Program Announcement

The 43rd International Technical Conference on Clean Energy

June 3 to 7, 2018

Sheraton Sand Key

Clearwater, Florida, USA

If You Want To Learn More About Innovations That Are Meeting The Challenges to Energy Utilization From The World's Key Planners, Leading Experts and "Super Scientists" In The Most Comprehensive Program on Energy Technologies With Representatives From Six Continents, Then You Must Attend.

THE CLEARWATER CLEAN ENERGY CONFERENCE

THE CLEARWATER CLEAN ENERGY CONFERENCE AGENDA

SUNDAY – June 3, 2018

Short Courses

9:00 – 11:00 a.m. – Combustion 101– *Alan Paschedag, Covanta, Inc.,* ***and*** *J.J. Letcavits, American Electric Power*
11:15 a.m. – 1:15 p.m. – Practical Optimization of the Coal Supply Chain – *G.H. Luttrell, Virginia Tech;* ***and*** *P. J. Bethell, Marshall Miller and Associates*
1:30 p.m. – 3:30 p.m. – Combustion Fundamentals – *Prof. Ashwani K, Gupta, University of Maryland*
3:45 p.m. – 5:45 p.m. – Advanced Biomass Pellet Characteristics for Utility Scale Co-firing and Conversion Programs – *Les Marshall, Ontario Power Generation Canada*

3:00 p.m. – Exhibit Center Setup in the Island Ballroom

MONDAY – June 4, 2018

8:30 a.m. - Technical Session Moderators' Meeting – Gulf Room

9:00 a.m. - Continental Breakfast – Exhibit Center

9:30 a.m. – Keynote Address: *Scott Smouse, Senior Advisor to Deputy Assistant Secretary, for Clean Coal & Carbon Management, U.S. Department of Energy,* ***USA***
Panel: Emerging International Developments in Power Generation
Moderator: Prof. Terry Wall, University of Newcastle, ***Australia***

- *Scott Smouse, Senior Advisor to Deputy Assistant Secretary, for Clean Coal & Carbon Management, U.S. Department of Energy,* ***USA***
- *Prof. Dongke Zhang, University of Western Australia and Research Professor of the Chinese Academy of Sciences,* ***Australia***
- *Prof. Klas Andersson (Chalmers University,* ***Sweden****) Brigham Young University; and*
- *Prof. Viktor Scherer, Ruhr-University Bochum,* ***Germany***

11:45 a.m. – Lunch – Exhibit Center

1:00 p.m. Panel: U.S. Energy Portfolio Today and in the Future
Moderator: Bonnie Courtemanche, Director of Quality and Safety, BPE/BPS, Riley Power, Inc.

- *Andrew Hlasko, U.S. Department of Energy,* ***USA***
- *Brad Crabtree, Vice President, Fossil Energy, Great Plains Institute*

3:00 p.m. Break – Exhibit Center

3:30 p.m. – Four Concurrent Sessions

- **Session 1 - Sand Key Room - Biomass Co-Firing**
  Les Marshall, Ontario Power Generation, ***Canada***
- **Session 2 - Gulf Room - Innovative Low Carbon Fuels I**
  Dongke Zhang, The Universty of Western Australia, ***Australia***
- **Session 3 - Palm Room - Supercritical CO_2 I**
  Joshua Stanislowski, UNDEERC **and** *Bhupesh Dhungel, Air Liquide*
- **Session 4 - Bay Room - Carbon Capture Utilization & Sequestration I,** *Dr. Erik Meuleman, ION Engineering, and Dr. David Hopkinson, National Energy Technology Laboratory, U.S. Department of Energy*

5:30 p.m. Beach Party – Poolside

TUESDAY – June 5, 2018

7:30 a.m. Continental Breakfast in the Exhibit Center

8:00 a.m. Three Concurrent Sessions:

- **Session 5 - Sand Key Room - Energy From Waste**
  Alan Paschedag, Covanta
- **Session 6 - Gulf Room - Innovative Low Carbon Fuels II**
  Dongke Zhange, The Universty of Western Australia

- **Session 7 - Palm Room - Oxy-Combustion I**
  Dr. Klas Andersson (Chalmers University, Sweden) **and**
  Dr. Andrew Fry, Brigham Young University

10:00 a.m. Break in the Exhibit Center

10:30 a.m. Three Concurrent Sessions

- **Session 8 - Sand Key Room - Fluidized Bed and Dense Particle Flows,** *Dr. Ronald Breault, National Energy Technology Laboratory, U.S. Department of Energy*
- **Session 9 - Gulf Room - Combustion Fundamentals**
  Dr. Weihong Yang, KTH Royal Institute of Technology, Sweden
- **Session 10 - Palm Room - Oxy-Combustion II**
  Dr. Klas Andersson (Chalmers University, Sweden) **and**
  Dr. Andrew Fry, Brigham Young University

12:30 p.m. – Lunch – Exhibit Center

2:00 p.m. Panel: Energy From Waste
Moderator: Prof. Ashwani Gupta, University of Maryland

- *Dr. Marco Castaldi, City University of New York,* ***USA***
- *Dr. Kunio Yoshikawa, Tokyo Institute of Technology,* ***JAPAN***
- *Dr. Somrat Kerdsuwan, King Mungkut University of Technology North Bangkok,* ***THAILAND***
- *Dr. Halina Pawlak-Kruczek, Head of Boiler, Combustion & Energy Process Department, Wrocław University of Technology,* ***POLAND***

3:30 p.m. Break

4:00 p.m. Four Concurrent Sessions

- **Session 11 - Sand Key Room - Radiative Heat Transfer**
  Brad Adams, Brigham Young University
- **Session 12 - Gulf Room - Gasification**
  Massood Ramezan, KeyLogic
- **Session 13 - Palm Room - Chemical Looping I – Oxygen Carrier Development,** *Dr. Andrew Tong, Ohio State University* **and** *Dr. Mandar Kathe, Ohio State University*
- **Session 14 - Beach Room - Carbon Capture Utilization & Sequestration II,** *Dr. David Hopkinson, National Energy Technology Laboratory, U.S. Department of Energy and Prof. Jochen Lauterbach, University of South Carolina*

6:00 p.m. – Conclusion of Technical Program

WEDNESDAY – June 6, 2018

7:30 a.m. Continental Breakfast – Exhibit Center

8:00 a.m. Four Concurrent Sessions:

- **Session 15 - Beach Room - Combustion Technologies**
  J.J. Letcavits, AEP **and** *Alan Paschedag, Covanta*
- **Session 16 - Gulf Room - Recovery of Rare Earth Elements I**
  Eric Eddings, University of Utah
- **Session 17 - Palm Room - Chemical Looping II – Process and Reactor Design and Testing**
  Thomas Flynn, Babcock and Wilcox, **and** *Dr. Luke Neal, North Carolina State University*
- **Session 18 - Bay Room - Biomass To Fuel**
  Prof. Viktor Scherer, *Ruhr-Universität Bochum, Germany*

10:00 a.m. Break – Exhibit Center

10:30 a.m. Four Concurrent Sessions

- **Session 19 - Beach Room - Supercritical CO_2 II**
  Joshua Stanislowski, UNDEERC **and** *Bhupesh Dhungel, Air Liquide*
- **Session 20 - Gulf Room - Carbon Capture Utilization & Sequestration III -** *Dr. Sankhar Bhattacharaya, Monash University,* ***Australia***
- **Session 21 - Palm Room - Modeling I**
  Dr. Edmundo Vasquez, Consultant, Boiler Combustion and Emission Controls
- **Session 22 - Beach Room - Recovery of Rare Earth Elements II**
  Prof. Eric Eddings, University of Utah

11:50 a.m. – Themed Lunch – Exhibit Center

- **Positioning to Win Government R&D Funding,** *Phil Winkler*
- **Energy From Waste,** *Alan Paschedag, Covanta*
- **Adaptive Mining Chains,** *Dr. Dave Osborne, Somerset Int'l Australia Pty. Ltd., Australia*
- **Biomass Utilization,** *Les Marshall, Ontario Power Generation, Canada*
- **Modular Energy Systems,** *Massood Ramezan, KeyLogic LLC*
- **Fuel Reforming**, *Prof. Ashwani Gupta, University of Maryland*
- **Combustion and Low NO_x Burners**, *J.J. Letcavits, AEP*
- **High Efficiency and Low Emission Technologies**, *Dr. Raj Gupta, University of Alberta, Canada*

1:30 p.m. – Panel: Adaptive Mining Chains – *Moderator: Dr. Dave Osborne, Somerset International Australia Pty Ltd., AUSTRALIA*

- *Michael O'Brien, Team Leader, Enhanced Coal Processing, Mining and Processing Technologies/Coal Mining Program, Queensland Centre for Advanced Technologies (QCAT), CSIRO,* ***AUSTRALIA***
- *Peter Bethell, Senior Principal: Mineral Processing, Marshall Miller and Associates,* ***USA***
- *Prof. Ron Honaker, Department of Mining Engineering, University of Kentucky*

3:30 p.m. – Break in the Exhibit Center

4:00 p.m. – Exhibit Center Closes

4:00 p.m. – Four Concurrent Sessions

- **Session 23 - Beach Room - Innovative Power Applications**
  David Tucker, National Energy Technology Laboratory, U.S. Department of Energy **and** *Dalia El Tawy, Siemens*
- **Session 24 - Gulf Room - Chemical Looping III – Process and Component Analysis**
  Dr. Andrew Tong, Ohio State University, **and** *Vasudev Pralhad Haribal, North Carolina State University*
- **Session 25 - Palm Room - Modeling II**
  Dr. Edmundo Vasquez, Consultant, Boiler Combustion and Emission Controls
- **Session 26 - Bay Room - Upgrading/ Beneficiation**
  Dr. Dave Osborne, Somerset International Australia Pty Ltd., Australia

5:40 p.m. – Conclusion of the Technical Program

5:40 p.m. – Conference Committee Meeting – Palm Room

THURSDAY – June 7, 2018

7:30 a.m. Continental Breakfast – Island Ballroom

8:00 a.m. – Panel: Gasification Technology – A Path Forward to Overcome Current Challenges
Moderator: Massood Ramezan, KeyLogic

- *Dave Lyons, Technology Manager, National Energy Technology Laboratory, U.S. Department of Energy;*
- *Francis Lau, Chief Technology Officer, Synthesis Energy Systems*
- *Joshua Stanislowski, Energy & Environmental Research Center, University of North Dakota*

