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EPA's Proposed GHG NSPS for New EGUs

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Logistics

- > Copy of presentation will be emailed to attendees after the presentation
- > Questions
 - ❖ Submit questions via WebEx chat
 - ❖ Submit questions via email
 - ❖ Trinity will followup on questions post-presentation
- > Discussion
 - ❖ Lines are muted during main part of presentation
 - ❖ At end, can un-mute individually for questions
 - ◆ Press *6 to un-mute
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Overview

- > Introduction
- > GHG NSPS History
- > Impacts of GHG NSPS beyond EGUs
- > Review of EGU NSPS Requirements
- > Next Steps



Trinity Consultants - Overview



- > Founded 1974 in Dallas, TX
- > 400 employees in 38 U.S. offices plus Canada, China and Middle East
- > Regulatory compliance and environmental management services
 - ❖ Focus in air permitting and regulatory compliance
- > ISO 9001 quality program
 - ❖ Certified in Dallas HQ





My Background

- > Lifelong interest in air quality
- > Native of Birmingham AL - red sky, dirty shirts
- > BS ME, Vanderbilt
 - ❖ Studied then-new 1990 Clean Air Act Amendments
- > MS EnvE, Illinois - air quality specialty
 - ❖ Thesis on visibility
- > In 19th year with Trinity
 - ❖ 14 years in Atlanta - 5 as office manager
 - ❖ Oversaw opening of Orlando office
 - ❖ Founded Virginia office in Roanoke
- > Focus on NSR and electric utility sector
- > Provide numerous custom courses to electric utility companies

EGU GHG NSPS: History

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EGU GHG NSPS Origin

- > February 27, 2006 - Final rule revising NSPS Subpart Da regulating electric generating units (EGU)
- > August 2009 - EPA requests voluntary remand from DC Circuit in *State of New York v. EPA* over 2006 rule and greenhouse gases (GHG)
- > December 16, 2010 - EPA settles lawsuit from NRDC, EDF, Sierra Club and 11 states by setting schedule for regulations for GHG
 - ❖ New Source Performance Standards under §111(b) for new and modified EGUs subject to Subpart Da
 - ❖ Emission Guidelines (EG) for existing EGUs under §111(d)
 - ❖ Original settlement set deadlines for final rules in 2012
- > Proposed settlement announced in Federal Register December 30, 2010 (75 FR 82392)

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GHG NSPS Recent History Round 1

- > April 13, 2012 (77 FR 22392) - proposed rule
 - ❖ 40 CFR 60 Subpart TTTT
 - ❖ Merged category from Subparts Da and KKKK
 - ❖ Retracted in 2013

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GHG EGU - New Schedule

- > June 25, 2013 - President Obama announces Climate Action Plan.
- > For power plants, plan set new schedules
- > For new sources (NSPS)
 - ❖ Directed EPA to issue revised proposal by September 20, 2013
 - ❖ Directed EPA to issue final rule *in a timely fashion*
- > For modified/reconstructed (NSPS) and existing (EG)
 - ❖ Requested EPA to issue proposal by June 1, 2014
 - ❖ Requested final standards by June 1, 2015
 - ❖ For EG, requested EPA require states submit SIPs no later than June 30, 2016 that implement the EG

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GHG NSPS Recent History Round 2

- > September 20, 2013 - new proposed rule signed
- > Not yet in Federal Register - anticipated January 2014
- > Major revisions to 2012 proposal
- > EPA also announced plan to rescind the 2012 proposal in entirety via a separate Federal Register notice the same day as the new proposed rule

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EGU GHG NSPS: Impacts beyond EGUs

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Impacts beyond EGUs

- > PSD
 - ❖ Applicability
 - ❖ BACT
- > Title V
 - ❖ Applicability
 - ❖ Fees
- > Mandatory Reporting Rule

