"Optimization of Air Pollution Control Systems"

Mcilvaine Webinar

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Today's Fossil Generation Challenges

- Unprecedented regulatory uncertainty
  - CSAPR
  - Utility MACT
  - Federal CO_2 regulation
  - Subsequent Clean Air Act Requirements (NAAQS, Regional Haze, etc.)
- Traditional and new sources of market volatility
  - Demand uncertainty (fighting the last war)
  - Fuel and allowance price volatility
  - Technological uncertainties
- All add to challenges bringing new capacity on-line
- CCCTs & renewables force new operating profiles
- Aging assets operating well beyond design life
- Graying work-force and skills shortage

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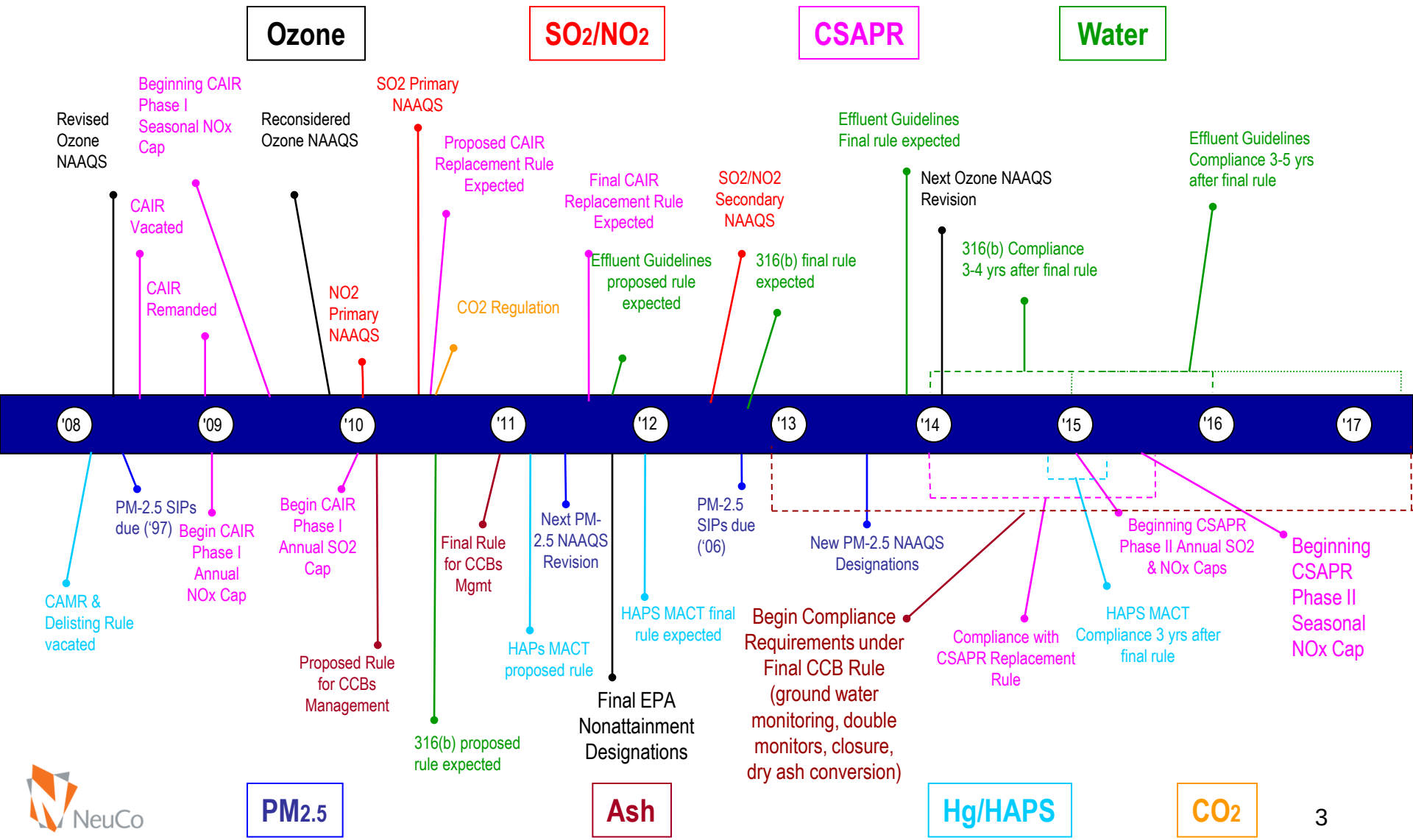
Do more with less and manage the risks!