10:00 a.m. – Break – Island Ballroom

10:30 a.m. – Three Concurrent Sessions

- **Session 27 - Beach Room - Load Following Issues & Turbines**
  Yogesh Patel, TECO
- **Session 28 - Gulf Room - Emerging Analytical Approaches**
  *Dr. Dave Osborne, Somerset International Australia Pty Ltd., **Australia***
- **Session 29 - Bay Room - Carbon Capture Utilization & Sequestration IV**
  Dr. Erik Meuleman, ION Engineering

11:50 a.m. – Lunch & Presentation of the Best Student Paper Award – Roundtable/Wrap-up Discussion – Island Ballroom

FRIDAY – June 8, 2018

6:30 a.m. – Continental Breakfast – Lobby 2

7:00 a.m. – Departure of the Covanta/Hillsborough and Polk Power Plant Tours

THE CLEARWATER CLEAN ENERGY CONFERENCE HIGHLIGHTS

Endorsing Organizations:

- **American Institute of Chemical Engineers**
- **American Public Power Association**
- **CANMET Natural Resources, Canada**
- **China Coal Research Institute**
  Ministry of Coal, People's Republic of China
- **Edison Electric Institute**
- **Export Assistance Center, U.S. Commercial Service**
- **International Energy Agency: Coal Research**
- **Japan Coal Energy Center (JCOAL)**
- **National Mining Association**
- **National Rural Electric Cooperative Association**
- **Ohio Coal Development Office**
- **U. S. Geological Survey**

MISSION STATEMENT – Increased demand – coupled with energy security issues, uncertainty in the oil sector, and changing environmental regulations – **make this conference a must for those involved in all aspects of power generation** who must meet the competitive pressures and environmental concerns in the 21st century.

The **current Administration** brings in many more challenges and opportunities for the energy sector. We plan to cover all the proposed programs and policies. As changes and additions occur, we will

The Panels, Short Courses and Technical Sessions offer information on all of the major topics of the day.

Technical Sessions The conference presents topics of the greatest interest to the industry in the technical sessions. We are offering 30 technical sessions.

Panels To provide our attendees with the most comprehensive and up-to-date information from the world's energy leaders, we offer panel presentations covering an overview of emerging, evolving, and innovative technologies, fuels, policy and/or equipment in the power generation industry.

cover them.

Through the Technical Sessions, Short Courses, and Panels, cutting-edge developments dealing **with technical solutions to problems; specific strategies; projects; innovations; industry trends; and/or regulatory compliance** will be offered. The program presents an extensive overview of emerging, evolving, and innovative technologies, fuels and/or equipment in the power generation industry. We seek papers from all countries worldwide.

The **Clearwater Clean Energy Conference** offers participants about 150 technical presentations in four days. Buffet style luncheons in the Exhibit Center (an area dedicated for the use of attendees all day), refreshment breaks and a fabulous beach reception offer numerous networking opportunities.

Short Courses On Sunday, we offer Short Courses on a wide variety of topics important to the energy community. **Participation is optional; is included in the registration fee; and open to all conference registrants.** The Short Courses are offered on Sunday, June 3rd.

Themed Luncheon – A conference favorite is the Themed Luncheon. Industry leaders host tables of 8 where a specific topic is chosen by the host for discussion during lunch.

Exhibit Center An **Exhibit Center** showcasing 24 booths also provides opportunities to highlight accomplishments and achievements. We also offer tables for Information Display. Those signing up for this were included in the write-ups and could include an ad in the Official Program.

Field Trips – Friday, June 8, 2018

Polk Power Plant Tour and
Covanta/Hillsborough Plant Tour

BACKGROUND

At the direction of the Conference Committee, it was decided to broaden the scope of the conference to include some new and exciting technologies currently on the horizon. Industry professionals representing nearly all the major players in the electric utility industry were in Clearwater, Florida, USA for the **42nd Clearwater Clean Energy Conference.**

This conference has earned a reputation for excellence as one of the premiere conferences on coal technologies as it grows in size and scope since its inception in 1975.

The 43rd International Technical Conference on Clean Energy

June 3 to 7, 2018

Sheraton Sand Key, Clearwater, Florida, USA

Visit
www.ClearwaterCleanEnergyConference.com
for complete conference details

HEADQUARTERS – Sand Key is one of the 20 Best Beaches, according to many travel and tourism organizations. **Sheraton Sand Key,** 1160 Gulf Boulevard, Clearwater, Florida – Phone: 727-595-1611 FAX: 727-596-8488 offers the conference $192/night for Single or Double accommodations. Identify as a conference participant and use code CE29AA. Go to

http://www.beachsand.com for information about the Sheraton Sand Key

THE CLEARWATER CLEAN ENERGY CONFERENCE

SUNDAY – June 3, 2018

Short Courses – Are open to all registered attendees.

9:00 – 11:00 a.m. – Combustion 101
Alan Paschedag, Covanta, Inc., and
J.J. Letcavits, American Electric Power

All you need to know about mixing fuel and air to create combustion. The various conditions that must be controlled such that combustion is both efficient and low in pollutants will be discussed. With this basic understanding of the combustion process, the process of burner tuning will be better understood. A basic approach to burner tuning will also be covered.

11:15 a.m. – 1:15 p.m. – Practical Optimization of the Coal Supply Chain
G.H. Luttrell, Virginia Tech; and
P. J. Bethell, Marshall Miller and Associates

Coal processing, handling and storage facilities play an important role in determining the overall economic viability of the fuel supply chain for coal-fired power stations. Optimization of these important facilities has traditionally been performed using search-engines that require large amounts of information such as coal quality data, production statistics and site costing models.

While this generic approach is technically correct, many operations have been overwhelmed by the large amount of real-time data that is required to properly implement such an optimization strategy. In light of this problem, a new optimization methodology has been developed that assigns unit values to each particle passing through the coal supply chain based on market sales contracts. This presentation describes the working features of this alternative optimization protocol and provides case studies illustrating the large economic value of well-designed coal processing and handling systems on coal-based fuel supply systems.

1:30 p.m. – 3:30 p.m. – Combustion Fundamentals
Prof. Ashwani K, Gupta, University of Maryland

This Short Course will cover fundamental aspects of combustion, including fuels and their fundamental properties, stoichiometric balances, adiabatic flame temperature calculations, flame stability and pollutants formation and mitigation. No prior knowledge on the subject will be assumed so that this tutorial will be very fitting to students and users of combustion devices in industry.

3:45 p.m. – 5:45 p.m. – Advanced Biomass Pellet Characteristics for Utility Scale Co-firing and Conversion Programs
Les Marshall, Ontario Power Generation Canada

The utility industry has made significant gains with decarbonising coal-fired power generation through the use of biomass co-firing and more recently via complete coal to biomass fuel conversions. Conversion projects especially have historically required high capital expenditures, limiting the adoption of this route in many jurisdictions.

Recent developments in the field of 2nd generation solid biomass fuels (advanced biomass) have enabled another potential pathway for utility-scale biomass use. These new "advanced biomass" pellets are produced with a range of thermal upgrading techniques to modify their physical characteristics such that they can form the basis of a low capital cost approach for a co-firing or conversion project.

The characteristics of both traditional white wood pellets and the new advanced biomass pellets will be discussed from an end user point of view. The results of fuel evaluations will be confirmed with practical full scale operating experience.

3:00 p.m. – Exhibit Center Setup in the Island Ballroom

MONDAY – June 4, 2018				
8:30 a.m.	**Technical Session Moderators' Meeting – Gulf Room**			
9:00 a.m.	**Continental Breakfast – Exhibit Center**			
9:30 a.m. – Keynote Address: Trends in International Coal Power Project Development (*Authors: Scott M. Smouse and Ayaka Jones, U.S. Department of Energy; Babatunde Fapohunda, KeyLogic Systems, Inc.; and Mark Render, West Virginia University Innovation Corporation*) **presented by** *Scott Smouse, Senior Advisor to Deputy Assistant Secretary, for Clean Coal & Carbon Management, U.S. Department of Energy,* ***USA*** **Panel: Emerging International Developments in Power Generation** *Moderator: Prof. Terry Wall, University of Newcastle,* ***Australia;*** • *Scott Smouse, Senior Advisor to Deputy Assistant Secretary, for Clean Coal & Carbon Management, U.S. Department of Energy,* ***USA*** • *Prof. Dongke Zhang, University of Western Australia and Research Professor of the Chinese Academy of Sciences,* ***Australia*** • *Prof. Klas Andersson (Chalmers University, Sweden) Brigham Young University* ***Sweden & USA****;* • *Prof. Viktor Scherer, Ruhr-University Bochum,* ***Germany***				
11:45 a.m. – Lunch in the Exhibit Center				
1:00 p.m. Panel: U.S. Energy Portfolio Today and in the Future *Moderator: Bonnie Courtemanche, Director of Quality and Safety, BPE/BPS, Riley Power, Inc.* • *Andrew Hlasko, U.S. Department of Energy,* ***USA*** • *Brad Crabtree, Vice President, Fossil Energy, Great Plains Institute,* ***USA***				
3:00 p.m. Break – Exhibit Center				
3:30 p.m. – Four Concurrent Technical Sessions				
	Session 1 **Sand Key Room** **Biomass Co-Firing** *Les Marshall, Ontario Power Generation,* ***Canada***	**Session 2** **Gulf Room** **Innovative Low Carbon Fuels I,** *Dongke Zhang, The Universty of Western Australia,* ***Australia***	**Session 3** **Palm Room** **Supercritical CO_2 I** *Joshua Stanislowski, UNDEERC* **and** *Bhupesh Dhungel, Air Liquide*	**Session 4** **Bay Room** **Carbon Capture Utilization & Sequestration I** *Dr. Erik Meuleman, ION Engineering, and Dr. David Hopkinson, National Energy Technology Laboratory, U.S. Department of Energy*

