

# **EPA Clean Power Plan: Implications for District Energy**

**International District Energy Association  
Annual Conference**

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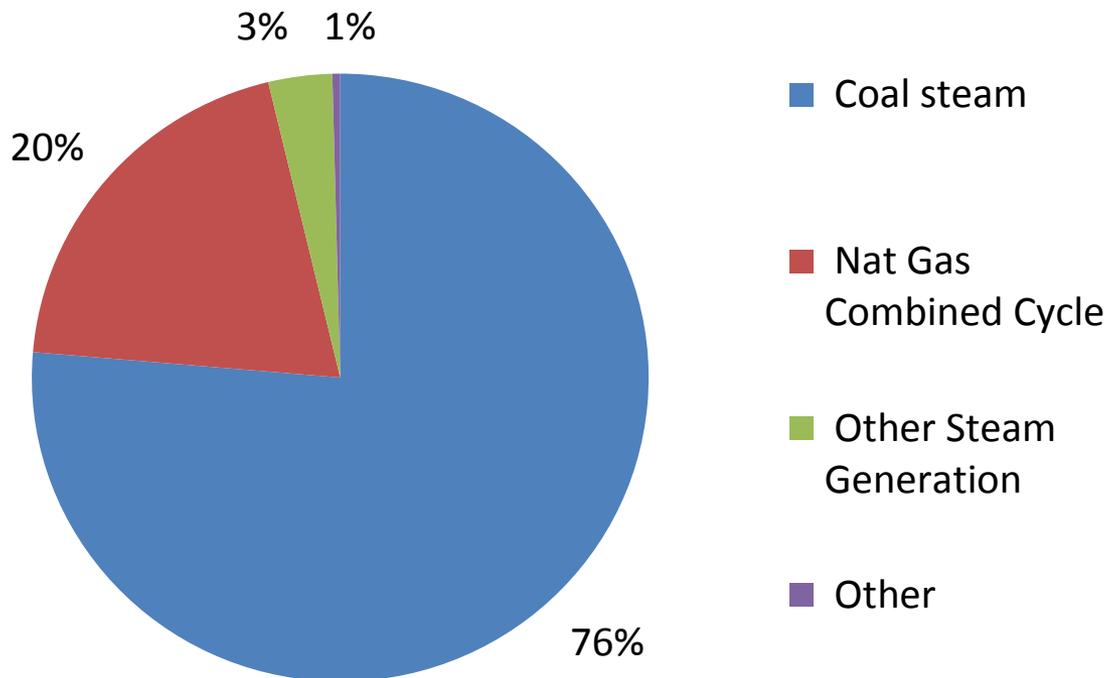
# Purpose of Presentation

- **Basics of the proposed rule**
- **Top 10 reasons states should include CHP in their Clean Power Plan**
- **Doing the math: 5 flavors of CHP**

# Basics of the Proposed Rule

## What is an Affected Unit?

- Affected Electric Generating Units (EGUs) are fossil fuel plants designed to annually **sell to the grid** more than the following amounts of power:
  - More than 219,000 MWh; **and**
  - More one-third of the potential electric output.

