REINHOLD ENVIRONMENTAL Ltd.

2015 NOx-Combustion Round Table & Expo Presentations

February 23 & 24, 2015, in Richmond, VA / Hosted by Dominion

Plant Efficiency Improvement via SO_3 Removal and Ljungström® Air Preheater Upgrade

Sterling Gray, AECOM

Reinhold Environmental NOx-Combustion Conference

February 24, 2015 – Richmond, VA

LJUNGSTRÖM | ARVOS GROUP

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Case Study – Midwest Utility

- 500 MW
- SCR-APH-ESP-WFGD
- Illinois Basin Fuel
- 5 lb SO_2 Fuel
- 40-70 ppm SO_3
- SBS Injection (2012)
- APH Upgrade (2014)

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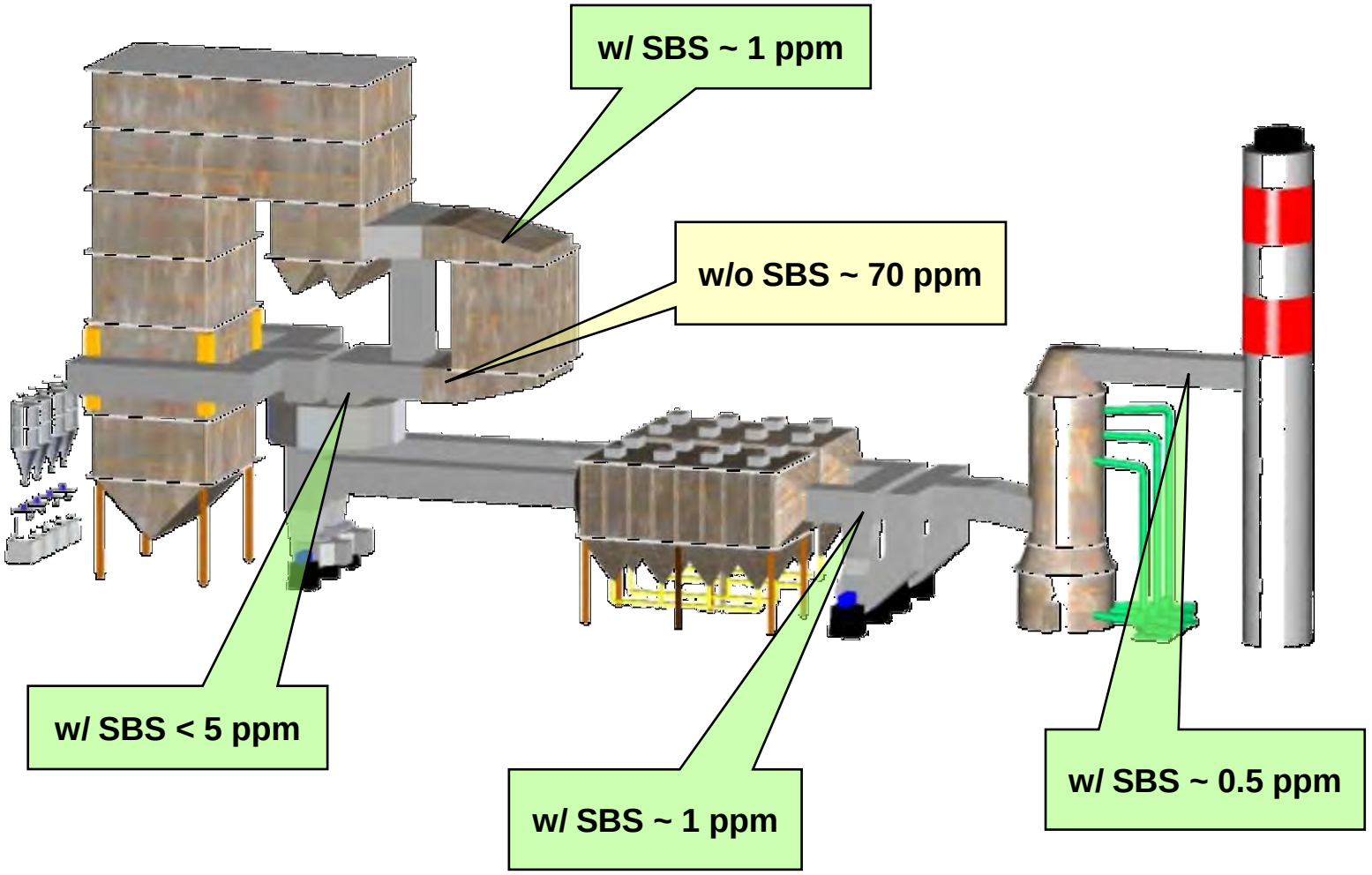
Relative SO_3 Levels Thru Gas Path



