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Energy solutions  
for a changing world

# CPP Options for States and Utilities Allow for Power Sector Innovation and Smart Grid Strategies

National Summit on Smart Grid and Climate Change  
([www.smartgridclimatechange.org](http://www.smartgridclimatechange.org))

Presented by David Littell

October 13, 2105

The Regulatory Assistance Project (RAP)<sup>™</sup>

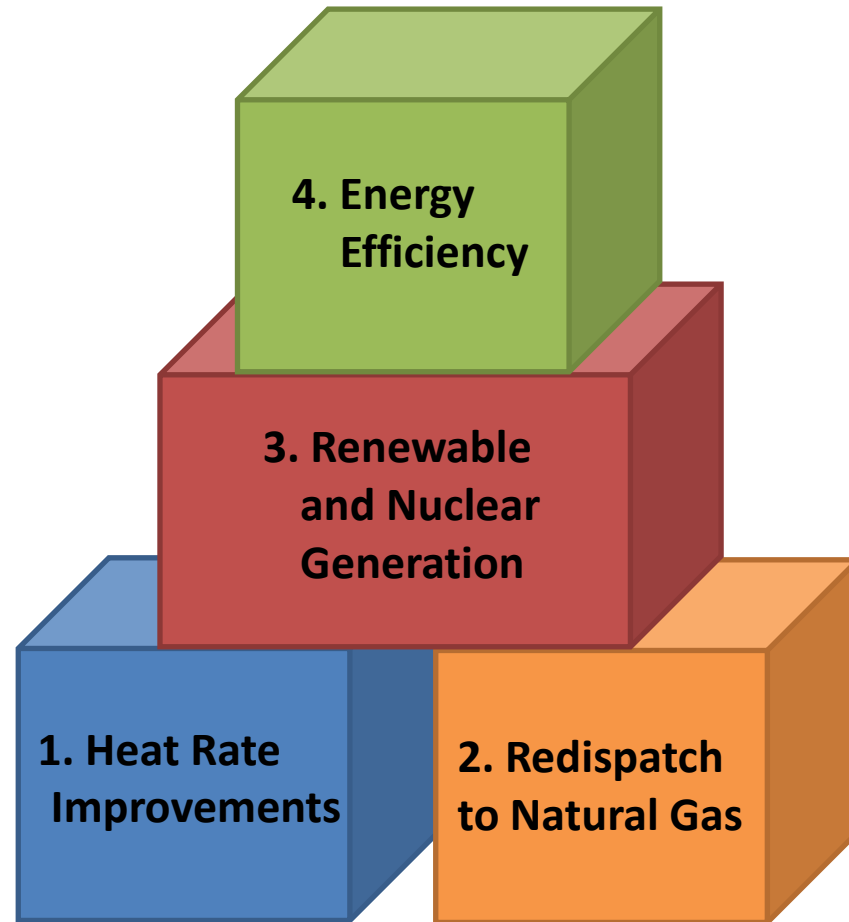
# RAP – the Regulatory Assistance Project

RAP is a non-profit organization providing technical and educational assistance to government officials on energy and environmental issues. RAP staff has extensive power sector regulatory experience. RAP technical assistance to states is supported by US DOE, US EPA and foundations.

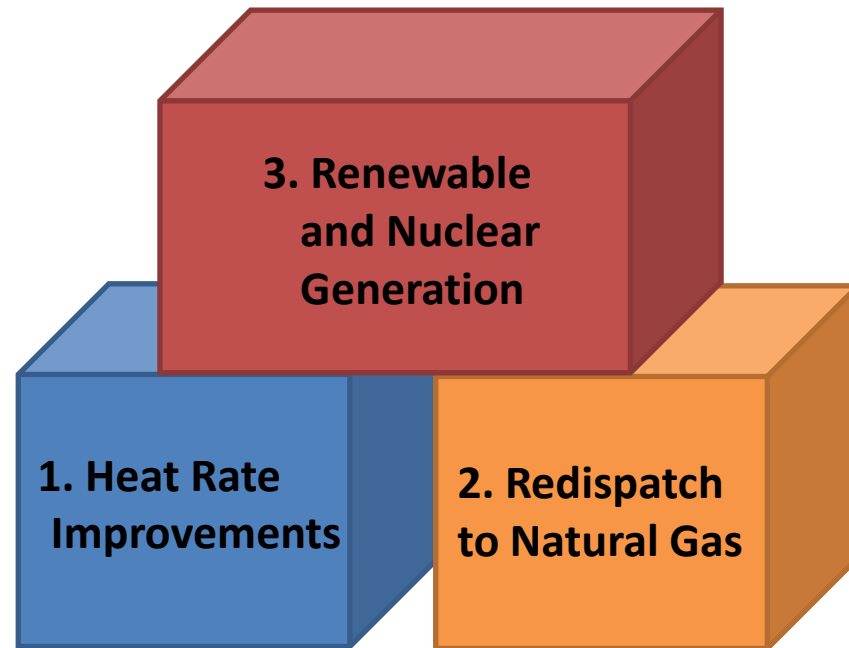
# EPA's Clean Power Plan (CPP)

- EPA: Reduce CO<sub>2</sub> emissions from affected sources 32% below 2005 levels
- Each state given an emission performance target
  - Based on “*best system of emission reduction* that has been adequately demonstrated” (**BSER**)
- Cooperative Federalism: Each **state determines its plan** to meet that goal
- EPA can impose and implement a **federal plan** if a state refuses or submits an inadequate plan

