Recast Energy Louisville, KY Coal-to-Biomass Conversion Case Study

Presented by:

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Introductions

- Donna Wirick – Environmental, Health & Safety Manager
- Ronnie Burnette – VP Engineering & Plant Operations
- Recast Energy
  - Provides safe, clean, efficient and reliable energy solutions
    - Develop/acquire and own/operate under long-term energy sales contracts
    - Operate plants owned by third parties under multi-year contracts
  - Currently own 3 facilities (2 of which are in operation)
  - Currently operating 3 facilities

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Recast Energy's Current Portfolio

- Kentucky
  - Coal-fired boiler being converted to biomass
  - Natural gas backup unit for 100% reliability
  - 240,000 lb/hr steam capacity (biomass & nat gas)
  - Steam supplied to 2 chemical plants
  - Acquired in 2010, currently being converted.
- Maine
  - 18 MW Wood-fired stand-alone power plant
  - Acquired in 2011
- Mississippi
  - 52,000 lb/hr biomass steam capacity
  - Steam supplied to paper mill
  - Natural gas backup unit for 100% reliability
  - Built in 2007
- Dominican Republic
  - 80,000 lb/hr biomass steam capacity
  - Steam supplied to textile mill
  - Built in 2008, O&M operator since startup

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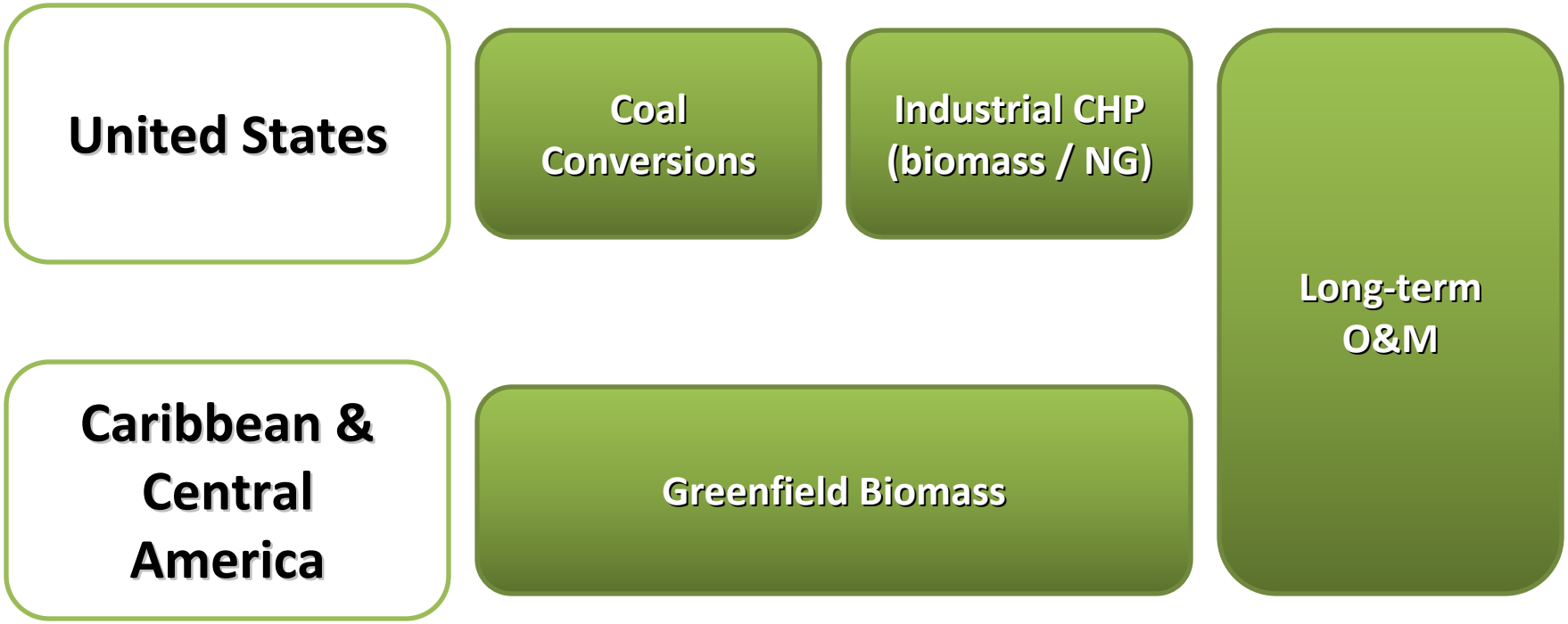
Recast Energy's Development Efforts