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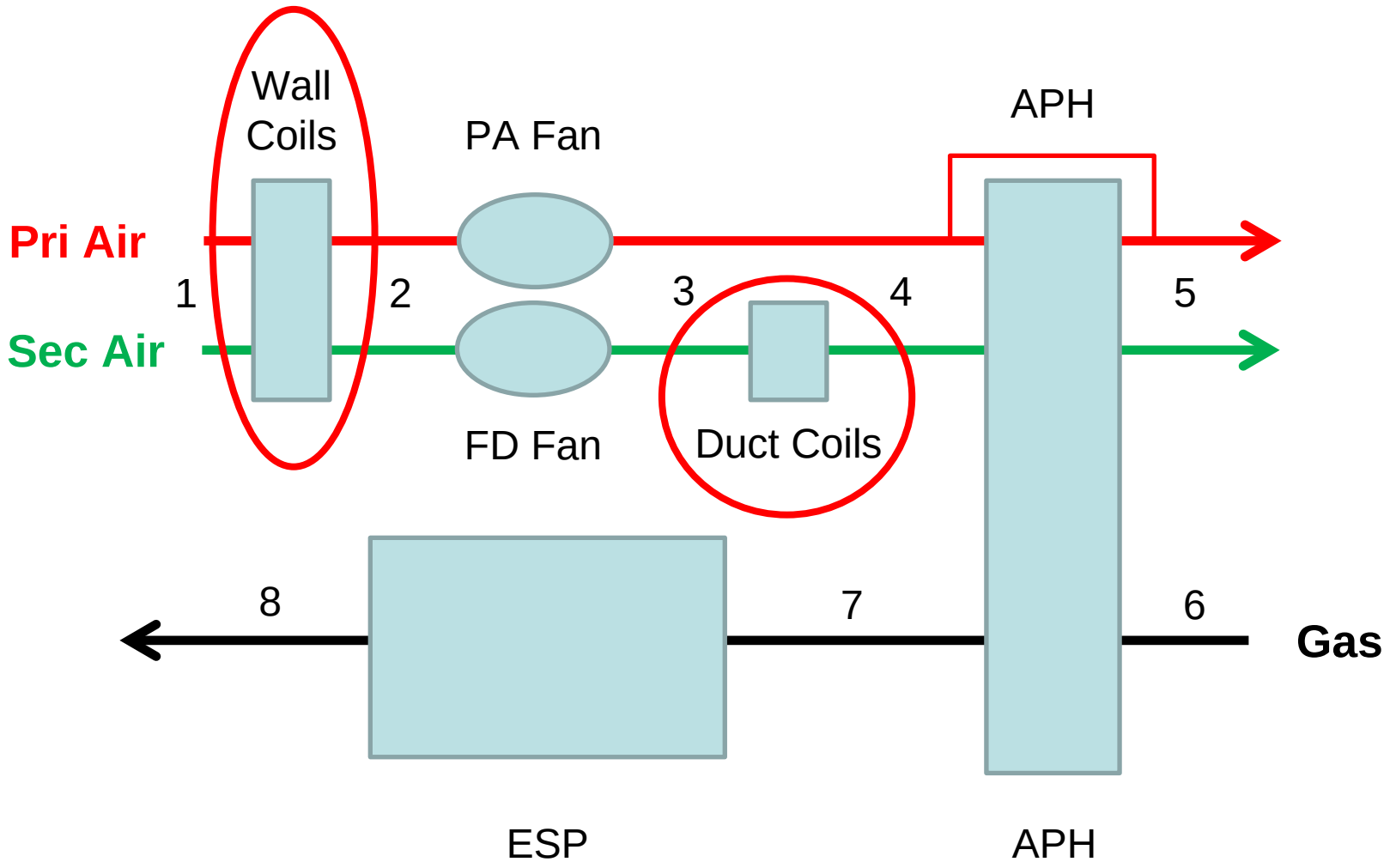
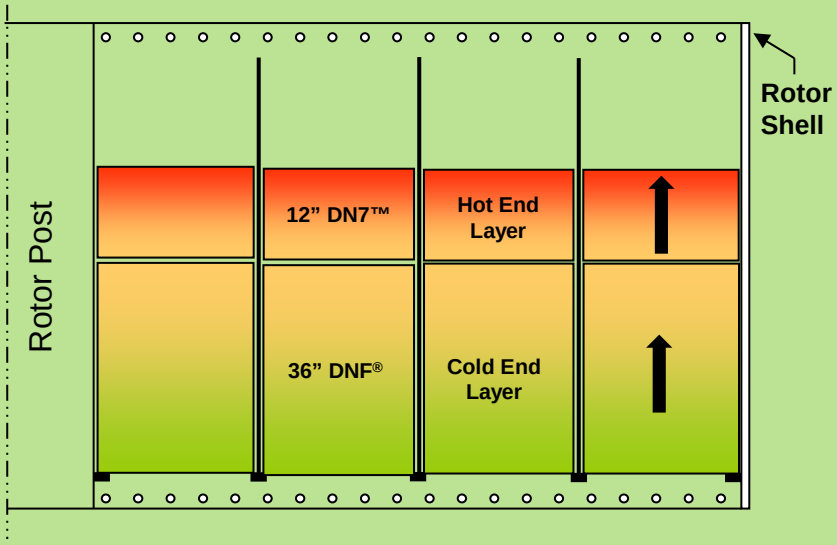
APH Configuration and Operation



