

# **Power Plant Pollutant and Effluent Control MEGA Symposium (MEGA 2018)**

Best Practices and Future Trends

Baltimore, Maryland, USA  
21 - 23 August 2018

ISBN: 978-1-5108-7263-9

**Printed from e-media with permission by:**

Curran Associates, Inc.  
57 Morehouse Lane  
Red Hook, NY 12571



**Some format issues inherent in the e-media version may also appear in this print version.**

The information and opinions expressed in these papers/presentations are solely of the authors and should not be considered as having the endorsement or support of the Association.

Compilation Copyright © (2018) by Air & Waste Management Association.  
Copyright of the individual papers are retained by the authors.

Additional copies of these and other A&WMA conference proceedings will be available through the A&WMA Online Store. To place an order, please visit the Online Store at [www.awma.org](http://www.awma.org) or contact the A&WMA Publications Order Department at [onlinestore@awma.org](mailto:onlinestore@awma.org), +1-412-232-3444 (phone) or +1-412-232-3450 (fax).

Printed by Curran Associates, Inc. (2018)

For permission requests, please contact Air and Waste Management Association at the address below.

Air and Waste Management Association  
One Gateway Center, 3rd Floor  
420 Fort Duquesne Blvd.  
Pittsburgh, Pennsylvania 15222-1435  
USA

Phone: +1-800-270-3444  
+1-412-232-3444  
Fax: +1-412-232-3450

[info@awma.org](mailto:info@awma.org)

**Additional copies of this publication are available from:**

Curran Associates, Inc.  
57 Morehouse Lane  
Red Hook, NY 12571 USA  
Phone: 845-758-0400  
Fax: 845-758-2633  
Email: [curran@proceedings.com](mailto:curran@proceedings.com)  
Web: [www.proceedings.com](http://www.proceedings.com)

# FINAL PROGRAM

## TECHNICAL PROGRAM – Tuesday, August 21

<b>Registration</b> 7:00 am - 5:00 pm Third Floor	<b>Continental Breakfast</b> 7:00 am - 8:00 am Grand Ballroom Foyer West	<b>Presenters' Meeting</b> 7:00 am - 8:00 am Grand Ballroom I - IV	<b>Exhibition Hours</b> 4:00 pm - 6:00 pm Grand Ballroom, Salons VI-X
---	--	--	---

**8:00 am - 10:00 am**

### Opening Keynote Session 1

Grand Ballroom V

**Moderator:** Michele Gehring, Coterie Environmental, LLC, and A&WMA President-elect

**Speakers include:**

- Steven Winberg, Assistant Secretary of Fossil Energy, US Department of Energy
- Mandy Gunasekara, Principal Deputy Assistant Administrator for the Office of Air and Radiation, US EPA
- Sharon Sjostrom, Vice President, ADA-ES Inc. and President of the Institute of Clean Air Companies

**10:00 am - 10:20 am**

### Networking break

Grand Ballroom Foyer West

**10:20 am – 11:45 am**

### Panel: The Transformation of the Power Industry and the Role of Energy Storage 6

Grand Ballroom V

**Session Chair:** John Litynski, DOE

**Panelists include:**

- Matt Moore, Executive Director of Portfolio Strategy, ACES
- Steve Baxley, Manager- Renewables, Storage, and Distributed Generation, Southern Company
- Deck S. Slone, Senior Vice President of Strategy & Public Policy, Arch Coal, Inc.
- Peter Balash, Senior Economist, DOE National Energy Technology Laboratory

**11:45 am – 12:10 pm**

### Technical Presentation: Old Smokey Power - Transforming Aging Power Plants 25

Grand Ballroom V

Control #10

*Peter T. Belmonte, TRC Solutions, Houston, TX*

**12:10 pm - 1:10 pm**

### Lunch

Grand Ballroom, Salons I - IV

**1:10 pm - 2:25 pm**

### Panel: Regulatory Trends and Strategy:

### ELG and CCR 35

Grand Ballroom V

**Session Chair:** Constance Senior, ADA-ES, Inc.

**Panelists include:**

- Dan Hedrick, Director of Environmental Affairs, City Utilities of Springfield
- Lisa Bradley, Senior Toxicologist, Haley & Aldrich
- William Kennedy, PE, Manager, Process & Environmental Engineering, Duke Energy

