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18th Annual

NO_x-Combustion-CCR Round Table

**NO_x Emissions, Combustion O&M,
Mercury, SO₃, Acid Gases, CCR**

*2019
Show Guide*

Smarter catalysts: two in one Better emissions compliance

Clean air is our business. The GTC-802 (NO_x/CO-VOC) “Dual Function” catalyst will help your plant meet stricter emission standards while improving performance and profitability. **GTC-802 combines two catalysts in one, delivering both superior NO_x reduction and outstanding CO and VOC oxidation.** Lowest pressure drop, near zero SO₂ oxidation and reduced ammonia slip add up to improved heat rate, increased power output and fewer cold-end maintenance issues. GTC-802 is positioned downstream of the ammonia injection grid in the same location as the current SCR catalyst. As an added benefit, the catalyst allows direct injection of liquid ammonia or urea in place of the traditional vaporized ammonia.



2019 NO_x-Combustion-CCR PCUG Conference

The 18th Annual NO_x-Combustion-CCR/PCUG Conference is presented by Reinhold Environmental (www.reinholdenvironmental.com)



Hosted by PacifiCorp



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Melissa Allen, Senior Mgr. Boilers & Envir.
Lindy Johnson, Senior Program Mgr. WWT
Matt Wilson, Pollution Control Engineer

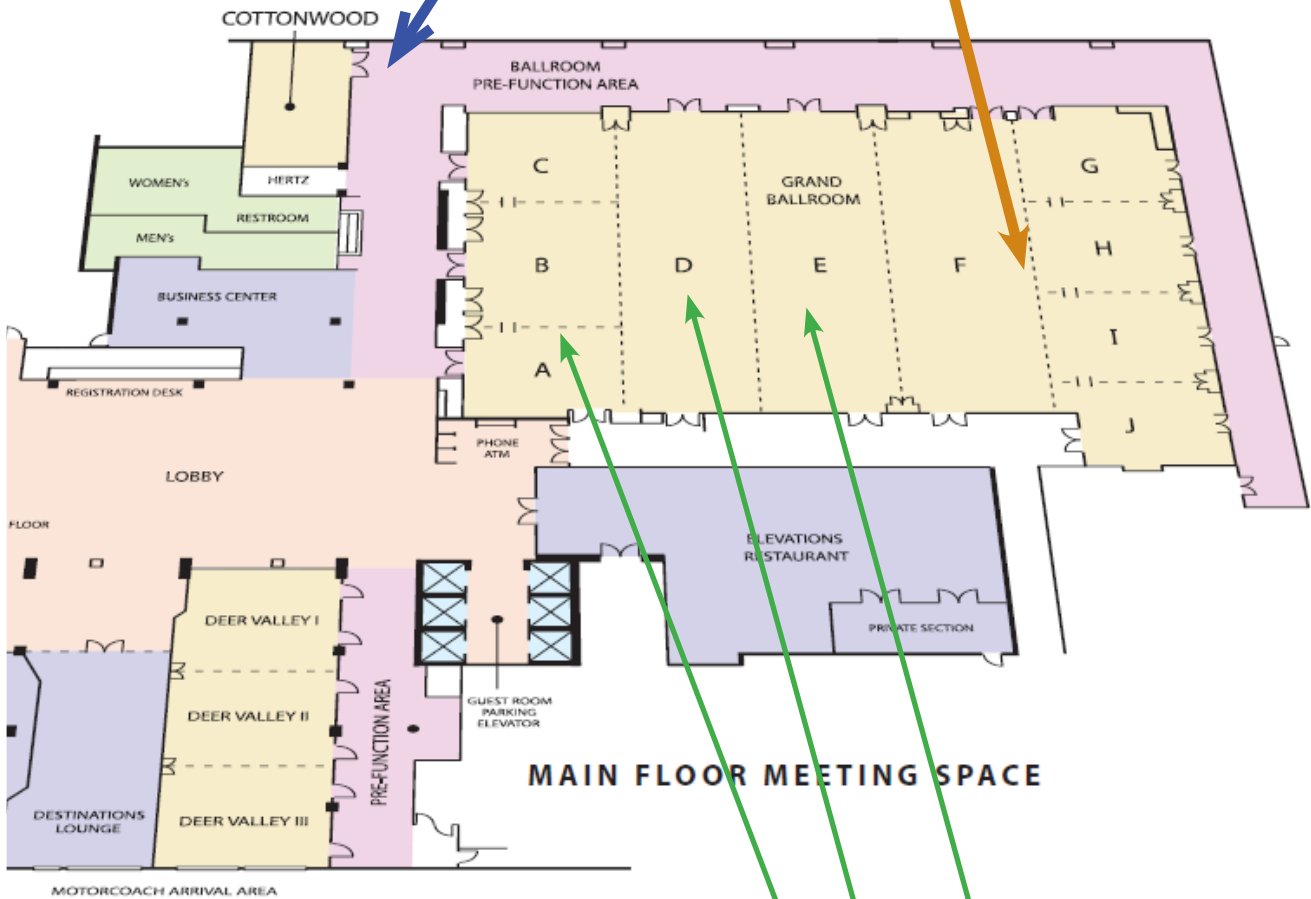


PCUG Website: www.pcug.info

Hotel Floor Plan

Registration Desk

Exhibition Hall



Round Table
Technical Sessions

2019 NO_x-Combustion-CCR Round Table

February 11-12, 2019; Marriott Salt Lake City Downtown City Creek Hotel

February 11, 2019 - Monday - NO_x-Combustion-CCR Round Table

Registration - Continental Breakfast & Breaks in expo from 7:00 am to 6:30 pm (Grand Ballroom F-J)				
8:00-9:00	Training Class 1 (Salon B-C)	Workshop 1 (Salon E)	Workshop 2 (Salon D)	Workshop 3 (Salon A)
	SCR O&M 101/201 by Ron Richard & Steve Wolsiffer, REC	SO _x and the SCR – How Sulfur Influences Catalyst Operation by Chris Bertole, Cormetech	Measuring Ammonia Slip for Process Control and Catalyst Management by John Arnold, MSI	Coal Boiler Issues Related to CCUS by Kevin Davis, REI
9:15-10:15	Training Class 2 (Salon B-C)	Workshop 4 (Salon E)	Workshop 5 (Salon D)	Workshop 6 (Salon A)
	Ammonia Injection and Mixing Systems (Coal & Gas) by Rob Mudry, Airflow Sciences	SCR Lessons Learned by APS by Bruce Salisbury, APS	Safety Best Practices & Lessons Learned by Doug Hartman, FirstEnergy & Darren Hanby, AEP	Heat Rate for the Clean Power Initiative by Tony Licata, Licata Energy & Env. Consultants; Jeffery Quick, Utah Geological Survey; Abe Kearl, PacifiCorp
Break in Exhibition Hall (Grand Ballroom F-J)				
11:00-12:00	Training Class 3 (Salon B-C)	Workshop 7 (Salon E)	Workshop 8 (Salon D)	Workshop 9 (Salon A)
	Catalyst Deactivation Mechanisms by Chris DiFrancesco, Cormetech	Update on Plant Crist/Gaston Limestone Addition for Arsenic Mitigation by Jason Bookout, Southern Company	Cost Effective DSI System Advancements for Future Plant Performance by Mark Thomas, Mark Thomas & Assoc.	Utilization of High Reactivity Hydrated Lime for Heat Rate and Operational Benefits by Cal Lockert, Mississippi Lime
Lunch in Exhibition Hall (Grand Ballroom F-J)				
General Session (Salon E)				
1:30-2:45	Welcome/Presentation of Round Table Award to John Brotherton (Duke Energy) and Blake Stapper (AECOM) by Susan Reinhold, Reinhold Environmental Keynote Speaker: Environmental Challenges and the Future of Fossil-Fueled Power by James Owen, Environmental Director - PacifiCorp			
3:00-4:00	Training Class 4 (Salon B-C)	Workshop 10 (Salon E)	Workshop 11 (Salon D)	Workshop 12 (Salon A)
	LNB Tuning 301 by Bruce Salisbury, APS	Coal - Hybrid Layer Catalyst Pitch Decisions to Balance Potential and Pluggage by Philip Elliott, Cormetech	Lessons Learned from Newly Commissioned Systems on Wet-to-Dry Ash Conversion Projects by Kevin McDonough, United Conveyor	Boiler Combustion Optimization to Reduce Superheat Tube Metal Temperatures and Creep by Richard Thompson, FERCo
Break in Exhibition Hall (Grand Ballroom F-J)				
4:30-5:30	Training Class 5 (Salon B-C)	Workshop 13 (Salon E)	Workshop 14 (Salon D)	Workshop 15 (Salon A)
	Combined Cycle Units SCR Retrofits by Larry Muzio, FERCo	SCR Catalyst Lab. Testing: Results of EPRI's Round Robin Study & Revised Lab. Testing Protocol by Scott Hinton, WS Hinton & Assoc.	CCR Impoundment Mapping/Modeling Results for Maximizing Beneficial Reuse by Steve Kosler, AECOM	Impact of Air In-Leakage on Combustion, Emissions and Cost of Unit Compliance & Operation by Patrick Fitzgerald, HTT
5:30-6:30 Reception for all attendees and families				

