REINHOLD ENVIRONMENTAL Ltd.

2012 Coal to Gas Conversion Round Table & Expo Presentation

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23 October 2012

PERMITTING ISSUES ASSOCIATED WITH COAL-TO-GAS CONVERSION

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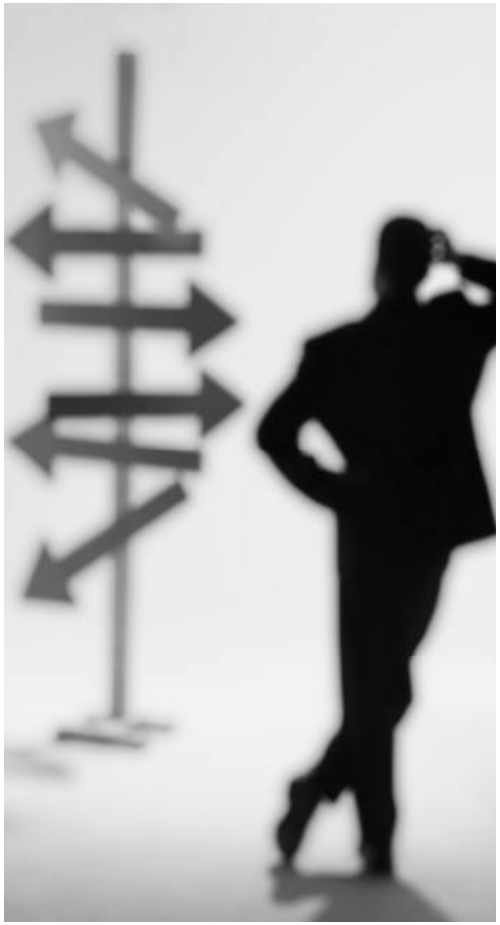
AGENDA

The Landscape
Types of Coal-to-Gas Conversions
Air Permitting Issues
Other Permitting Considerations

THE LANDSCAPE

ENVIRONMENTAL DRIVERS

- Cross-State Air Pollution Rule (vacated but may be back)
- Utility MACT a.k.a MATS, Boiler MACT and CISWI
- National Ambient Air Quality Standards (NAAQS)
- GHGs
- Coal Combustion Residuals
- Effluent Standards



OTHER DRIVERS

- Price of natural gas
- Development of shale gas drilling and processing either onsite or nearby
- Coal availability / transportation
- Regulatory uncertainty *fatigue*

TYPES OF COAL-TO-GAS CONVERSION

TYPES OF COAL-TO-GAS CONVERSION

- Converting existing coal fired boilers to 100% gas
- Installing new gas-fired boilers
- New combined cycle block
- Steam turbine repowering in a combined cycle configuration
- A combination of one or more of the above

Permitting implications for all types of conversions

COAL TO GAS: AN EMISSIONS PERSPECTIVE

Representative Air Emission Rates for Generation Options						
	Existing Coal Unit	Retrofit with Emissions Controls	Coal and 25% Natural Gas Co-Firing	Coal to Natural Gas Conversion	New Combined Cycle Block	Steam Turbine Repowering in a Combined Cycle
NO_X	BASE	15 – 90% reduction	0 – 20% reduction	20 – 75% reduction	95 – >99% reduction	95 – >99% reduction
SO_2	BASE	50 – >98% reduction	0 – 25% reduction	>99% reduction	>99% reduction	>99% reduction
PM	BASE	0 – 50% reduction	0 – 20% reduction	0 – 80% reduction	0 – 80% reduction	0 – 80% reduction
CO_2	BASE	BASE	10 – 15% reduction	40 – 50% reduction	60 – 70% reduction	60 – 70% reduction

AIR PERMITTING ISSUES

Air Permitting 101

New Source Review Applicability

Regulatory Driver Applicability

AIR PERMITTING 101

REGULATED POLLUTANTS

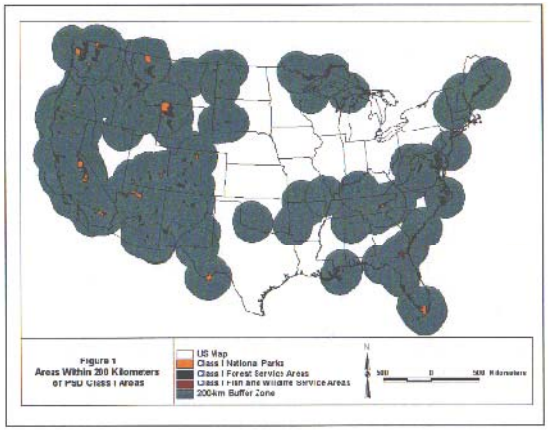
Plum Point Energy Station
Osceola, Arkansas