**2:25 pm - 2:45 pm**

### Networking Break

Grand Ballroom Foyer West

### Session 1: PREPARING FOR EFFLUENT LIMITATIONS: SELENIUM AND WATER BALANCE

Grand Ballroom V

**Session Chair:** Cassandra Hutson, AECOM

**2:45 pm - 3:10 pm**

Control #17

### Impact of Air Pollution Control Devices on Selenium in FGD and Wastewater Treatment Systems at Coal-Fired Boilers 63

*Constance Senior, ADA-ES, Inc., Highlands Ranch, CO*

**3:10 pm - 3:35 pm**

Control #20

### Operational Water Balances for a Coal-Fired Power Plant with FGDs and Wastewater Recycling 75

*Jonathan O. Allen, Christopher K. Ferens-Foulet, Allen Analytics LLC, Tucson, AZ; Chethan K. Acharya, Southern Company Services, Birmingham, AL*

**3:35 pm - 4:00 pm**

Control #48

### Near Real-Time Detection of Mercury and Selenium for Process Control 89

*Cassandra Hutson, Craig Katkic, Mandi Richardson, AECOM, Austin, TX; Naomi Goodman, EPRI, Palo Alto, CA*

**4:00 pm - 5:00 pm**

Poster Session in Exhibit Hall

**NETWORKING RECEPTION AND**

**EXHIBITION VIEWING**

**5:00 pm - 6:00 pm**

## TECHNICAL PROGRAM – Wednesday, August 22

### Registration

7:00 am - 5:00 pm  
Third Floor

### Continental Breakfast

7:00 am - 8:00 am  
Exhibit Hall

### Presenters' Meeting

7:00 am - 8:00 am  
Grand Ballroom I - IV

### Exhibition Hours

9:00 am - 6:00 pm  
Grand Ballroom VI - X

8:00 am - 9:30 am

### Panel: Integration of Diverse Generation Sources and Effects of Variable Load on Pollution Control Equipment and Emissions 104

Grand Ballroom V

Session Chair: Sheila Glesmann, Emission Strategies, Inc.

#### Speakers include:

- Tony Licata, Partner, Licata Energy & Environmental Consultants, Inc.
- Doug Campbell, Senior Technical Advisor, Nova Scotia Power
- Mike Mattes, President & CEO, Cormetech
- Angelos Kokkinos, Director of the Office of Advanced Technology Systems, US Department of Energy

9:30 am - 10:00 am

Networking Break and Exhibition Viewing  
Exhibit Hall

### TRACK 1 (Grand Ballroom V)

### TRACK 2 (Dover A, B, C)

#### Session 2A

##### MANAGING IMPACTS OF LOAD CYCLING

[concurrent with Session 2B]

Session Chair: Ian Saratovsky, Lhoist

10:00 am - 10:25 am

Control #41

##### Impacts to SCR System and Catalyst Management from Load Cycling and Reserve Outages 120

Jared Koliha, John Cochran, IBIDEN CERAM Environmental, Inc., Overland Park, KS

10:25 am - 10:50 am

Control #65

##### Utilization of High Reactivity Hydrated Lime for Heat Rate and Operational Benefits 136

Charles Lockert, Mississippi Lime Company, Chagrin Falls, OH

10:50 am - 11:15 am

Control #40

##### The Real-Time Measurement of Sulfur Bearing Vaporous Compounds ("SO<sub>3</sub>", Sulfuric Acid, Ammonium Bisulfate) and its Application for Use for Process and Environmental Control 146

Daniel Menniti, Breen Energy Solutions, Houston, TX

11:15 am - 11:40 am

Control #11

##### Improving Acid Gas Abatement: Tales in Dry Sorbent Injection System Optimization 157

Ian Saratovsky, Martin Dillon, Greg Filippelli, Gerald Hunt, Lhoist North America, Fort Worth, TX

#### Session 2B

##### ELG AND CCR

[concurrent with Session 2A]