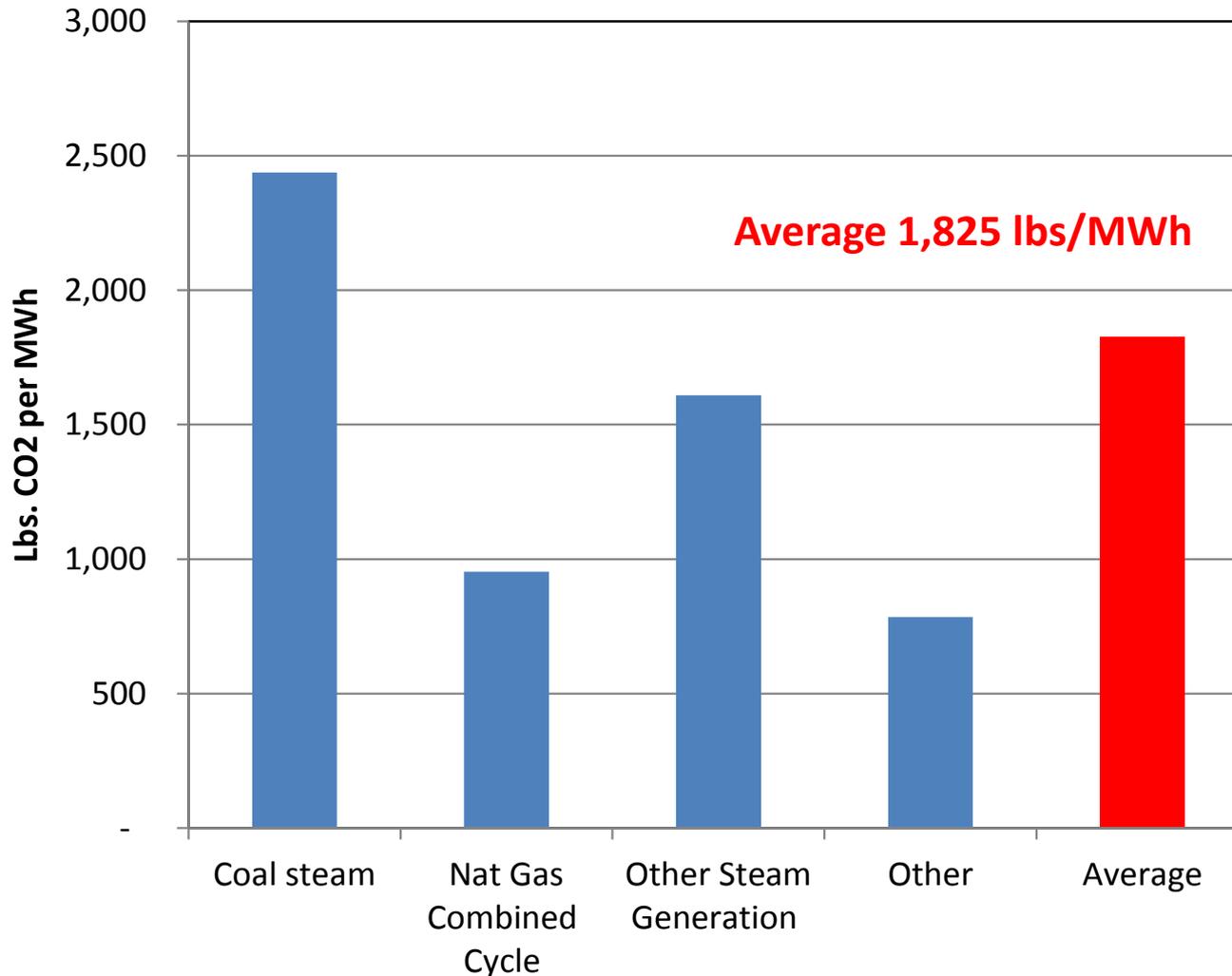


## Emissions of Affected Units

- 1,100 Affected EGUs
- Total 2012 CO<sub>2</sub> emissions: *2.2 billion tons*

# Basics of the Proposed Rule

## Emission Rates of Affected Units



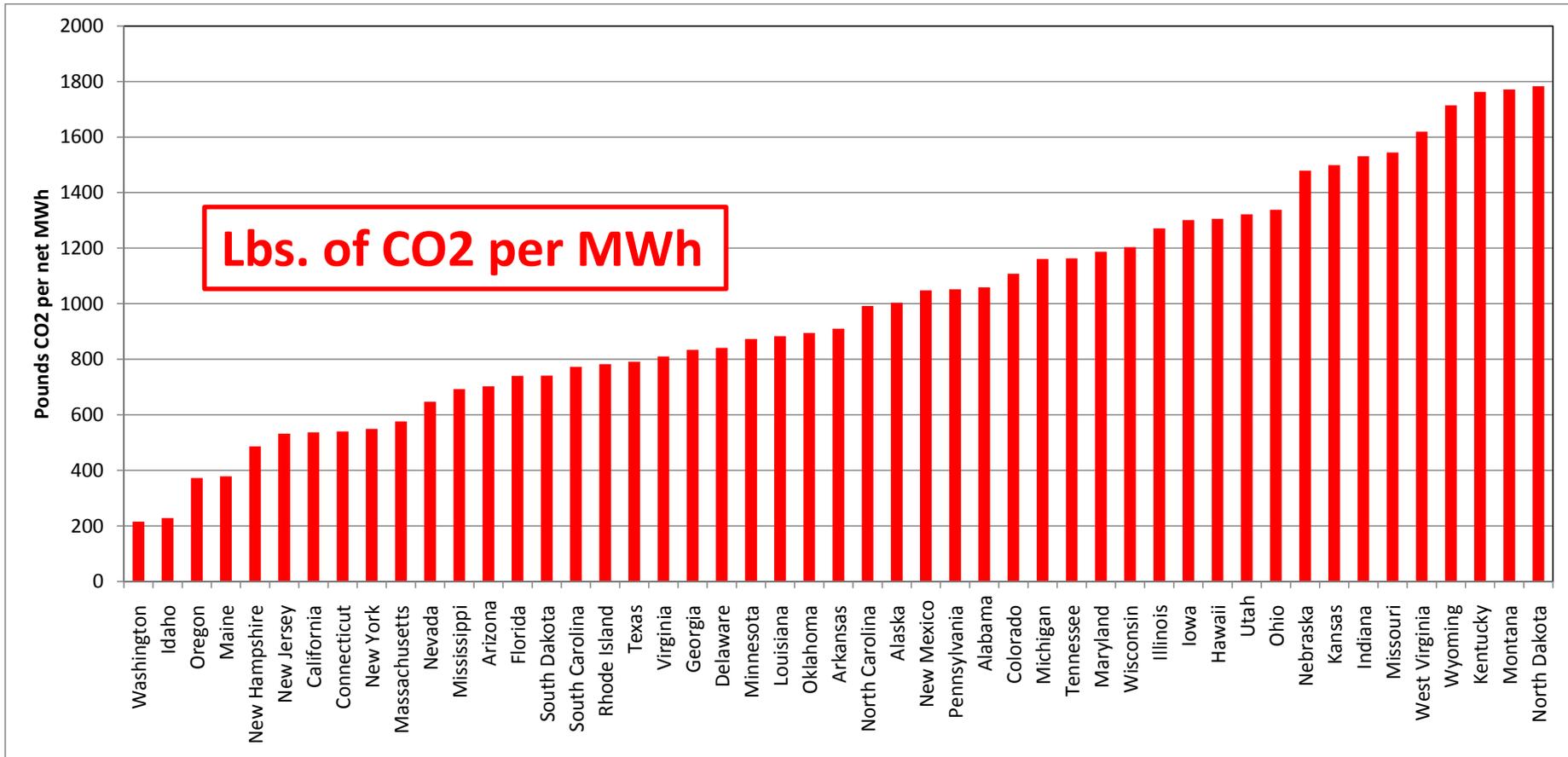
# Basics of the Proposed Rule

## State Reduction Goals

- Reduction goals set for each state based on EPA analysis of four “***building blocks***”:
  1. heat rate improvements at coal-fired EGUs
  2. redispatch from steam generators using coal, oil or natural gas to existing natural gas combined-cycle units
  3. reductions in EGU emissions due to increased low- or zero-carbon generation
  4. reductions in EGU emissions due to end-use energy efficiency