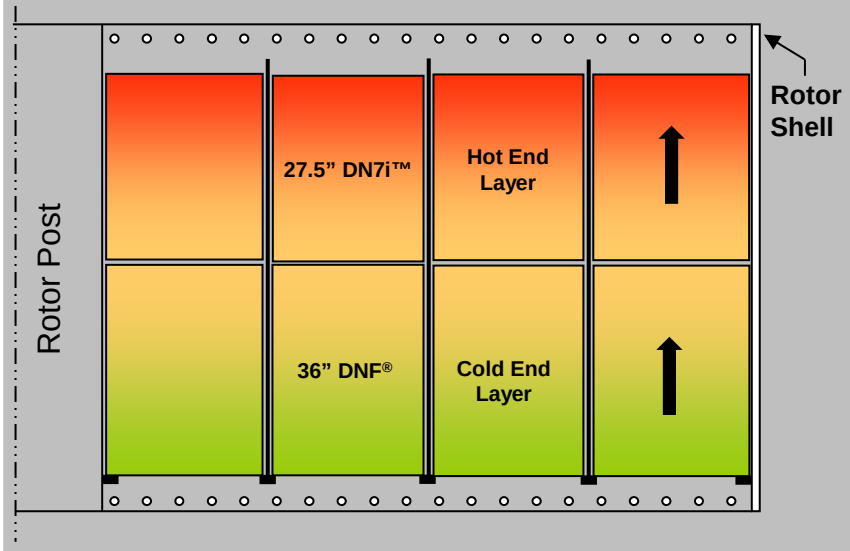
APH Upgrade Modifications

Old Configuration



Total heat transfer surface depth 48”

New Configuration



Total heat transfer surface depth 63.5”