Session Chair: John Chang, EPA

10:00 am - 10:25 am

Control #50

##### A Detailed Overview of the KLeeNwater Pilot System for ELG Compliance 160

Katie McIntyre, KLEENwater, LLC, Elliston, VA

10:25 am - 10:50 am

Control #56

##### Heavy Metal Contaminant Sequestration in Ash by PAC 175

Micala Mitchek, Ariel Li, Joe Wong, ADA Carbon Solutions LLC; Sheila Glesmann, Emission Strategies, Inc., Littleton, CO

10:50 am - 11:15 am

Control #38

##### New Buffer Additive for Wet FGD Systems 184

Lewis B. Benson, Benson Environmental, Sewickley, PA

11:40 am - 12:40 pm

Lunch

Grand Ballroom I - IV

# FINAL PROGRAM

## TECHNICAL PROGRAM – Wednesday, August 22

### TRACK 1 (Grand Ballroom V)

#### Session 3A

##### PANEL: REGULATORY TRENDS AND OUTLOOK: NSR/CPP/MATS

[concurrent with Session 3B] 189

Session Chair: Michael Goo, ICAC

12:40 pm - 2:20 pm

Speakers include:

- Dan Chartier, Regulatory Director, Environmental Policy, National Rural Electric Cooperative Association (NRECA)
- Angelos Kokkinos, Director of the Office of Advanced Technology Systems, DOE
- Miles Keogh, Executive Director, National Association of Clean Air Agencies

2:20 pm - 2:40 pm

Networking Break and Exhibition Viewing (for both tracks)

Exhibit Hall

#### Session 4A

##### HEAT RATE IMPACTS AND IMPROVEMENTS

[concurrent with Session 4B]

Session Chair: Anthony Licata, Licata Energy & Environmental Consultants

2:40 pm - 3:05 pm

Control #49

##### Heat Rate – Impact on EGUs and Emissions

Anthony Licata, Licata Energy & Environmental Consultants, Inc., Yonkers, NY; Jeffrey Quick, Utah Geological Survey, Salt Lake City, UT 234

3:05 pm - 3:30 pm

Control #1

##### Heat Rate Improvement Case Studies on Coal-Fired Power Plants

Emily Kunkel, Rajendra Gaikwad, Sargent & Lundy, Chicago, IL; Rae Cronmiller, NRECA, Washington, DC 247

3:30 pm - 3:55 pm

Control #3

##### Minimizing NOx and Heat Rate in Chinese Coal Fired Utility Boilers

Richard Conn, Jeff Shan, Sunco International Co., Ltd, Naperville, IL; May Chen, Blue Horizon, Inc. Suzhou, Jinangsu China; Xiaodong Fang, Xiangyu Hu, Mingzhi Lu, Xiaolin Xing, Pingwei Power Station, China Power Int'l Development Ltd., Huainan, Anhui, China 259

4:00 pm - 5:00 pm

Poster Session in Exhibit Hall

### TRACK 2 (Dover A, B, C)

#### Session 3B

##### EMISSIONS FROM NATURAL GAS-FIRED PLANTS

[concurrent with Session 3A]

Session Chair: Stan Mack, Johnson Matthey

12:40 pm - 1:05 pm

Control #43

##### The Impact of Changes in Electric Generation on Air Quality in Northern New Jersey 195

Peter Mayes, Thomas F. McNevin, New Jersey Department of Environmental Protection, NJ

1:05 pm - 1:30 pm

Control #9

##### Gas Turbine Combined Cycle Startup Emissions – A New Paradigm 207

Jordan M. Haywood, Siemens Energy, Inc., Orlando, FL

1:30 pm - 1:55 pm

Control #21

##### Advanced SCR Catalysts for Combustion Turbines

Gavin MacInnes, Christopher Bertole, Brian Helner, CORMETECH Inc., Durham, NC; Neal Coffey, Ennis Power Company, LLC, Dallas, TX 217

1:55 pm - 2:20 pm

Control #71

##### Low Level NOx Monitoring on "Rapid Start" Simple Cycle Turbines

Jeremy Whorton, Thermo Fisher Scientific; Tommy Leach, Oklahoma Gas & Electric 228

#### Session 4B

##### EMISSIONS MONITORING

[concurrent with Session 4A]

Session Chair: William Vining, BASF

2:40 pm - 3:05 pm

Control #52

##### Improved Measurements of PM10/2.5 Emissions from Natural Gas-Fired Combined Cycle Power Generation Units 273

Jordan Haywood, Siemens Energy Inc., Orlando, FL; Glenn England, Ramboll US Corporation, Orange County, CA; Kevin Crosby, Montrose Air Quality Services LLC, San Francisco, CA