3:30 p.m.	**86. Pilot-scale Co-firing of Modified Biomass with Pulverized Coal in Support of a Full-scale Co-firing Demonstration at the Hunter Plant** *Zsolt Dobo, and Eric Eddings, Department of Chemical Engineering, University of Utah; Andrew Fry, Department of Chemical Engineering, Brigham Young University; Ken Clark, Pacificorp,* ***USA****; and Prof. Klas Andersson, Department of Chemical Engineering, Chalmers University,* ***SWEDEN***	**12. Ammonia as a Transport Fuel in Internal Combustion Engines: A Technical Review** *Herry Lesmana, Zhezi Zhang, Zhijian Wan, Mingming Zhu, Wenqiang Xu (National Institute of Clean and Low-Carbon Energy,* ***CHINA****), and Dongke Zhang, Centre for Energy (M473), The University of Western Australia,* ***AUSTRALIA****; and Chuanfu Wang, and Xianming Li, National Institute of Clean and Low-Carbon Energy,* ***CHINA***	**11. Coal-Based Allam Cycle Technology Development Overview** *Joshua Stanislowski, Energy and Environmental Research Center, University of North Dakota,* ***USA***	**40. U.S. DOE Office of Fossil Energy – CCUS Research Efforts and Major Demonstration Program Update** *Andrew Hlasko, U.S. Department of Energy,* ***USA***
3:50 p.m.	**59. The Influence of Fuel Composition on Sulfation and Deposition Rate of Alkali Salts** *Thomas Allgurén, and Prof. Klas Andersson (Brigham Young University), Department of Space Earth & Environment, Chalmers University of Technology,* ***SWEDEN****; Jost Went and Yueming Wang, Department of Chemical Engineering, University of Utah; and Andrew Fry, Department of Chemical Engineering, Brigham Young University,* ***USA***	**61. Ignition and Extinction of Ammonia/Methane/Air Combustion** *Yang Zhang, Hai Zhang, Changfu* You, Yuxin Wu and Qing Liu, Key Laboratory for Thermal Science and Power Engineering of Ministry of Education Department of Energy and Power Engineering, Tsinghua University, **CHINA**	**16. Performance and Cost of Closed, Indirect Supercritical CO_2 Brayton Power Cycles with Oxy-Fired Heaters** *Dr. Andrew Maxson, and George Booras, Electric Power Research Institute, Inc. (EPRI); Jason Miller, Echogen Power Systems, LLC; Bartev Sakadjian, Babcock & Wilcox Research Center; Babcock & Wilcox Power Generation Group, Inc.; and Glen Jukkola, representing General Electric Power,* ***USA;*** *and Dougal Hogg; Deputy Chief Engineer - Heater Technology; Howden Group Ltd.; Renfrew,* ***UNITED KINGDOM***	**39. Port Arthur CO_2 Capture - World's First Full-Scale CCUS via CO_2 Adsorption from Syngas: Concept to Commercialization** *Cory Sanderson, Air Products,* ***USA***
4:10 p.m.	**30. Impact of Additives on Ash Deposition Rate During Co-firing of Coal and Straw** YongWoon Lee, TaeYoung Chae,	**24. Catalytic Dissociation of Ammonia for Hydrogen Production: A Review** *Zhijian Wan, Zhezi Zhang, Mingming Zhu,*	**87. Development of PCHE Off-design Performance Model for Optimizing Power System Control Strategies in S-CO_2 Brayton Cycle**	**103. A New Bench Scale Facility for Evaluating Hydrophobic Physical Solvents for Pre-Combustion Carbon Capture**

	JaeWook Lee, and Won Yang, *Thermochemical Energy System R&D Group, Korea Institute of Industrial Technology,* ***KOREA***	*Herry Lesmana, and Dongke Zhang, Centre for Energy (M473), The University of Western Australia,* ***AUSTRALIA****; and Chuanfu Wang, Qi Sun, Xianming Li; and Wenqiang Xu (Centre for Energy (M473), The University of Western Australia), National Institute of Clean and Low-Carbon Energy,* ***CHINA***	*Jinsu Kwon, and Jeong Ik Lee, Department of Nuclear and Quantum Engineering, Korea Advanced Institute of Science and Technology,* ***KOREA****	*Omar Basha (ORISE), Robert Thompson, Megan Macala, Jeffrey Culp, Wei Shi, and Lei Hong (AECOM), Nick Siefert, and Dave Hopkinson, National Energy Technology Laboratory, U.S. Department of Energy,* ***USA***
4:30 p.m.	**77. Elucidating the Behavior of a Blend of Prepared Woody Biomass and Utah Bituminous Coal in a Raymond Bowl Mill** *Seyedhassan Fakourian, and Andrew Fry, Brigham Young University,* ***USA***	**21. A Numerical Investigation into Combustion Characteristics of Ammonia Jet Diffusion Flames** *Jian Gao and Dongke Zhang (Centre for Energy (M473), The University of Western Australia) Key Laboratory of Biofuels, Qingdao Institute of Bioenergy and Bioprocess Technology, Chinese Academy of Sciences,* ***CHINA***	**18. Catalytic Gasifier-Based Direct Supercritical Carbon Dioxide (sCO_2) System Study** *Charles W. White, Principal Engineer, KeyLogic Systems, Inc,; and Walter W. Shelton, Nathan T. Weiland, and Travis R. Shultz, U.S. Department of Energy, National Energy Technology Laboratory,* ***USA***	**7. Sorption-enhanced Mixed Matrix Membranes for Precombustion CO_2 Capture** *Haiqing Lin, Assistant Professor , Lingxiang Zhu, PhD student, Deqiang Yin, PhD student, Shailesh Konda, PhD student, and Mark T. Swihart, Professor, Department of Chemical and Biological Engineering, University at Buffalo, The State University of New York,* ***USA (Invited)***
4:50 p.m.	**161. Upgrade of Mills und Burners for Biomass Firing** *Daniel Harajda, VP Engineering Operations, Mitsubishi,* ***USA***	**38. Carbon Dioxide Hydrogenation over a Metal-Free Carbon-Based Catalyst** *Juan Jimenez, Cun Wen, and Jochen Lauterbach, Department of Chemical Engineering, University of South Carolina; and Jingjie Wu and Pulickel Ajayan, Department of Materials Science and Nano-Engineering, Rice University,* ***USA***	**136. Modeling and Design Strategies for Direct-Fired sCO_2 Combustors** *K. R. V. Manikantachari, Prof. Jayanta Kapat, and Prof. Subith Vasu, Center for Advanced Turbomachinery and Energy Research (CATER), University of Central Florida; and Dr. Scott Martin, Eagle Flight Research Center, Embry-Riddle Aeronautical University,* ***USA***	**100. A Combined Computational and Experimental Approach to Mixed Matrix Membranes for CO_2 Capture** *Dave Hopkinson, Jan Steckel, Samir Budhathoki and Surendar Venna (AECOM), National Energy Technology Laboratory, U.S. Department of Energy; and Christopher Wilmer, University of Pittsburgh,* ***USA***

5:10 p.m.	**145. A Successful Torrefied Biomass Test Burn Program at the PGE Boardman Station** *Una Nowling, Black & Veatch,* ***USA***	**33. Re-utilizing Carbon Dioxide in Metal Combustion Processes** *Martin Schiemann and Viktor Scherer, Department of Energy Plant Technology, Ruhr-University Bochum, and Dan Taroata, and Günter Schmid, Siemens AG, Corporate Technology,* ***GERMANY****; and Jeffrey M. Bergthorson, Alternative Fuels Laboratory, Department of Mechanical Engineering, McGill University,* ***CANADA***	**72. Oxy-Combustion Modeling for Direct-Fired sCO$_2$ Cycles** *P.A. Strakey, National Energy Technology Laboratory, U.S. Department of Energy,* ***USA***	**102. Building Structural and Functional Gradients into Metal-Organic Frameworks for the Selective Transport of Molecular Species** *Nathaniel Rosi, Chong Liu, and Tianyi Luo, University of Pittsburgh,* ***USA (Invited)***
5:30 p.m. Beach Party – Poolside				

TUESDAY – June 5, 2018			
7:30 a.m. Continental Breakfast in the Exhibit Center			
8:00 a.m. Three Concurrent Technical Sessions			
	Session 5 **Sand Key Room** **Energy From Waste** *Alan Paschedag, Covanta*	**Session 6** **Gulf Room** **Innovative Low Carbon Fuels II** *Dongke Zhange, The University of Western Australia*	**Session 7** **Palm Room** **Oxy-Combustion I** *Dr. Klas Andersson (Chalmers University, Sweden)* **and** *Dr. Andrew Fry, Brigham Young University*
8:00 a.m.	**32. Reducing the Carbon Footprint of Spray Roasters: Iron as Fuel in Iron Chloride Processing** *Martin Schiemann and Viktor Scherer, Department of Energy Plant Technology, Ruhr-University Bochum, Bochum,* ***GERMANY****; and Jeffrey M. Bergthorson, Alternative Fuels Laboratory, Department of Mechanical Engineering, McGill University,* ***CANADA***	**147. Low Load Operating Challenges of Existing Air Quality Control Systems** *Suzette Puski, Babcock Power Environmental,* ***USA***	**75. Progress in Commissioning a Pilot-scale Staged, Pressurized Oxy-combustion System** *Zhiwei Yang, Dishant Khatri, Akshay Gopan, Pan Du, Tianxiang Li, Adewale Adeosun, Benjamin M. Kumfer, and Prof. Richard L. Axelbaum, Department of Energy, Environmental & Chemical Engineering, Washington University in St. Louis,* ***USA***
8:20 a.m.	**55. Magnetic Separation for the Recirculation of Oxygen Active Bed Materials When Combusting Municipal Solid Waste in Large Scale CFB Boilers** *Fredrik Lind, Mikael Israelsson, and Henrik Thunman, Chalmers University of Technology, Energy and Environment,* ***SWEDEN***	**123. The Effect of Nickel and Magnesium Loadings on the Activity, Selectivity and Stability for Catalytic Dry Reforming of Biogas Using Pt/cerium-zirconium Oxide Catalyst** *Yetunde Oluwatosin Sokefun, Babu Joseph, and John N. Kuhn Department of Chemical & Biomedical Engineering, University of South Florida,* ***USA***	**68. Model-Based Characterization of Elevated Temperature and High Pressure Oxy-Coal Combustion Systems** *Andrew Chiodo, Kevin Davis, Zhonghua Zhan, Dave Wang, and Martin Denison, Reaction Engineering International; and Kevin Whitty, and Jost Wendt, Department of Chemical Engineering and Institute for Clean and Secure Energy, University of Utah,* ***USA***