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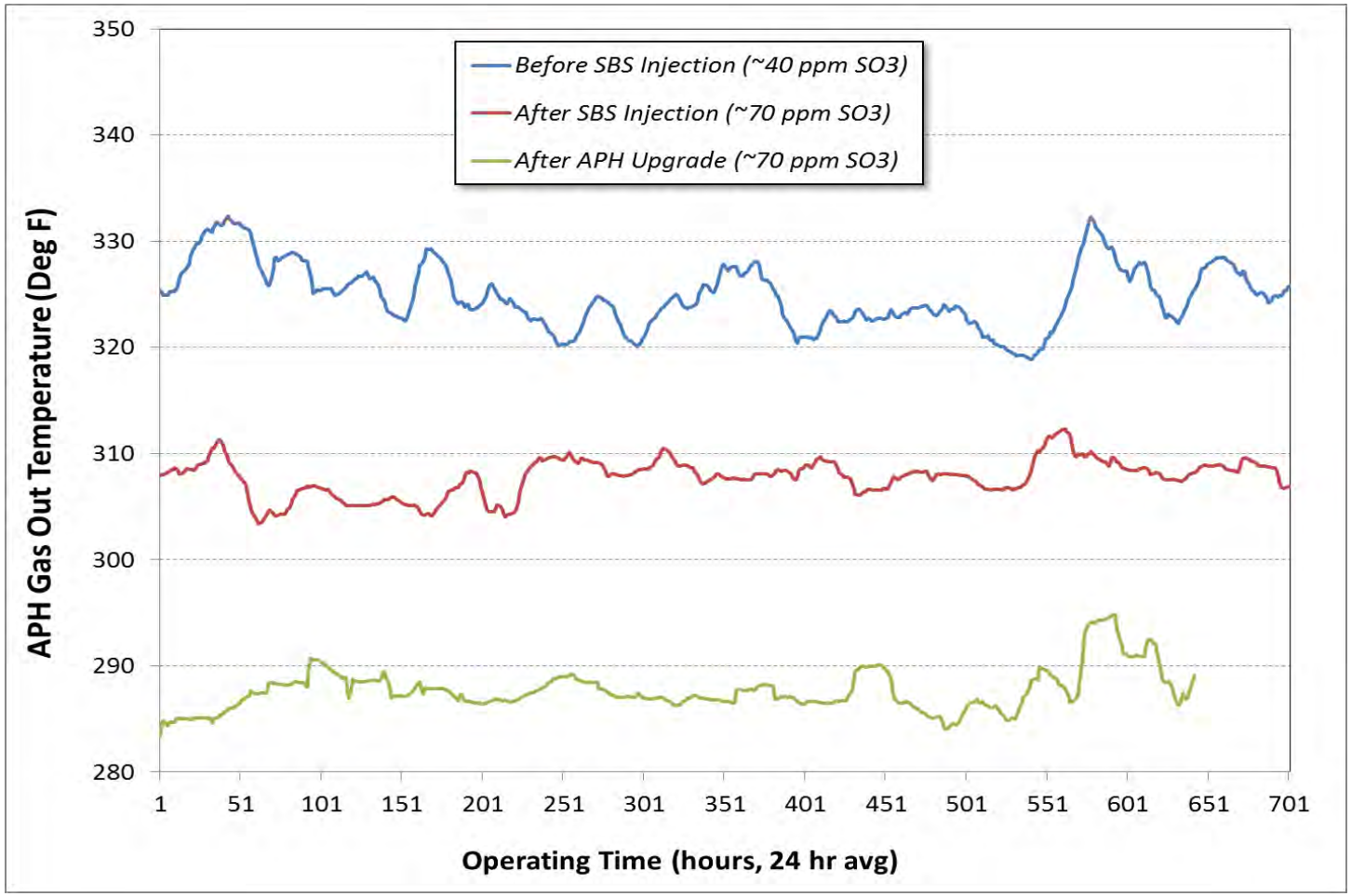
APH Temperature Changes