# BSER Building Blocks: Proposed Rule



# BSER Building Blocks: Final Rule



# Keys for State CPP Plans

- Take Advantage of CPP flexibility (“It’s not a SIP”)
- Consider “outside the blocks” & “outside the power plant”
- Consider multi-objective and multiple benefits
- Consider multi-state and regional cooperation

# Implementing EPA's Clean Power Plan: A Menu of Options



May 2015

## Implementing EPA's Clean Power Plan: A Menu of Options

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# *NACAA Menu of Options:* Each Chapter Contents

- Profile (description, pros, cons, etc.)
- Regulatory Backdrop
- State & Local Implementation Experience
- GHG Emissions Reductions
- Co-Benefits
- Costs and Cost-Effectiveness
- Other Considerations
- For More Information
- Summary

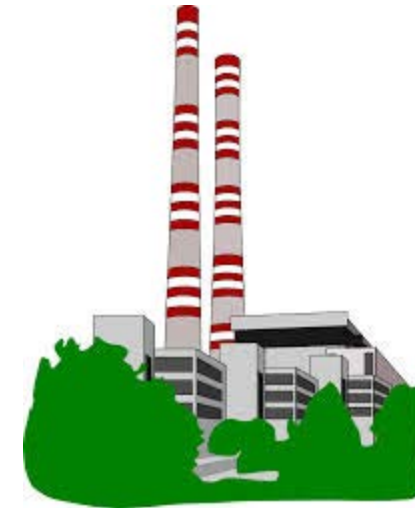


# The Power Plant

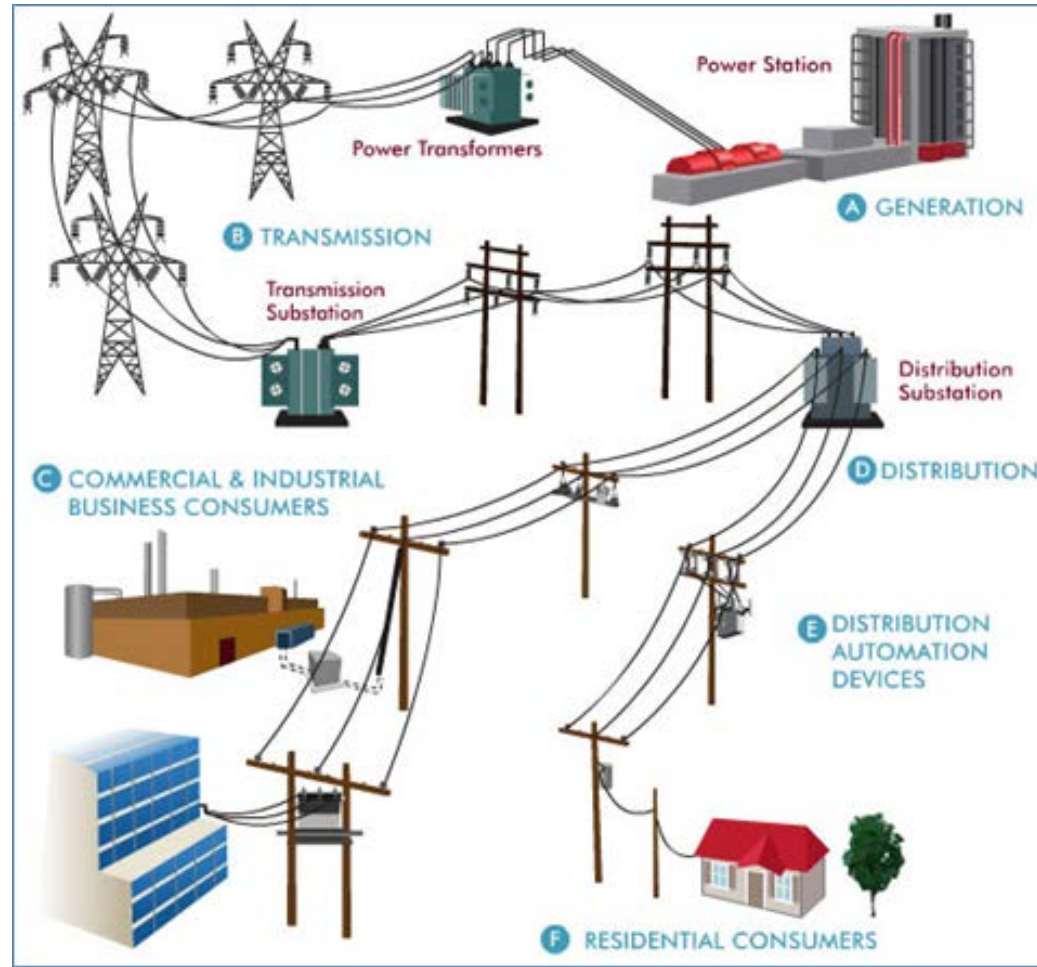


# Power Plant Options

- Ch. 1: Optimize heat rate (Building Block 1)
- Ch. 2: Use on-site (utility) CHP and WHP
- Ch. 4: Improve coal quality
- Ch. 7: Capture & store or use CO<sub>2</sub>
- Ch. 8: Retire aging power plants
- Ch. 9: Switch fuels/co-fire









# The electricity power system



# Clean Generation

- Ch. 3: Increase CHP and WHP in industrial and commercial sectors
- Ch. 6: Deploy low-emission technologies