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Case Study of Current Coal-to-Biomass Conversion Project in Louisville, KY

- Overview of the Louisville Project
- Project Concept
- Ownership Transition
- Project Status
- Project Permitting
- Project Status
- What's Next?
- Summary
- Q&A

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Plant Overview Prior to Conversion

- #1 Boiler
  - Natural gas
  - 70’s Vintage
- #4 Boiler
  - Coal
  - 80’s vintage
- #5 Boiler
  - Natural Gas
  - 80’s vintage
- #6 Boiler
  - Coal
  - 60’s vintage

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Project High-Level Overview

Original Configuration

- Firing coal via 4 stokers
- Flue gas path included dust collector, economizer, baghouse, ID Fan and Stack

Final Configuration

- Firing biomass via 3 stokers
- Flue gas path to include dust collector, new economizer, air heater, ESP, ID Fan and Stack

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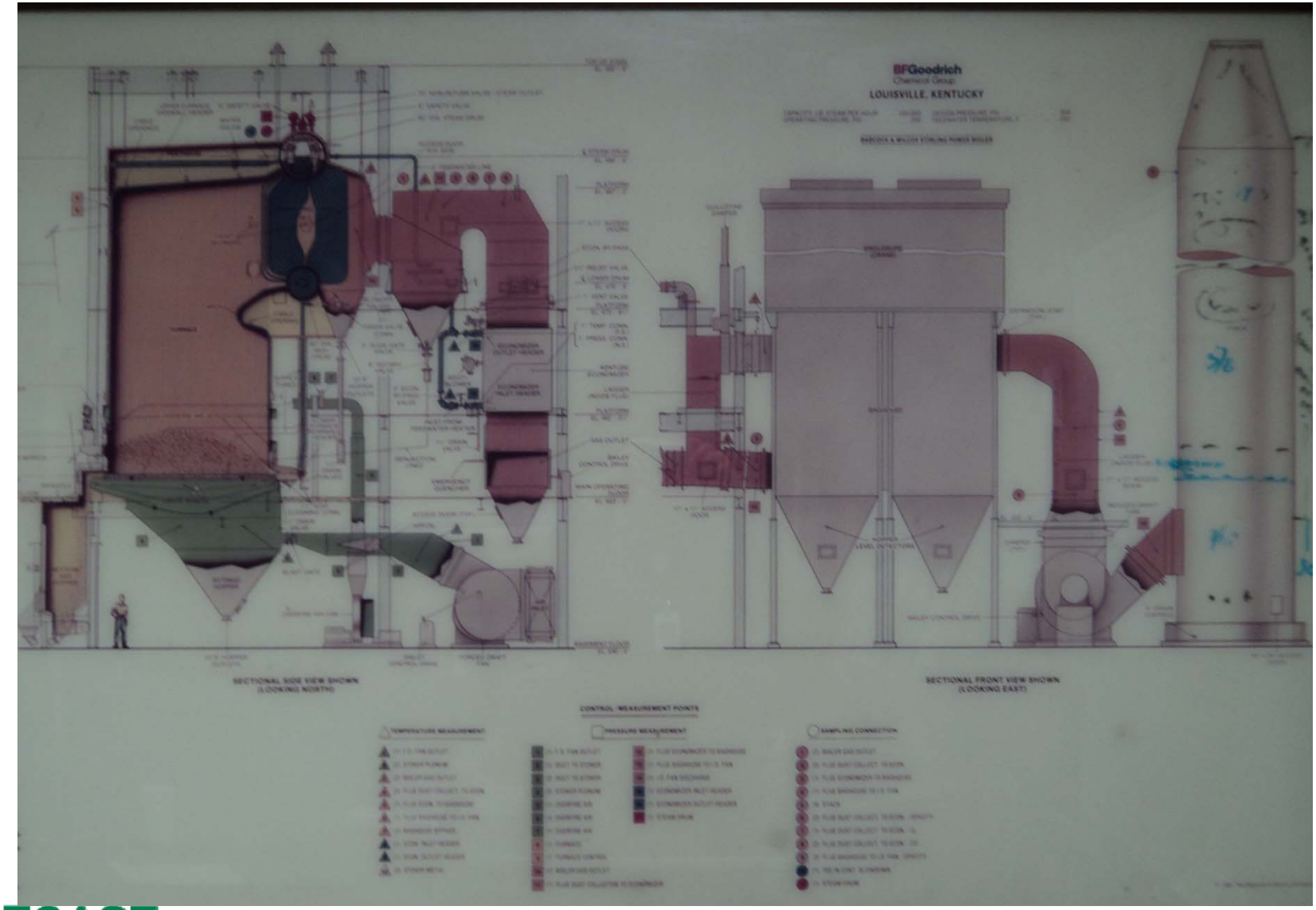
When We Started