8:40 a.m.	**5. Gasification Kinetics of Blended Biomass-Plastic Char in CO_2** *K. Burra and A. K. Gupta, The Combustion Laboratory, Department of Mechanical Engineering, University of Maryland,* ***USA***	**19. Biomass Electrolysis for Hydrogen Production** *Xiang Lyu and Gerardine G. Botte, Center for Electrochemical Engineering Research, Department of Chemical and Biomolecular Engineering, Russ College of Engineering and Technology, Ohio University,* ***USA***	**66. Investigation on Combustion Characteristics of Lab-scale Pressurized Oxy-fuel Combustion System Using Gaseous Fuel** *Donghee Kim (Department of Mechanical Engineering, Pohang University of Science and Technology), Hyungjun Ahn, Won Yang, Taeyoung Chae, Jaewook Lee, and Youngjae Lee, Thermochemical Energy System, Korea Institute of Industrial Technology,* ***KOREA***
9:00 a.m.	***62.*** **Steam Network Study for Use of LP Waste Heat Recovery Boiler at Cracker Plant** *K. K. Parmar, Technology Department, Reliance Industries Limited; and S. K. Dash, School of Technology, Chemical Engineering Department, Pandit Deendayal Petroleum University,* ***INDIA***	**79. Low-Cost, Small-Scale Hydrogen Production** *Dr. Girish Srinivas, TDA Research, Inc.,* ***USA***	**3. Experiments on SO_x and NO_x Co-removal as Condensates during Compression of Oxyfuel Flue Gas: Extent, N_2O Formed, and Condensate Stability** *Rohan Stanger and Terry Wall, Chemical Engineering, University of Newcastle, and Peter Nelson, Chemistry, Macquarie University, Sydney,* ***AUSTRALIA***
9:20 a.m.	**27. Impacts of Co-firing Refuse Derived Fuel (RDF) in Rotary Cement Kilns: Numerical Investigation with Advanced Flight and Combustion Models for RDF** *V. Scherer , B. Liedmann, and S. Wirtz, Department of Energy Plant Technology (LEAT), Ruhr-University, Bochum,* ***GERMANY***	**144. Bulk Combustion Structure of Packed Activated Carbon Particles** *Hiroki Yoshitome, Tsuneyoshi Matsuoka, Takuya Yamazaki, Jian Gao and Yuji Nakamura, Toyohashi University of Technology,* ***JAPAN***	**47. Technology Development for a Pressurized Dry Feed Oxy-Coal Reactor – Year 1 Update** *Bradley Adams, Andrew Fry, and Dale Tree, Brigham Young University,* ***USA***

9:40 a.m.	**125. The Staged Thermal Conversion of Sewage Sludge** *Dr. Halina Pawlak-Kruczek, Wrocław University of Technology,* ***POLAND***	**37. NiCe@SiO_2 Yolk-Shell Nanotube Morphology and Its Catalytic Effects on Activity and Stability in Tri-Reforming of Methane** *Sunkyu Kim, Erdem Sasmaz, and Jochen Lauterbach, Smartstate Center for Strategic Approaches to the Generation of Electricity (SAGE), Department of Chemical Engineering, University of South Carolina,* ***USA***	**TBA**
10:00 a.m. Break in the Exhibit Center			

10:30 a.m. – Three Concurrent Technical Sessions			
	Session 8 **Sand Key Room** **Fluidized Bed and Dense Particle Flows** *Dr. Ronald Breault, National Energy Technology Laboratory, U.S. Department of Energy*	**Session 9** **Gulf Room** **Combustion Fundamentals** *Dr. Weihong Yang, KTH Royal Institute of Technology, Sweden*	**Session 10** **Palm Room** **Oxy-Combustion II** *Dr. Klas Andersson (Chalmers University, Sweden)* **and** *Dr. Andrew Fry, Brigham Young University*
10:30 a.m.	**28. Numerical Approaches for Modeling Gas-Solid Fluidized Bed Reactors: Comparison of the Models and Application to Different Technical Problems** *Peter Ostermeier, Annelies Vandersickel, Stephan Gleis, and Hartmut Spliethoff (Bavarian Center for Applied Energy Research (ZAE Bayern), Institute for Energy Systems, Technical University of Munich, Germany,* ***GERMANY*****	*64.* **Chemical Interactions Between NO_x and Soot in Oxygen-enriched Propane Flames** *Rikard Edland, Thomas Allgurén, Fredrik Normann, Klas Andersson, Department of Space Earth and Environment, Division of Energy Technology, Chalmers University of Technology,* ***SWEDEN*****	**34. Integrated Flue Gas Purification for Staged, Pressurized Oxy-Combustion** *David Stokie, Benjamin Kumfer, Piyush Verma, Yujia Min, Yaguang Zhu, Young-Shin Jun and Richard L. Axelbaum, Energy, Environmental and Chemical Engineering Dept., Washington University; Gregory Yablonsky, Parks College,* ***USA****; and Akkihebbal K. Suresh, Dept. of Chemical Engineering, Indian Institute of Technology,* ***INDIA*****
10:50 a.m.	**74. Vortexing CFB High Speed Video Analysis: Axial Particle Velocity Distribution** *Michael Bobek, Ron Breault, Frank Shaffer, and Justin Weber, National Energy Technology Laboratory, U.S. Department of Energy,* ***USA***	**58. Toward Understanding Mercury(Hg) Speciation in Coals by Sequential Extraction and Thermal Desorption** *Yinjiao Su, Yang Teng, Xuan Liu, Yanjun Guan, and Kai Zhang, Beijing Key Laboratory of Emission Surveillance and Control for Thermal Power Generation, North China Electric Power University,* ***CHINA***	**20. The Effects of Specific Heat, Radiation and Gasification on the MILD-Oxy Combustion of Pulverized Coal at H_2O/CO_2 atmospheres** *Zewu Zhang, Xiaoshan Li, Cong Luo, Liqi Zhang, Xiongqing Xu, Ji Liu, Chuguang Zheng, State Key Laboratory of Coal Combustion, School of Energy and Power Engineering, Huazhong University of Science and Technology, Wuhan,* ***CHINA***
11:10 a.m.	**101. Integrated Beneficiation and Drying of Low Rank Coal in Air Dense Medium Fluidized Bed** *Ebrahim Azimi, Department of Mining Engineering, Isfahan University of Technology,* ***IRAN****; and Rajender Gupta,*	**14. Application of Sorbent Polymer Catalyst (SPC) Modules for Mercury Emission Control** *A. Ryfa, W.A. Adamczyk, R.A. Białecki, and M. Nowak, Institute of Thermal Technology, Silesian*	**81. Impact of Flue Gas Recycle on Efficiency of Oxy-fuel Combustion Systems** *Piyush Verma, Akshay Gopan, Zhiwei Yang and Richard L. Axelbaum, Department of Energy, Environmental &*

	Faculty of Engineering, University of Alberta, ***CANADA***	*University of Technology, and M. Wdowin, The Mineral and Energy Economy Research Institute of the Polish Academy of Sciences; and R. Żmuda, S. Mandrela, L. Lelek, B. Higins, E. Pozzobon, SBB ENERGY S.A. DeNOx Technology Department,* ***POLAND***	*Chemical Engineering, Consortium for Clean Coal Utilization, Washington University in St. Louis,* ***USA****
11:30 a.m.	**73. Grid Jet Particle Attrition Model Development for Circulating Fluidized Bed Systems** *Nathan Galinsky (Oak Ridge Institute of Science and Education), Samuel Bayham, and Ronald Breault, National Energy Technology Laboratory,* ***USA***	**67. Predicting Particle Deposition Temperature for Flow Over a Boiler Tube in Combustion Environments** *Akshay Gopan, Zhiwei Yang, and Richard L. Axelbaum, Department of Energy, Environmental & Chemical Engineering, Washington University in St. Louis,* ***USA***	**111. Performance Analysis of Advanced Thermal Power Generation System Based on Pressurized Oxy-combustion** *Tefera Zelalem Tumsa and Won Yang (Green Process and System Engineering, University of Science and Technology (UST), Youngjae Lee, Yong Woon Lee, Jaewook Lee, and Woo Sang Jung, Korea Institute of Industrial Technology,* ***SOUTH KOREA****; and Fredrik Normann and, Klas Andersson, Energy and Environment, Chalmers University of Technology,* ***SWEDEN***
11:50 a.m.	**48. Modeling Transport of Pressurized Dense Phase Coal** *Taylor Schroedter, and Bradley Adams, Brigham Young University,* ***USA***	**71. Early Stage Sub-micron Particle Formation During Pulverized Coal Combustion in Two-stage Flat Flame Burner** *Dishant Khatri, Adewale Adeosun, Akshay Gopan, Zhiwei Wang, and Richard L. Axelbaum, Department of Energy, Environmental & Chemical Engineering, Consortium for Clean Coal Utilization, Washington University in St. Louis,* ***USA***	**146. The Interaction Between Alkali, Sulphur, Nitrogen and Soot-species in Oxygen-rich Flames** *Thomas Allgurén, Klas Andersson, and Fredrik Normann, Department of Space Earth & Environment, Chalmers University of Technology,* ***SWEDEN***
12:10 p.m.	**131. Three Dimensional Full-Loop Simulation of a Circulating Fluidized Bed Gasifier** *Vikrant Sharma and Prof. V.K. Agarwal, Department of Chemical Engineering, Indian Institute of Technology*	**36. Activation of Oil Shale Ashes for Sulfur Capture** *Olev Trass, Department of Chemical Engineering and Applied Chemistry, University of Toronto,* ***CANADA***	**150. Oxy-Combustion Characteristics of Lignite and Wood Pellet in a 0.1 MW_{th} Circulating Fluidized Bed Combustion System** *Tae-Young Mun, Ji Hong Moon, Sung-Ho Jo, Myung Won Seo, Sung-Jin Park, Ho Won*

	Roorkee, Roorkee, Uttarakhand, ***INDIA***		*Ra, Sung-Min Yoon and Jae-Goo Lee, Korea Institute of Energy Research; and Nguyen Hoang Khoi, Kunsan National University,* ***KOREA***
12:30 p.m. – Lunch – Exhibit Center			
2:00 p.m. Energy From Waste Panel – Palm Bay Rooms *Moderator: Prof. Ashwani Gupta, University of Maryland* • *Dr. Marco Castaldi, City University of New York,* ***USA*** • *Dr. Kunio Yoshikawa, Tokyo Institute of Technology,* ***JAPAN*** • *Dr. Somrat Kerdsuwan, King Mungkut University of Technology North Bangkok,* ***THAILAND*** • ***Current Waste Management Trends in Europe/ Poland*** *Prof. Grzegorz Wielgosinski, Lodz University, Dr. Halina Pawlak-Kruczek, Wrocław University of Technology,* ***POLAND***			
3:30 p.m. Break in the Exhibit Center			

