Preparing for Federal Greenhouse Gas Regulations

NCSL Task Force on Energy Supply
December 3-4, 2013
Washington, DC

Presented by Ken Colburn, Senior Associate
Introduction

• The Regulatory Assistance Project (RAP) is a global, non-profit team of energy experts, mostly veteran regulators, advising current regulators on the long-term economic and environmental sustainability of the power and natural gas sectors. (www.raponline.org)

• Ken Colburn is a Senior Associate at RAP; he previously served as New Hampshire’s Air Director and as Executive Director of NESCAUM.
Overview of Remarks

• Framing § 111 Circumstances
• “What” Shape It May Take
• “How” It May Be Implemented
• What Should States Do Now?
• Reflections About Costs
Essentially new terrain for EPA...

On a very tight schedule...

With some legal tension...

And recent SIP-related court decisions reinforcing states’ role...

– (Corn Growers, CSAPR)
“What” (1)

• New Sources - § 111(b): (reproposed September 20, 2013)
  – Source-based “standards of performance”
  – Somewhat bifurcated coal vs. gas

• Existing Sources - § 111(d): (proposal June 2013)
  – “Best system of emission reduction” (BSER)
  – Adequately demonstrated; consider cost; timeframe
  – Emission “Guideline” (but mandatory)

• Modified or Reconstructed Sources:
  – Not clear
“What” (2)

• Existing Sources - § 111(d) (continued):
  – Anticipate BSER will be some combination of supply-side and demand-side measures
  – Supply-side:
  – Demand-side:
    • Energy Efficiency – EERS? 1%/year? Utility-run?
    • Combined Heat & Power (CHP)?
“What” (3)

• Cornerstone questions remain:
  – What level(s) of reduction will be required?
  – Against what baseline?
  – Within what compliance timeframe?
  – (e.g., Copenhagen: 17% below 2005 by 2020; economy-wide)
“How” (1)

• Uncharted territory...
• But states will definitely get “first crack” on existing sources:
  – “Each state shall submit a plan” under a procedure EPA establishes “similar to ... section 7410” (i.e., §110 SIPs)
  – aka, “State Equivalency Plan”
Implementation issues are critical because approval of “state equivalency plans” will hinge on them:

– How will emission reductions be measured?
  • Mass-based (tons CO2e)? Rate-based (#/MWh)? Carbon intensity? Carbon pricing?
– What GHG accounting, tracking, reporting?
– Will there be a Model Rule?
“How” (3)

• Implementation issues (continued):
  – What flexibility mechanisms (if any)?
    • Any kind of trading (and allowance issues)?
    • Alternative compliance payments? Other?
  – How to quantify emissions benefits of EE?*
    • EMV? “Deemed savings?” Location/grid issues?
      “RSVPE?” ... (if EPA does this at all – vs. states)
  – How will “first-mover” states be recognized?
    • RGGI, AB-32, WCI, RPS, EERS, IRP, etc.

*A recent RAP paper by John Shenot specifically addresses this issue
“How” (4)

• **Bottom Line:** The burden will fall on EPA to clearly define in rule, or on states to clearly demonstrate in plans

  – “Clear definition” has lacked in the past (e.g., iterative process of nonattainment SIPs)

  – EPA doesn’t have all the answers – or time; framing suggests greater deference to states

  – Time for states to “cowboy up”; establish credible, defensible reductions
What Should States Do Now? (1)

• Get your “ducks in a row”

• What EE, RE, CHP, EGU or other supply-side reductions are in place? What review processes?
  – Have measured energy savings (and how – SEEAction? DOE Uniform Methods?)
  – How EMV’d, reviewed, and translated into emission reductions?
  – Determined where located?
  – What does EPA/DOE-EIA have in their baseline projections?
What Should States Do Now? (2)

• Are PUC, DEP, and SEO talking with each other? Planning together?
• Dialogue with EPA Regional Office?
• Pursuing “SIP-quality” credit using EPA’s EE/RE Roadmap?
• Joined EPA’s “Ozone Advance” and/or “PM Advance” program(s)?
  – Inventory, identify EE/RE measures, etc.
What Should States Do Now? (3)