					
Solar	Wind	Geo	Hydro	Bio	Tide

- Ch. 16: Adopt clean energy procurement requirements (e.g. RPS laws)
- Ch. 17: Increase distributed generation

# Transmission & Distribution Improvements



- Ch. 5: Optimize grid operations through conservation voltage reduction, power factor optimization, phase balancing, etc.
  - Potential 1% to 3% reduction in energy
- Ch. 10: Reduce line losses
  - Potential 2% to 4% reduction in energy

# Energy Efficiency (EE) on the Demand Side

- Ch. 11: Establish utility EE targets
- Ch. 12: Foster markets for EE services
- Ch. 13: Pursue behavioral EE programs
- Ch. 14: Boost appliance efficiency standards
- Ch. 15: Boost building energy codes



# EE is often the Lowest-Cost Method to Control Air Pollution

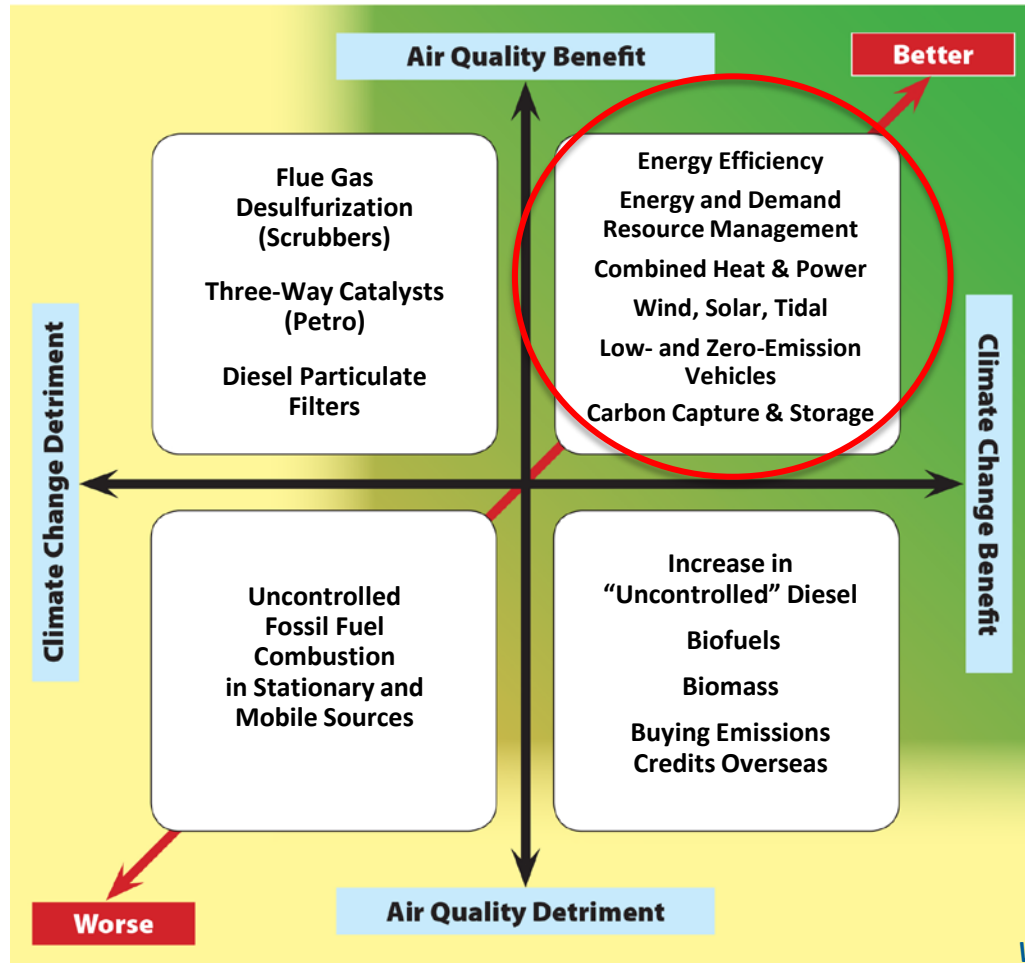
	<b>Nitrogen Oxides</b>	<b>Particulate Matter</b>	<b>Sulfur Dioxide</b>
Selective Catalytic Reduction (“SCR”)	\$1550+/ton	No reduction	No reduction
Fabric Filter (“Baghouse”)	No reduction	\$42+/ton	No reduction
Electrostatic Precipitator (“ESP”)	No reduction	\$40+/ton	No reduction
Wet Flue Gas Desulfurization (“Wet Scrubber”)	No reduction	\$80+/ton	\$80+/ton
Energy Efficiency (cost-effective measures only)	\$0/ton	\$0/ton	\$0/ton

Source: U.S. EPA, *Menu of Air Pollution Control Measures, 2013*



# Co-Benefits

Air Quality and Climate Change Trade-Offs and “Co-Benefits”