4:00 p.m. Four Technical Sessions				
	Session 11 **Sand Key Room** **Radiative Heat Transfer** *Brad Adams, Brigham Young University*	**Session 12** **Gulf Room** **Gasification** *Massood Ramezan, KeyLogic*	**Session 13** **Palm Room** **Chemical Looping I – Oxygen Carrier Development** *Dr. Andrew Tong, Ohio State University* **and** *Dr. Mandar Kathe, Ohio State University*	**Session 14** **Beach Room** **Carbon Capture Utilization & Sequestration II** *Dr. David Hopkinson, National Energy Technology Laboratory, U.S. Department of Energy, and Prof. Jochen Lauterbach, University of South Carolina*
4:00 p.m.	**49. Particle Property Impacts on Radiation in a Pressurized Oxy-Coal Combustor** *Ty Hosler, and Bradley Adams, Brigham Young University,* ***USA***	**10. Design and Performance of First Commercial Scale Transport Gasifier at the Kemper IGCC Power Plant** *Guohai Liu, WanWang Peng, Brandon Davis, Philip J. Keb, P. Vimalchand, Matt Nelson, and Tim Pinkston, Gasification Technology, Southern Company; and Diane Revay Madden, Project Manager, U. S. Department of Energy, National Energy Technology Laboratory,* ***USA***	**53. A Method to Examine Oxidation Kinetics of Ilmenite** *Fredrik Lind, and Klas Andersson (Brigham Young University, Chemical Engineering Department), Chalmers University of Technology, Department of Space, Earth and Environment,* ***SWEDEN***	**76. Status of Technology Development at the National Carbon Capture Center** *Doug McCarty, NCCC Process and Design Engineering Manager, Southern Company,* ***USA***
4:20 p.m.	**78. Radiometer Measurements in High Pressure Flames: System Design, Sensors and Calibration** *Lara Houghton, Brad Adams, and Andrew Fry, Brigham Young University,* ***USA****; and Adrian Gunnarsson, and Klas Andersson,*	**4. Turnkey Plasma Gasification Solution for the destruction of Hazardous Wastes** *Kal Bhojak, Business Analyst, Alter NRG Corp.,* ***CANADA***	**132. Development of Bimetallic Cu-Fe Oxygen Carriers for Coal Chemical-Looping Combustion** *Ping Wang, National Energy Technology Laboratory, U.S. Department of Energy,* ***USA***	**121. Thermodynamic Efficiency of Absorption/Stripping Based CO_2 Capture Processes** *Scott Chen, Carbon Capture Scientific, LLC,* ***USA***

	Chalmers University of Technology, ***SWEDEN***			
4:40 p.m.	**115. Simulation of the Thermal Behavior of Heat Exchangers in a Pressurized Combustion System** *Pan Du, Zhiwei Yang, Akshay Gopan and Prof. Richard. L. Axelbaum, Department of Energy, Environmental & Chemical Engineering, Washington University in St. Louis,* ***USA***	**9. Transport Gasifier Integrated Coal Feed and Ash Handling Systems at the Kemper IGCC Power Plant** *WanWang Peng,* Guohai Liu, *Brandon Davis, Philip J. Keb, P. Vimalchand, Matt Nelson, and Tim Pinkston, Southern Company; and Diane Revay Madden, Project Manager, U. S. Department of Energy, National Energy Technology Laboratory,* ***USA***	**41. Tailored Mn-Containing Perovskites for Chemical Looping with Oxygen Uncoupling** *Luke Neal, Amit Mishra, Erik Santiso, Fanxing Li, Dept. of Chemical and Biomolecular Engineering, North Carolina State University,* ***USA***	**124. UKy-CAER Approach to CO_2 Capture** *Heather Nikolic, Reynolds Frimpong, James Landon, Department of Mechanical Engineering, and Kunlei Liu, University of Kentucky Center for Applied Energy Research,* ***USA***
5:00 p.m.	**50. Full Scale 3D-Modelling of the Radiative Heat Transfer in Rotary Kilns with a Present Bed Material** *Adrian Gunnarsson, and Klas Andersson (Mechanical Engineering Department, Brigham Young University), Space, Earth and Environment, Chalmers University of Technology,* ***SWEDEN****; and Bradley Adams, Mechanical Engineering Department, Brigham Young University,* ***USA*******	**110. Effect of Hydrocarbons and Dilution on NO_x Formation in Pressurized Premixed Syngas/Air Flames** *Nazli Asgari, Ryan Cichowicz and Bihter Padak, Department of Chemical Engineering, University of South Carolina,* ***USA***	**82. Red Mud-modified Oxygen Carrier for Chemical Looping Combustion: A Possible Solution to the Heat of Combustion Compensation** *Lian Kong, Heather Nikolilc, Zhen Fan and Kunlei Liu, Center for Applied Energy Research, University of Kentucky,* ***USA***	**122. An Innovative Gas Pressurized Stripping (GPS) Process for CO_2 Separations** *Scott Chen, Carbon Capture Scientific, LLC,* ***USA***
5:20 p.m.	**130. Total Radiation Intensity from Combustion Gas Measurement** *Bradley Adams, John Tobiasson, Scott*	**142. Pilot-Scale Capture of Mercury, Arsenic, and Selenium from Warm Syngas at Elevated Pressures**	**23. A Novel CeO_2 Supported $Ba_{0.3}Sr_{0.7}Co_xFe_{1-x}O_{3-\delta}$ Perovskites for Chemical-looping Steam Methane**	**127. Update on PCC with ION's Advanced Solvent at 12 MWe Scale** *Dr. Erik Meuleman, ION Engineering,* ***USA***

	Egbert, and Dale Tree, Brigham Young University, ***USA***	**by Palladium Sorbents** *Henry W. Pennline, Karen J. Uffalussy, Elliot Roth, and Evan J. Granite, National Energy Technology Laboratory, United States Department of Energy; Tony Wu, Nick Seamon, Subhash Datta, and Robert C. Lambrecht, National Carbon Capture Center, Southern Company,* ***USA****; and Hugh G. C. Hamilton, Stephen Poulston, Liz Rowsell, Wilson Chu, and Andrew W. J. Smith, Johnson Matthey Technology Centre,* ***UNITED KINGDOM***	**Reforming to Syngas and Hydrogen** *Dingshan Cao, Haoran Ding, Guoqiu Cai, Xuan Yang, Cong Luo, Liqi Zhang, and Chuguang Zheng, State Key Laboratory of Coal Combustion, School of Energy and Power Engineering, Huazhong University of Science, Wuhan,* ***CHINA****	
5:40 p.m.	**155. Spectral Emittance of Important Coal Ashes Minerals and Selected Mixtures Thereof: Pyrite, Iron Oxide, Carbonates and Sulfates** *J. Gorewoda, V. Scherer, Department of Energy Plant Technology, Ruhr-University Bochum,* ***GERMANY***	**152. Non-Traditional Thermal Reactors for Gasification** *Dr. Ronald Breault, National Energy Technology Laboratory, U.S. Department of Energy,* ***USA***	**98. The Search of Proper Oxygen Carriers for Chem-ical Looping Partial Oxidation of Carbon** *Jinzhi Zhang, Tao He, Zhiqi Wang, and Jinhu Wu, Key Laboratory of Biofuels, Qingdao Institute of Bioenergy and Bioprocess Technology, Chinese Academy of Sciences,* ***CHINA***	**148. CO_2 as a Geological Working Fluid: Enhancing Oil Recovery from Unconventional Resources** *Jared Ciferno, National Energy Technology Laboratory, U.S. Department of Energy,* ***USA***
6:00 p.m. – Conclusion of Technical Program				

WEDNESDAY MORNING – June 6, 2018				
7:30 a.m. Continental Breakfast in the Exhibit Center				
8:00 a.m. Four Concurrent Technical Sessions				
	Session 15 **Beach Room** **Combustion Technologies** *J.J. Letcavits, AEP* **and** *Alan Paschedag, Covanta*	**Session 16** **Gulf Room** **Recovery of Rare Earth Elements I** *Prof. Eric Eddings, University of Utah*	**Session 17** **Palm Room** **Chemical Looping II – Process and Reactor Design and Testing** *Thomas Flynn, Babcock and Wilcox,* **and** *Dr. Luke Neal, North Carolina State University*	**Session 18** **Bay Room** **Biomass To Fuel** *Prof. Viktor Scherer, Ruhr-Universität Bochum, Germany*
8:00	**17. Technical Scale Experimental Evaluation of Scrubber Based NO_x and SO_x Control** *Jakob Johansson, Fredrik Normann, Klas Andersson, Chalmers University of Technology, Department of Energy and Environment; and Anette Heijnesson-Hultén, Pär Nilsson, and Marie Samuelsson, Akzo Nobel Pulp and Paper Performance Chemicals, Bleaching Chemicals,* ***SWEDEN***	**63. Rare Earth Elements Recovery from North Dakota Lignite** *Dan Laudal, Institute for Energy Studies, University of North Dakota; Steve Benson, Microbeam Technologies Incorporated; Dan Palo, Barr Engineering Company; and Shane Addleman; Pacific Northwest National Laboratory,* ***USA***	**96. Update on Design of 10 MWe Iron-Based Coal-Direct Chemical Looping Demonstration Plant** *Luis Velazquez Vargas, Timothy Fuller, William Arnold, Thomas Flynn, The Babcock & Wilcox Company; and Dawei Wang, Dikai Xu, Tien-Lin Hsieh, Cody Park, Andrew Tong, and Liang-Shih Fan, The Ohio State University,* ***USA***	**54. Evaluation of Cheap Catalysts for Catalytic Fast Pyrolysis of Lignin with Aiming at of Bio-oil Production** *Tong Han, Weihong Yang, and Pär Jönsson, KTH Royal Institute of Technology, Department of Material Science Engineering, Unit of process, Group of Energy and Furnace Technology,* ***SWEDEN****
8:20	**6. Effect of Pre-drying on the Combustion Characteristics of Zhundong Lignite** *Zhezi Zhang, Mingming Zhu, Dongke Zhang and Jianbo Li (Key Laboratory of Low-grade Energy Utilization*	**163. Rare Earth Elements from Coal-Based Resources** *Mary Anne Alvin, Technology Manager, Rare Earth Elements, Science & Technology Strategic Plans, National Energy Technology Laboratory, U.S. Department of Energy*	**99. Conversion of Coal in a Fluidized Bed Chemical Looping Reactor with and without Oxygen Uncoupling** *Kirsten M. Merrett and Kevin J. Whitty, Department of Chemical Engineering, University of Utah,* ***USA***	**25. Operational Results from a Coal/Biomass to Liquid Fuels Pilot Facility** *Andrew Placido, Center for Applied Energy Research, and Kunlei Liu, Department of Mechanical Engineering,*