3:05 pm - 3:30 pm

Control #34

##### Innovative Measurement Technologies: Hg, SO3, NH3, HCl, HBr, As, Se 285

Alexandra Sipershteyn, The Ohio Lumex Company, Cleveland, OH

3:30 pm - 3:55 pm

Control #29

##### Effects of Sample Conditioning on SO2 Retention and Measured Emissions 299

Craig D. Sunada, Amy Geary, Perma Pure LLC, A Halma Company, Lakewood, NJ

5:00 pm - 6:00 pm

Reception in Exhibit Hall

## TECHNICAL PROGRAM – Thursday, August 23

<b>Registration</b> 7:00 am - 12:00 pm Third floor	<b>Continental Breakfast</b> 7:00 am - 8:00 am Exhibit Hall	<b>Presenters' Meeting</b> 7:00 am - 8:00 am Grand Ballroom I - IV	<b>Exhibition Hours</b> 7:30 am - 12:00 pm
--	---	--	---

### TRACK 1 (Dover A, B, C)

#### Session 5A

##### MERCURY MEASUREMENT AND CONTROLS 1 [concurrent with 5B]

Session Chair: Constance Senior, ADA-ES

**8:00 am - 8:25 am**

Control #37

##### Mercury Emissions Rate: The Evolution of Control Technology Effectiveness

J. Edward Cichanowicz, J.E. Cichanowicz, Inc., Los Gatos, CA; Michael Hein, Hein Analytics, LLC, Whitefish, MT; James Marchetti, J.P. Marchetti, Washington, DC 313

**8:25 am - 8:50 am**

Control #28

##### Sulfite Control of WFGD Systems

Ray Gansley, Rita Mardini, General Electric Power, Knoxville, TN 314

**8:50 am - 9:15 am**

Control #62

##### Mercury Capture in the Wet Scrubber with WetJect™ -- Minimizing Plant Balance Effects

Regina Rodriguez, Lindsey Costin, Erica Gonzaga, David Mazyck, Carbonxt, Gainesville, FL 327

**9:15 am - 9:40 am**

Control #18

##### Improving Fuel Flexibility on Bituminous-Fired Boilers with Fuel Additives for Mercury Control

Constance Senior, Sharon Sjostrom, ADA-ES, Inc., Highlands Ranch, CO 338

### TRACK 2 (Grand Ballroom V)

#### Session 5B

##### PLANT DIGITIZATION AND IMPACTS ON EMISSIONS AND OPERATING COSTS PANEL [concurrent with Session 5A] 346

Session Chair: Jessica Mullen, National Energy Technology Laboratory (NETL) DOE

**8:00 am - 9:40 am**

##### Speakers include:

- Stephen Zitney, Process Systems Engineering Research, National Energy Technology Laboratory
- Paula Restrepo, Power Digital Product Manager, GE Power
- Marc A. Cremer, Senior Principal and Co-president, Reaction Engineering International

**9:40 am - 10:10 am**

##### Networking Break and Exhibition Viewing (Exhibit Hall)

#### Session 6A

##### MERCURY MEASUREMENT AND CONTROLS 2 [concurrent with 6B]

Session Chair: John Pavlish, MEEC

**10:10 am - 10:35 am**

Control #39

##### Optimizing ACI Usage to Reduce Costs, Increase Fly Ash Quality, and Avoid Corrosion

John Satterfield, Cabot Corporation, Marshall, TX 370

**10:35 am - 11:00 am**

Control #63

##### No Bromine, No Problem! – High Performing Activated Carbon

Regina Rodriguez, Lindsey Costin, Erica Gonzaga, David Mazyck, Carbonxt, Gainesville, FL 379

**11:00 am - 11:25 am**

Control #13

##### Using Mer-Cure and Other Enhancements to Reduce PAC Usage

Jon Norman, United Conveyor Corporation, Waukegan, IL 389

#### Session 6B

##### DEVELOPMENT ACTIVITIES [concurrent with Session 6A]

Session Chair: CW Lee, US EPA

**10:10 am - 10:35 am**

Control #59

##### Merits and Plant Specific Experience with SCR Catalyst Bench Scale Testing

Marc Harton, Richard Storm, Innovative Combustion Technologies, Inc.; Jason Bookout, Southern Company Services, Pelham, AL 399