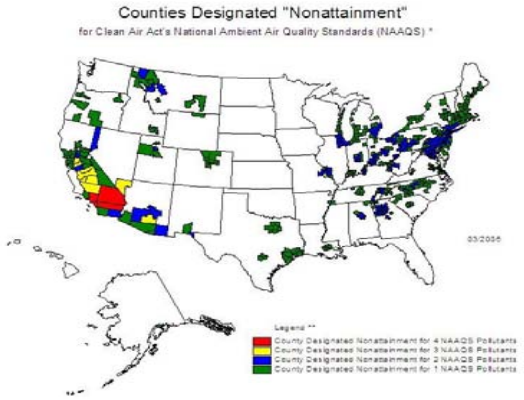
- **Criteria Pollutants:**
  - NO_2, SO_2, CO, Ozone, PM and Pb
- **Hazardous Air Pollutants (HAPs)**
  - 187 regulated HAPs (i.e. Hg, formaldehyde, some VOCs)
- **Certain state-specific air toxics**
- **GHGs**

NO_2: Nitrogen Dioxide
SO_2: Sulfur Dioxide
CO: Carbon Monoxide
PM: Particulate Matter
VOC: Volatile Organic Compounds
GHGs: Greenhouse Gases

NEED FOR AIR PERMITS

- **Stationary Source: "any building, structure, facility or installation which emits any air pollutant subject to regulation under the Act"**
- **Air construction permits required prior to project implementation: new sources, or modification of existing sources**
- **Modification of an Existing Source… "any physical change in, or change in the method of operation…."**
  - Modification: Converting existing coal fired boilers to gas or installing new equipment at existing source location
- **New Source: New replacement gas-based generation on a greenfield site**





SIGNIFICANT EMISSION RATES (SER)

Pollutant / Pollutant Group	Significant Net Emission Increase (tons/year)
Carbon Monoxide (CO)	100
Nitrogen Oxides (NO_x)	40
Sulfur Dioxide (SO_2)	40
Particulate Matter (PM)	25
Particulate Matter less than 10 microns (PM_{10})	15
Volatile Organic Compounds (ozone precursor)	40
Lead	0.6
GHGs (CO_2e)	75,000
Sulfuric Acid Mist	7

- Prevention of Significant Deterioration (PSD) is applicable if project emissions increase > SER
- PSD = BACT, Air Dispersion Modeling, Class I Area Impacts and Additional Impacts, longer permit review times
- Nonattainment areas have more stringent requirements

NEW SOURCE REVIEW APPLICABILITY

NSR REFORM

- **Pollution Control Project (PCP) exclusion not available for a while now**
- **Major Modification Determination is a 2-Step Process**
  - Step 1: Is there a significant emissions increase ?
    - Projected actual emissions (PAE) – Baseline Actual Emissions (BAE) (i.e., Future vs. Past)
  - Step 2 (also called netting): Is there a significant net emissions increase ?
- **PSD is applicable if both Step 1 and Step 2 are "yes"**
- **Project Netting is not allowed**

Major or minor modification will depend on the magnitude of the emissions change

DETERMINING BAE

- For EGUs, actual average annual emissions over any consecutive 24-month period in the previous 5-year look-back period
- For Non-EGUs, actual average annual emissions over any consecutive 24-month period in previous 10 years
- Can be different consecutive 24-month period for different pollutants
- Generally beneficial to choose the highest BAE Level in the look-back period

BAE are historical boiler emissions when combusting coal

DETERMINING PAE

- **Project actual emissions based on projected level of unit activity**
  - Project 5 or 10 years into the future
- **Increased unit operation due to natural demand growth**
- **Increased unit operation due to the project**

PAE are forecasted boiler emissions on natural gas

CALCULATING EMISSIONS CHANGE FOR STEP 1

- **Emissions Change = PAE – BAE**
  - Also called actual to projected actual (ATPA) applicability test
- **For new Units: Potential to Emit (PTE)**
- **Account for Excludable Emissions**
- **Compare Emissions Change to PSD SERs**
- **Proceed to step 2 only if step 1 emission increase is greater than PSD SERs**

Step 1: Is there a significant emission increase?