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Original Configuration

Project Concept

- Recast Energy would
  - Buy the existing powerhouse
  - Assume operations and maintenance immediately
  - Transfer permits
  - Initiate permit modification process
  - Install a temporary boiler to ensure a reliable, continuous supply of steam during the project
  - Retire and remove the oldest coal and natural gas boilers
  - Convert the largest and newest coal-fired boiler to biomass
  - Upgrade plant equipment to support a 15-year energy supply agreement
- Customers would buy steam

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Ownership Transition

- Recast procured the powerhouse and began O&M in June 2010 using #5 Boiler
- Permits transferred as part of purchase
- Permit modified to support the installation of a temporary natural gas boiler
- Permit modification initiated to:
  - convert #4 coal-fired boiler to biomass
  - retire and demolish #1 natural gas-fire boiler
  - retire and demolish #6 coal-fired boiler

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Project Status

- Recast Energy is operating 120,000 pph natural gas-fired Boiler #5
- Temporary 70 Kpph natural gas boiler supporting steam demand as required during conversion process
- Recast Energy designed and installed all interconnection points in June 2011 to ensure the ability to transition to biomass without a plant-wide shutdown

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Project Status Continued

- Boilers #1 and #6 demolished
- Baghouse demolished
- Coal Handling and Storage Equipment removed
- Ash system removed – 90%
- Remediate Coal Yard – Done

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Project Status Continued

- Remove existing economizer – Done
- Remove OFA Fan and Ducting – Done
- Remove Coal Feeders – Done
- Install Electrostatic Precipitator – Mechanically Complete
- Turn the FD Fan 180 degrees – Done
- Install new Economizer and Air Heater – Equipment to arrive in March

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Project Status Continued

- Install new Fuel Handling, Receiving and In-Feed Systems – Equipment to arrive in April
- Install new Ash System – Equipment to arrive in April
- Install new air sweep feeders – Equipment on-site and will be completed when bent tube section replacements are complete
- Install new Flue Gas Ducting – Ducting fabricated