PSD Impacts - Applicability

- > EPA position: no impact on PSD applicability
- > Basis is preamble to Tailoring Rule
- > Tailoring rule dealt with GHG based on *subject to regulation*
- > With CO₂ subject to an NSPS directly, GHG instead becomes a *regulated air pollutant*
- > Specific citation in proposed NSPS rule attempts to address by explicitly linking the Tailoring Rule to the NSPS trigger provision in the PSD regulations

PSD Impacts - BACT

- > Statute [§169(a)(3)] mandates that BACT can be no less stringent than any standard under §111
- > EPA position is that NSPS set a BACT “floor” once final (a proposed NSPS does not set the floor)
- > EPA position is that the proposed NSPS
 - ❖ Only sets a floor for new EGUs
 - ❖ Does not set a floor for modified or reconstructed EGUs
 - ❖ Basis is that under the proposed NSPS, an affected facility is only a new EGU

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Title V Impacts

- > Unlike PSD, the Title V definition of major source does not have different regulatory triggers
- > Thus, the distinction in *subject to regulation* and *regulated air pollutant* has little potential impact
 - ❖ Although all NSPS sources must obtain a Title V permit unless exempted, for the EGUs considered here Title V would be necessary regardless
- > EPA does separate “Greenhouse gases” definition from within “Subject to regulation” definition in 40 CFR 70.2 and 71.2

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Title V Fees - Problem

- > Without action by EPA, following would occur
 - ❖ Being a “regulated air pollutant” will add GHG to the list of air pollutants used in *presumptive fee* calculations used by some states
 - ❖ Sources with federal permits (40 CFR 71) will be required to include GHG in calculating annual fees
- > No impact to states that shows it collects sufficient fees to cover costs of program
- > EGU GHG NSPS triggers Title V fees for all sources - not just EGUs

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Title V Fees - Solution

- > EPA proposes to define a new term
 - ❖ *Regulated air pollutant (for presumptive fee calculation)*
 - ❖ Means any regulated air pollutant except GHG
- > EPA requires states to add costs for GHG program management into calculating presumptive fees
 - ❖ Add staff hours at average total \$/hr
 - ❖ To \$25/ton (adjusted) times emissions of non-GHG regulated air pollutants
 - ❖ Slightly different calculations for Part 70 vs. Part 71

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Mandatory Reporting Rule

- > Revisions to 40 CFR 98 Subpart PP
Suppliers of Carbon Dioxide
- > Adds reporting requirements for EGUs that capture a CO₂ stream and transfer to facilities subject to Subpart RR *Geologic Sequestration of Carbon Dioxide*



EGU GHG NSPS: Review of Requirements



EGU GHG NSPS - Proposal

- > Administrative
- > Pollutants
- > Types of units are regulated
- > Emission limits
- > Monitoring
- > Compliance

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Administrative

- > Two potential approaches - both are included in proposed rule but only one will be finalized
- > Option 1. Amend existing subparts
 - ❖ Subpart Da - boilers - would add a new standalone section 60.46Da
 - ❖ Subpart KKKK - turbines - would be a mix of new and amended sections within KKKK
- > Option 2. Consolidate in new GHG subpart
 - ❖ Subpart TTTT - *Greenhouse Gas Emissions for Electric Utility Generating Units*
 - ❖ Potential for future system wide averaging options across multiple unit types

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Pollutants

- > Only CO₂ is covered
- > N₂O and CH₄ are also emitted - comprise about 0.8% of CO₂e emissions
 - ❖ CO₂e is the weighted value of all GHG emissions by their global warming potential (GWP)
- > EPA not proposing to cover N₂O and CH₄ due to
 - ❖ Lack of more precise data on quantity of emissions
 - ❖ Lack information on cost-effective controls
- > EPA is seeking comment on this approach

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Regulated Units - NSPS Da

1. Steam generating unit or IGCC
2. Design heat input > 250 MMBtu/hr of fossil fuel
3. Combusts fossil fuel > 10% of average annual heat input on 3-year rolling average basis
4. Constructed for purpose of supplying, and supplies, 1/3 or more of potential electrical output and more than 219,000 MW-hrs to a utility distribution system on an annual basis