# Basics of the Proposed Rule

## State reduction goals vary widely



# Basics of the Proposed Rule

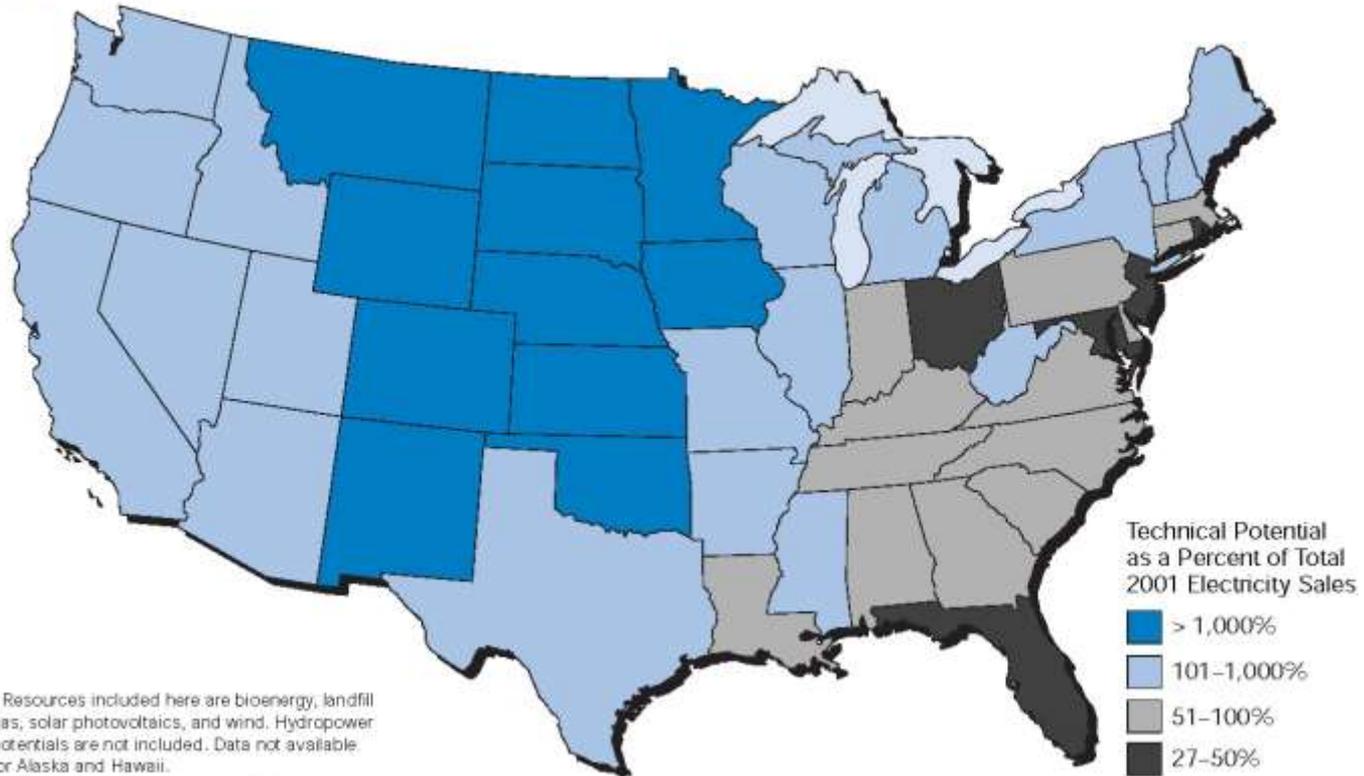
## State Clean Power Plans

- States have wide latitude on how to achieve the reductions; not limited to the “building blocks”
- EPA proposes a “portfolio approach” in which reductions are achieved through measures beyond the fence-line of the affected EGUs
- EPA specifically addresses CHP as a reduction strategy
- State compliance measured in lbs CO<sub>2</sub> per MWh
  - Can reduce lbs of CO<sub>2</sub> and/or
  - Produce more MWh of usable energy
- Key question for beyond the fence-line measures:
  - How to demonstrate that the measure reduces output and emissions at Affected EGUs?