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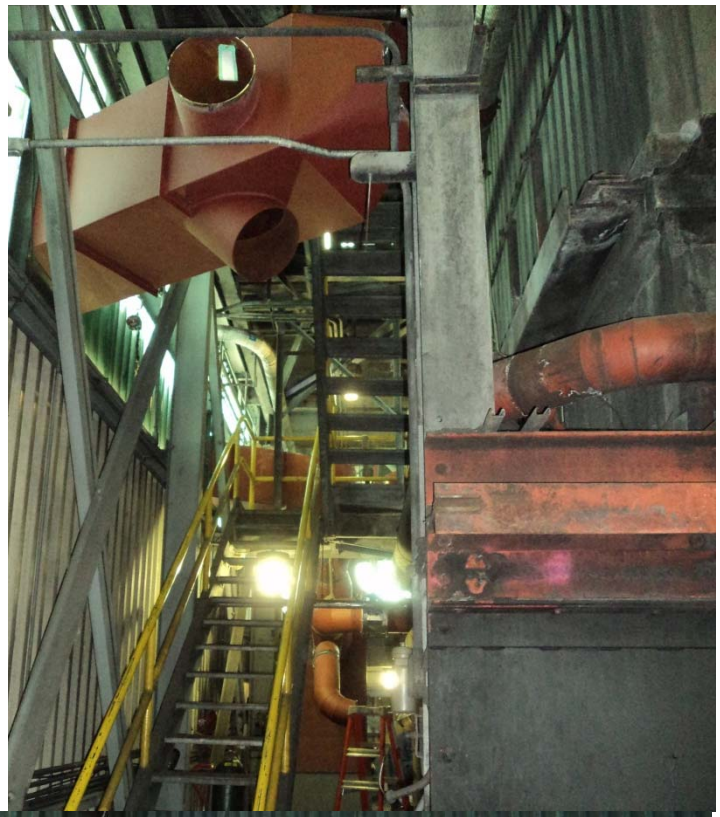
Project Status Continued

- Install the new OFA System to include new levels front and rear – 50% Complete
- Install new Control System – Factory Acceptance test one week from today
- Upgrade and retrofit existing electrical system – 20% complete
- Replace existing Soft Water System – Tie-ins complete, softeners to arrive in June
- Upgrade the existing control room – 20% complete



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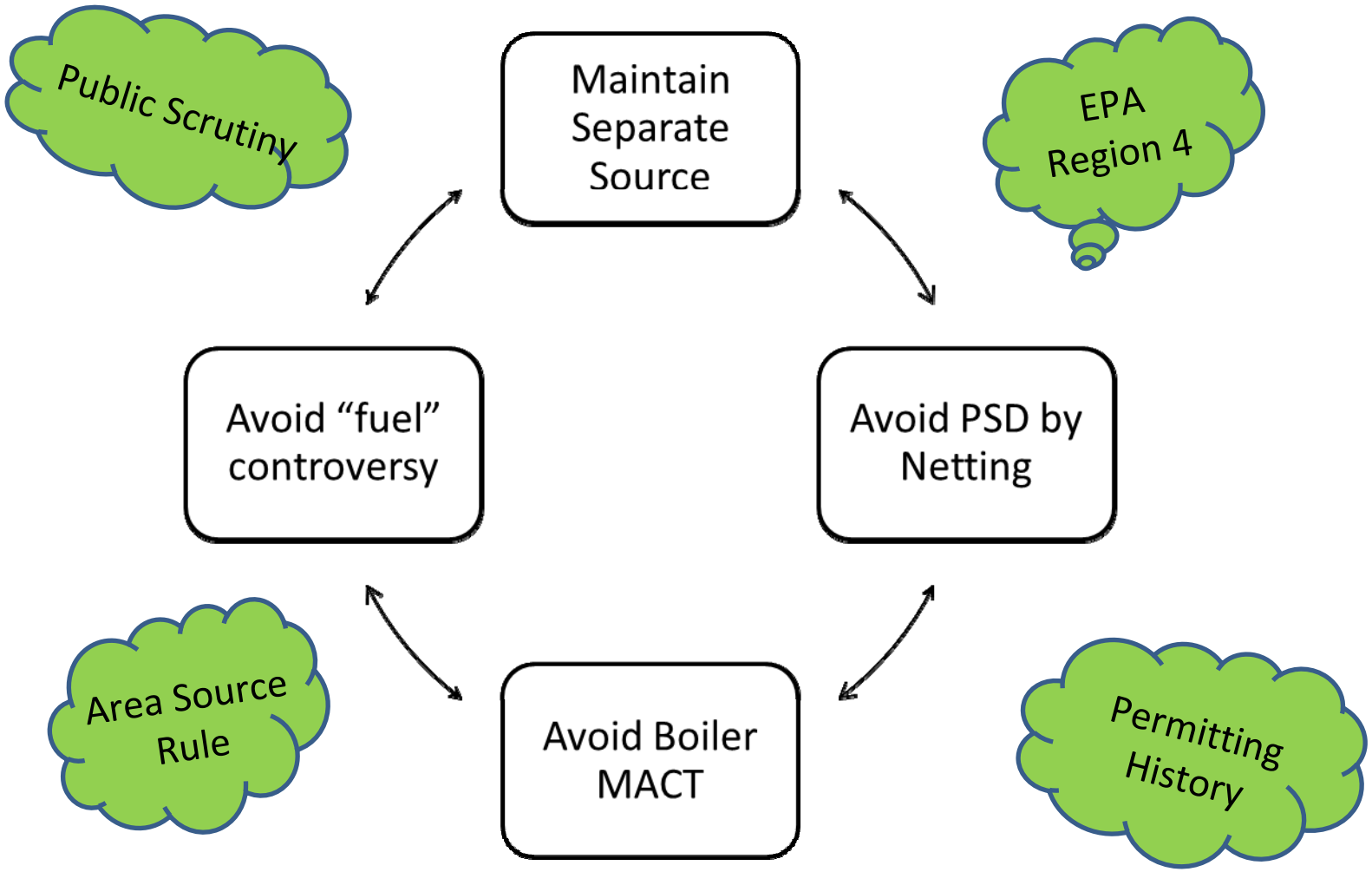
Permitting Plan and Execution