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Regulated Units - NSPS KKKK

1. Stationary combustion turbine
2. Design heat input > 250 MMBtu/hr
3. Combusts fossil fuel > 10% of average annual heat input on 3-year rolling average basis
4. Combusts over 90% natural gas on a heat input basis on a 3-year rolling average basis
5. Constructed for purpose of supplying, and supplies, 1/3 or more of potential electrical output and more than 219,000 MW-hrs to a utility distribution system on 3-year rolling average basis

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Regulated Units - Impacts

- > EGUs fired predominantly on biomass are exempted
 - ❖ "Fossil" is the traditional NSPS definition - fossil + fossil-derived fuels only if derived for the purpose of creating useful heat
 - ❖ Petroleum coke is included in definition of coal
- > Simple-cycle combustion turbines are not exempted
 - ❖ If sell (generate) more than 1/3 of potential output, would be subject to rule
 - ❖ Since a simple-cycle combustion turbine cannot meet the emission limit without control, rule would effectively cap allowable operation of future simple-cycle combustion turbines
- > Reciprocating engines (RICE) are not covered

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New/Modified/Reconstructed

- > Current proposal only addresses new units
- > Separate proposal for modified/reconstructed units due in Summer 2014

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Emission Limits - Summary

Unit Type	CO ₂ - lb/MW-hr	
	12-month avg	84-month avg
Boiler	1,100	1,050
IGCC	1,100	1,050
Turbine <=850 MMBtu/hr	1,100	--
Turbine >850 MMBtu/hr	1,000	--

- > All limits on gross power basis
- > EPA is requesting comment on a net power approach with different numerical limits (higher numerically)

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Emission Limits - Summary

Unit Type	CO ₂ lb/MW-hr	Heat Rate	Efficiency
		HHV - Gross (Btu/kW-hr)	HHV - Gross (%)
Boiler/IGCC - Bituminous	1,100	5,349	64%
Boiler/IGCC - Sub-Bituminous	1,100	5,135	66%
Turbine <=850 MMBtu/hr	1,100	9,411	36%
Turbine >850 MMBtu/hr	1,000	8,555	40%

Carnot cycle
 $T_h - 1,200\text{ F}$
 $T_c - 80\text{ F}$
 $\eta_{th} - 67\%$

Not feasible w/o CCS

Not feasible for simple cycle

One of the most efficient simple cycle turbines
 GE LMS100 – design heat rate (HHV) ~ 8,500 Btu/kW-hr

Efficient but more typical turbines
 GE LM6000 – design heat rate (HHV) ~ 9,400 Btu/kW-hr
 GE 7FA – design efficiency (HHV) ~ 35%

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Emission Limits - Basis

- > Separate determination of Best System of Emission Reduction (BSER) for two different classes of units (unlike 2012 proposal which had a single determination)
- > NSPS Da units - partial implementation of carbon capture and storage
- > NSPS KKKK units - modern, efficient natural gas combined cycle technology

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Standard of Performance - BSER

The term "standard of performance" means

- > 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 nonair quality health and environmental impact and energy requirements) the Administrator determines has been adequately demonstrated*

§111(a)(1) [emphasis and bullets added]



BSER - EPA Four Factors

- > Feasibility: whether the system of emission reduction is technically feasible.
- > Costs: whether the costs of the system are reasonable.
- > Size of emission reductions: the amount of emissions reductions that the system would generate.
- > Technology: whether the system promotes the implementation and further development of technology.



BSER Options - Boilers

- > Highly efficient new generation without carbon capture and sequestration (CCS)
- > Highly efficient new generation with "full capture" CCS
- > **Highly efficient new generation with "partial capture" CCS**
 - ❖ Expected to generally be a high solvent circulation rate as in full capture but on only a portion of the exhaust stream ("slip stream")
 - ❖ Other option is to process full exhaust stream at lower solvent circulation rates

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Boilers - CCS Cost Impacts

Moreover, even if requiring CCS adds sufficient costs to prevent new coal-fired plants from constructing in a particular part of the country due to lack of available EOR to defray the costs, or, in fact, from constructing at all, a new NGCC plant can be built to serve the electricity demand that the coal-fired plant would otherwise serve. Thus, the present rulemaking does not prevent basic electricity demand from being met, and thus does not have an adverse effect on the supply of electricity.