February 12, 2019 - Tuesday - NO_x-Combustion-CCR Round Table

Registration - Continental Breakfast & Breaks in expo from 7:30 am to 5:15 pm (Grand Ballroom F-J)				
8:30 - 9:30	Workshop 16 (Salon B-C)	Workshop 17 (Salon E)	Workshop 18 (Salon D)	Workshop 19 (Salon A)
	Mercury Control: 2018 Year in Review by Sharon Sjoström, ADA	NO _x Reduction IED and EPA Compliance by Lawrence Berg, RJM	Determining O&M Savings for AQCS Upgrades by Suzette Puski, Babcock Power	Combined Cycle - Multi-Pollutant Catalyst Performance and Experience by Matt Wilson, TVA
Break in Exhibition Hall (Grand Ballroom F-J)				
10:30 - 11:30	Workshop 20 (Salon B-C)	Workshop 21 (Salon E)	Workshop 22 (Salon D)	Workshop 23 (Salon A)
	Plant Retirements by Doug Hartman, First Energy	Maximizing the Value from Catalyst Sampling and Testing by Justin Brown, Innovative Combustion	A Chemical Combustion Catalyst Effect on Emission, Sediments and Fuel Efficiency by Leif Vevenstad, Johnsen Chemicals AS	Duke Energy Gas Co-Firing: The Why, the Where and the How by Brad Rudolph, Duke Energy
Lunch in Exhibition Hall (Continental Ballroom F-J)				
1:00-2:00	Workshop 24 (Salon B-C)	Panel I (Salon E)		Workshop 25 (Salon A)
	Advanced Sensing and Control by Marc Cremer, REI	DSI a Flexible Tool for SCR Turndown and Improved Plant Operations Chairman: Mark Thomas, Mark Thomas & Assoc. / Panelists: Rick Himes, EPRI; Chris Bertole, Cormetech; Mike O'Connor, Vistra		4½ Years Dual Function Catalyst Performance and Deactivation at Wolf Hollow by Henrik Andersen, Umicore
2:15-3:15	Workshop 26 (Salon B-C)	Workshop 27 (Salon E)	Workshop 28 (Salon D)	Workshop 29 (Salon A)
	Latest Developments for the Second Decadal Review for the Regional Haze Rule by Bob Paine, AECOM	Operational Benefits of Heavy Metals Capture with Hydrated Lime by Ian Saratovsky, Lhoist NA	Update from Zimmer Station on their Hydrated Lime Injection Upstream of the SCR for Low Load Operation by Mike O'Connor, Vistra Energy	CO Catalyst Performance on a 100% Bark-fired Boiler (<100MW) by Steve Feeney, Steve Feeney Consulting
Break in Exhibition Hall (Expo) - drawing of the Treasure Hunt Winners				
Panel II (Salon E)				
4:15 - 5:15	Catalyst Management / Load Cycling and Reserve Outages Chairman: John Brotherton, Duke Energy / Panelists: Scott Williams, Duke Energy; Ian Mylenbusch, Southern Company; Darren Hanby, AEP; Mike O'Connor, Vistra Energy			
6:00 - 10:00 Conference Event.....Dinner and Game Night / free to all attendees and their families				

Workshops and Panels

Monday: February 11, 2019

8:00 to 9:00 am

Training Class 1: “SCR O&M 101/201” by Ron Richard and Steve Wolsiffer, RE Consulting (Salon B-C)

If you will be operating or maintaining a SCR system for the first time, this class will highlight the important points that will help you be successful in meeting emission requirements, optimizing operational and maintenance costs, and achieving reasonable catalyst life.

Workshop 1: “SO_x and the SCR – How Sulfur Influences Catalyst Operation” by Chris Bertole, Cormetech, (Salon E)

The SCR catalyst in a coal-fired utility boiler application (1) reduces NO_x to N₂ using NH₃ as reductant and (2) oxidizes Hg for downstream capture in the wet scrubber. However, coal contains sulfur compounds; the resultant SO₂, SO₃, and H₂SO₄ concentrations in the flue gas must be taken into account in the design of the SCR catalyst, as well as in the design of its operating guidelines. This presentation will review these design considerations. Specific topic areas include:

1. Sulfur’s effect on DeNO_x activity at full load,
2. Sulfur’s influence on low load operating limits,
3. Catalytic SO₂ oxidation (steady state, transient) and how it’s affected by operating conditions, catalyst formulation, catalyst substrate geometry, and contaminants, and
4. The role that sulfur can play in catalyst deactivation mechanisms (bituminous and PRB).

Workshop 2: “Measuring Ammonia Slip for Process Control and Catalyst Management” by John Arnold, MSI (Salon D)

Ammonia slip is a problem for both coal fired boilers and gas fired combustion turbines with SCR and SNCR abatement systems for controlling NO_x emissions. Measuring ammonia slip accurately provides the following benefits:

1. Minimizes the use of ammonia;
2. Minimizes ammonia related operational issues;
3. Minimizes ammonia related maintenance issues;
4. Protects beneficial use of fly ash;
5. Provides data to determine catalyst condition and catalyst life.

The workshop discusses four topics: (1) Why measure ammonia slip; (2) What causes ammonia slip; (3) How is ammonia slip measured; (4) What does the data tell us and how do we analyze the data.

Workshop 3: “Coal Boiler Issues Related to CCUS” by Kevin Davis, REI (Salon A)

Recent efforts to advance the implementation of Carbon Capture, Utilization, and Storage (CCUS) have had mixed results; however, the Petra Nova plant opened in 2016 and was on schedule and on budget. Although the development of more CCUS projects has not occurred, extensions of the section 45Q tax credits earlier this year have increased interest. One possibility beginning to gain traction with utilities is oxy-coal combustion. This workshop will discuss some of the unique issues related to the combustion, heat transfer, steam cycle and emissions control associated with this technology.

9:15 to 10:15 am

Training Class 2: “Ammonia Injection and Mixing Systems (Coal & Gas)” by Rob Mudry, Airflow Sciences (Salon B-C)

This training class will provide an overview and detailed discussion of SCR ammonia injection system design options and issues encountered in the field for both coal and natural gas units. Topics will include AIG design, vaporized and direct liquid injection, the different types of static mixers, as well as the benefits of flow modeling and testing. The pros and cons of various ammonia injection and mixing approaches will be discussed. Attendees can opt to receive a free trial license of the CFD software Azore to try out ammonia modeling options for themselves.

Workshop 4: “SCR Lessons Learned” by Bruce Salisbury, APS (Salon E)

A presentation on the SCR Build at Four Corners, with lessons learned, and the accomplishments for the build.

Workshop 5: “Safety Best Practices & Lessons Learned” by Doug Hartman, FirstEnergy and Darren Hanby, AEP (Salon D)

This workshop will be an interactive session moderated by FirstEnergy and AEP. The discussion will focus on significant OSHA reportable and near miss events and the lessons learned from those events. Additional safety best practices will be incorporated into the discussion. Audience participation will strengthen the overall discussion.

Workshops and Panels

Monday: February 11, 2019 (cont.)

9:15 to 10:15 am (cont.)