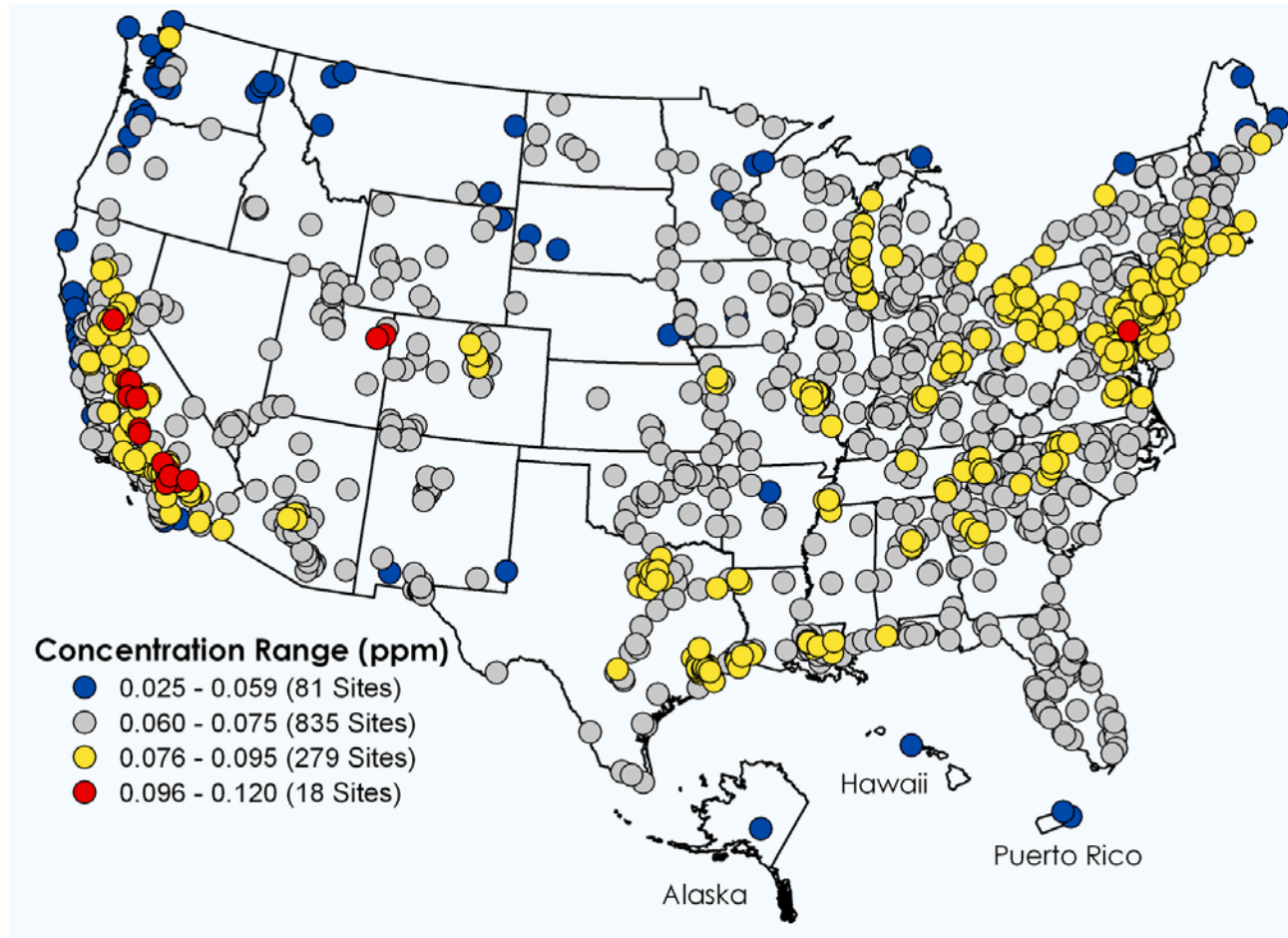


- Good 111(d) choices can help air quality; good air quality choices can help 111(d) compliance
- Ditto for increasing *water* concerns
- Integrated multi-pollutant, multi-media approach can lower cost, risk (**IMPEAQ**)

[www.raponline.org/document/download/id/6440](http://www.raponline.org/document/download/id/6440)



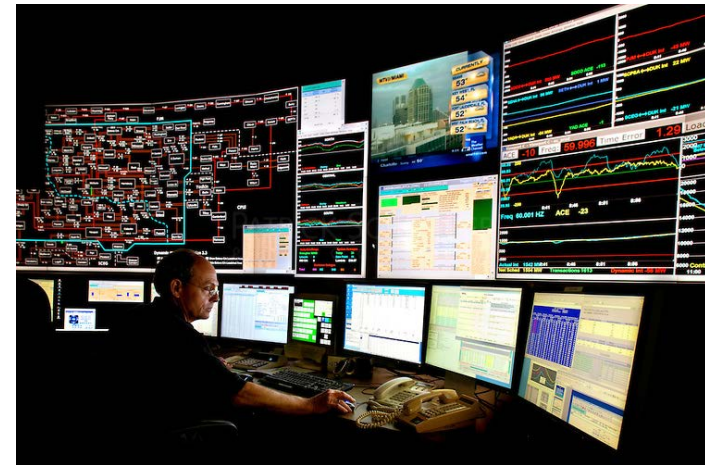
# More Stringent Ozone Standards Coming? (EPA, Ozone Concentrations, 2010)



EPA Clean  
Air Science  
Advisory  
Committee  
(CASAC) is  
in 60-70 ppb  
range for  
new NAAQS

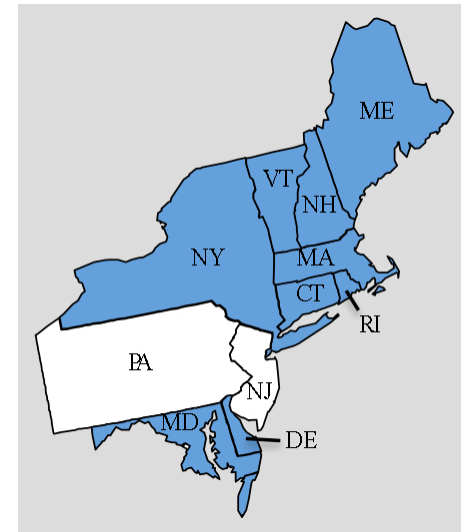
# Improved Grid Operations and Planning

- Ch. 18: Transmission Pricing and Access
- Ch. 19: Capacity Markets
- Ch. 20: Integration of Renewables
- Ch. 21: Dispatch Order
- Ch. 22: Resource Planning