SO_3 Mitigation Allows Lower APH Op Temps

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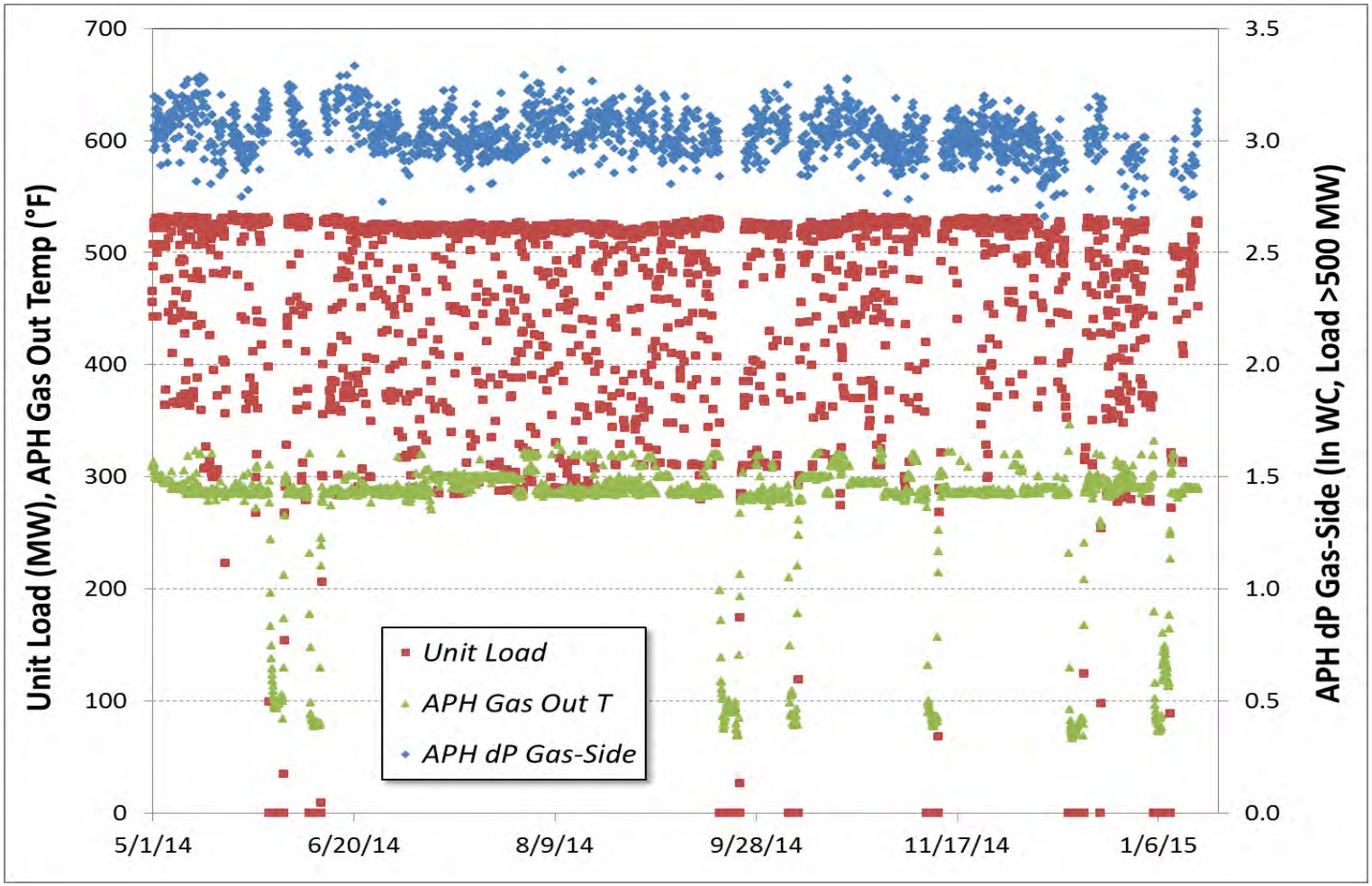
APH Upgrade Operating History