**Top 10  
Reasons States Should Include CHP  
in Their Clean Power Plans**

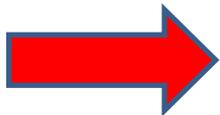
# #10: Not all states are created equal when it comes to renewable energy

Figure 1 Renewable Energy\* Potential



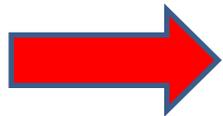
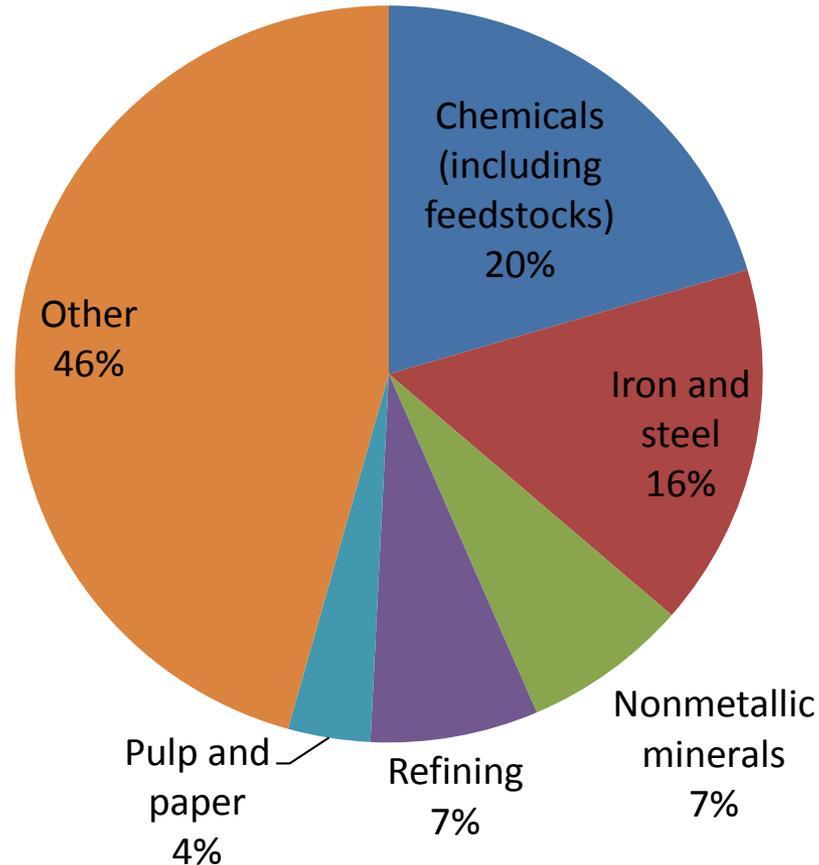
\* Resources included here are bioenergy, landfill gas, solar photovoltaics, and wind. Hydropower potentials are not included. Data not available for Alaska and Hawaii.

SOURCES: See Appendix A and B.



***CHP can be implemented in every state***

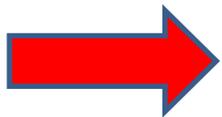
## #9. CHP helps industries compete in a global economy



***CHP helps reduce operating costs***

## #8. CHP helps reduce peak-load stresses on power grids

Average line losses in U.S. ~ 6%



***District energy and CHP reduce line losses by:***

- Generating power close to load centers
- Shifting power demand to off-peak with thermal storage
- Supplying cooling with heat-driven chillers

## #7. CHP and DE enhance energy security & resiliency

Maintaining essential services during extreme weather events or other power grid disruptions is a key concern

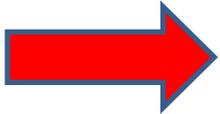
- 
- Local microgrids enable continued availability of power, heating and cooling
  - Provide a refuge for local community
  - Protect critical facilities



## #6. Integrated resource planning can be an effective tool for facilitating CHP

Sound policy requires consideration of the potential benefits of CHP that currently do not have a market value:

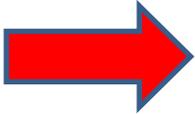
- GHG reduction
- Grid resiliency
- Reduced transmission/distribution losses



- State IRP provides a context for considering these benefits

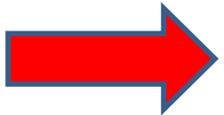
## #5. Energy efficiency portfolio standards can include CHP

- More than 20 states have EERS
- Most focused on end-use efficiency
- Seven state EERS include CHP and/or power grid efficiency
- EERS can be adapted to encourage implementation of CHP to meet Clean Power Plan goals