STEP 2 OR NETTING

ALGEBRAIC SUM OF ALL CONTEMPORANEOUS EMISSION INCREASES AND DECREASES

- Account for all emission plusses and minuses within the contemporaneous period
- The contemporaneous period begins five years prior to the start of construction on the proposed project and ends on the date the emissions change from the project occurs
- If the algebraic sum of all the emission plusses and minuses > SER then project subject to PSD review
- All historical contemporaneous emission changes calculated based on PTE – BAE (Actual to Potential) and not PAE to BAE (ATPA)

EMISSIONS CHANGE CALCULATION EXAMPLE FOR COAL TO GAS CONVERSION

- **Example Project: Shutdown of a coal fired boiler 1 and conversion of boilers 2 and 3 to 100% gas**
  - Step 1: Consider only the increases on a per unit basis and determine if the PSD SER threshold is exceeded

	CO (tpy)
Boiler 1 Shutdown (BAE)	-105
Boiler 2 Conversion to gas (PAE-BAE)	120
Boiler 3 Conversion to gas (PAE-BAE)	-90
Step 1 Emissions Change	?

EMISSIONS CHANGE CALCULATION EXAMPLE FOR COAL TO GAS CONVERSION

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	CO (tpy)
Boiler 1 Shutdown (BAE)	-105
Boiler 2 Conversion to gas (PAE-BAE)	120
Boiler 3 Conversion to gas (PAE-BAE)	-90
Step 1 Emissions Change	120

  - Proceed to Step 2 (Netting)

EMISSIONS CHANGE CALCULATION FOR COAL TO GAS CONVERSION

- **Example Project: Shutdown of a coal fired boiler 1 and conversion of boilers 2 and 3 to 100% gas**
  - Step 2: Contemporaneous Period Emissions Accounting

	CO (tpy)
Boiler 1 Shutdown	-105
Boiler 2 Conversion to gas (PAE-BAE)	+120
Boiler 3 Conversion to gas (PAE-BAE)	-90
Contemporaneous New Auxiliary Boiler (PTE)	+90
Boiler 4 Low NOx Burner Project (PTE-BAE)	+95
Step 2 Emission Change	?

EMISSIONS CHANGE CALCULATION FOR COAL TO GAS CONVERSION

- **Example Project: Shutdown of a coal fired boiler 1 and conversion of boilers 2 and 3 to 100% gas**
  - Step 2: Contemporaneous Period Emissions Accounting

	CO (tpy)
Boiler 1 Shutdown	-105
Boiler 2 Conversion to gas (PAE-BAE)	+120
Boiler 3 Conversion to gas (PAE-BAE)	-90
Contemporaneous New Auxiliary Boiler (PTE)	+90
Boiler 4 Low NOx Burner Project (PTE-BAE)	+95
Step 2 Emission Change	110

Step 2 emissions change > 100 tpy CO PSD SER

FACTORS IMPACTING PSD APPLICABILITY

- **Accurately determining emissions**
  - Negotiating emission estimates and guarantees from natural gas burner vendors
  - Using appropriate emission factors for accurately capturing baseline emissions data
  - Conceptual engineering design data
  - Actual stack / performance tests
  - Approved trial or test-burns along with boiler performance modeling
- **Willingness to accept federally enforceable permit limits**
- **Existing Site vs. New Site**
- **Co-location of shale gas processing facility**
- **Retaining capability to fire coal**

REGULATORY DRIVER APPLICABILITY

MATS and BMACT

NAAQS

GHGs

COAL TO GAS CONVERSION BENEFITS

Impact on Regulatory Applicability				
	Existing Coal Unit	New Gas Boilers	Coal to Natural Gas Conversion	New Gas-Fired Combined Cycle Block
MACT	MATS – EGUs BMACT – NonEGUs	BMACT – Non-EGUs Work Practice Stds.	BMACT for Non-EGUS Work Practice Stds.	CT MACT – Only notification requirements
NAAQS	↑	↓	↓	↓
GHGs	↑	↓	↓	↓
CSAPR (Future)	Stay within the allowances or buy	New unit set aside, old allowances will eventually expire	Existing allowances for Coal Unit do not expire	New unit set aside, old allowances will eventually expire