No APH dP Increase Over 8 Months Operation

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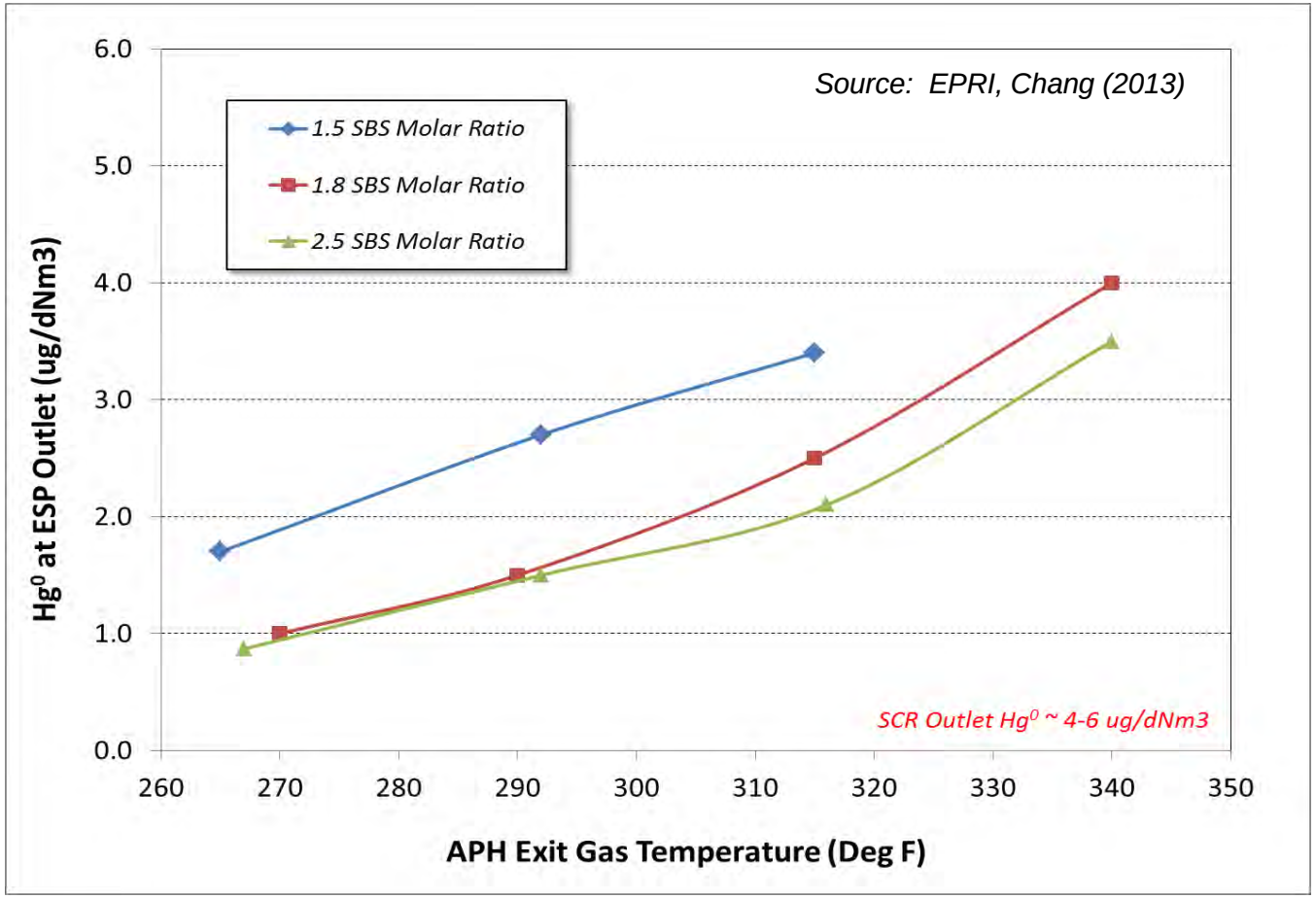
Impact on Mercury Capture



Lower APH Exit Temp = Lower Mercury Emissions

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Long-Term RGOT APH Demonstration

- Utility Drivers / Benefits
  - Heat Rate Improvement (O&M Savings)
  - CO_2 Reduction (Clean Power Plan)
  - Enhanced Mercury Capture (MATS)
  - Consider More Efficient APH Upgrade on 2nd Unit
- Approach
  - Conduct During Winter (lower ambient temp)
  - Reduce Fan/SAH Inlet Air Temp
  - Lower APH Gas Exit Temp Incrementally
    - From 285°F to ~ 250°F
  - Monitor Plant Operation & Performance
    - APH dp, Heat rate, Aux power, Opacity, Stack Hg