	Technologies and Systems of the Ministry of Education of China, Chongqing University, ***CHINA****), Centre for Energy (M473), The University of Western Australia,* ***AUSTRALIA****; Kai Zhang, Guoqing Shen, and Gang Xu, Beijing Key Laboratory of Emission Surveillance and Control for Thermal Power Generation, North China Electric Power University,* ***CHINA****; and Xianchun Li, School of Chemical Engineering, University of Science and Technology Liaoning,* ***CHINA***	***USA***		*University of Kentucky, Lexington,* ***USA***
8:40	**52. Retrofitting of Existing NO_x Control System to Meet Specified Emission Limits in IED** *W.A. Adamczyk, Institute of Thermal Technology, Silesian University of Technology; and D. Bandola, R. Żmuda, S. Mandrela, and L. Lelek, SBB ENERGY S.A. DeNO$_x$ Technology Department,* ***POLAND***	**112. Partitioning Behavior of Rare Earth Elements in a Coal Preparation Facility** *Peter Bethell, Marshall Miller and Associates,* ***USA***	**93. Syngas Chemical Looping Process for Hydrogen Production: Process Analysis and Pilot Plant Design and Testing** *Tien-Lin Hsieh, Dikai Xu, Yitao Zhang, Sourabh Nadgouda, Dawei Wang, Cheng Chung, Yaswanth Pottimurphy, Mengqing Guo, Yu-Yen Chen, Mingyuan Xu, Pengfei He, Liang-Shih Fan, and Andrew Tong, The Ohio State University,* ***USA***	**8. Effect of Biochar Addition, Initial pH and Temperature on Methane Production in Two-Phase Anaerobic Digestion of Carbohydrates Food Waste** *Nimas M. S. Sunyoto, Mingming Zhu, Yusron Sugiarto, and Dongke Zhang, Centre for Energy (M473), The University of Western Australia,* ***AUSTRALIA***
9:00	**57. 600MW Supercritical Tower-Type Pulverized Coal-fired Boiler for**	**113. Precon-centration of Coal-Based Rare Earth Element Feedstocks Using X-Ray Sorter**	**95. Evaluation of a Spouted Bed Reactor for Chemical-Looping-Combustion of Solid**	**141. The World's First Coal to Biomass Conversion Using Advanced Wood Pellets**

	Burning High-alkali Content Zhundong Coal *Hai Zhang, Jianwen Zhang, Yanmei Yang, Yang Zhang, Naixin Wu, Xiaojiang Wu, Xiang Zhang, Qing Liu, Junfu Lu, Key Laboratory for Thermal Science and Power Engineering of the Ministry of Education, Departme nt of Energy and Power Engineering, Tsinghua University, and Shanghai Boiler Works Co., Ltd, Shanghai Electric Group,* ***CHINA***	**Technology** *Dr. Gerald Luttrell, Virginia Technical University,* ***USA***	**Fuels** *Johannes George van der Watt, Ben Jenson, Daniel Laudal, Harry Feilen, Junior Nasah, Michael Mann, and Ryder Shallbetter, UND Institute for Energy Studies, University of North Dakota (IES, UND); Gautham Krishnamoorthy; Department of Chemical Engineering, UND; and Srivats Srinivasachar and Teagan Nelson Envergex LLC,* ***USA***	*Les Marshall, Ontario Power Generation* ***Canada***
9:20	**65. A Study on Pulverized Coal Ignition Using a Two-stage Flat-flame Burner with a Transition from a Reducing Environment to Oxidizing Environment** *Adewale Adeosun, Dishant Khatri, Akshay Gopan, Zhiwei Yang, Tianxiang Li, and Richard L. Axelbaum, Department of Energy, Environmental & Chemical Engineering, Washington University in St. Louis,* ***USA***	**138. LIBS Sensor for a Rapid Source Characterization of Rare Earth Elements** *Chet Bhatt, Jinesh Jain, Daniel Hartzler, and Dustin McIntyre, National Energy Technology Laboratory, U.S. Department of Energy,* ***USA***	**134. Chemical Looping Oxidative Dehydrogenation: A Greener Route to Ethylene Production** *Vasudev Pralhad Haribal, Luke Neal, Fanxing Li, Department of Chemical and Biomolecular Engineering, North Carolina University,* ***USA*****	**29. Rheological Properties and Stability Characteristics of Biochar-Algae-Water Slurry Fuels Prepared by Wet Milling** *Pengfei Liu, Mingming Zhu, Zhezi Zhang, and Dongke Zhang, Centre for Energy (M473), The University of Western Australia,* ***AUSTRALIA***
9:40	**162. Management of Boiler Slagging in an Open-Pass Coal Boiler after Low-NO_x Retrofit** *Kevin Davis, Hong-*	**143. Study of Western Pennsylvania Fireclays for Rare-Earth Element Content**	**133. Effect of Volatiles on Natural Iron-based Oxygen Carriers During Long Operation of Chemical Looping**	**TBA**

	Shig Shim and James Valentine, Reaction Engineering International; Mark Simpson, Edward McGovern, and Annette Hope, Ohio Valley Electric Corporation, Kyger Creek Station; and J.J. Letcavits, American Electric Power, ***USA***	*Dr. Robert Uhrin, XLight Corporation,* ***USA***	**Combustion of Victorian Brown Coal** *Imtenan Sayeed, Srikanth Srivatsa, and Sankar Bhattacharya, Department of Chemical Engineering, Monash University,* ***AUSTRALIA***	
10:00 a.m. Break in the Exhibit Center				
10:30 a.m. Four Concurrent Technical Sessions				
	Session 19 **Beach Room** **Supercritical CO_2 II** *Joshua Stanislowski, UNDEERC* **and** *Bhupesh Dhungel, Air Liquide*	**Session 20** **Gulf Room** **Carbon Capture Utilization & Sequestration III** *Dr. Sankhar Bhattacharaya, Monash University,* ***Australia***	**Session 21** **Palm Room** **Modeling I** *Dr. Edmundo Vasquez, Consultant, Boiler Combustion and Emission Controls*	**Session 22** **Beach Room** **Recovery of Rare Earth Elements II** *Prof. Eric Eddings, University of Utah*
10:30 a.m.	**26. Study of Magnetic Bearing Instability Issues in Supercritical CO_2 Turbomachinery** *Dokyu Kim,Seungjoon Baik, and Jeong Ik Lee, Department of Nuclear and Quantum Engineering, Korea Advanced Institute of Science and Technology,* ***KOREA*****	**118. Carbon Dioxide Conversion over LaCoxFeyMn1-x-yO3 Perovskite Oxides** *Adela Ramos, Debtanu Maiti, Yolanda Daza, John N. Kuhn, Venkat R. Bhethanabotlam, University of South Florida,* ***USA***	**13. Application CFD-LES Model for Modeling Multifluid Coal Combustion in Large Utility Boiler** *W.P. Adamczyk, Institute of Thermal Technology, Silesian University of Tech-nology, and R. Zmuda, SBB ENERGY S.A., DeNox Technology Department,* ***POLAND****; and B. Isaac, J. Parra-Alvarez, S. Smith, D. Harris, J. Thornock, M. Zhou, and P. Smith, Institute for Clean and Secure Energy, University of Utah,* ***USA***	**139. Determination and Recovery of Rare Earths from Coal Combustion By-Products** *Evan Granite and Elliot Roth, United States Department of Energy; and Ken Ladwig, Electric Power Research Institute,* ***USA***

10:50 a.m.	**108. Corrosion of Alloys in Direct-fired Supercritical CO_2 Power Cycles** *Ömer N. Doğan, Joseph H. Tylczak, Reyixiati Repukaiti, Richard P. Oleksak (AECOM), Margaret Ziomek - Moroz, and Gordon R. Holcomb, National Energy Technology Laboratory, U.S. Department of Energy,* ***USA***	**51. New Method for Numerical Modeling of CO_2 Sequestration in Dollar Bay Formation, Florida, USA** *Ram Kumar, Department of Chemical & Biomedical Engineering, University of South Florida; Tina Roberts-Ashby and Madalyn Blondes, U.S. Geological Survey; and Peter Bereger, Illinois State Geological Survey,* ***USA*****	**35. Ash Deposition Modeling I Low Temperature Heat Exchangers for Pulverized Coal Fired Power Plant Applications** *Sandeep Aryal, Santosh Tamang and Kwangkook Jeong, Arkansas State University,* ***USA****; and Jedal Lee, Doosan Heavy Industries & Construction Co.,* ***KOREA***	**153. Production of Critical Rare Earth Element Concentrates from Coal Sources** *R. Honaker, J. Werner and W. Zhang, Department of Mining Engineering, University of Kentucky; and R.-H. Yoon, G.H. Luttrell and A. Noble, Mining & Minerals Engineering, Virginia Tech,* ***USA***
11:10 a.m.	**116. Supercritical CO_2 Cycles for Next Generation Concentrated Solar Power and Nuclear Power Plants: Thermodynamic Optimization and Transient Analysis** *Akshay Khadse, Ankur Deshmukh, Jahed Hossain, and Jayanta Kapat University of Central Florida,* ***USA***	**69. Post Combustion CO_2 Capture for Conventional Coal Plants Using Supersonic Expansion and Oblique Shock Compression Gas Separation** *John VanOsdol, National Energy Technology Laboratory, U.S. Department of Energy,* ***USA***	**42. Large Technical Scale Parametric Investigation of Co-firing of Hard Coal and Pre-dried Lignite under Part Load and Full Load Conditions in the Scope of Enhancing the Flexibility of Hard Coal Fired Power Stations** *Ioannis Papandreou, Selahattin Babat, Jörg Maier, Costas Georgiou, Emmanouil Karampinis, Ioannis Avagianos, Panagiotis Vounatsos, Panagiotis Grammelis, and Emmanuel Kakaras, Institute of Combustion and Power Plant Technology – IFK, University of Stuttgart,* ***GERMANY*****	**164. Recovery of High Purity Rare Earth Elements from Coal Ash** *Rick Peterson, Mike Heinrichs, and Darwin Argumedo, Battelle; and Joseph Brewer, and Ryan Winburn, Rare Earth Salts,* ***USA***

