Symposium on the EPA’s Proposed Rules on Carbon Reduction

September 25, 2014
EPA’s Proposed Rules on Carbon Reduction
Context and Challenges

- National view of Electric Generation Technology
- We are not just coal
- The proposed rule is all about CO₂ reduction
- Our goals are aligned with the environmental community
- EPA has been prescriptive in how it established each state’s CO₂ emission reduction requirement, providing states with the flexibility to craft their own unique plan to achieve the state’s CO₂ reduction requirement
- Preliminary challenges we have identified are: timing, cost, and reliability, as well as the ability to efficiently adapt nuclear, solar, wind, and hydro technologies in our region
EPA Proposed Carbon Reduction Guidelines
National View of Electric Generating Technology
2012 US National View

Electricity Generation by Source (EIA)

- Coal: 37%
- Natural Gas: 30%
- Nuclear: 19%
- Hydro: 7%
- Wind: 3%
- Solar: 0.1%
- Other: 3%

CO₂ Intensity

- Coal: 2400 pounds CO₂ per megawatt-hour
- Natural Gas CT: 1200
- Natural Gas CC: 850
- Nuclear: 740
- Hydro: 80.3
- Wind: 84.5
- Solar PV*: 118.6

U.S. Average Levelized Costs For Plants Entering Service In 2019

Source: EIA's 2014 Annual Energy Outlook

- Coal: $128.4/MWh
- Natural Gas CT: $74.6/MWh
- Natural Gas CC: $66.3/MWh
- Advanced Nuclear*: $86.1/MWh
- Hydro: $84.5/MWh
- Western Wind: $80.3/MWh
- Solar PV*: $118.6/MWh

* Includes 10% Subsidy

The proposed rules target carbon emissions with mandatory state-level performance goal, rather than a goal for individual energy sources.
Existing Generation Capacity – 3225 MWs
We Are Not Just Coal

SJRPP: Coal : 637 MW
Northside Gen Units 1 & 2: Coal/Pet Coke: 586 MW
Brandy Branch: Natural Gas 796 MW
Greenland Energy Center: Natural Gas: 372 MW
Kennedy: Natural Gas 382 MW
Existing Generation Capacity – 3225 MWs
We Are Not Just Coal

Plant Scherer
Coal: 194 MW

Jacksonville Solar
Solar PV: 15 MW
(not included in capacity total)

Northside Peaking CTs
Diesel Fuel Oil
246 MW

The Energy Authority – TEA

Trail Ridge/Girvin
Landfill Gas: 10 MW
Existing Generation Capacity – 3225 MWs
We Are Not Just Coal

- In the 2018-2019 time frame, JEA’s sale to FPL will suspend, adding 383 MW.
- FPL’s output will be reduced to its equity ownership percentage of 20%.

Upon completion of Georgia Power’s Plant Vogtle Nuclear Units 3 (2017) and 4 (2018), JEA has contracted to purchase a total of 206 MW of capacity and energy.

Future Renewables: Add where economically viable or mandated.
Greenland Energy Center was constructed with future expansion capacity of up to 1000 MW – through conversion of existing units and additional unit construction.

JEA has an option to purchase up to 20 percent of Duke Energy’s William States Lee III Nuclear Station (440 MW), in Cherokee County, South Carolina.

Future Renewables: Add where economically viable or mandated.
<table>
<thead>
<tr>
<th>Unit</th>
<th>Fuel</th>
<th>MW</th>
</tr>
</thead>
<tbody>
<tr>
<td>SJRPP</td>
<td>Coal</td>
<td>634</td>
</tr>
<tr>
<td>Northside 1&amp;2</td>
<td>Coal</td>
<td>600</td>
</tr>
<tr>
<td>Brandy Branch</td>
<td>Gas - CC</td>
<td>450</td>
</tr>
<tr>
<td>Brandy Branch</td>
<td>Gas - CT</td>
<td>150</td>
</tr>
<tr>
<td>Kennedy</td>
<td>Gas - CT</td>
<td>300</td>
</tr>
<tr>
<td>Greenland</td>
<td>Gas - CT</td>
<td>300</td>
</tr>
<tr>
<td>Jax Solar</td>
<td>Solar</td>
<td>15</td>
</tr>
<tr>
<td>Landfill Gas</td>
<td>Methane</td>
<td>10</td>
</tr>
<tr>
<td>Vogtle</td>
<td>Nuclear</td>
<td>200</td>
</tr>
<tr>
<td>Northside</td>
<td>Diesel - CT</td>
<td>212</td>
</tr>
</tbody>
</table>
EPA’s Clean Power Plan – Florida
Perspective State Goals – Flexible State Plans

<table>
<thead>
<tr>
<th>State</th>
<th>Historical emissions rate (2012)</th>
<th>Interim emissions rate goal (2020-2029)¹</th>
<th>Final emissions rate goal (2030+)</th>
<th>Required change (2012-2030)²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Florida</td>
<td>35</td>
<td>1,200</td>
<td>844 – 794</td>
<td>-38%</td>
</tr>
</tbody>
</table>