Anticipate Reporting Results in Summer 2015

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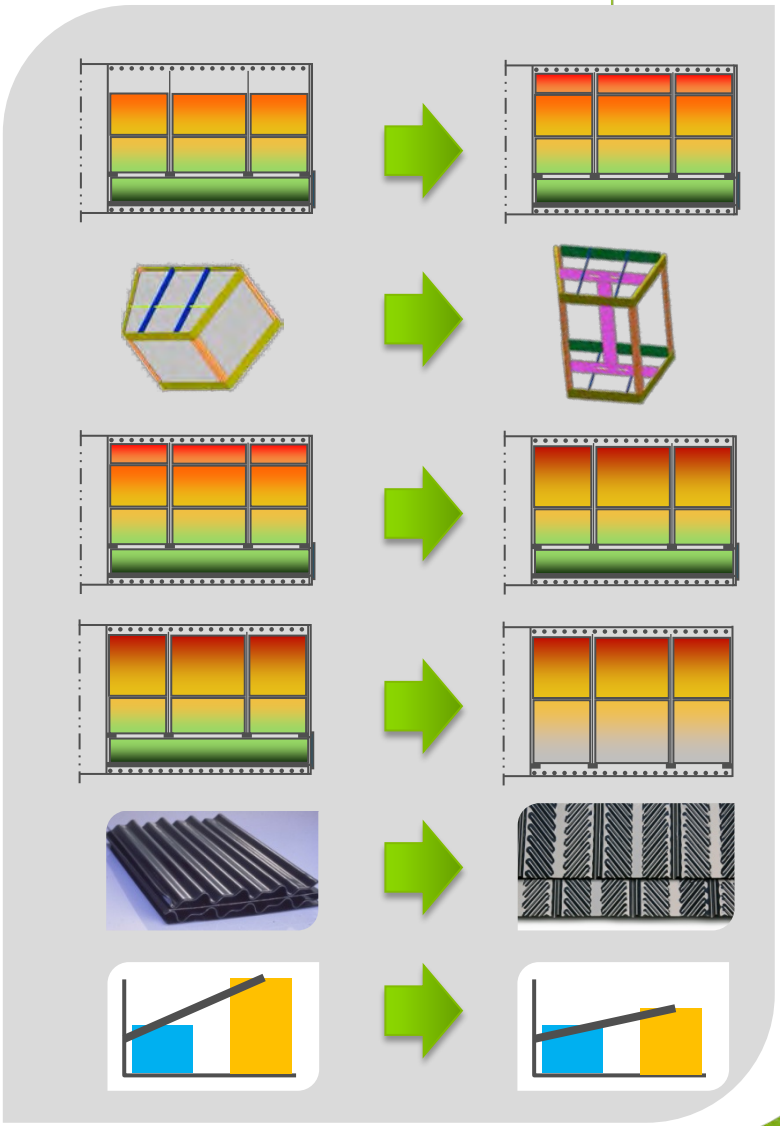
RGOT OPERATION
MEANS TO ACCOMPLISH

1. Fill empty voids in APH rotor with additional basket layers
2. Utilize special basket designs to maximize useable space for heat transfer surface
3. Consolidate shallow basket layers into single deeper layers
4. Modify APH rotor to more efficiently support basket layers
5. Switch to more efficient types of heat transfer surface
6. Reduce air preheater to air inlet of APH



Strategy: Other Co-Benefits

- Reduced CO_2 Emissions
  - higher unit energy efficiency
- Enhanced Mercury Capture
  - greater carbon absorption capacity
  - less SO_3 interference
- Enhanced ESP Performance
  - lower gas volumetric flow (higher SCA)
  - lower ash resistivity (temp and SO_3 effect)
- Reduced Fan Aux Power Consumption
  - reduced gas flow and gas path pressure drop
- Reduced WFGD Water Consumption
  - cooler inlet flue gas temp
- Reduced Unit Derates
  - higher PA temp and greater fan margin

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Thank You

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