# Market-Based Mechanisms

- Ch. 23: Improved Demand Response
- Ch. 24: Cap and Trade
- Ch. 25: Carbon Taxes



## Chapter 13: Pursue Behavioral EE Programs

- Information dissemination, social interaction, competition, and/or potential rewards to change energy consumption behavior
- Types, benefits, and limitations of behavioral programs; states' experiences

## Chapter 17: Encourage Clean DG

- Facilities <20 MW interconnected to the distribution grid
- Encompasses solar PV, wind, biomass, anaerobic digestion, geothermal, fuel cell, and small CHP
- Also avoids some or all T&D line losses
- Is increasingly cost-competitive

## Chapter 19: Revise Capacity Markets

- In many (but not all) areas of the U.S.
- Where they exist, the market rules can and do affect GHG emissions
- Rule reforms can be a tool to support and enhance other GHG strategies (e.g., EE, RE, NTAs, etc.)

## Chapter 20: Improve Grid Integration of RE

- Steps to help ensure reliability as grid morphs to greater RE
- Do not reduce emissions themselves, but necessary complements for lower-GHG portfolio
- Balancing areas, balancing periods, etc.

## Chapter 23: Improve Demand Response (DR)

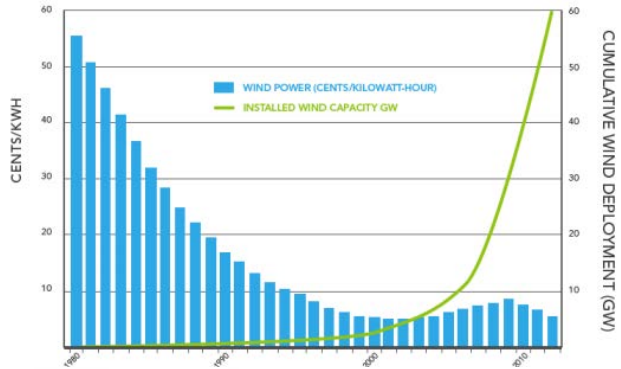
- Intentional modification of electricity usage by or for end-use customers
- First targeted peaks (via curtailment); now can provide ancillary services too (voltage regulation)
- Promote economic efficiency in wholesale markets
- Can reduce costs and facilitate RE integration

## Chapter 24: Market-Based Solutions

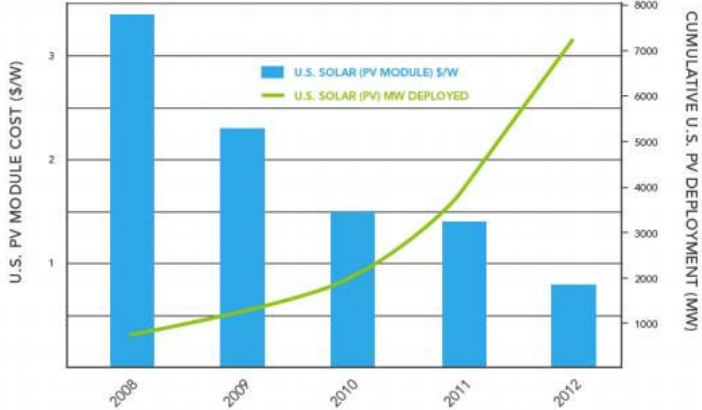
- Price emissions and rely on market forces to reduce costs (innovation, competition, customization)
- Price can be direct (e.g., tax) or indirect (e.g., RGGI)
- Easy to implement; significant U.S. experience

# PowerShift Atlantic, NB Power

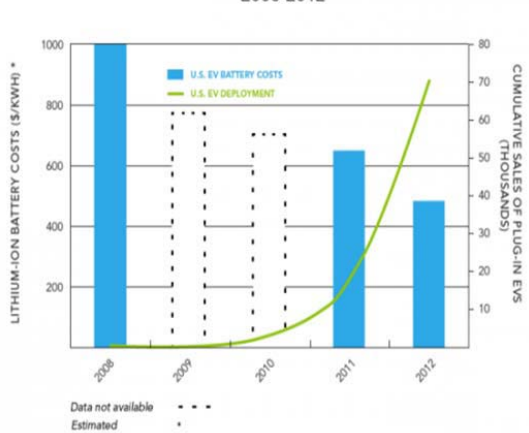
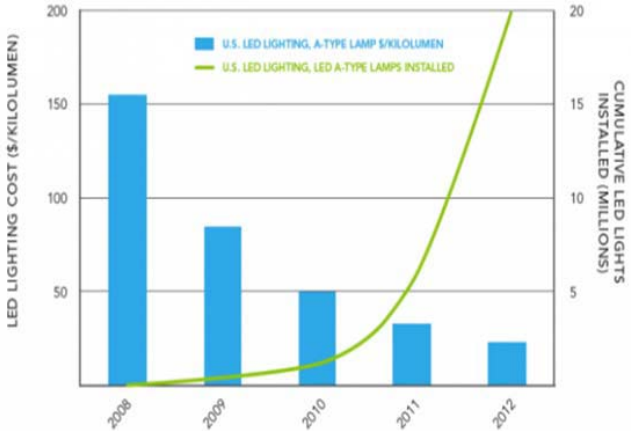
Deployment and Cost for U.S. Land-Based Wind 2008-2012