EPA utilizes four steps, or “Building Blocks”, to calculate “Required Change”
Challenges: Timing, Cost, and Reliability

Initially assumed a level or straight line glide path
Challenges: Timing, Cost and Reliability

Florida CO₂ lb/MWh

Actual Reduction Mandated by Proposed Rule

Year
EPA’s Proposed Clean Power Plan
Preliminary Challenges: timing, cost, reliability
Florida Power Plants – 2012 Energy

<table>
<thead>
<tr>
<th>2012 Energy</th>
<th>GWh</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Natural Gas</td>
<td>152,000</td>
<td>65%</td>
</tr>
<tr>
<td>Coal</td>
<td>48,000</td>
<td>21%</td>
</tr>
<tr>
<td>Nuclear</td>
<td>18,000</td>
<td>8%</td>
</tr>
<tr>
<td>Purchases</td>
<td>5,000</td>
<td>2%</td>
</tr>
<tr>
<td>Renewables</td>
<td>3,000</td>
<td>1%</td>
</tr>
<tr>
<td>Other</td>
<td>8,000</td>
<td>3%</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>234,000</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

Note: Icon size proportional to Energy (GWh)
EPA’s Proposed Clean Power Plan  
Preliminary Challenges: timing, cost, reliability  
Florida Power Plants – Redispatch Estimate

<table>
<thead>
<tr>
<th>2030 Energy</th>
<th>GWH</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Natural Gas</td>
<td>225,000</td>
<td>75%</td>
</tr>
<tr>
<td>Coal</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>Nuclear</td>
<td>50,000</td>
<td>17%</td>
</tr>
<tr>
<td>Renewables</td>
<td>23,000</td>
<td>8%</td>
</tr>
<tr>
<td>Other</td>
<td>2,000</td>
<td>&lt;1%</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>300,000</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

Note: Icon size proportional to Energy (GWh)

To meet this level with solar would require covering 88,000 acres with panels.
Florida Major Natural Gas Pipelines
Electric System reliability will rest on two, maybe three major natural gas pipelines.

1 Sabal Trail not yet fully permitted

Sabal Trail
EPA’s Proposed Rule on Carbon Reduction

Preliminary Challenges: Ability to efficiently adapt
EPA’s Proposed Rule on Carbon Reduction

Preliminary Challenges: Ability to efficiently adapt
EPA’s Proposed Rule on Carbon Reduction
Preliminary Challenges: Ability to efficiently adapt

New Stream-reach Development (NSD) Potential by Subbasin for the United States

This map was produced by Oak Ridge National Laboratory for the U.S. Department of Energy.
• The Southeast and Florida in particular received disparate treatment in setting mandatory state level carbon reduction goals –
  • 34 states have higher emission rates than Florida, yet only 15 states received higher carbon reduction goals.
  • Kentucky, North Dakota, Utah and others will be allowed to continue using coal because in 2012 there was no idle NGCC redispach capacity in these states.
  • CO_2 emissions from residential and commercial heating in Northern states will not be regulated, while Florida’s heating will be regulated.
• Similar disparate treatment could occur at the state level, with a significant economic shift to the south.
• Places current generating assets at risk – stranded cost.
• Current generation technologies capable of achieving meaningful change are challenged by timing, cost and reliability: nuclear, wind, solar, and NGCC.
• Places significant accelerated downward pressure on electric unit sales – energy efficiency and distributed generation.
• Potential higher costs, especially unit costs, for consumers and businesses.
EPA’s four Building Blocks for State Goals

1. **Coal heat-rate (efficiency) improvement** – 6% across the entire coal fleet

2. **Re-dispatch** existing coal units to existing natural gas combined cycle units (NGCC)
   - Florida would re-dispatch 90% of coal energy to NGCC

3. **Zero carbon generation** to increase substantially: existing nuclear fleet to generate 5.8% more energy in addition to new units now under construction. Florida would increase renewables from 2% in 2012 to 10% in 2030.

4. **End-Use Energy Efficiency** to provide 10% of cumulative CO₂ reductions by 2030
   - Florida would increase from 2% in 2020 to 10% in 2030

---

Final EPA Computation for Florida

<table>
<thead>
<tr>
<th>Projected Reduction</th>
<th>lbs CO₂/MWh</th>
</tr>
</thead>
<tbody>
<tr>
<td>2012 Base Rate</td>
<td>1,200</td>
</tr>
<tr>
<td>BB1 – Improved Coal Heat Rate</td>
<td>(29)</td>
</tr>
<tr>
<td>BB2 – Redispach</td>
<td>(274)</td>
</tr>
<tr>
<td>BB3 – Nuclear</td>
<td>(7)</td>
</tr>
<tr>
<td>BB3 – Renewables</td>
<td>(83)</td>
</tr>
<tr>
<td>BB4 – Efficiency</td>
<td>(67)</td>
</tr>
<tr>
<td>Total Reduction</td>
<td>(460)</td>
</tr>
<tr>
<td>State Goal</td>
<td>740</td>
</tr>
<tr>
<td>Percent Reduction from 2012</td>
<td>38.3%</td>
</tr>
</tbody>
</table>