OTHER PERMITTING CONSIDERATIONS

316(b)

CCRs

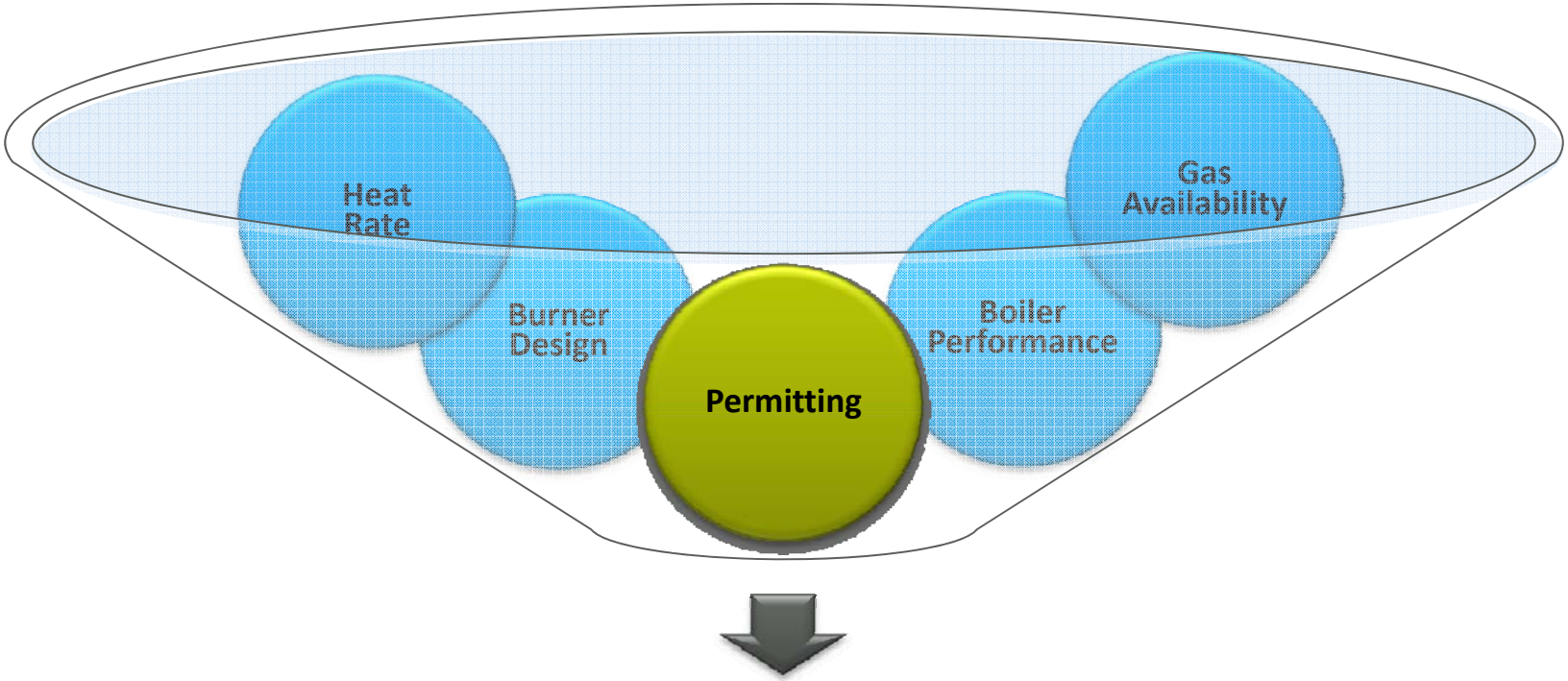
Effluent Standards

Nuisance Issues

OTHER REGULATIONS

Impact on Regulatory Applicability				
	Existing Coal Unit	New Gas Boilers	Coal to Natural Gas Conversion	New Combined Cycle Block
316 (b)	Yes	Yes	Yes	Yes
Effluent	↑	↓	↓	↓
CCRs	↑	↓	↓	↓
Nuisance Issues	↑	↓	↓	↓

CLOSING REMARKS



Cost of Compliance by Gas Conversion

Do not ignore the air permitting metric

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