...the EPA is authorized to promulgate standards of performance under CAA § 111 that may have the effect of precluding construction of sources in certain geographic locations

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Geographic Restrictions ??

... in 1970, Congress designed section 111 to require uniform national controls for large industrial facilities, while recognizing that those facilities could not necessarily construct in every place in the country.

Although at the time, Congress expected that the reason why some sources would not be able to locate in certain places was related to local air quality concerns, if the reason turns out to be related to the emission limits that the EPA promulgates under section 111, that should not be viewed as inconsistent with congressional intent for section 111.

A large jump in logic that could be very impactful in some areas



Geographic Restrictions ??

For example, if the EPA promulgates section 111 emission limits based on a particular type of technology, and for economic or technical reasons, sources are able to utilize that technology in only certain parts of the country and not other parts, that result should not be viewed as inconsistent with congressional intent for CAA section 111.

Rather, that result is consistent with Congress's recognition that certain sources may be precluded from locating in certain areas.



BSER Options - Turbines

- > **Modern efficient natural gas combined cycle (NGCC) units**
- > Modern efficient natural gas combined cycle (NGCC) units with CCS
- > Size delineation at 850 MMBtu/hr
 - ❖ Consistent with NSPS KKKK
 - ❖ Typical differentiator between aero-derivative and frame turbines

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Monitoring

- > Default approach - CO₂ CEMS and flow rate monitor
 - ❖ Generally follows Part 75
 - ❖ No bias adjustment to flow rates
- > Alternative approach for units firing only liquid or gaseous fuel
 - ❖ Hourly fuel flow rates and periodic gross calorific value with F-factors
 - ❖ Option to determine site-specific F-factors

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Compliance

- > Measure hourly CO₂ emissions
- > Measure gross electric output
 - ❖ More complex for combined heat and power (CHP) or direct mechanical drive
 - ❖ Apportion across multiple units using a plan approved by Administrator (e.g., heat input)
- > For all operating hours in average
 - ❖ Sum CO₂ emissions
 - ❖ Sum gross output
 - ❖ Divide emissions by gross output
(hours with substitute data provisions of Part 75 excluded)
- > Compliance is determined by stack emissions

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EGU GHG NSPS: Next Steps

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Key Events and Dates

- > Federal Register publication - anticipated January 2014
- > Comments - due within 60 days after Federal Register publication
- > Public hearing in DC - date TBD but will be set with Federal Register publication
- > Docket EPA-HQ-OAR-2013-0495
 - ❖ Will not open until Federal Register publication
 - ❖ Contains various supporting documents for rule proposal

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Other Requests for Comments

- > Coal refuse - seeking information that may justify a subcategory
- > Emergency conditions - considering excluding times operating under grid emergency
- > Initial design efficiency test - considering initial performance test for turbines at a more stringent level than the 12-month average

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Future Key Dates

- > For modified/reconstructed (NSPS) and existing (EG)
- > EPA to issue proposal by June 1, 2014
- > Final standards by June 1, 2015
- > For EG, require states submit SIPs no later than June 30, 2016 that implement the EG

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Emission Guidelines

- > 11 “public listening sessions” held in major cities
- > NRDC has been active on public advocacy on this topic
 - ❖ March 2013 paper
<http://www.nrdc.org/air/pollution-standards/files/pollution-standards-report.pdf>
 - ❖ October 2013 paper
<http://www.nrdc.org/air/pollution-standards/files/system-based-pollution-standards-IB.pdf>
- > Unclear what path EPA may take, but EPA has committed (via consent agreement) to issue Emission Guidelines

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Questions & Discussion



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