**10:35 am - 11:00 am**

Control #12

##### Novel Cross Flow Hybrid Precipitator

Muhammad Ali, Clinton Hedrick, Anbara Lutfullaeva, Khairul Alam, Ohio University, Stocker Center, Athens, OH 416

**11:00 am - 11:25 am**

Control #74

##### A Novel Wet Electrostatic Precipitator Installation

Ralph Altman, Bruce Scherer, Altman, Scherer & Associates LLC; M. Zhu, US Power Environmental Technologies 425

# FINAL PROGRAM

## TECHNICAL PROGRAM – Thursday, August 23

**TRACK 1 (Dover A, B, C)**

**TRACK 2 (Grand Ballroom V)**

11:25 am - 11:45 am

Networking Break and Exhibition Viewing (Exhibit Hall)

### Session 6A

#### MERCURY MEASUREMENT AND CONTROLS 2 (CON'T)

[concurrent with Session 6B]

11:45 am - 12:10 pm

Control #15

#### Working with Your Supplier to Provide Fast and Accurate Troubleshooting to Ensure MATS Compliance

John H. Pavlish, Midwest Energy Emissions Corp. (ME<sub>2</sub>C), Grand Forks, ND 439

12:10 pm - 12:35 pm

Control #25

#### Mercury and Air Toxics Control Using The Chem-Mod™ Solution

Murray F. Abbott, Chem-Mod LLC, Pittsburgh, PA 445

12:35 pm - 1:00 pm

Control #16

#### Activities in South East Asia Supporting Implementation of Minamata Convention on Mercury 455

Wojciech Jozewicz, ARCADIS U.S., Inc., Research Triangle Park, NC

### Session 6B

#### DEVELOPMENT ACTIVITIES (CON'T)

[concurrent with Session 6A]

11:45 am - 12:10 pm

Control #2

#### Aerosol Deposition in the Sampling Train of PM CEMS 467

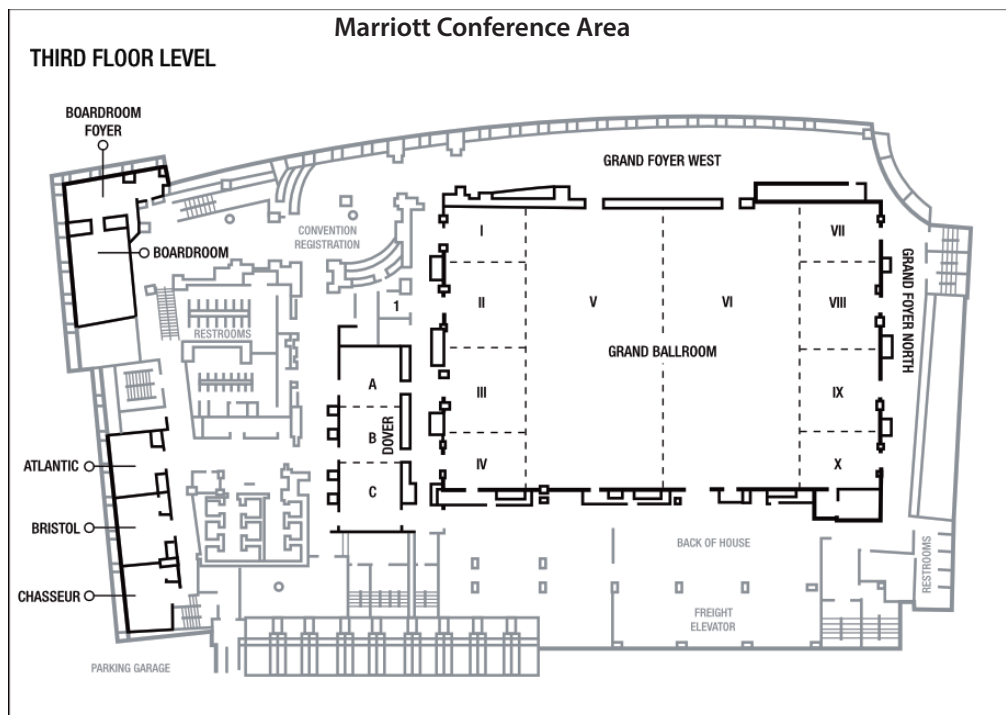
Shi-Bo Wang, Chih-Wei Lin, Sheng-Hsiu Huang, Chih-Chieh Chen, National Taiwan University, Taipei, Taiwan; Yu-Mei Kuo, Chung Hwa University of Medical Technology, Tainan, Taiwan; Hsien-Shiow Tsai, Environmental Protection Department, Taipower, Taipei, Taiwan