Workshop 6: “Heat Rate for the Clean Power Initiative” by Tony Licata, *Licata Energy & Environmental*; Jeffrey Quick, *Utah Geological Survey*; Abe Kearl, *PacifiCorp* (Salon A)

In August of 2018 EPA proposed their “Affordable Clean Energy” rule (ACE). The intent of this proposed rule would be to require improvements in annual heat rates of coal fired units to reduce CO₂ emissions. In EPA’s proposal they requested comments on many open technical issues on how annual heat rates can be measured and how to implement improvements to unit heat rates. ASME’s Research Committee prepared responses to many of EPA’s request for information. This workshop will discuss the implications that the ACE rule would have on plant operations and ability to comply with the rule.

11:00 to 12:00 noon

Training Class 3: “Catalyst Deactivation Mechanism” by Chris DiFrancesco, *Cormetech* (Salon B-C)

Consideration of catalyst deactivation is a key component of catalyst lifecycle management for coal-fired SCR systems. Such management is important for maintaining emissions compliance while minimizing the cost of compliance. This workshop will review deactivation mechanisms, impact of coal properties and operating conditions on deactivation, mitigation techniques, and ability to address deactivation with catalyst regeneration.

Workshop 7: “Update on Plant Crist/Gaston Limestone Addition for Arsenic Mitigation” by Jason Bookout, *Southern Company* (Salon E)

This workshop updates the information on the Plant Crist/Gaston deactivation rates and longer term effects of limestone mitigation on a high arsenic/low calcium fuel and how this changes the overall catalyst management plan. Including new test data performed during the summer of 2018.

Workshop 8: “Cost Effective DSI System Advancements for Future Plant Performance” by Mark Thomas, *Mark Thomas & Associates* (Salon D)

DSI continues to demonstrate benefits beyond plume mitigation. Recent advancements improve DSI system performance, reliability and flexibility. Cost effective improvements can allow stations to achieve more balance of plant benefits.

Workshop 9: “Utilization of High Reactivity Hydrated Lime for Heat Rate and Operational Benefits” by Cal Lockert, *Mississippi Lime* (Salon A)

This workshop will focus on current industry experiences with High Reactivity Hydrated Lime injected ahead of the SCR. The session will include a theoretical portion to help plants predict potential benefits as well as a full-scale program portion comparing actual results with predicted expectations. The closing portion of the workshop will explore the impacts of SCR catalyst aging/replacement on condensable material present and sorbent usage requirements/control at various functional locations in the flue gas train.

LUNCH in Exhibition Hall (12:00 to 1:30 pm)

1:30 to 2:45 pm

Welcome: “Presentation of Round Table Lifetime Achievement Awards” by Susan Reinhold, *Reinhold Environmental* (Salon E)
The Round Table Awards will be given to John Brotherton, Duke Energy and Blake Stapper, AECOM.

Keynote: “Environmental Challenges and the Future of Fossil-Fueled Power.” by James Owen, *Environmental Director, PacifiCorp* (Salon E)

This presentation will include a discussion of the current and future environmentally-driven challenges and opportunities being faced by coal and gas power generation stations. It will include a high-level review of potential impacts of environmental regulations, climate goals, innovative legal tactics by environmental organizations, increasing renewable generation, and changing customer demands.

Workshops and Panels

Monday: February 19, 2018 (cont.)

3:00 to 4:00 pm

Training Class 4: “LNB Tuning 301” by Bruce Salisbury, APS (Salon B-C)

A Newbies’ guide to Low NOx Burners. What to do when it’s 2 in the morning and you are in charge.

Workshop 10: “Coal – Hybrid Layer Catalyst Pitch Decisions to Balance Potential and Pluggage” by Philip Elliott, Cormetech (Salon E)

Coal plant SCR operators have experienced varying amounts of ash pluggage on their catalyst layers depending on the location in the reactor. That can lead to a decrease in overall performance and physical damage to the catalyst. This workshop will discuss options for utility operators how a hybrid catalyst layer approach can permit for more utilization of catalyst surface area to reduce NOx.

Workshop 11: “Lessons Learned from Newly Commissioned Systems on Wet-to-Dry Ash Conversion Projects” by Kevin McDonough, United Conveyor (Salon D)

Over the past 8-10 years, many North American utilities have commissioned new technologies for Bottom Ash handling in an effort to convert traditional wet conveying systems to dry or closed-loop systems. With numerous new systems now in operation across a wide range of generating units and operating conditions, this presentation focuses on the lessons learned for these new technologies, particularly in the planning and training phases of system implementation.

Workshop 12: “Boiler Combustion Optimization to Reduce Superheat Tube Metal Temperatures and Creep” by Richard Thompson, FERCo (Salon A)

Many coal-fired utility boilers have experienced a major shift in duty cycle to more frequent load ramps, furnace exit gas and tube metal temperature excursions, and combustion related fireside problems. Even when operating at steady full-load, these problems include load derate, boiler tube failures, slagging/fouling, and water wall corrosion related to deep staging with overfire air (OFA) NOx controls. This presentation summarizes the results from a combustion optimization test program that reduced peak superheat tube metal temperatures by 15 to 27°F across the unit operating load range.

4:30 to 5:30 pm

Training Class 5: “Combined Cycle Units SCR Retrofits” by Larry Muzio, FERCo (Salon B-C)

This training class will review some of our recent experiences optimizing and dealing with performance issues with gas turbine combined cycle SCR systems. We will also review a unique retrofit using new dual function catalyst.

Workshop 13: “SCR Catalyst Laboratory Testing: Results of EPRI’s Round Robin Study & Revised Laboratory Testing Protocol” by Scott Hinton, WS Hinton & Associates (Salon E)

Results of the recent EPRI bench-scale SCR catalyst testing laboratory round-robin study will be presented, discussing the comparative performance of the laboratory fleet, testing concerns, and future work. EPRI’s updated SCR Catalyst Testing Protocol will also be discussed, with changes from previous versions highlighted. Critical aspects of catalyst testing, along with sources of testing errors and proposed future work, will be addressed.

Workshop 14: “CCR Impoundment Mapping/Modeling Results for Maximizing Beneficial Reuse” by Steve Kosler, AECOM (Salon D)

AECOM will present a case study to remove CCR materials from a 160-acre valley-fill ash pond along with conveyance and off-site beneficial reuse of the materials in cement production. Presenter will discuss the closure plan, permitting strategy, ponded material statistical analysis, geospatial modeling and excavation strategy performed to maximize beneficial use.

Workshop 15: “Impact of Air In-Leakage on Combustion, Emissions and Cost of Unit Compliance & Operation” by Patrick Fitzgerald, High Temperature Technologies (Salon A)

The impact of air in-leakage on boiler combustion and air pollution control equipment (APC) is well known, however the degree at which it impacts actual operating costs is less documented. Limiting excess air in the boiler improves combustion control and efficiency, reducing overall through-put and emissions. Limiting air in-leakage along the flue gas path enables better control over four

Workshops and Panels

Monday: February 11, 2019 (cont.)

4:30 to 5:30 pm (cont.)

Workshop 15: (cont.) gas characteristics (temperature, moisture, volume & velocity) that can have a significant impact on APC performance, cost of operation and sorbent consumption. This workshop will provide several case examples that demonstrate the measurable results several plants were able to achieve by implementing air in-leakage reduction projects.

****** RECEPTION in Exhibition Hall (5:30pm to 6:30 pm) ******

Tuesday: February 12, 2019

8:30 to 9:30 am

Workshop 16: “Mercury Control: 2018 Year in Review” by Sharon Sjostrom, ADA (Salon B-C)

During this workshop, a review of mercury controls in use by US plants will be provided, followed by an assessment of the efficacy of different control strategies as a function of both Hg control strategy and type of coal being combusted. The assessment is based on twelve-months of unit-specific operational data, associated control technology, and mercury emissions data reported by coal plants to EPA and the Energy Information Agency. Examples of technologies under development to meet more challenging operating conditions will also be discussed.

Workshop 17: “NOx Reduction IED and EPA Compliance” by Lawrence Berg, RJM (Salon E)

NOx regulations are briefly compared between Europe (IED) and US (EPA regs). In both cases, compliance is driven by economics. Two examples of compliance are provided. One in the US and one in Europe. A significant variable of coal type is also discussed.