• Get ahead of the curve
  – Identify current situation
  – Identify preferred direction

• Communicate policy preferences to EPA

• Talk with other states about regional approaches
Reflections About Costs (1)

Source: Global CCS Institute, 2011
Reflections About Costs (2)

Table 1: Levelized Cost of Electricity for New-Build Power Plants with and without CCS

<table>
<thead>
<tr>
<th>Power Plant Type</th>
<th>Average LCOE without CCS ($/MWh)</th>
<th>Average LCOE with CCS ($/MWh)</th>
<th>Increment (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>IGCC</td>
<td>97.8</td>
<td>141.7</td>
<td>+45%</td>
</tr>
<tr>
<td>PC</td>
<td>75.0</td>
<td>137.1</td>
<td>+83%</td>
</tr>
<tr>
<td>NGCC</td>
<td>74.7</td>
<td>108.9</td>
<td>+46%</td>
</tr>
</tbody>
</table>

Retrofitting existing plants for CCS is expected to be more expensive and reduce a plant’s overall efficiency when compared to building a new plant that incorporates CCS from the start. In addition, retrofitting CCS on existing power plants faces additional constraints: insufficient land and space for capture equipment; a shorter expected plant life than a new plant, which limits the window in which to repay the investment in CCS equipment; and the tendency of existing plants to have lower efficiency, which consequently means that CCS will have a proportionally greater impact on net output than it would have in new plants. New power plants without CCS can be designed to be “CCS-ready” so that the cost of later retrofitting the plant for CCS will be lower.

Source: C2ES
First, Do No Harm

• Unwise climate policy choices can hurt air quality & water
• Unwise air quality & water choices can hurt climate
• End result: Higher overall costs
Energy Efficiency: The “First Fuel”

• Example:
  – Efficiency Vermont supplied electric efficiency in 2012 at $3.4\,¥/\text{kWh}$.
  – Taking into account participating customers’ additional costs and savings, the levelized net resource cost of saved electric energy in 2012 was less than $0.1\,¥/\text{kWh}$.
  – By contrast, the cost of comparable electric supply in 2012 was $8.6\,¥/\text{kWh}$. 
EE Also Reduces Multiple Pollutants: What if the Ozone NAAQS is Tightened?

Counties With Monitors Violating Primary 8-hour Ground-level Ozone Standards
0.060 - 0.070 parts per million
(Based on 2006 – 2008 Air Quality Data)

EPA will not designate areas as nonattainment on these data, but likely on 2008 – 2010 data which are expected to show improved air quality.

Notes:
1. No monitored counties outside the continental U.S. violate.
2. EPA is proposing to determine compliance with a revised primary ozone standard by rounding the 3-year average to three decimal places.
EE Impacts in ISO-NE Forecasts

These results have already led to the cancellation of 10 planned transmission upgrades in New Hampshire and Vermont, saving $260 million.
RGGI States’ Experience (1)

Figure 1: New RGGI Cap and Projected CO₂ Emissions Without Cap Reduction
RGGI States’ Experience (2)

Figure 4: Illustrative Example of Factors Driving CO₂ Emission Reductions

- Reducing the need for fossil-fuel generated electricity
- Reducing the carbon intensity of RGGI fossil-fuel fired units (projected to be 39% lower by 2020)

Energy solutions for a changing world
$1.6 billion in growth. The 10-state RGGI regional economy gains more than $1.6 billion in economic value.

$912 million in allowance proceeds. Power plant owners have spent roughly $912 million from mid-2008 through September 2011 to buy allowances from states. Proceeds are disbursed to states and spent on different projects.

$1.3 billion in energy savings to consumers. Customers save nearly $1.1 billion on electricity bills, and an additional $174 million on natural gas and heating oil bills. Over time, customers will save nearly $1.3 billion.

Power plant owners lose revenue. Power plant owners experience $1.6 billion in lower net revenue over time from reduced demand, although overall had higher net revenues during the 2009-2011 period.

Reduced fossil fuel use keeps more money local. Reduced demand for fossil fuels keeps more than $765 million in the local economy.