12:10 pm - 12:35 pm

Control #44

#### FTIR Monitoring System Provides Tighter Control on Emissions from Carbon Capture Process 469

Jim Cornish, Gasmot Technologies, Inc., Pulttitie 8, Helsinki, Finland



## TECHNICAL POSTERS

Two dedicated poster sessions will be held in the Exhibit Hall

Tuesday, August 21, 4:00 pm - 5:00 pm

Wednesday, August 22, 4:30 pm - 5:30 pm

### Multipollutant Controls and Measurements

Control #5

**Clean Power and An Economical, Reliable Grid —The Place for Coal**  
Mark R. Sankey, Mark R. Sankey & Associates LLC, Frederick, MD 482

Control #27

**Use of Air Emissions Measurement Technologies to Optimize Fuel Co-Firing and Pollution Control for Emissions Compliance**  
Thomas A. Dunder, TRC Environmental Corporation, Raleigh, NC 487

Control #73

**Optimized Boiler Efficiency with SO<sub>3</sub> Control** N/A  
Brian Conway, SICK, Inc., Plymouth, MA

### SO<sub>2</sub>, PM and NO<sub>x</sub> Controls

Control #30

**Reuse of magnesium by-products from the calcination of natural magnesite in dry desulfurization at low temperature**  
Josefa Fernández-Ferreras, Geidy Guzman-Pardías, University of Cantabria, Santander, Spain 490

Control #33

**A High-Performing Iron Oxide-Based Sorbent for Capturing Elemental and Oxidized Mercury Vapor in Flue Gas** N/A  
Yongheng Huang, Viviron Technology LLC, Houston, TX

Control #42

**Aging TR Sets on Electrostatic Precipitators - The Hidden Liability**  
Paul Leanza, KraftPowercon, Inc., Pensacola, FL N/A

Control #60

**Filter Technology Takes a Leap into Next Generation**  
Richard Williams, John B. Johnson, David Escott, FLSmidth AFT, Evans GA N/A

Control #68

**Developing an SCR High Dust Catalyst for Highly Abrasive Ash** N/A  
Tilman Knorr, Maria Brandmair, Silvia Alcove Clave, Juan-Carlos Martin, Sailesh Mullanpudi, Paul Andersen, Johnson Matthey, Redwitz, Germany

### Fine Particulates

Control #53

**Evaluation of the Concentration, Size Distribution and Chemical Composition of Fine Particles Emitted By Biomass Combustion Process in Sugarcane Region** N/A  
M.A.M. Costa, A. Sarti, A.A. Cardoso, H.M. Fogarin, M.L. Souza, Universidade Estadual Paulista, UNESP, Campus of Araraquara - IQ, Brazil; Araraquara, São Paulo.; J.A. Carvalho Jr., Department of Energy, Universidade Estadual Paulista, UNESP, Campus of Guaratinguetá, Brazil A.F.M.Costa; Department of Bioprocesses and Biotechnology, Unesp, Campus of Araraquara, Brazil

Control #54

**PM<sub>2.5</sub> And Gaseous Pollutants from the Burning of Different Types of Biomass Used by Industries** N/A

Maria Angélica Martins Costaa, Juliana Esteves Fernandes Cieslinskib, Kelly Dussan Medinaa, Arnaldo Alves Cardosoa, João Andrade de Carvalho Júniorc; a Universidade Estadual Paulista, UNESP, Campus of Araraquara - IQ, Brazil; b Departamento de Engenharia Industrial Madeireira - Universidade Estadual Paulista, UNESP, Itapeva, Brasil; c Departamento de Engenharia Mecânica - Universidade Estadual Paulista, UNESP, Guaratinguetá, Brasil