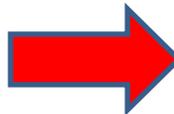
## #4. Renewable or alternative portfolio standards can include CHP

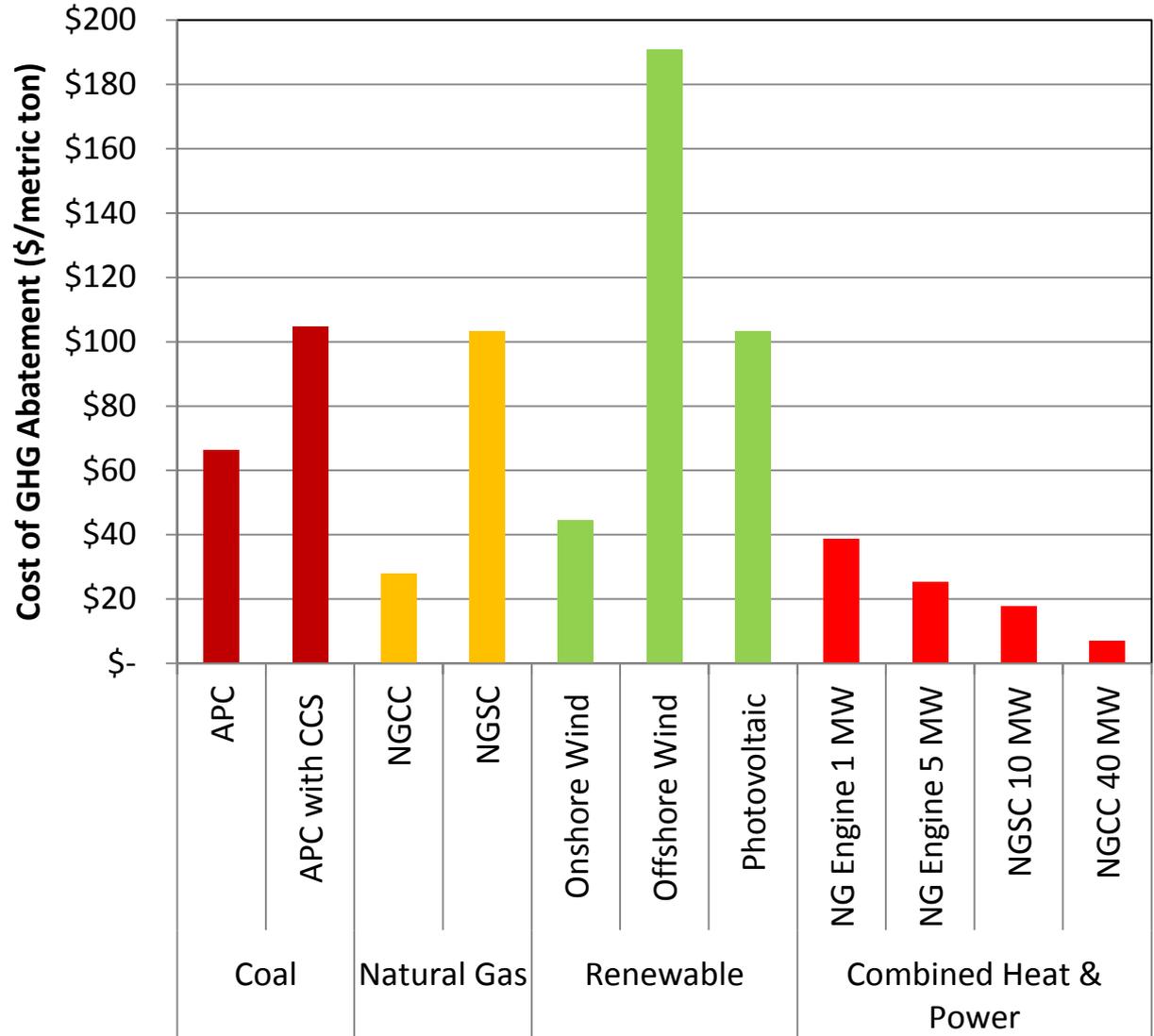
- 41 states plus the District of Columbia have some type of portfolio standard
  - 4 states have a mandatory alternative portfolio standard (APS) including CHP
  - 8 states have a mandatory RPS with CHP qualifying under a separate tier
  - 4 states have a mandatory RPS with CHP qualifying under the general standard