More than 16,000 net jobs are created. Based on economic savings and investments, 16,000 net jobs are created regionwide.
Conclusion

• Good news about 111(d): States are likely to have great freedom and flexibility

• Bad news about 111(d): States are likely to bear greatest responsibility

• Key question for states: “What’s your plan?”
Thank You for Your Time and Attention!

About RAP

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

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

Learn more about RAP at www.raponline.org

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Additional Slides
Reflections About Costs (4)

Figure 5 Cost of CO₂ avoided

Source: Global CCS Institute, 2011
Exhibit 1-1: Illustration of Avoided Electricity Cost Components, AESC 2011 vs. AESC 2009 (WCMA Zone, Summer On-Peak, 15 Year Levelized Results, 2011$)

<table>
<thead>
<tr>
<th>Component</th>
<th>AESC 2009</th>
<th>AESC 2011</th>
<th>Difference Relative to AESC 2009</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>cents/kWh</td>
<td>cents/kWh</td>
<td>cents/kWh % Difference</td>
</tr>
<tr>
<td>Avoided Energy Costs</td>
<td>9.63</td>
<td>9.06</td>
<td>-0.57 -5.9%</td>
</tr>
<tr>
<td>Avoided Capacity Costs</td>
<td>0.59</td>
<td>1.08</td>
<td>0.49 83.2%</td>
</tr>
<tr>
<td><strong>Energy and Capacity Subtotal</strong></td>
<td>10.22</td>
<td>10.14</td>
<td>-0.08 -0.8%</td>
</tr>
<tr>
<td>DRIPE</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intrastate Energy</td>
<td>2.76</td>
<td>3.18</td>
<td>0.43 15.4%</td>
</tr>
<tr>
<td>Capacity</td>
<td>0.26</td>
<td>1.23</td>
<td>0.97 371.9%</td>
</tr>
<tr>
<td><strong>DRIPE Subtotal</strong></td>
<td>3.02</td>
<td>4.41</td>
<td>1.39 46.1%</td>
</tr>
</tbody>
</table>

**Subtotal: Avoided Energy and Capacity + Intrastate DRIPE**

|                        | 13.23 | 14.55 | 1.31 | 9.9% |
| CO₂ Externality        | 2.95  | 3.41  | 0.46 | 15.5% |
| **Total**              | 16.19 | 17.96 | 1.77 | 10.9% |

**Notes**
- Values may not sum due to rounding
- Avoided energy costs for Summer On-Peak incorporate avoided REC costs (All Classes for AESC 2011, Class I for AESC 2009)
- AESC 2009 values levelized (2010-2024) escalated to 2011$
  1) Avoided capacity costs assumes 100% selling into Forward Capacity Markets
  2) Assuming a 55% load factor
  3) Values are for Intrastate energy DRIPE
  4) 2011 CO₂ prices and physical emission rates
Reflections About Costs (1)

• Efficiency improvements on existing coal-fired plants:
  – Combustion Control Optimization (0.15 to 0.84%)
  – Cooling System Heat Loss Recovery (0.2 to 1%)
  – Flue Gas Heat Recovery (0.3 to 1.5%)
  – Low-Rank Coal Drying (0.1 to 1.7%)
  – Sootblower Optimization (0.1 to 0.65%)
  – Steam Turbine Design (0.84 to 2.6%)
Synergistic Multi-Pollutant Effects of Energy Efficiency Offer Economic Benefits

Design Task: Reduce air pollution health impacts by 50%.

(Source: Based upon Bollen et al, 2009 cited in RAP 2012, Integrating Energy and Environmental Policy)
Most analyses of EE are incomplete:

- Some look only at avoided energy costs.
- Many include production capacity costs, but not transmission or distribution capacity or line losses.
- Few include other resource savings (water, gas, oil).
- Very few try to quantity non-energy benefits.
RGGI States’ Experience

Figure 3: RGGI CO₂ Emissions and Economic Output (2005-2012)

Since 2005, CO₂ pollution from the power sector has declined more than 40 percent, from 162.5 million tons in 2005 to 92 million tons in 2012.