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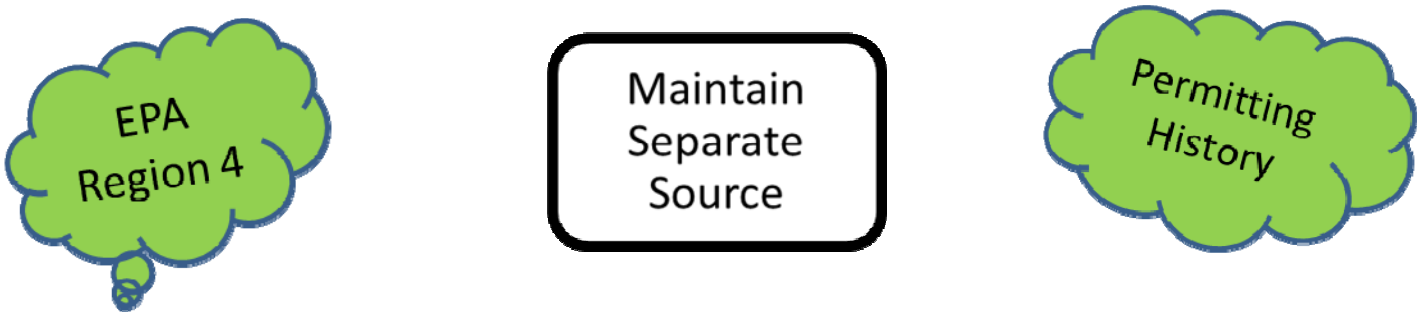
Permitting Plan and Execution



- "Rubbertown" – original WWII U.S. Office of War Production – BF Goodrich facility – Divided into several companies over many years
- LAPCD (Louisville Air Pollution Control District) enjoys "special attention" from Region IV
- Existing companies (Lubrizol, Zeon, OxyVinyl) had to argue for separate source status in the past.
- Ultimately, Region IV agreed based on multiple customers – *who would they combine us with????*