11:30 a.m.	**128. Dynamic Corrosion Testing of Alloys in Supercritical CO_2 Environments, including Sulfur** *Joshua Stanislowski, Energy and Environmental Research Center, University of North Dakota,* ***USA***	**22. Synthesis of Calcium-based CO_2 Sorbents by Wet-mixing Combustion Method for Carbonate Looping Cycle** *Linyi Xiang, Ning Ding, Yang Xuan, Cong Luo, Liqi Zhang, and Chuguang Zheng, State Key Laboratory of Coal Combustion, School of Energy and Power Engineering, Huazhong University of Science; and Hebei Ji-Yan Energy Science and Technology Research Institute Co. Ltd,* ***CHINA***	**45. Large Eddy Simulation of Dynamic Ash Deposition and Erosion in the Pulverized Coal Boiler** *Min-min Zhou, Benjamin Isaac, Sean T. Smith, Jeremy N. Thornock, and Philip J. Smith, The University of Utah,* ***USA****	**104. Simultaneous Extraction of Clean Coal and Rare Earth Elements from Coal Middlings Using Alkali-Acid Leaching Process** *V. Kumar, A. Kumar and M. Holuszko, Norman B. Keevil Institute of Mining Engineering, University of British Columbia (UBC),* ***CANADA***

11:50 a.m. – Themed Lunch in the Exhibit Center – *These industry leaders are hosting tables; all conference attendees are eligible to sign up:*

- **Positioning to Win Government R&D Funding,** *Phil Winkler*
- **Energy From Waste,** *Alan Paschedag, Covanta*
- **Adaptive Mining Chains,** *Dr. Dave Osborne, Somerset Int'l Australia Pty. Ltd., Australia*
- **Biomass Utilization,** *Les Marshall, Ontario Power Generation, Canada*
- **Modular Energy Systems,** *Massood Ramezan, KeyLogic LLC*
- **Fuel Reforming**, *Prof. Ashwani Gupta, University of Maryland*
- **Combustion and Low NO_x Burners**, *J.J. Letcavits, AEP*
- **High Efficiency and Low Emission Technologies**, *Dr. Raj Gupta, University of Alberta, Canada*

1:30 p.m. – Adaptive Mining Chains Panel

Moderator: Dr. Dave Osborne, Somerset International Australia Pty Ltd., AUSTRALIA

- *Michael O'Brien, Team Leader, Enhanced Coal Processing, Mining and Processing Technologies /Coal Mining Program, Queensland Centre for Advanced Technologies (QCAT), CSIRO,* ***AUSTRALIA***
- *Peter Bethell, Senior Principal: Mineral Processing, Marshall Miller and Associates,* ***USA***
- *Prof. Rick Honaker, Department of Mining Engineering, University of Kentucky,* ***USA***

3:30 p.m. – Break in the Exhibit Center

4:00 p.m. – Exhibit Center Closes and Is Dismantled

4:00 p.m. – Four Technical Sessions				
	Session 23 **Beach Room** **Innovative Power Applications** *David Tucker, National Energy Technology Laboratory, U.S. Department of Energy* **and** *Dalia El Tawy, Siemens*	**Session 24** **Gulf Room** **Chemical Looping III – Process and Component Analysis** *Dr. Andrew Tong, Ohio State University*, **and** *Vasudev Pralhad Haribal, North Carolina State University*	**Session 25** **Palm Room** **Modeling II** *Dr. Edmundo Vasquez, Consultant, Boiler Combustion and Emission Controls*	**Session 26** **Bay Room** **Upgrading/ Beneficiation** *Dr. Dave Osborne, Somerset International Australia Pty Ltd., Australia*
4:00	**83. Incorporating Thermal Energy Storage into Fuel Cell Turbine Hybrid Power System** *Wadood Daoud, Michael Shelton, David Tucker, Larry Shadle, Ron Breault, and Nor Farida Harun, National Energy Technology Laboratory, U.S. Department of Energy,* ***USA***	**92. Chemical Looping Coal Gasification Economic Assessment for IGCC Applications and Sub-pilot Scale Demonstrations** *Andrew Tong, Pengfei He, Tien-lin Hsieh, Peter Sandvik, Dawei Wang, Fanhe Kong, Mandar Kathe, Vedant Shah , and Liang-Shih Fan, The Ohio State University; Jim Simpson, and Erich Mace, Worley Parsons Company; and Bob Statnick, Clearwater Consulting Company,* ***USA***	**89. A Preliminary Model to Predict the Complex Refractive Indices of Natural Coal Ash at High Temperature** *Teri Draper, Erica White, Terry Ring, and Eric Eddings, Department of Chemical Engineering, University of Utah,* ***USA****	**158. Coal Tar and Biosolvent Extraction of Heavy Liquids from Appalachian Bituminous Coal** *Elliot B. Kennel (Applied Sciences, Inc.), Gilbert Chalifoux, and Mark Scafela, Quantex Energy; and Satya Chauhan and Daniel Garbark, Battelle Memorial Institute,* ***USA***
4:20	**149. Integrated Approach to Plant Water and ELG** *Suzette Puski, Babcock Power Environmental,* ***USA***	**94. Reactive Jet Attrition Analysis of Oxygen Carriers in Chemical-Looping-Combustion Systems** *Johannes Van der Watt, Daniel Laudal, Harry Feilen, and Michael Mann, Institute for Energy Studies, University of*	**129. Development of a Cold-flow Visualization Rig (C-FVR) for the Design and Modeling of Spouted Bed Reactors** *John P Dooher, Dooher Institute of Physics and Energy, and Phil Beylison , Basil Spanopoulos,*	**46. The Changing Role of Technical Standards in Coal Preparation and Handling** *Dave Osborne, Somerset International Australia Pty Ltd.; Michael Campbell, Enhanced Coal Processing, Mining*

		North Dakota (IES, UND); Srivats Srinivasachar, and Teagan Nelson; Envergex LLC; and Steven A. Benson; Microbeam Technologies Incorporated, ***USA***	*Devan Cole, and Frank Chisena, Department of Physics, and Jingfeng Ju, Environmental Studies, Adelphi University,* ***USA***	*and Processing Technologies /Coal Mining Program, Queensland Centre for Advanced Technologies (QCAT), CSIRO; and Michael O'Brien, Steel River Testing,* ***AUSTRALIA***
4:40	**114. Development of a Continuous Fluidized Bed Reactor for Thermochemical Energy Storage Application** *Manuel Würth, Moritz Becker, Peter Ostermeier, Stephan Gleis, and Hartmut Spliethoff (Bavarian Center for Applied Energy Research (ZAE Bayern)), Institute for Energy Systems, Technical University of Munich,* ***GERMANY*****	**137. Chemical Looping Combustion Reference Plant Design and Sensitivity Studies with A CLOU-based Oxygen Carrier** *Robert Stevens, National Energy Technology Laboratory, U.S. Department of Energy; Richard Newby, KeyLogic Systems, Inc.; and Dale Keairns, Deloitte Consulting, LLP,* ***USA***	**60. Computational Fluid Dynamic Simulations of Coal Pyrolysis in a Circulating Fluidized Bed Reactor** *Yanjun Guan, Kai Zhang, Wenbiao Zhang, Yang Teng, and Nana Qi, Beijing Key Laboratory of Emission Surveillance and Control for Thermal Power Generation, North China Electric Power University,* ***CHINA***	**126. Coal Preparation Research in Australia's Commonwealth and Scientific Research Organisation (CSIRO)- Multislope Screen Research** *Michael O'Brien and Shenggen Hu, Enhanced Coal Processing, Mining and Processing Technologies /Coal Mining Program, Queensland Centre for Advanced Technologies (QCAT), CSIRO; and Nerrida Scott, Independent Consultant,* ***AUSTRALIA***
5:00	**156. Cogeneration Solutions Using Renewable Fu els - Case Studies** *Dalia El Tawy, Siemens,* ***USA***	**120. Hot Flow Demonstration of a Carbon Stripper for Chemical Looping Combustion** *Ben Jensen Junior Nasah, Dan Laudal, Harry Feilen, Nicholas Dyrstad-Cincotta, Institute for Energy Studies, University of North Dakota (IES, UND); and Srivats Srinivasachar and Teagan Nelson, Envergex LLC, USA*	**TBA**	**107. Coal Preparation Research in Australia's Commonwealth and Scientific Research Organisation (CSIRO)- Dense Medium Cyclone Circuits** *Michael O'Brien and Shenggen Hu, Enhanced Coal Processing, Mining and Processing Technologies/Coal Mining Program, Queensland Centre for*

				Advanced Technologies (QCAT); and Nerrida Scott, Independent Consultant, ***AUSTRALIA***
5:20	**154. Production of Carbon Nanotubes from Syngas** *Elliot B. Kennel, Applied Sciences Inc.; and Robert M. Statnick, Clear Skies, LLC; and Liang-Shih Fan, Frank Kong, and Andrew Tong, William. G. Lowrie Department of Chemical and Biomolecular Engineering, Koffolt Labs, The Ohio State University,* ***USA***	**135. CFD Simulations of Chemical Looping Combustion in a Packed Bed and a Bubbling Bed Fuel Reactor** *Ramesh K. Agarwal and Guanglei Ma, Washington University in St. Louis,* ***USA***	**TBA**	**2. Lignite Drying at the Kemper IGCC Power Plant** *Brent Duncan, Venkat Rajagopalan, Abhijit Bhagavatula, Jason Evans, Joe Mau, Nathan Campbell, and Matt Nelson, Gasification Technology, Southern Company,* ***USA***
5:40 p.m. – Conclusion of the Technical Program				
5:40 p.m. – Conference Committee Meeting – Palm Room				