- RPS or APS can be modified or created to encourage CHP

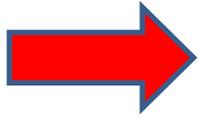
### #3. On a level playing field, there is significant cost-effective CHP potential in every state

 CHP reduces CO2 at low cost



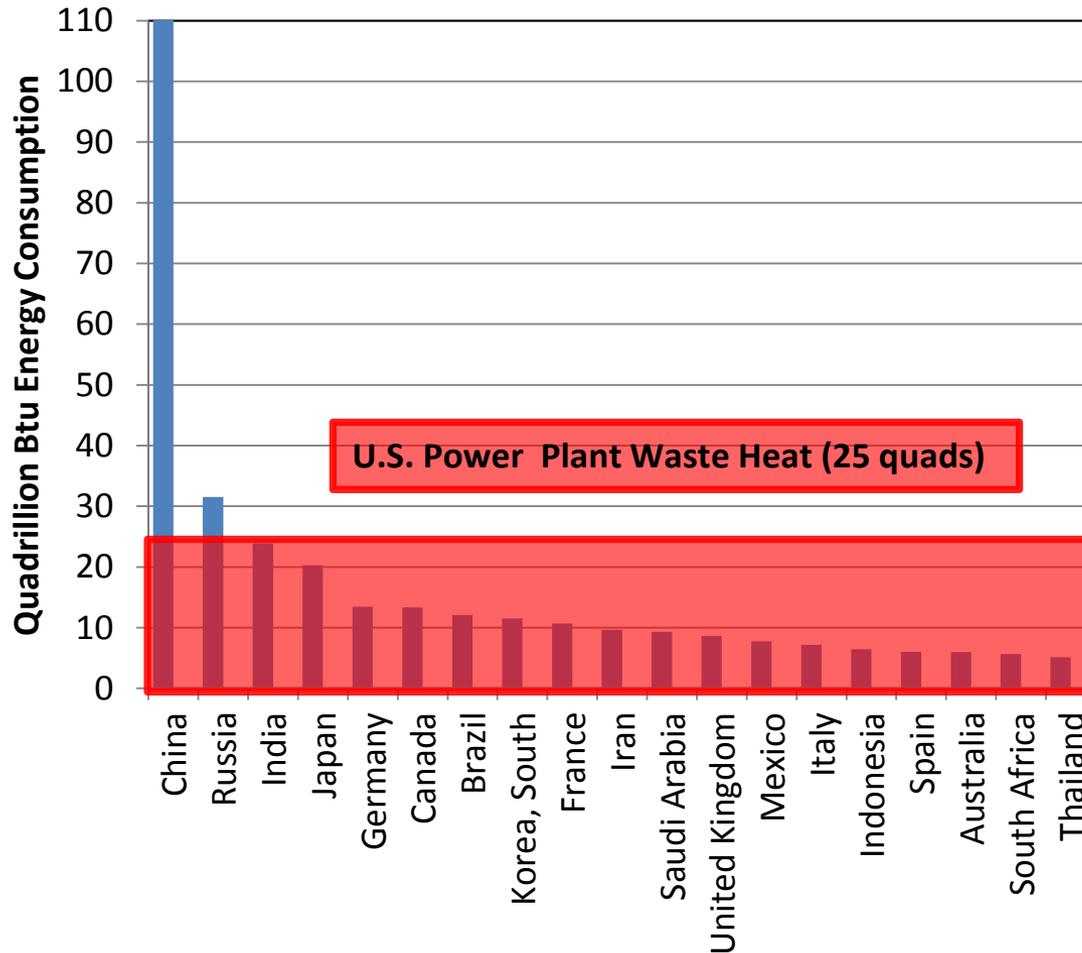
## #2. District energy greatly expands CHP potential by distributing waste heat to buildings and industry

