Greenhouse Gas Permitting Rule and Power Plant New Source Performance Standards
Presentation Topics

- Impacts of US EPA Tailoring Rule
- GHG Best Available Control Technology (BACT)
- Power Plant New Source Performance Standards (NSPS)
How We Got Here - GHG Regulatory History

- **Massachusetts vs. EPA - 2007** - US Supreme Court case decided 5-4 in which twelve states and several cities force the Agency to regulate carbon dioxide and other greenhouse gases (GHG) as air pollutants.

- **US EPA proposes and finalizes Endangerment Finding** (…cause(s) or contribute(s) to air pollution which may reasonably be anticipated to endanger public health or welfare) issued under § 202(a)(1) related to motor vehicles.

- **US EPA promulgates Final GHG Emissions Standards for light duty vehicles** – GHGs become a regulated air pollutant under CAA.

- **US EPA promulgates Final PSD and Title V GHG Tailoring Rule - June 2010**
GHG Tailoring Rule

**Impacts**

- PSD pre-construction permitting for GHG emissions
- BACT for GHG Emissions
- Title V Operating Permits
- Six GHGs treated as One PSD or Title V Regulated Pollutant
- Thresholds expressed as Tons CO$_2$e – Note: 40 CFR Part 98 GHG Reporting Rule Uses Tonnes
Greenhouse Gases

- **GHG covered:**
  - Carbon dioxide (CO₂)
  - Methane (CH₄)
  - Nitrous oxide (N₂O)
  - Hydrofluorocarbons (HFCs), Perfluorocarbons (PFCs), Sulfur hexafluoride (SF₆)

- **All converted to CO₂ equivalent emissions using Global Warming Potentials (GWP)**
  - CO₂ = 1
  - CH₄ = 25
  - N₂O = 310
## Permitting Thresholds

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>Title V</th>
<th>PSD</th>
<th>PSD Significance Level</th>
</tr>
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<tbody>
<tr>
<td>PM$_{10}$</td>
<td>100</td>
<td>100 or 250</td>
<td>15</td>
</tr>
<tr>
<td>PM</td>
<td>NA</td>
<td>100 or 250</td>
<td>25</td>
</tr>
<tr>
<td>SO$_2$</td>
<td>100</td>
<td>100 or 250</td>
<td>40</td>
</tr>
<tr>
<td>NO$_x$</td>
<td>100</td>
<td>100 or 250</td>
<td>40</td>
</tr>
<tr>
<td>CO</td>
<td>100</td>
<td>100 or 250</td>
<td>100</td>
</tr>
<tr>
<td>Ozone/VOC</td>
<td>100</td>
<td>100 or 250</td>
<td>40</td>
</tr>
<tr>
<td>Lead</td>
<td>100</td>
<td>100 or 250</td>
<td>0.6</td>
</tr>
<tr>
<td>HAP</td>
<td>10 - individual 25 - combination</td>
<td>Not regulated under PSD.</td>
<td></td>
</tr>
<tr>
<td>GHG (no Tailoring)</td>
<td>100</td>
<td>100 or 250</td>
<td>Any increase.</td>
</tr>
<tr>
<td>GHG (with Tailoring)</td>
<td>100,000</td>
<td>100,000</td>
<td>75,000</td>
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</table>
Impacts Without and With Tailoring Rule

- **PSD Permitting**
  - **Without Rule** - 82,000 permitting actions per year – ($1.5 billion)
  - **With Rule** - 1,600 permitting actions per year – ($36 million)

- **Title V Operating Permits**
  - **Without Rule** - 6 million sources would have needed Title V operating permits - ($21 billion)
  - **With Rule** - 15,500 sources will need Title V operating permits – ($69 million)
PSD applicability determinations are based on both mass and CO$_2$e emissions

- Applies if mass emissions exceed the statutory thresholds (e.g., 100/250 tpy for new sources), \textit{and}
  - CO$_2$e emissions exceed the Tailoring Rule threshold (100,000 tpy for new sources)
  - (75,000 tpy for modifications)
Title V Operating Permit Applicability

- Sources with CO$_2$e PTE $> 100,000$ tpy
- Applicable requirements may include those resulting from permitting actions, e.g., PSD BACT
- 40 CFR Part 98 GHG Reporting Rule is not an applicable requirement

**Example 195 MMBtu/hr natural gas boiler**
Biogenic carbon dioxide emissions -

...resulting from the combustion or decomposition of biologically-based materials, (e.g., all types of wood, ethanol, landfill waste, manure, etc.) other than fossil fuels.

US Court of Appeals for the DC Circuit vacated EPA’s 2011 deferral of GHG biogenic emissions from being included in permitting applicability determinations.