Environmental Regulatory Timeline for Coal Units



-- adapted from Wegman (EPA 2003)

CSAPR for NOx Reduction

- Affected power plant NOx emissions required to be reduced by 54% by 2014
- 26 states would be required to reduce NOX emissions during the ozone season to help downwind states attain NAAQS standards
  - Specifically the 1997 ground-level ozone standard
- Supplemental NOPR adds Ozone Season limits for NOx to five states covered by PM 2.5 plus Louisiana
- Most allowances for 2012 have already been allocated and deposited
- Emissions reductions required very quickly, in 2012 – less than two months from now!

Near-Term CSAPR Rule Compliance Alternatives

- De-rate units
  - Live with reduced revenue and increased cost for less efficient gas-fired generation
- Change fuels – haven't already looked at this?
- Stage deeper with LNBs and OFA
  - Live with more erosion & tube leaks & slagging
- Run SCRs and/or SNCRs harder
  - Live with reagents costs & slip & plume & pluggage
- Optimize your boilers
  - Reduced and less variable boiler NOx
  - Deeper staging with less slagging and corrosion
  - Greater removal from SCRs/SNCRs w/fewer side-effects

Longer-Term Strategic Implications

- Minimize capital commitments for CSAPR while emerging regulatory changes make clear which units can survive and which cannot
- Inform future capital decisions for surviving units with better understanding of true (optimal) baseline performance
- Better equip surviving units to cope with:
  - Greater demands on existing emissions control hardware
  - Process changes and variable costs for new emissions hardware
  - Operational profiles associated with fundamentally altered markets
    - Influx of renewables with intermittent generation output profiles
    - Reduced capacity factor due to more efficient newer capacity coming on-line
    - Problems associated with aging assets and changes from design conditions
    - Greater operational challenges with fewer skilled operators and engineers
    - Ever-greater needs to “push the envelope” in order to “stay in the money”

BoilerOpt®

- NeuCo's total Boiler Optimization software solution:
  - Optimizes boiler performance in closed loop to improve unit reliability, efficiency & emissions
- Combines CombustionOpt® and SootOpt® products
- Uses a combination of optimization technologies:
  - Neural networks, expert rules, model predictive control
- Continually manages interrelated boiler variables:
  - Combustion quality, fuel & air mixing, gas & steam temps, fouling, tube erosion & emissions
- Manages tradeoffs between combustion and heat transfer processes
  - Aligns them with overall performance and emissions objectives
- Adjusts to fluctuating constraints & changing objectives

Breadth, Depth, and Flexibility

- Optimization can provide benefits in all these areas:
  - Heat Rate – NOx – MW – Commercial Availability
  - CO_2 – Opacity – SO_2 – Equipment Reliability
  - LOI – Particulates – Hg – Steam Temps
  - CO – Ramp Rates – NH_3 usage – Attemperation Sprays
  - Aux Power – Operational Consistency – Slagging & Fouling
- Maximum benefits can only be achieved with an integrated platform approach
- Platform designed for fleet-wide application, where benefits can be realized in manner best suited to differing organizations
  - Plant use
  - Centralized “war room”
  - Tailored service offering
  - Any combination of these

Indirect Optimization Benefits

- Process Illumination
- Tradeoff Management
- Expertise Codification
- KPI-Focused Workflow
- Analysis & Decision Support
- Set-Point Refinement
- Dynamic Uncertainty Management

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Integration of Emissions & Efficiency Silos

- Emissions and efficiency used to be addressed by different “silos” within power generation organizations
- Efficiency efforts often took back-seat to emissions
  - Regulatory “pass-through” clauses
- Fuel costs often handled fleet-wide
- CO_2 has brought efficiency and emissions together
- Reagent costs for NOx create large new “non-fuel” O&M cost

Bottom Line: Must integrate management of emissions, fuel, reagent costs and tradeoffs between them

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Contact Information

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