CHP potential is constrained if opportunities are limited to heat and power loads at a single site



- District energy (DE) systems represent a substantial “heat sink” for further implementation of CHP
- DE systems exist in all 50 U.S. states
- DE provides economies of scale for larger, more efficient and cost-effective CHP
- DE can link thermal customers with power plants retrofitted for CHP (which would improve plant heat rate)
- District hot water systems are highly efficient in conveying waste heat long distances

# #1. The amount of energy wasted in U.S. power plants is staggering

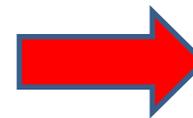


## U.S. power sector:

- 32.5% efficient
- Rejects around 25 quads of waste heat annually

## This waste heat:

- Equals 25% of total U.S. energy
- Exceeds the total national energy of every country in the world except China and Russia



**Reducing this waste requires CHP**

# Five Flavors of CHP

- In comments submitted to the EPA, IDEA recommended that five categories of CHP should be creditable in state Clean Power Plans
- Calculating the credit requires reference to several other rules:

Proposed Rule	Section of Clean Air Act	Shorthand Title	Federal Register Publication	Status as of Jan. 8, 2014 *
Proposed Rule, Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units	111(d)	Existing Unit Rule (Clean Power Plan)	79 Fed. Reg. 34,830, June 18, 2014	Existing
Standards of Performance for Greenhouse Gas Emissions From New Stationary Sources: Electric Utility Generating Units	111(b)	New Unit Rule	79 Fed. Reg. 1430, Jan. 8, 2014	New
Carbon Pollution Standards for Modified and Reconstructed Stationary Sources: Electric Utility Generating Units, Proposed Rule	111(b)	Modified Unit Rule	79 Fed. Reg. 34,960, June 18, 2014	Modified **

\* In operation or under construction as of that date.

\*\* "Modified" means a plant that undergoes a physical or operational change that increases the source's maximum achievable hourly rate of emissions.

# Five Flavors of CHP

## 1. CHP Retrofit of Affected EGU

- Conversion to CHP would provide useful thermal energy that had been previously wasted.
- Would likely trigger regulation under Section 111(b) as a “new, modified or reconstructed” source.
- Increased energy efficiency and associated reductions in emissions in comparison with the Section 111(b) requirements should be creditable in state plans.

## 2. Modification of Existing Affected Unit That is Already CHP

- Plant may increase annual output or switch to a lower-carbon fuel (such as switching from coal to natural gas or from coal or gas to renewable fuels such as biomass).
- Resulting emission reductions should be creditable in state plans.

## 3. Increased Output in Existing CHP Plant That is Not Affected EGU

- Most existing CHP plants do not meet the threshold for regulation under Section 111(d).
- Increased output from such plants should be creditable in state plans because the increased generation will substitute for output from Affected Units.

# Five Flavors of CHP

## 4. New CHP Plant that is Affected Under New Unit Rule

- If a new CHP plant has a lower emissions rate than required under Section 111(b), the reduction in emissions rate below the Section 111(b) requirement should be creditable in state plans under Section 111(d).
- Such highly efficient new CHP plants can be expected to displace generation, and thus emissions, from less efficient plants that are affected EGUs under 111(d).

## 5. New CHP Not Meeting Any Affected Unit Criteria

- These new systems should be treated as energy efficiency measures under 111(d).
- Credit the emission reductions from replacement of generation from Affected Units.

## Further Information

*“Five Flavors of CHP: Recipes for state clean power compliance plans”* District Energy Magazine, First Quarter 2015 (this provides detailed guidance on CHP crediting calculation methodology)

*“Comments of the International District Energy Association on Proposed Rule, Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units,”* International District Energy Association, Dec. 1, 2014

*“Smart Tools in a 111(d) Toolbox: Combined Heat and Power and District Energy,”* International District Energy Association

# Thanks for your attention!

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