Workshop 18: “Determining O&M Savings for AQCS Upgrades” by Suzette Puski, Babcock Power (Salon D)

Traditional Ammonia Injection Grids (AIG) often require a large number of adjustment valves and small diameter injection ports. Often tuning completed with one fuel at full load is not effective at reduced loads or other fuel blends. Utilizing static mixers upstream of ammonia injection is important to improve temperature, NOx and particulate distribution to ammonia injection. Utilizing static mixers with ammonia injection reduces the number of tuning valves and allows for large open injection lances. Optimizing SCR performance is important to reduce catalyst minimum operating temperature and low load operation, reduce ammonium bisulfate scaling, improve air heater efficiency, and increase catalyst and air heater basket life. Modeling can be completed to predict and guarantee performance across the operating load range. It is important to understand the return on investment and secondary benefits including reducing the catalyst minimum operating temperature and low load limits.

Workshop 19: “Combined Cycle – Multi-Pollutant Catalyst Performance and Experience” by Matt Wilson, TVA (Salon A)

We'll review the installation drivers, the up-to-date NOx/CO/VOC performance, and our experience / lessons-learned from the Fall 2018 installed CC multi-pollutant catalyst. Detailed results from new inlet and outlet multi-point sampling grid will be reviewed, along with observed pros, cons, and lessons learned from use of the sampling grids.

10:30 to 11:30 am

Workshop 20: “Plant Retirements” by Doug Hartman, FirstEnergy (Salon B-C)

This workshop will cover FirstEnergy's experience with the retirement of 10 coal fired generation plants. Specifically, the Safety, Security, and ongoing environmental compliance required at the retired plant sites will be addressed.

Workshop 21: “Maximizing the Value from Catalyst Sampling and Testing” by Justin Brown, Innovative Combustion Technologies (Salon E)

Regular bench-scale testing of SCR catalyst is a vital component of any catalyst management program; however, there are several simple things often overlooked to consider, from accurate baseline values and sample handling procedures, that can have a large impact on the quality of the testing data, and on the accuracy of the data analysis and projected deactivation trends. This workshop will highlight many of the main contributors to poor data quality and analysis associated with bench-scale catalyst testing and quantify the estimated impact on catalyst lifetime projections. Finally, the value and return on investment of a regular catalyst testing program will be demonstrated through several case studies.

Workshops and Panels

Tuesday: February 12, 2019 (cont.)

10:30 to 11:30 am (cont.)

Workshop 22: “A Chemical Combustion Catalyst Effect on Emission, Sediments and Fuel Efficiency” by *Leif Vebenstad, Johnsen Chemicals AS (Salon D)*

This workshop will describe how chemical combustion catalyst is able to reduce emissions, reduce building of sediments and improve fuel efficiency. We will also show results from full scale operations in Europe and Asia

Workshop 23: “Duke Energy Gas Co-Firing: The Why, The Where and The How” by *Brad Rudolph, Duke Energy (Salon A)*

Discussion of Duke Energy’s Dual Fuel / Gas co-firing program including program goals, project sites and project goals. Actual commissioning experiences will be shared from the Roger’s Energy Complex Cliffside Unit 5 and 6 projects.

LUNCH in Exhibition Hall (11:30 to 1:00 pm)

1:00 to 2:00 pm

Workshop 24: “Advanced Sensing and Control” by *Marc Cremer, REI (Salon B-C)*

Electrochemical noise-based corrosion monitoring technology has been demonstrated and applied to numerous combustion systems for generation of real-time data relating operating conditions to fireside waterwall corrosion, superheater corrosion, and air heater corrosion. Continuing efforts to miniaturize the probes and to provide real-time information on particulate deposition rates are focused on providing a high-spatial-resolution, multi-process monitoring system for use in advanced control systems for boiler condition management and combustion optimization.

Panel 1: “DSI a Flexible Tool for SCR Turndown and Improved Plant Operations” Panel Chairman: *Mark Thomas, Mark Thomas & Associates / Panelists: Rick Himes, EPRI; Mike O’Connor, Vistra; Chris Bertole, Cormetech; (Salon E)*

Low load SCR operations is a growing concern as stations are pushed to operate for extended periods below MOT. DSI can be an effective tool to increase SCR turndown while improving performance during these periods. Various options, benefits and concerns are discussed during this panel.

Workshop 25: “4½ Years Dual Function Catalyst Performance and Deactivation at Wolf Hollow” by *Henrik Andersen, Umicore (Salon A)*

This workshop will cover combined catalyst operating and experience gained after 4½ years.

2:15 to 3:15 pm

Workshop 26: “Latest Developments for the Second Decadal Review for the Regional Haze Rule” by *Bob Paine, AECOM (Salon B-C)*

Like the return of the locusts, the Regional Haze Rule is coming back for a “Second Decadal Review”! This time, no emission source is initially exempt, but the regulatory guidance for which facilities are subject to the dreaded 4-factor analysis is evolving. The latest developments will be presented in this workshop.

Workshop 27: “Operational Benefits of Heavy Metals Capture with Hydrated Lime” by *Ian Saratovsky, Lhoist (Salon E)*

The Effluent Limitation Guideline (ELG) regulates arsenic and selenium concentrations in aqueous effluent streams from power plants. Dry sorbent injection of hydrated lime ahead of wet flue gas desulfurization (wFGD) units can be effective at reducing gas-phase arsenic and selenium concentrations, prior to dilution in thousands of gallons of water that must be treated. This workshop will discuss gas-phase arsenic and selenium capture results from several combustion units, background and theory of capture, ultimate fate and leaching results, and available measurement techniques.

Workshops and Panels

Tuesday: February 12, 2019 (cont.)

2:15 to 3:15 pm (cont.)

Workshop 28: “Update from Zimmer Station on Their Hydrated Lime Injection Upstream of the SCR for Low Load Operation” by *Mike O’Connor, Vistra (Salon D)*

This workshop will discuss the improvements made to the Zimmer DSI injection system and how it has benefited the Station. Zimmer now has three injection locations and injection location is determined based on multiple operating parameters and market conditions

Workshop 29: “CO Catalyst Performance on a 100% Bark-fired Boiler (<100MW)” by *Steve Feeney, Steve Feeney Consulting (Salon A)*

The impact of operating performance on CO emissions will be reviewed, and how operations were monitored to ensure the very low CO limit was maintained across the the load range. There are some operational lessons-learned that might provide insights for potential CO catalyst usage on fossil units.

3:15 to 4:15 PM

Break and Treasure Hunt Drawing

4:15 to 5:15 pm

Panel II: “Catalyst Management / Load Cycling and Reserve Outages” *Panel Chairman: John Brotherton, Duke Energy / Panelists: Scott Williams, Duke Energy; Ian Mylenbusch, Southern Company; Darren Hanby, AEP; Mike O’Connor, Vistra Energy (Salon E)*

The panel will discuss impacts to SCR catalyst management planning, strategy, and execution due to changes in load profiles for coal and gas units. Experience gained operating units at lower loads and/or gas temperatures as well as impacts due to additional or extended shutdown periods will be topics for the panel. The panel will cover strategies employed and options available for compliance of NOx and other regulated emissions.