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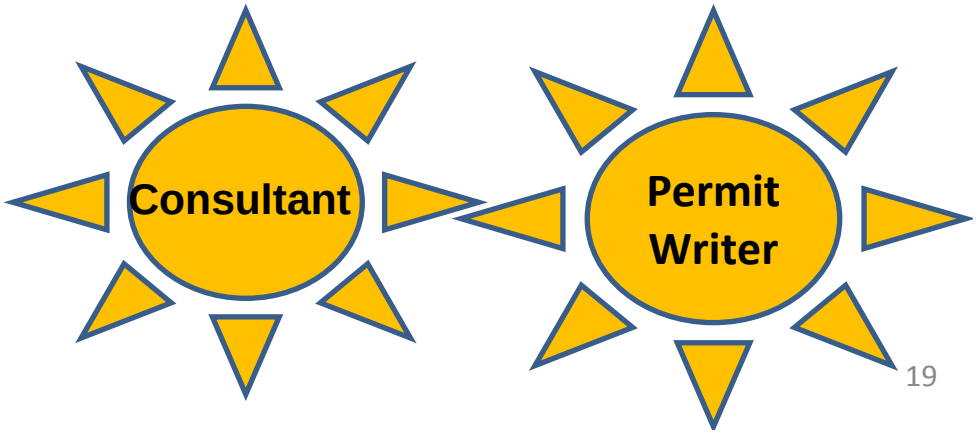
Permitting Plan and Execution

- **Benefit** from NOx, SOx and PM emission reductions from eliminating 1960-70 era coal and natural gas operations
- **Challenged** by difference in CO emissions between coal and wood
  - Started project with wide CO netting margin
  - Permitting history and EPA involvement whittled down the baseline
- **CO netting** ➡ **creative permit structure**



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Permitting Plan and Execution

- Wood fuel HAP's were managed to avoid MACT
- Avoided **ANYTHING** that might end up in the "Solid Waste" column
  - Eliminated "creative" biomass fuel options
- Held-our-breath on Area Source Rule (CO limit)

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Permitting Plan and Execution

Pollutant	2in10 Baseline	PTE	Permit Limits
CO	163	573	260
NOX	483	303	NA
SO2	806	22	NA
PM	69	23	NA
PM10	24	23	NA
PM2.5	9	23	19
VOC	1.2	19	NA

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Permitting Plan and Execution

- Rubbertown Emergency Action (REACT)
- West Jefferson County Community Task Force (WJCCTF)
- Strategic Toxic Air Reduction Program (STAR)

- Lubrizol and Zeon – large employers
- Economic Development
- State level recognition

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Customer and Political Support

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Permitting Plan and Execution

- Final Permit
  - Separate Source
  - Title V
  - Particulate Controls - ESP
  - Area Source
  - No PSD significance triggers
  - Facility bubble limit for CO, $PM_{2.5}$
  - Application submitted: Dec 2010
  - Permit issued: June 14, 2011
  - Construction began: June 15, 2011(Tailoring Rule)

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More to Come

- Expecting to fire the biomass boiler in early June
- Commissioning completion is expected mid-to-late July
- Emissions testing should occur in early July
- We hope to present the rest of the story at the CIBO **Industrial Emissions Control Technology X Conference Regulatory Workshop** in Portland, Maine (July 30 - August 2)

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Summary

- Recast acquired an existing coal-fired facility
- Recast strategically permitted the facility to minimize the operational and economic impact of the transition
- Recast is well into the process of converting a coal-fired industrial boiler to burn biomass to provide steam to three on-site industrial clients while minimizing the impact on client production activities

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Summary

- No construction or modification induced impact on the customer's production activities
- Target full operations on biomass in August of this year
- Recast is looking for additional coal-to-biomass conversion projects and ways to help new clients
- Recast can also employ combined cycle natural gas opportunities to support potential clients

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Questions, Answers and Comments

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