching from higher-emitting fuels to lower-emitting fuels
- operate as a proven demand-side energy efficiency resource
- improve the electric grid's ability to accept greater levels of intermittent no-carbon renewable energy, such as wind and solar, by offering grid-balancing services, **storage opportunities**, and free up transmission space

District Energy Opportunities

- shift dispatch order by providing thermal storage

  California RPS increase was 33% by 2020

  to 50% by 2030



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CPP Covered Units

- EIA Generators include Solar to Landfill Gas to Coal Units = 22,655 Units
- Nameplate capacity **25 MW** or greater & **33%** capacity factor & **219,000** MWh to any utility power distribution system for sale
- Total Covered Units = 3,108 Units
- CHP Cover Units = 394 Units

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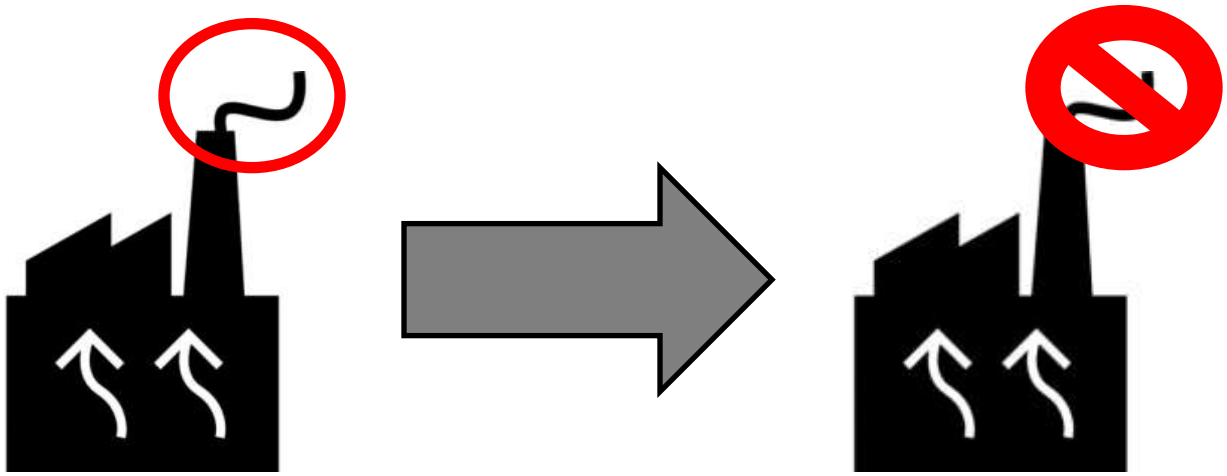
CPP Confined by Clean Air Act



CPP Covered Sources
Base and Intermediate Load Resource
- Coal and Natural Gas

CPP Non - Covered Sources
- District Energy
- Most CHP
- Most Peaking Units
- Biomass Generators
- Possibly New Natural Gas

$$\text{rate} = \frac{State\ CO2\ emissions\ from\ covered\ fossil\ fuel\ fired\ power\ plants\ (lbs)}{State\ electricity\ generation\ from\ covered\ fossil\ plants + RE + nuclear* + EE\ (MWh)}$$

State Compliance Plans – Rate Based

- If district energy and CHP is classified as energy efficiency in a State Compliance Plan every MWH generated could be counted as “carbon” free
- Important to work with state air regulators to develop the State Compliance Plans.

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OPPORTUNITIES

Opportunities for District Energy

Clean Power Plan a great opportunity to expand district energy in the US

Energy storage is one of the next big opportunities in energy

Clean Power Plan will likely create inefficiencies in energy and carbon markets

District Energy is positioned to take advantage of these inefficiencies with storage, non-covered, and highly efficient energy

Next Steps

- EPA release final plan “August 2015”
- State (Air Quality Divisions) will be giving 1-2 years to submit a compliance plan
- Get involved with state stakeholder groups and educate air quality regulators about benefits district energy.
- Work with air regulators to incorporate district energy into State Compliance Plans

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QUESTIONS

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