6:00 to 10:00 pm

Conference Event Dinner, Entertainment, Dinner and Game Night

(free to all attendees and their families)

Upcoming Conference

2019 REINHOLD/PCUG Conference

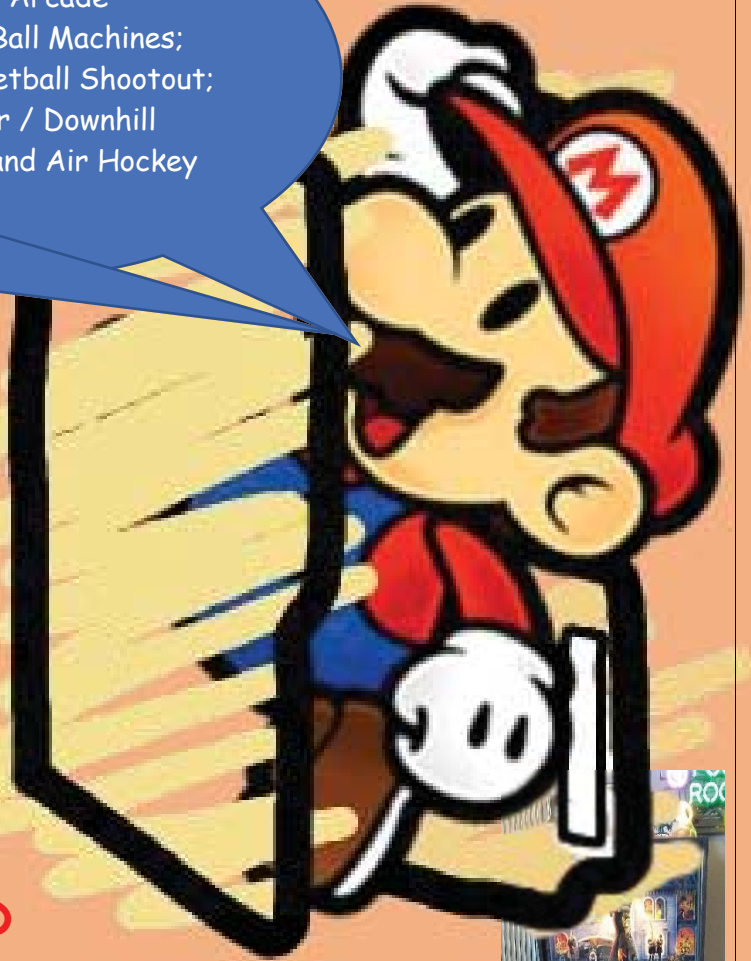
Hosted by the Southern Company

June 24-27, 2019

The Sheraton Birmingham Hotel, Birmingham, AL

Game Night
Tuesday
6PM UNTIL 10 PM

Games include: Arcade
Legends / Pin Ball Machines;
Foosball; Basketball Shootout;
Down Hill Skier / Downhill
Snowboarder and Air Hockey



Location: Salons A, B, C, D

Cash Bar opens at 6:00 pm

Dinner starting at 7:00 pm

Hamburgers, Hot Dogs, Chicken Strips and all the fixings
Chips, Popcorn, Crackers Jacks and
Ice Cream stand with Sundaes and Cones



2019 Salt Lake City Conference Event

Round Table Lifetime Achievement Awardees



**John Brotherton; Blake Stapper
Melissa Allen; Sharon Sjostrom
Randy Fields; Gary Tonnemacher
Doug Hartman; Dan Steinhaur
Darren Hanby; Nate White
Melanie McCoy; Per Ranstad;
Tony Engelmeyer; Connie Senior;
Scott Thomas; Robert Crynack; Paul Ford;
Michael O'Connor; Cindy Khalaf; Ron Richard;
John Walker; Gordon Maller; Steve Wolsiffer;
George Valentine; James Chaney; Nancy Stephenson;
Bruce Salisbury; Greg Betenson; Greg Bielawski;
Gerry Klemm; Hans Hartenstein;
Ed Healy; Russ Ridgeway; Robert Taylor;
Rick Collins; Rob Mudry;
Scott Williams; Tony Licata;
James Benes; Scott Hinton;
Michael Nelson; Jean Bustard;
John Lytle; Ralph Altman;
Rod Hansen; Chairman Tal Woo Lee**

Treasure Hunt!

Utility attendees - look for the treasure hunt card inside your name tag. Search the expo for the answers. Place your completed card in the box at the registration desk by 3:15 Tuesday afternoon. Drawing for prizes will be held in the expo hall at 3:30 pm.

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AirTek Construction

HTT ISOMEMBRANE

Mississippi Lime

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Babcock Power

Cormetech

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10 VISA Gift Cards will be awarded