Control #55

**Carbonaceous Aerosols Associated with Very Fine Particles in the Delhi-National Capital Region**  
Arun Srivastava, Naba Hazarika, School of Environmental Sciences, Jawaharlal Nehru University, New Delhi, India N/A

### Mercury Control

Control #46

**Mercury Adsorption Test of Activated carbon using a Fixed-Bed Reactor**  
Jeong Min Park, Sinang Choi, Sang-Sup Lee; Department of Environmental Engineering, Chungbuk National University, Cheongju, South Korea N/A

Control #6

**Elimination of Ancillary Impacts of Mercury Control in Coal-Fired Power Plants and Improvement of Fly Ash Quality** N/A  
Thomas K. Gale, Novinda Holdings, Inc., Golden, CO

Control #8

**Fast Simulation of Mercury Capture within ESPs**  
Herek L. Clack, Department of Civil and Environmental Engineering, University of Michigan, Ann Arbor, MI N/A

Control #64

**High Performing Activated Carbon for Industrial Boiler Applications** N/A  
Regina Rodriguez, Lindsey Costin, Erica Gonzaga, David Mazyck, Carbonxt, Gainesville, FL



# FINAL PROGRAM

## TECHNICAL POSTERS, CON'T.

### ELG, CCR, and Byproduct Use

Control #31  
**Concrete and Cement Spec. Coal Fly Ash from a Waste Fly Ash**  
Michael Varner, SCB International Materials, Inc., Newtown, CT N/A

Control #14  
**New Effluent Regulations for Steam Electric Power plants and Emerging Calcium-Based Technologies**  
Narahari Kramadhati, Lhoist North America, Los Angeles, CA N/A

### Variable Operation

Control #7  
**Challenges Complying with Emissions Limits in Chile Caused by New Modes of Operations and High Levels of Renewable Energy Integration**  
Jorge Moreno, Donny Holaschutz, inodú – Energy & Sustainability, Santiago, Chile N/A

Control #51  
**Energy Storage is Emerging Worldwide as a Tool for Managing System Variability**  
Karin Wadsack, Northern Arizona University, Flagstaff, AZ N/A

### Carbon Capture

Control #57  
**Designing a Performance Test Program for a Carbon Capture Process**  
Thomas Dunder, TRC Environmental, Austin, TX N/A

Control #67  
**Techno-Economic Analysis of CO2 Separation Based on the Experiences in South Korea**  
Gwang G. Lee, Sungwon Ham, Kyungil University, Gyeongsan, Republic of Korea; Junhan Kim, Jungbin Lee, KEPCO Research Institute, Daejeon, Republic of Korea N/A

## In Memoriam

### Dr. George Offen (1939 – 2018)

Founder and champion of the MEGA Symposium  
A&WMA Member since 1998, Emeritus  
Winner of the Richard C. Scherr Award of Industrial Environmental Excellence in 2014

Dr. George Offen was a Senior Technical Executive at the Electric Power Research Institute (EPRI). His research focused on the reduction of air pollutants from coal-fired power plants. His group had developed/evaluated controls for mercury emissions and had expanded to address post-combustion CO2 capture and CO2 storage from any source.

Before joining EPRI, Dr. Offen was Manager, Energy Engineering at Acurex Corporation. Earlier positions included teaching at Stanford and Santa Clara Universities, research assignments at Chevron Research and the French Institute of Petroleum, and three years as an officer and test engineer with the U.S. Air Force.

Dr. Offen received his Bachelor of Science and Doctorate degrees in mechanical engineering from Stanford University and his Master's degree in mechanical engineering from MIT. He was fluent in French and German.

A standout volunteer and community member of Woodside, CA, George's efforts extended more than three decades, with three terms on the local elementary school board in the 1980s and 1990s, and 20 years (starting in 1998) on committees associated with the town's response to issues of sustainability, conservation and the environment. Most recently, he presided over the 2018 May Day parade as the grand marshal.

George Offen died at home on Sunday, August 5, 2018. He is survived by his wife Karen; daughters Catherine and Stephanie; and four grandchildren. The family asks that donations in George's memory be made to Mission Hospice & Home Care in San Mateo, CA; KDFC, his favorite music station; or the San Francisco Opera.