U.S. Deployment and Cost for Solar PV Modules 2008-2012

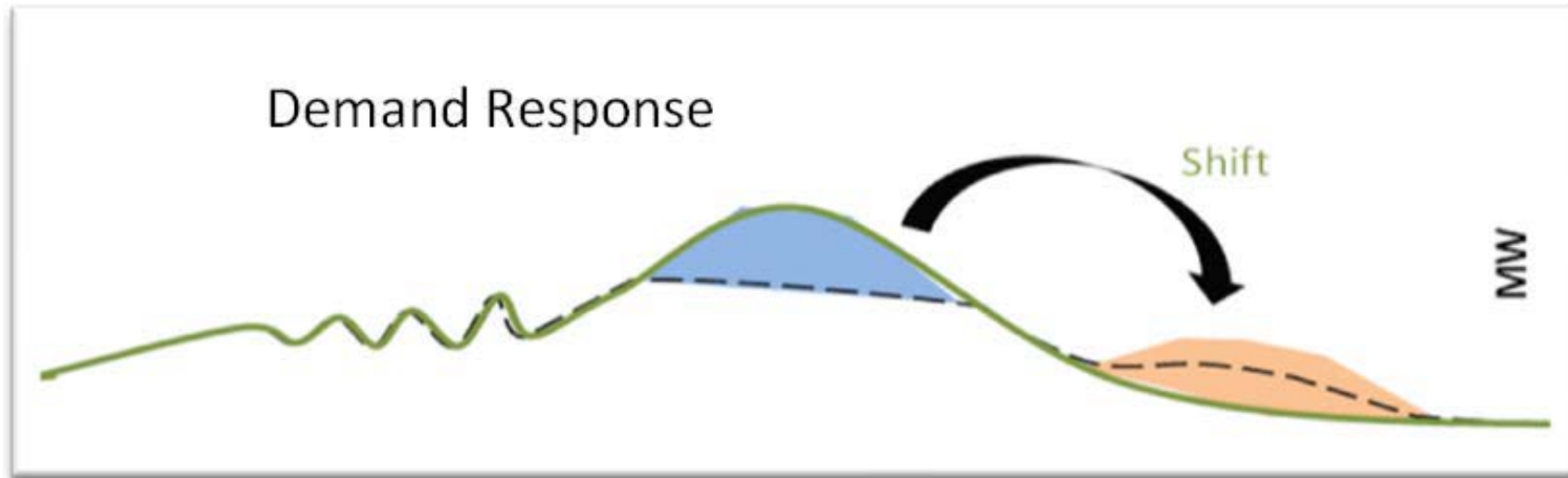


Deployment and Cost for LED Lights Installed 2008-2012



Source: Power Shift Atlantic Business Case for Intelligent Load Management, p. 3 (May 2015), Fig 1, citing, U.S. DOE, September 17, 2013)

# DERMS Demonstration: PowerShift Atlantic by NB Power



Source: Power Shift Atlantic Business Case for Intelligent Load Management, p. 9 (May 2015)



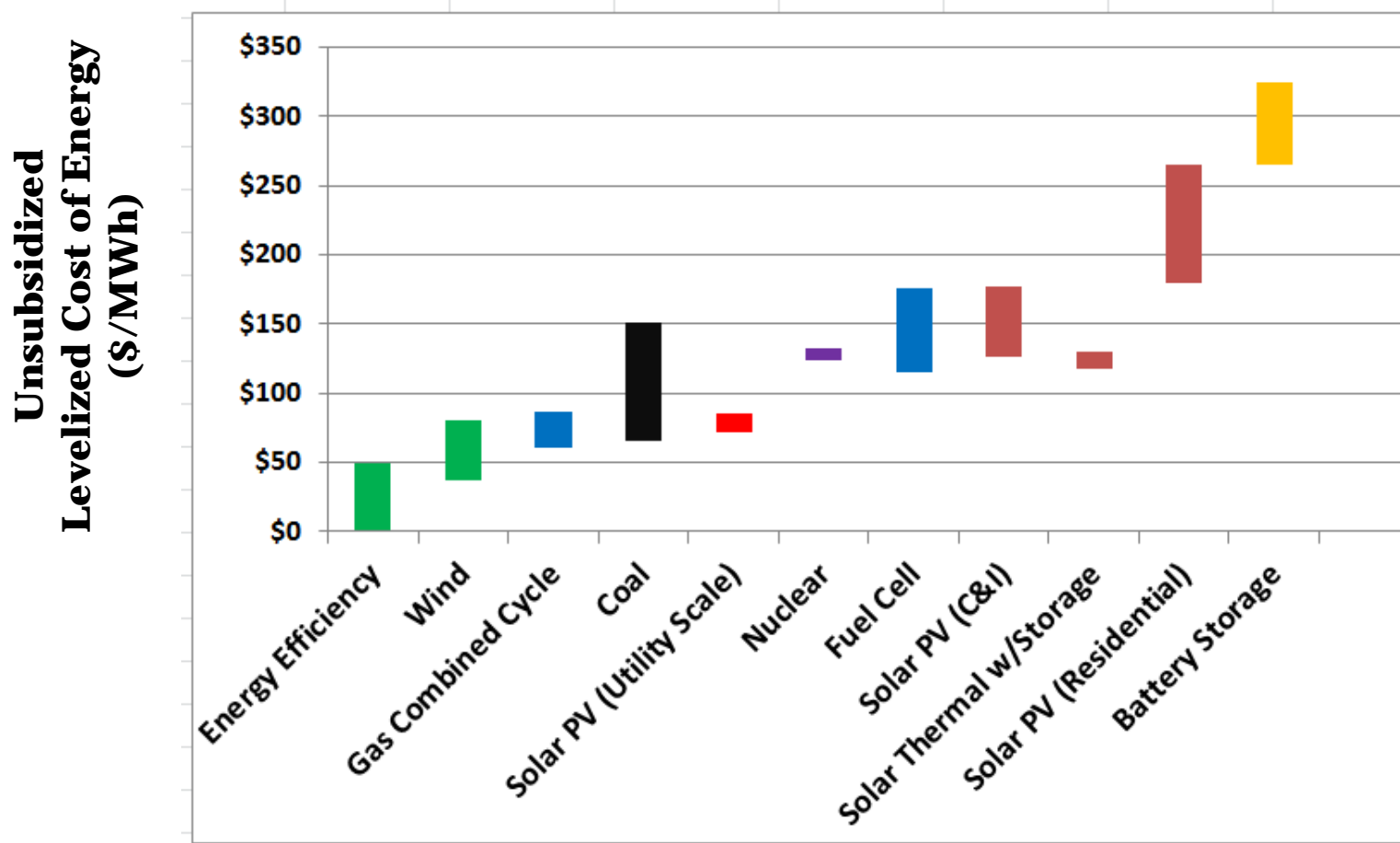
## Chapter 25: Tax Carbon Dioxide Emissions