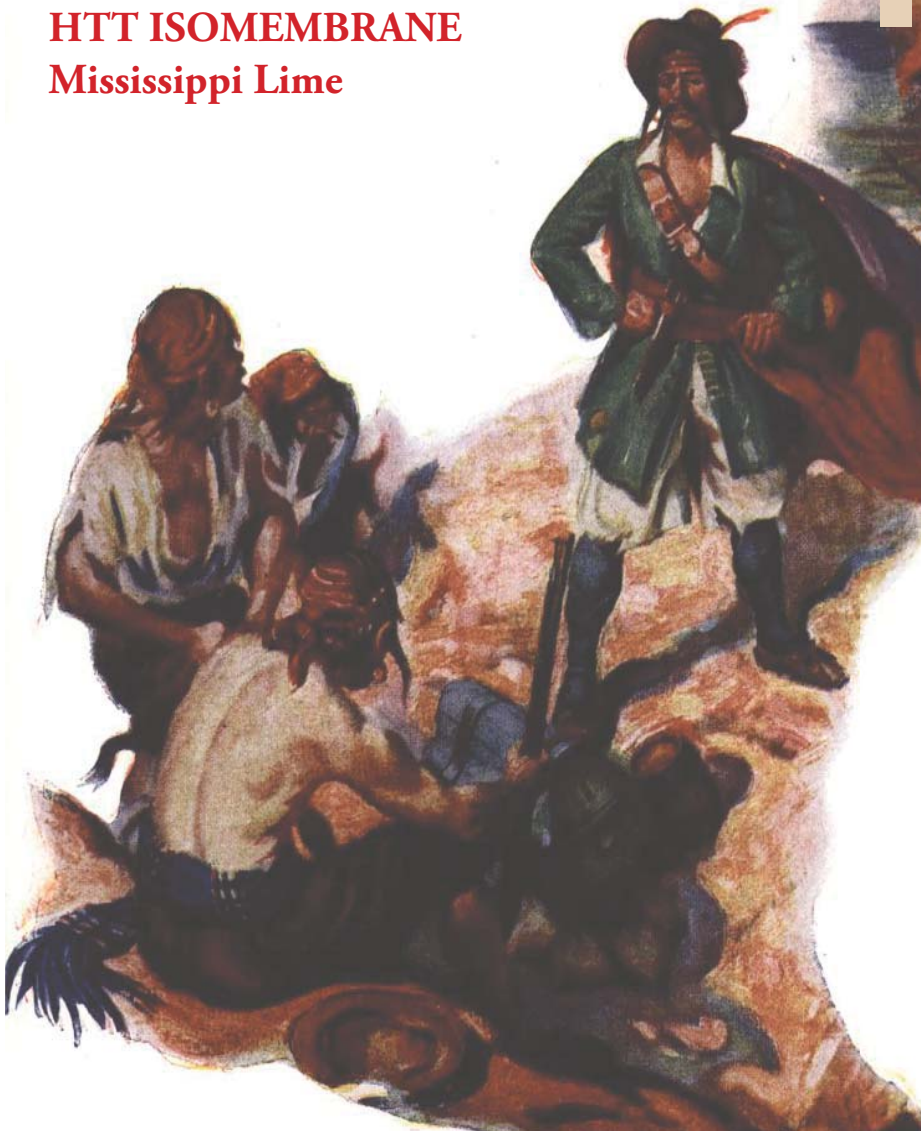
1@ \$500

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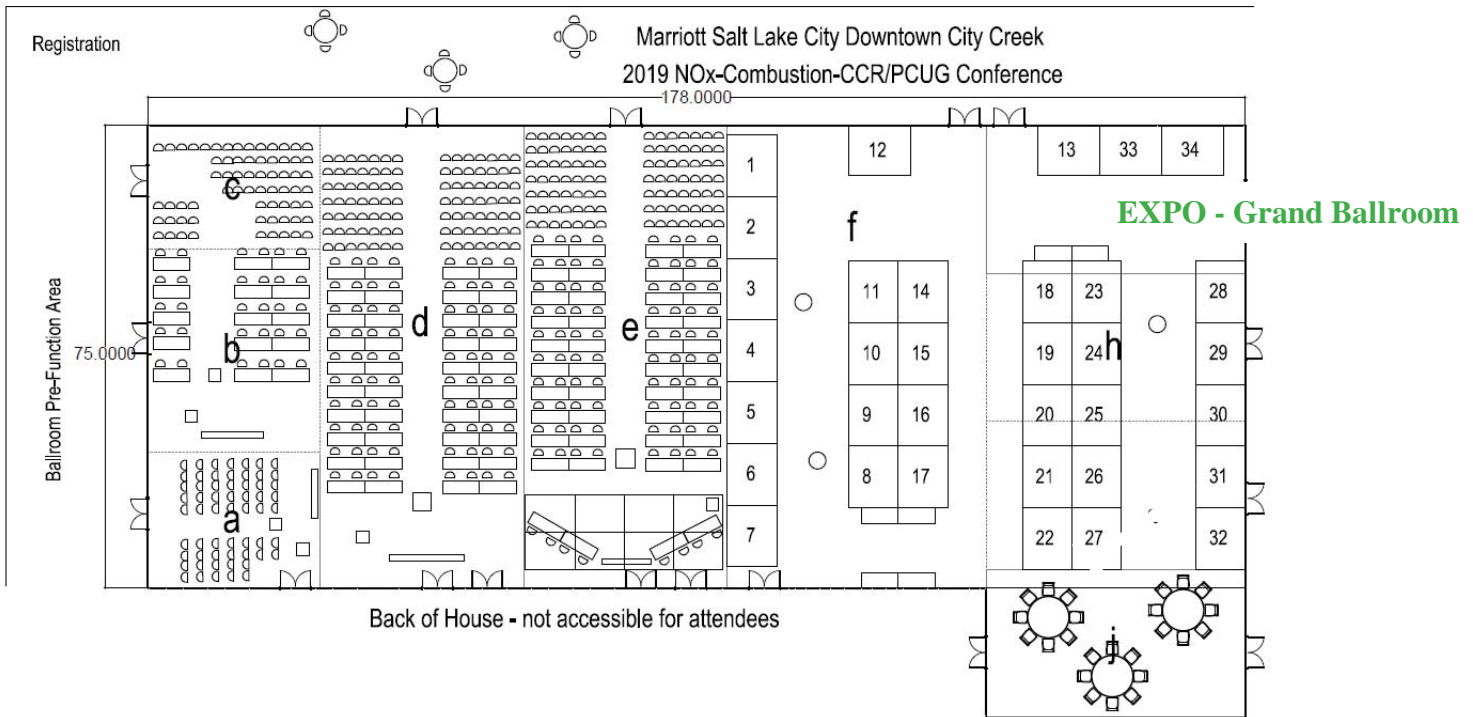
3@ \$200

4@ \$100

*Drawing to be held
Tuesday
at 3:30 pm in the Expo
Hall*



2019 NOx-Combustion-CCR Exhibitors



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Exhibition Hall

Grand Ballroom

Hours
Monday: 7:00am to 6:30pm
Tuesday: 7:30am to 4:15pm

ADA-ES, Inc.5
 640 Plaza Drive
 Highlands Ranch, CO 80129
 Scott Terhune, Vice President, Sales
 Scott.Terhune@adaes.com
 Business: 720.598.3510 / www.adaes.com



ADA-ES, Inc. (“ADA”) is a wholly-owned subsidiary of Advanced Emissions Solutions, Inc. (“ADES”) that provides emissions control solutions for coal-fired power generation and industrial boilers. With more than 25 years of experience developing advanced mercury control solutions, ADA delivers proprietary environmental technologies and specialty chemicals that enable coal-fueled boilers to meet emissions regulations. These solutions enhance existing air pollution control equipment, maximizing capacity and improving operating efficiencies. Our track record includes securing more than 30 US patents for emissions control technology and systems. For more information on ADA, and its products and services, visit www.adaes.com or the ADA Blog (<http://www.adaes.com/blog/>).

2019 NOx-Combustion-CCR Exhibitors

AECOM.....20
 9400 Amberglen Boulevard
 Austin, TX 78729
 Blake Stapper, PE
 Business Manager, Process Technologies
 blake.stapper@aecom.com
 Business: 512.419.6610 / www.aecom.com



AECOM is a fully integrated, Fortune 500 firm that connects knowledge and experience across our global network of experts to help clients solve their most complex challenges. From high-performance buildings and infrastructure, to resilient communities and environments, to stable and secure nations, our work is transformative, differentiated and vital. Process Technologies is an entrepreneurial, highly valued organization within AECOM that provides specialized process solutions for our customers. For more than four decades, we have helped clients in the Power sector successfully overcome regulatory and operational challenges through the development, implementation, and optimization of clean air, wastewater treatment, and solid waste management processes. Learn more at www.aecomprocesstechnologies.com.

Airflow Sciences Corporation.....13
 12190 HubbardLivonia, MI 48150
 Robert G. Mudry, P.E., President
 rmudry@airflowsciences.com
 Business: 734-525-0300 / www.airflowsciences.com



Experts in CFD, physical flow modeling, and field testing since 1975. Our modeling provides cost-effective designs for ducts, pulverizers, windboxes, SCRs, ESPs, baghouses, scrubbers, and stacks. Custom field test equipment ensures accurate and efficient measurement of flow, temperature, chemical species, and particulate. The combination of modeling, testing, and engineering expertise makes ASC the one-stop shop for all your flow-related needs.

AirTek Construction.....2
 P.O. Box 388, 700 Hudson St.
 Troy, AL 36081
 John Roberts, President
 jr@airtek-troy.com
 Business: 334-566-7400 / www.airtek-troy.com



Since 1988, AirTek has been a leading provider of services to air pollution control equipment users. We are also an ESP OEM. Our services include new ESPs, field service engineering, consulting services, construction management, maintenance, outage and repair services, new construction, major rebuilds and the supply of spare parts. We are an experienced provider of catalyst change outs, catalyst cleaning and general maintenance services to users of NOx removal systems having completed projects totaling over 10,000 MW to date. Let us put our experience to work for YOU!

Babcock Power.....10
 5 Neponset Street
 Worcester, MA 01606
 Jennifer Pasquariello, Dir. Mkt & Comm.
 jpasquariello@babcockpower.com
 Business: 860-607-3033 / www.babcockpower.com



Babcock Power Environmental Inc., along with its affiliate Riley Power Inc., provide fully integrated environmental solutions for utility power plants, waste-to-energy facilities, and large industrial applications. With more than forty years of experience in planning, designing, fabricating, constructing and commissioning environmental control systems, Babcock Power has developed into one of the market leaders in the field of environmental air pollution control technology.

Breen Energy Solutions.....9
 700 Bursca Drive #701
 Bridgeville, PA 15017
 Daniel T. Menniti,
 Sr. Director N. Am. Sales & Mkt
 dmenniti@breenes.com
 Business: 412-431-4499 / www.BreenES.com



Breen Energy Solutions is a fully integrated provider of technology, solutions and services for the Power and Industrial markets. Our offerings range from measuring and optimizing the control of acid gas (SO₂) dewpoint, Dry Sorbent Injection (DSI), Activated

Carbon injection (ACI), emissions control products. Breen also supplies solutions for long term DSI/ACI operation, optimization and compliance consulting. Ask us about our next generation hydrate optimization and compliance assurance consulting services. Our products and technologies help our customers to walk the fine line between economic viability and regulatory compliance.

Cemtek KVB-Enertec.....24
 3041 South Orange Avenue
 Santa Ana, CA 92707
 Gary Cacciatore Midwest Regional Sales Mgr.
 gcacciatore@cemteks.com
 Business: 714-437-7100 / www.cemteks.com



Cemtek KVB-Enertec is a division of the Cemtek Group. Cemtek founders are recognized pioneers in the development and design of Continuous Emissions Monitoring Systems (CEMS) for compliance, combustion optimization and process efficiency. We have over 40 years of experience in the CEMS industry. Cemtek KVB-Enertec is a full service CEMS company. We have offices in California, Pennsylvania and New Jersey and a combined production space of 40,000 square feet. With a field technician network across the United States, we are ready to serve all industrial and utility plants. Cemtek KVB-Enertec is an organization dedicated to forward thinking solutions for today's environmental compliance challenges and continual process efficiency improvements. Our mission is to design, engineer, construct and deliver the best possible system for each individual application utilizing quality materials and proven engineering principles to meet the goal of both Cemtek and those of our customers.