DC Circuit has effectively postponed its “vacatur” decision until 30 days after US Supreme Court decides Utility Air Regulatory Group case challenging the Tailoring Rule.
**GHG Best Available Control Technology (BACT)**

- **US EPA’s “PSD and Title V Permitting Guidance for Greenhouse Gases” provides framework for GHG BACT**
  - Heavy reliance on energy efficiency
  - Add-on controls must be considered, including CCS for large sources
  - No “Redefining” the source

- **US EPA guidance documents also released for seven sectors with more specific discussions of how to address BACT**
  - Sector guidance documents are aimed at what should be considered as opposed to what is BACT, i.e. information source
  - EGUs, ICI Boilers, Pulp & Paper, Refining, Iron & Steel, Cement, Nitric Acid Production

- **US EPA website**
  - http://www.epa.gov/nsr/ghgpermitting.html
GHG BACT Considerations for Combustion Sources

- Use of energy efficient technology
- CCS for large GHG sources
- Combined heat and power (CHP)
- Low carbon fuels
  - combustion of natural gas produces lower CO₂ emissions than other fossil fuels - ~30% less than oil, and ~45% less than coal (on a lb/MMBtu basis).
- Good combustion practices
  - Optimization of combustion efficiency through initial tuning, annual tune-ups, instrumentation and controls, and regular PM.
GHG BACT Considerations for Combustion Sources (cont’d)

- **Energy efficiency**
  - Latest technologies with advanced efficiency
  - Co-generation that produces thermal energy and electricity
  - Options that reduce emissions by improving the utilization of thermal energy and electricity that is generated and used onsite
  - Capture and re-use of waste heat in flue gas
  - New burner designs and air balance system to increase fuel combustion and heat transfer efficiency.

- **Catalytic oxidation**
  - Primarily designed to reduce CO emissions but will also reduce methane (CH₄) emissions to a lesser extent (reportedly less that 0.05 percent)
Carbon Capture and Storage (CCS)

- CCS involves the capture and/or compression, transport and storage of CO₂.
- Commercially-available solvent-based CO₂ capture systems exist but at pilot and demonstration-scale.
- CCS not suitable for low-purity, low concentration CO₂ streams.
- Need access to pipeline and permanent storage infrastructure.
- Environmental permitting of pipeline and storage structures.
- Comparison of BACT $/ton costs is difficult.
Recent Trends in GHG BACT Determinations for Combustion Sources

- Numerical emission limitations, e.g., output based emission limit = lb CO$_2$e /MW-hr net
- CO$_2$e limits should be stated on a 12-month rolling total basis (recent decisions include lb/hour limits)
- GHG BACT emission limit needs to cover SSM events
- GHG mass emission limit for aux boiler, emergency generators, etc. (e.g., lb/MMBtu)
Under Clean Air Act

- Section 111(b) covers new sources
- Section 111(d) covers existing sources
NSPS for New Sources -
- Proposed 2012
- Re-proposed in 2013
- US EPA to issue final this year

NSPS for Existing Sources -
- 2014 Proposed Guidelines
- 2015 Final Guidelines
- 2016 State Plans Due
"A standard for emissions of air pollutants which reflects the degree of emission limitation achievable through the application of the best system of emission reduction, which (taking into account the cost of achieving such reduction and any non-air quality health and environmental impact and energy requirements) the Administrator determines has been adequately demonstrated."
## Proposed Limits for New Sources

<table>
<thead>
<tr>
<th>Natural Gas</th>
<th>Proposed limit</th>
<th>Coal/IGCC Proposed Limits</th>
<th>Averaging period</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small &lt; 850 MMBtu/hr</td>
<td>1,100 lb CO₂ / MWh</td>
<td>1,100 lb CO₂ / MWh</td>
<td>12 months</td>
</tr>
<tr>
<td>Large &gt; 850 MMBtu/hr</td>
<td>1,000 lb CO₂ / MWh</td>
<td>1,000-1,050 lb CO₂ / MWh</td>
<td>84 months</td>
</tr>
</tbody>
</table>
NSPS GHG Reduction Methods

“Best system of emission reduction”
- For Natural Gas: Combined Cycle Plant
- For Coal/IGCC: Partial CCS
“The Administrator shall prescribe regulations . . . under which each State shall submit to the Administrator a plan which establishes standards of performance for any existing source for any air pollutant for which air quality criteria have not been issued . . . but to which a standard of performance under this section would apply if such existing source were a new source, and provides for the implementation and enforcement of such standards of performance.”
Variety of Approaches on the table -

- Energy efficiency
- Coal to gas conversions
- “Beyond the fenceline” EE/RE programs
- SIP will be unique to State’s energy mix and economy
Concluding Remarks

- GHG Permitting Rule has not had nor will likely have a widespread impact on New England power companies and facilities *
- NSPS for new sources likewise will not have a widespread impact on New England power companies and facilities
- NSPS for existing sources will pose more of a concern as it relates to implementing compliance programs

*outcome on how biogenic CO₂ emissions are accounted for may change this
Parting Thoughts – What You Should Be Doing Now

- Include CO₂e permitting strategy as part of Capital Projects planning
- Stay current on GHG BACT determinations
- As applicable, monitor US EPA’s position regarding biogenic CO₂ emissions
- Monitor NSPS rulemaking
- Track ramifications of UARG Supreme Court Decision
Peter H. Anderson
Geosyntec Consultants
978-339-3898
panderson@geosyntec.com