- Pricing mechanisms internalize costs so market economies can be more effective
- Most effective in concert with other policies (that enable substitution or increase elasticity)
- Can spur innovation; provides revenue stream

## Chapter 26: Emerging Technologies & Policies

- Previous 25 chapters reflect existing options
- Power sector changing from 1-way analog to 2-way digital system
- Supply and demand will both be managed
- Smart grid, “internet of things,” storage, business models, EVs, aggregation, water-energy nexus, etc.

# Lower Costs: Pursue Lowest Cost Energy Resources



# System Based Solutions

Considering smart system operations will as a general rule:

- ✓ Lower costs
- ✓ Lower risks
- ✓ Provide greater co-benefits

# Risk: Kemper County 582 MW CCS Project

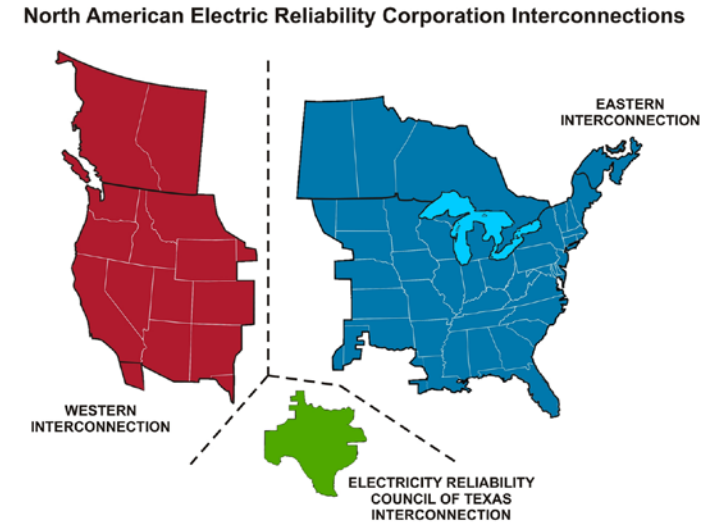


# What's not in the *Menu of Options*

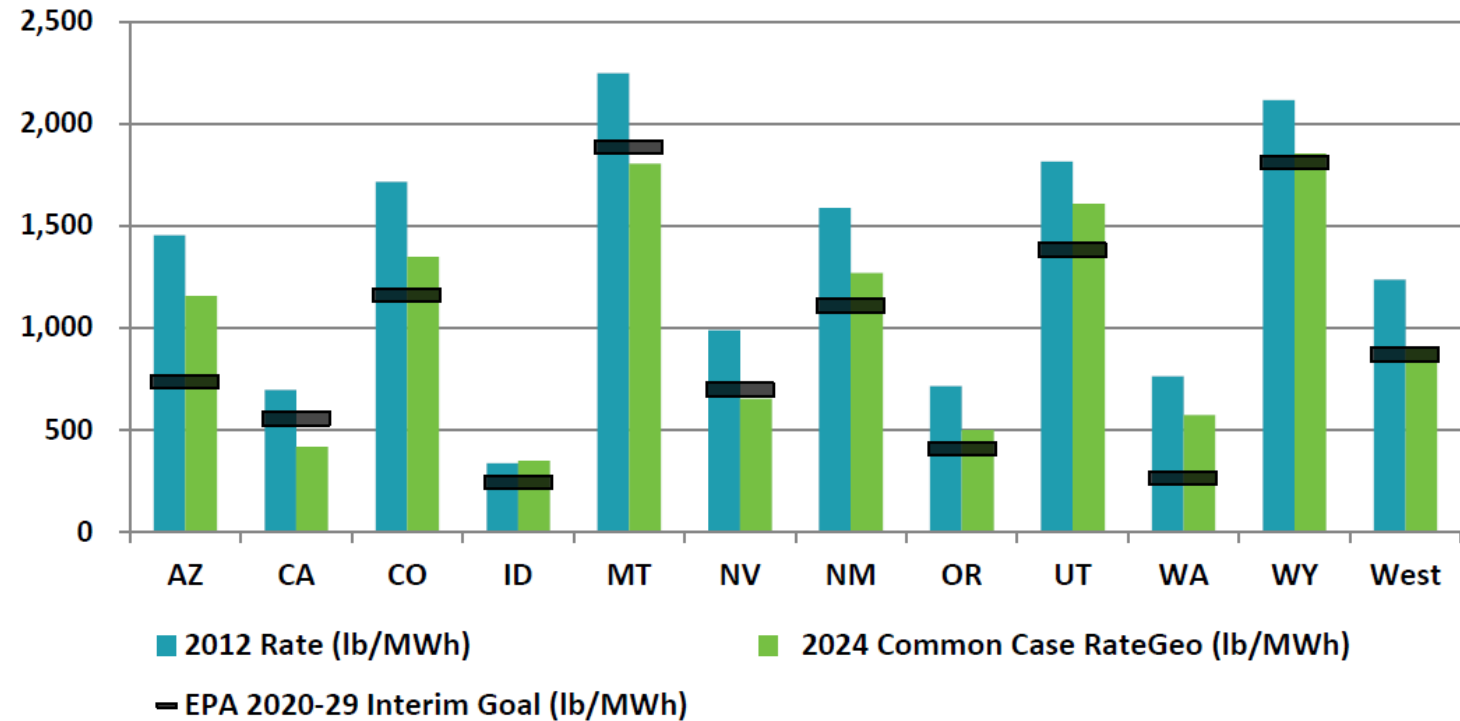
- Many technologies and policies are evolving rapidly today via innovation and opportunity
  - Expect many examples of “even better than characterized in the NACAA Menu”
- How will emissions reductions from these options actually be credited?
  - RAP has done a lot of work on quantification of EE emission reductions
  - EPA proposed guidance on EE EMV provide part of answer

# Challenges?

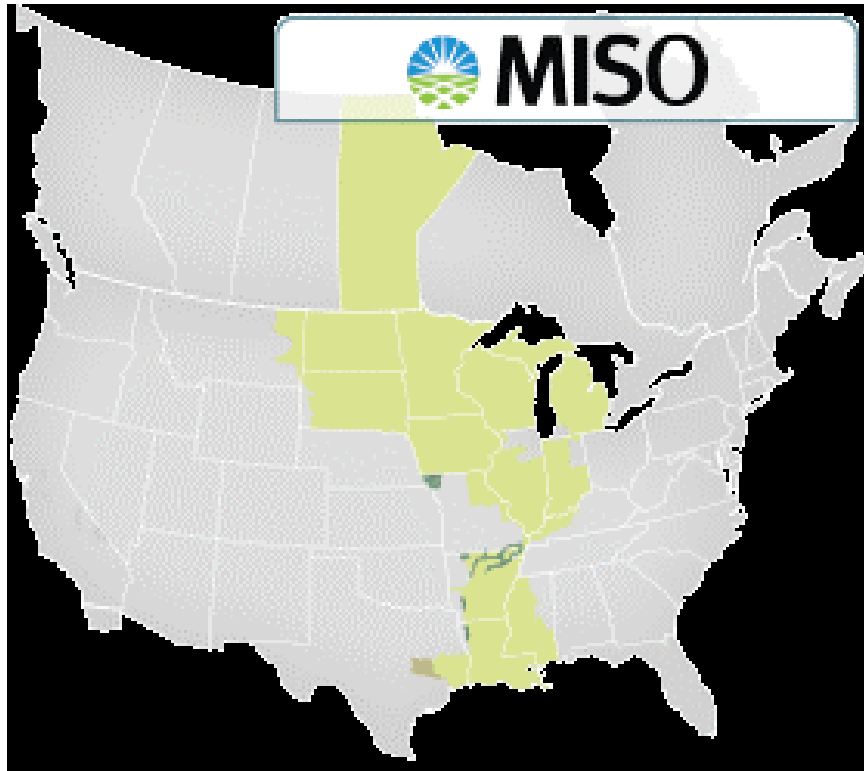
- Many cost-effective options can't be implemented on state-stand-alone basis
  - Regional approaches for transmission, grid optimization, integration, dispatch, capacity markets, trading etc.
- *Transforming air regulation into the new flexible model as reflected in EPA's rule may be difficult (for EPA offices and the states).*



# WECC Study on Common Rate Across West



# MISO Study



“Regional compliance is approximately 40% less expensive.”



# Key Take-Aways

- Recognize that §111(d) is not a traditional SIP
- Think “outside the blocks” to NACAA’s 25 options
- Think regional (multi-state)
- Think least-cost, least-risk
  - Changing industry raises specter of stranded-costs
- Think integrated (ozone/particulates, water, & risk co-benefits)
- Ask not what EPA wants your plan to be; ask what *you* want it to be



## About RAP

The Regulatory Assistance Project (RAP) is a global, non-profit team of experts that focuses on the long-term economic and environmental sustainability of the power and natural gas sectors. RAP has deep expertise in regulatory and market policies that:

- Promote economic efficiency
- Protect the environment
- Ensure system reliability
- Allocate system benefits fairly among all consumers

Learn more about RAP at [www.raponline.org](http://www.raponline.org)

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