CERAM.....12
 7304 W. 130th St., Suite 140
 Overland Park, KS 66213
 John Cochran, President
 info@ceram-usa.com
 Business: 913-239-9896 / www.ceram-ibiden.com



CERAM manufactures honeycomb and plate type SCR catalysts and provides comprehensive SCR system services. We have delivered SCR catalysts for more than 2,000 SCR systems worldwide. Our experience portfolio includes coal, gas, oil, biomass, cement, MSW/RDF, petroleum refineries, diesel engines, and other unusual fuel/application types. SCR system services include catalyst testing, reactor inspections, operations assessments, AIG tunings, low load studies, and catalyst management planning utilizing the proprietary Manage CATLife® model. This model is adaptable for all catalyst types, geometries and compositions. The model is also flexible to evaluate both regenerated and new catalysts over multiple operating scenarios, fuels changes, and emissions targets.

CORMETECH.....18-19
 11707 Steele Creek Road
 Charlotte, NC 28273
 Philip Elliott
 Vice President – Business Development
 p.elliott@cormetech.com
 Business: 704-827-8933 / www.cormetech.com



CORMETECH is a leader in providing environmental services solutions used to reduce emissions from coal and gas-fired power generation, chemical process industries, petroleum refineries, and diesel engines. It manufactures new SCR catalyst (e.g. COMET™, DUST BUSTER™), provides SCR catalyst regeneration and full life-cycle catalyst management services. Additional products and services include engineering, design and supply services for SCRs, SNCRs, and ammonia systems. CORMETECH has delivered environmental catalyst solutions to more than 1,600 SCR systems totaling over 156 GW of worldwide generating capacity. The company is co-owned by Energy Capital Partners and STEAG Energy Services GmbH.

Environmental Energy Services.....16
 5 Turnberry Lane
 Sandy Hook, CT 06482
 Mark Keffer, VP Sales
 mkeffer@eescorp.com
 Business: 203-270-0337
 www.eescorp.com



EES offers innovative chemistry for fuel flexibility and environmental compliance strategy. KLeeNscrub® mercury precipitant for total Hg remediation. KLeeNwater™

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for ELG and ZLD. CoalTreat® for improved thermal performance and reliability of coal fired boilers. STEP combustion for gas conversions, burner tuning, SNCR and SCR catalyst tuning and management.

Fossil Energy Research Corporation.....23

23342-C South Pointe
Laguna Hills, CA 92653
Richard Thompson, President
rthompson@ferco.com
Business: 949-859-4466 /www.ferco.com



FERCo is an engineering services and R&D company specializing in combustion and emission control. FERCo has over 30 years of experience in combustion, SCR and SNCR optimization in the utility industry. SCR optimization tools developed for coal-fired systems are now being applied to gas turbine SCR systems. FERCo also specializes in the development of advanced measurement systems for the utility industry, such as CatalysTrak®, a system to measure and monitor catalyst activity in situ (e.g., without requiring an outage to remove catalyst samples). FERCo also provides laboratory catalyst testing services with both bench- and micro-scale reactors.

FuelTech, Inc.....34

27601 Bella Vista Parkway
Warrenville, IL 60555
Kevin Dougherty,
VP Business Development & Marketing
info@ftek.com
Business: 630-845-4500
www.ftek.com



APC technologies include low NOX combustion systems, ESP upgrades, NOXOUT® and HERT™ SNCR systems, Advanced SCR systems, ULTRA® ammonia generation process, and TIFI® programs to improve boiler efficiency while reducing slagging, corrosion, SO₃, and GHG emissions. Water treatment technologies include DGI™ Dissolved Gas Infusion Systems using Oxygenation and a patented nozzle for cost effective approach over conventional utility and industrial aeration, and REDOX chemical additives for effective control of mercury emissions for wet FGD scrubbers.

Howden.....33

2475 George Urban Blvd
Depew, NY 14043
Jesper Osterlund, Sales Director
hnasales@howden.com
Business: 716-817-6900 / www.howden.com



Howden is a world-class engineering company with a proud heritage and a desire to be the world's leading application engineering company providing solutions for you in air and gas handling. With 6,000 employees in 27 countries we are undergoing a period of significant business growth. Howden provides high quality air and gas handling products and services to the power, oil & gas, mining and petrochemical industries - just to name a few. Our core focus is on providing quality solutions for air and gas handling, and with over a century of experience in doing so, it's no wonder that we are renowned for such projects across multiple sectors.

HTT ISOMEMBRANE.....3

4324 Barringer Drive, Ste 106
Charlotte, NC 28217
Patrick Fitzgerald, Air In Leakage Reduction Mgr.
patrick@isomembrane.com
Business: 704.375.2111 / www.isomembrane.com



2018 marked our 25th Anniversary in helping coal-fired plants measurably reduce emissions, operating costs, and improve plant safety and efficiency. With well over 2,500 installations, ISOMEMBRANE® has a demonstrated track-record of solving air in-leakage issues - from the boiler to the stack - with greater reliability, lower cost and faster install times than traditional options. ISOMEMBRANE® is a maintenance-free alternative to refractory and weld repairs in dead air space applications, and a more cost-effective option to expansion joint replacement (online repairs are an option in many applications). ISOMEMBRANE® is an effective tool to resolve air in-leakage, significantly enhancing APC equipment performance, and reducing sorbent costs & parasitic power consumption.

Innovative Combustion Technologies.....21

10 Commerce Drive
Pelham, AL 35124
Marc Harton, SCR Lab Manager
mharton@innovativecombustion.com
Business: 205-453-0236 / www.innovativecombustion.com



Innovative Combustion Technologies (ICT) provides technical, consulting, and field testing services worldwide to troubleshoot/optimize combustion and pollution control system performance. ICT's products and services include: (1) SCR catalyst management services through the operation of the USA's only independent third-party bench-scale SCR catalyst testing lab. (2) Dynamic classifiers, pulverizers, and technical services for solid fuel firing installations as the NA sales agent for Loesche Energy Systems. (3) SCR-AIG tuning and EPA method testing/stack testing as a certified AETB. (4) Engineered solutions, equipment, and CFD/numeric mesh modelling to solve challenges associated with airflow measurement, fuel/air distribution, and pulverizer/boiler performance. (5) MillPro systems as an alternative to steam inerting to inhibit coal pulverizer fires and explosions.

Integrated Global Services, Inc.....1

7600 Whitepine Rd.
Richmond, VA 23237
Mark Buzanowski,
Senior Product Manager - LPA Filtration
Mark.Buzanowski@integratedglobal.com
Business: 804-794-1646 / www.integratedglobal.com



Industry leading NoNOx Components offer high temperature erosion resistant LPA/Popcorn Ash filtration systems for protection against catalyst plugging. NoNOx supports utilities and OEM's in the design and manufacture of components for effective filtration over long service intervals, while minimizing system pressure drop. The NoNOx patented screens have been successfully installed in over 60 SCRs across the USA

Johnson Matthey Stationary Emissions Control LLC.....4

1121 Alderman Drive, Suite 204
Alpharetta, GA 30005
Ken Jeffers, Sales Manager
kenneth.jeffers@jmusa.com
Business: 770-313-3022 / www.matthey.com



Johnson Matthey manufactures plate and honeycomb SCR catalyst and CO catalyst for many applications including coal fired power plants and gas turbines. We have extensive world-wide experience including over 50 coal-fired utility boiler installations in the U.S. alone. Johnson Matthey has installed over 100,000 m³ of plate-type SCR catalyst in U.S. coal-fired applications. Plate catalyst is recognized for its resistance to fly ash plugging, low SO₂/SO₃ conversion, low pressure loss and mechanical robustness. Johnson Matthey is a 200-year old specialty chemicals company focused on its core skills in catalysts, precious metals, fine chemicals and process technologies. Our \$15 billion company has been providing catalytic solutions for air quality problems for more than 30 years.

Lhoist North America.....29

5600 Clearfork Main Street,
Fort Worth, Texas 76107
Ian Saratovsky, Director - Flue Gas Treatment Solutions
Ian.Saratovsky@lhoist.com
Business: 917-541-0723 / www.Sorbacal.com



Lhoist North America is a leading supplier of high quality calcium based products, including Sorbacal® engineered hydrated lime sorbents for flue gas treatment. Sorbacal® SP is a highly reactive hydrated lime sorbent for acid gas, arsenic, and selenium abatement. Sorbacal® SPS is chemically activated to provide further improved performance while improving electrical resistivity, making it more compatible with ESPs. Lhoist also offers blended activated carbon (PAC) - hydrated lime sorbents for simultaneous capture of Hg and acid gases with a single sorbent. Lhoist can provide injection equipment, acid gas and/or mercury measurement equipment, data analysis, and application experts to identify and implement an optimized DSI solution.