THURSDAY MORNING – June 7, 2018			
7:30 a.m. Continental Breakfast – Island Ballroom			
8:00 a.m. – Gasification Technology – A Path Forward to Overcome Current Challenges *Moderator: Massood Ramezan, KeyLogic* • *Dave Lyons, Technology Manager, National Energy Technology Laboratory, U.S. Department of Energy;* • *Francis Lau, Chief Technology Officer, Synthesis Energy Systems* • *Joshua Stanislowski, Energy & Environmental Research Center, University of North Dakota*			
10:00 a.m. – Break in the Island Ballroom			
10:30 a.m. – Three Concurrent Technical Sessions			
	Session 27 **Beach Room** **Load Following Issues & Turbines** *Yogesh Patel, TECO*	**Session 28** **Gulf Room** **Emerging Analytical Approaches** *Dr. Dave Osborne, Somerset International Australia Pty Ltd.,* ***Australia***	**Session 29** **Palm Room** **Carbon Capture Utilization & Sequestration IV** *Dr. Erik Meuleman, ION Engineering*
10:30	**84. Load Following Through Power Sharing in a Fuel Cell Turbine Hybrid** *Marlene Llaugel, David Tucker, Ron Breault, Nor Farida Harun, National Energy Technology Laboratory, U.S. Department of Energy,* ***USA***	**15. Strikingly Enhanced Photoelectro-catalytic Activity for Organic Pollutants Treatment in a Bioelectro-chemical System** *Libin Zeng and Xinyong Li (Department of Chemical Engineering, Curtin University,* ***AUSTRALIA****), State Key Laboratory of Fine Chemicals, Key Laboratory of Industrial Ecology and Environmental Engineering (MOE), School of Environmental Science and Technology, Dalian University of Technology,* ***CHINA***	**140. Diamonds from the Sky - Ready Transformation of the Greenhouse Gas CO_2 to Valuable Carbon Nano Materials** *Stuart Licht, Professor of Chemistry, George Washington University,* ***USA***
10:50	**85. Effects of Compressor Isentropic Efficiency on Hybrid Power System Performance** *Dan Oryshchyn, Larry Shadle, Ron Breault, and David Tucker, National Energy Technology Laboratory, U.S. Department of Energy,* ***USA***	**44. Inline Analysis of Washability Parameters for Process Control** *C. C. Bachmann, J. F. Bachmann, M. P. Cipold, J&C Bachmann GmbH,* ***GERMANY***	**88. Port Arthur CO_2 Capture- World's First Full-Scale CCUS via CO_2 Adsorption from Syngas: Operational Update** *Cory Sanderson, Air Products,* ***USA***
11:10	**157. Utilizing Energy Storage Systems to**	**97. Thermogravi-metric Analysis (TGA) and**	**151. Regional Impacts of Carbon Capture and**

	Optimize Power Plants and Increase Grid Stability - Case Studies and Lessons Learned *Dalia El Tawy, Siemens,* ***USA***	**High Temperature Furnace (HTF) as an Alternative to the CRI Test** *Ananthan Santhanakrishnan,* ***Deepak Pudasainee, Vinoj Kurian, Mohamed Belaid, and Rajender Gupta, Department of Chemical & Materials Engineering, University of Alberta, CANADA***	**Sequestration-Tax Revenue and Job Creation** *Joshua Stanislowski, Environmental & Energy Research Center, University of North Dakota,* ***USA***
11:30	**TBA**	**109. Using Quantitative Information Obtained on Individual Particles for Coal Exploration, Fine Coal Benefication, Cal Utilisation and Environmental Applications** *Graham O'Brien, Karryn Warren, Priyanthi Hapugoda and Silvie Koval, Coal Mining Program, Queensland Centre for Advanced Technologies (QCAT), CSIRO,* ***AUSTRALIA***	**160. Integrated CO_2 Capture Water-Gas Shift Process for IGCC Applications** *Shen Zhao, Brittany Basu, Jessica Barber, Santosh Gangwal, Southern Research,* ***USA***
11:50 a.m. – Lunch in the Island Ballroom – Presentation of the Best Student Paper Award – Roundtable/Wrap-up Discussion			

Best Student Paper Award – Over the years the conference has benefitted from the many excellent papers given by students. These papers are marked on the program with a double asterisk (**). To give these exceptional students well deserved recognition, the Conference Committee now presents the **Clearwater Clean Energy Conference Best Student Paper Award. This year's participants are:**

Teri Snow Draper, Department of Chemical Engineering and Institute for Clean and Secure Energy, University of Utah, **A Preliminary Model to Predict the Complex Refractive Indices of Natural Coal Ash at High Temperature**

Adrian Gunnerson, Department of Space, Earth and Environment, Chalmers University of Technology, **Full Scale 3D-Modelling of the Radiative Heat Transfer in Rotary Kilns with a Present Bed Material**

Peter Ostermeier, M.Sc., Technical University of Munich, **Numerical Approaches for Modeling Gas-Solid Fluidized Bed Reactors: Comparison of the Models and Application to Different Technical Problems**

Ioannis Papandreou, Institute of Combustion and Power Plant Technology - IFK Universität Stuttgart, **Large Technical Scale Parametric Investigation of Co-firing of Hard Coal and Pre-dried Lignite under Part Load and Full Load Conditions in the Scope of Enhancing the Flexibility of Hard Coal Fired Power Stations**

Han Tong, Department of Material Science Engineering, Unit of process, KTH Royal Institute of Technology, **Evaluation of Cheap Catalysts for Catalytic Fast Pyrolysis of Lignin with Aiming at of Bio-oil Production**

V. Kumar, Institute of Mining Engineering, University of British Columbia (UBC), **Simultaneous Extraction of Clean Coal and Rare Earth Elements from Coal Middlings Using Alkali-Acid Leaching Process**

Vasudev P. Haribal, North Carolina State University, **Chemical Looping Oxidative Dehydrogenation: A Greener route to Ethylene Production**

Rikard Edland, Chalmers University of Technology, **Chemical Interactions Between NO_x and Soot in Oxygen-enriched Propane Flames**

Cong Luo, State Key Laboratory of Coal Combustion, School of Energy and Power Engineering, Huazhong University of Science, **A Novel CeO_2 Supported $Ba_{0.3}Sr_{0.7}Co_xFe_{1-x}O_{3-\delta}$ Perovskites for Chemical-looping Steam Methane Reforming to Syngas and Hydrogen**

Jinsu Kwon, Department of Nuclear and Quantum Engineering, Korea Advanced Institute of Science and Technology, **Development of PCHE Off-design Performance Model for Optimizing Power System Control Strategies in S-CO_2 Brayton Cycle**

Min-min Zhou, The University of Utah, **Large Eddy Simulation of Dynamic Ash Deposition and Erosion in the Pulverized Coal Boiler**

Dingshan Cao, State Key Laboratory of Coal Combustion, School of Energy and Power Engineering, Huazhong University of Science, **A Novel CeO_2 Supported $Ba_{0.3}Sr_{0.7}Co_xFe_{1-x}O_{3-\delta}$ Perovskites for Chemical-looping Steam Methane Reforming to Syngas and Hydrogen,**

Dokyu Kim, Department of Nuclear and Quantum Engineering, Korea Advanced Institute of Science and Technology, **Study of Magnetic Bearing Instability Issues in Supercritical CO_2 Turbomachinery,**

Min-min Zhou, The University of Utah, **Large Eddy Simulation of Dynamic Ash Deposition and Erosion in the Pulverized Coal Boiler**

*Piyush Verma, Department of Energy, Environmental & Chemical Engineering, Consortium for Clean Coal Utilization, Washington University in St. Louis, **USA,*** **Impact of Flue Gas Recycle on Efficiency of Oxy-fuel Combustion Systems**

FRIDAY MORNING – June 8, 2018
6:30 a.m. – Continental Breakfast – Lobby 2
7:00 a.m. – Departure of the Covanta/Hillsborough and Polk Power Plant Tours – Starting at 6:30 a.m., coffee, juice and bakery items will be offered in Lobby 2 for those taking the tour. Please note the dress requirements: you must wear **long pants and boots or a full shoe; no tennis shoes nor sandals.** To participate you must be registered for the conference and pay an additional fee of $175.00. Both tour buses will stop at Tampa International Airport prior to returning to the hotel. Expect to be at the airport around noon; and back at the Sheraton Sand Key around 1 p.m.
1:00 p.m. (approximately) – Return to the Sheraton Sand Key

Covanta Hillsborough:

The Hillsborough County Resource Recovery Facility, operating as Covanta Hillsborough, Inc., began commercial operation in October 1987. After a 2009 expansion that increased its processing capacity, the facility now processes up to 1,800 tons per day of solid waste. The facility, located near Tampa, FL, generates up to 46.5 megawatts of renewable energy and is owned by Hillsborough County, which supplies the waste processed at the facility. Covanta Hillsborough recycles secondary sewer treatment runoff from the adjacent wastewater treatment plant as part of its process water. It also maintains emissions control equipment in compliance with the United States Environmental Protection Agency's Clean Air Act.

Commercial Operation: October 1987

Waste Processing Capacity: 1,800 tons per day

Air Pollution Control Equipment: Semi-dry flue gas scrubbers injecting lime, fabric filter baghouses, nitrogen oxide control system, mercury control system and continuous emissions monitoring system

Energy-from-Waste System: One 600 ton per day (5000 Btu/lb) and three 400 ton per day (4500 British Thermal Units per pound) waterwall furnaces with Martin® reverse-reciprocating grates and ash handling system

Energy Generation: Up to 46.5 megawatts

Awards and Recognition: Designated a Voluntary Protection Program Star facility by the U.S. Occupational Safety and Health Administration (OSHA) for workplace safety

Polk Power Plant Field Trip:

Tampa Electric Company planned, engineered, built, and operates the Polk Power Plant Unit #1 Integrated Gasification Combined Cycle (IGCC) Power Plant. The project was partially funded under the Department of Energy's Clean Coal Technology Program pursuant to a Round III award.

THE CONFERENCE COMMITTEE The dedicated efforts and expertise of each Committee member result in the excellent Technical Program offered each year. They reach out to all segments of the energy industry so that the state-of-the-art (and beyond) is presented. Through their hard work, we offer a world-renowned conference each year. This year's Conference Committee members are:

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43rd International Technical Conference on Clean Energy

June 3 to 8, 2018
Sheraton Sand Key
Clearwater, Florida, USA

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Student Registration *To encourage participation by full-time students currently enrolled in a college or university, the Conference Committee is offering a registration fee of $395.*

The registration fee covers one ***Proceedings****, all conference events (Sunday through Thursday), the Exhibit Center, 4 luncheons, evening events, all breaks, all Continental breakfasts, and all conference materials.*

Send information about the Exhibit Center.

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$895 Now to May 1st

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