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Mississippi Lime.....8

3870 S. Lindbergh Blvd. Suite 200
St. Louis, MO 63127
Curt Biehn, Dir. of Marketing & Tech. Services
crbiehn@mississippilime.com
Business: 314.543.6309 / www.mississippilime.com



Mississippi Lime is a leading supplier of hydrated lime for Dry Sorbent Injection applications. Through the years, our company has supported the DSI industry through high-quality product, sponsorship of test programs, technical service, and research and development. Mississippi Lime's High Reactivity Hydrated Lime and HRH-64 are enhanced hydrated limes that offers improved utilization, lower emissions, and operational improvements. The high-performing, rapid-reacting HR Hydrate has proven benefits to Utilities with pre-APH and pre-SCR injection applications. We also offer high-purity quicklime for Spray Dry Absorbers and Circulating Dry Scrubbers. Mississippi Lime production facilities are located in Ste. Genevieve MO, Vicksburg MS, Verona KY, Weirton WV, Chester SC, and Mobile AL.

Mitsubishi Hitachi Power Systems.....15

Basking Ridge, NJ
Kyle Neidig, Product Mgr., SCR Systems & Catalyst
kyle.neidig@mhpsystems.com
Business: 330-201-5459 / www.mhpsa.com



Headquartered in Lake Mary, FL, MHPS Americas employs more than 2,000 people who design, build, install, monitor and service aero-derivative and heavy-duty natural gas turbines, steam turbines, generators, battery storage products and environmental control systems throughout North and South America. MHPS Americas collaborates with customers to deploy artificial intelligence and low carbon technologies to take the cost and carbon out of the electric power value chain. MHPS Americas is a subsidiary of Mitsubishi Hitachi Power Systems, a joint venture between Mitsubishi Heavy Industries, Ltd. and Hitachi, Ltd. PWPS and MD&A are wholly owned subsidiaries of MHPS Americas. Learn more about MHPS by visiting www.changeinpower.com.

MSI.....22

480 Progress Way
Sun Prairie, WI 53590
Chuck Arnold
chucka@msicems.com
Business: 608-825-2055 / www.msicems.com



MSI is a leading integrator of CEMS for SO₂, NO_x, CO, PM, Hg, VOC, NH₃, Flow & Opacity using industry proven instrumentation and our unique system design. For particulate emission monitoring, we feature our BetaGuard PM, the first U.S. EPA approved compliance particulate monitor on a power plant stack. Systems are designed for ease of use and low cost of ownership.

RE Consulting.....6-7

3850 Bordeaux Drive
Northbrook, IL 60062
Gary D. Reinhold, President
gary.reinhold@reconsulting.info
Business: 847-477-8540 / www.reconsulting.info



RE Consulting is a division of Reinhold Environmental Ltd., a corporation which continues to provide numerous O&M services to the coal-burning utility industry since 1993. Using its team of industry experts, RE Consulting's current focus is to provide engineering studies, on-site training, and O&M based troubleshooting and consulting.

ReNOx.....17

250 East 5th Street, Suite 1500
Cincinnati, OH 45202
Peter Harrison
VP of Bus. Dev. & Marketing
P.Harrison@ReNOx-us.com / Business: 513-562-1818
www.ReNOx-us.com



ReNOx Inc. in partnership with Laborelec ENGIE, a global independent laboratory and energy service provider for the past 55 years, has begun operations in North America. Our 25 years' experience in expert environmental services using DeNOx technologies has already led Laborelec ENGIE to be the largest independent SCR

specialist in the world. With our custom new options for DeNOx catalyst from multiple sources around the world, couple with comprehensive in-house testing capability, reactor inspection and in-situ high-performance cleaning ReNOx is now in the unique position of being the go-to independent partner for integrated SCR management services

SAS Global Corp.....14

21601 Mullin Avenue
Warren, MI 48089
Thomas Mahfet, V.P. Of Sales and Marketing.
tmahfet@sasglobalcorp.com
Business: 248-414-4470 / www.sasglobalcorp.com



Keep your Plant MATS and HAPs compliant with the SAS Global Combustion Diagnostic Testing and Tuning Group. Regain lost generation capacity and lower emissions thru the installation of the SAS Patented Components that will increase pulverizer performance, balance fuel pipes, correct air/fuel ratios, improve burner combustion, and lower fuel consumption. SAS Global also provides a turnkey solution for all of your coal handling and processing needs from the fuel unloaders to the pulverizers and lastly to the burners.

Umicore Catalyst USA, LLC.....28

17625 El Camino Real, Suite # 210
Houston, TX 77058
Henrik T Andersen, Sales Manager | Power Generation
Henrik.Andersen@am.umicore.com
Business: 281-684-8812 / www.umicore.com



Umicore Catalyst USA, LLC (Umicore) is recognized as the world leader in the development and supply of catalyst and technology for air pollution control with a global presence encompassing five with over 1,800 worldwide references. With manufacturing facilities in Pasadena, TX, Umicore services the petro-chemical, refinery, and power generation with stationary emissions control technology solutions. Umicore's air pollution technologies, including Selective Catalytic Reduction (SCR) catalyst for the control of nitrogen oxides (NO_x), the reduction of Carbon Monoxide (CO) and VOC's, provides energy efficient and reliable solutions for the reduction of air emissions including a multiple function catalyst. Umicore's catalysts are highly efficient reducing CO, VOC's and Nitrogen Oxide at levels greater than 95% at an almost zero ammonia slip. Umicore has proven, over the 20 years, to be the supplier of choice when it comes to advanced products for environmental catalytic systems.

United Conveyor Corporation.....11

2100 Norman Drive W
Waukegan, IL 60085
Jon Norman
jonnorman@unitedconveyor.com
Business: 847-473-5900 / www.unitedconveyor.com



United Conveyor Corporation is a global leader in material handling and multi-pollutant emissions control systems for the power generation industry. Our in-depth knowledge of regulatory compliance and expertise in material behavior, product innovation and system development provides customers with comprehensive, cost-effective solutions specific to their individualized and complex plant needs.

Zhejiang TUNA Environmental Science & Technology Co.....25

The South of Sanjiang Road,
Paojiang New District,
Shaoxing, Zhejiang 312000 China
overseas@zj-tuna.com
Business: +86-571-56231004
www.zj-tuna.com



TUNA, a National High-tech enterprise provides EPC service of FGD, SCR DeNO_x, and ESP systems, is listed in Shanghai main board with annual turnover of 120 mil USD. As a major SCR catalyst supplier in China, TUNA has delivered more than 70,000m³ catalyst so far, including 2,500m³ exported in the year of 2017. Our vision is to be a reliable global SCR catalyst supplier by 2022.

Imagine it. Delivered.

AECOM is a fully integrated multi-disciplinary firm. We are built to deliver cost-competitive, reliable solutions for environmental regulatory compliance, including those specific to NOx and CCR.

For more than forty years, AECOM's Process Technologies group has helped clients overcome regulatory and operational challenges. We develop, implement and optimize clean air and water treatment technologies, and deliver turnkey solutions for coal combustion product management with a focus on beneficial use.

Visit our website for more information on our products and services.

www.aecomprocesstechnologies.com

Blake Stapper, P.E.
blake.stapper@aecom.com
T. 512.419.6610

2019-20 Upcoming Conferences



Presented by
**Reinhold
Environmental**

2020 REINHOLD/ PCUG Conference

Hosted by LG&E-KU

**June 22, 2020
Marriott Griffin Gate
Resort & Spa
Lexington, KY**

2019 REINHOLD/ PCUG Conference

Hosted by Southern Company

**June 24-27, 2019
Sheraton Birmingham Hotel
Birmingham, AL**



www.reinholdenvironmental.com

Exhibitor info: sreinhold@reinholdenvironmental.com

Registration info: virginia.plaster@reinholdenvironmental.com