The Clearwater Clean Energy Conference
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*
Wednesday, 8:00	**17. Technical Scale Experimental Evaluation of Scrubber Based NO_x and SO_x Control** *Jakob Johansson, Chalmers University of Technology, Department of Energy and Environment, Chalmers University,* ***SWEDEN***	**63. Rare Earth Elements Recovery from North Dakota Lignite** *Dan Laudal, Institute for Energy Studies, University of North Dakota,* ***USA***	**96. Update on Design of 10 MWe Iron-Based Coal-Direct Chemical Looping Demonstration Plant** *Luis Velazquez Vargas, The Babcock & Wilcox Company,* ***USA***	**54. Evaluation of Cheap Catalysts for Catalytic Fast Pyrolysis of Lignin with Aiming at of Bio-oil Production** *Tong Han, KTH Royal Institute of Technology, Department of Material Science Engineering, Unit of Process, Group of Energy and Furnace Technology,* ***SWEDEN*****
Wednesday, 8:20	**6. Effect of Pre-drying on the Combustion Characteristics of Zhundong Lignite** *Zhezi Zhang, Centre for Energy (M473), The University of Western Australia,* ***Australia***	**163. Rare Earth Elements from Coal-Based Resources** *Mary Anne Alvin, Rare Earth Elements, Science & Technology Strategic Plans, National Energy Technology Laboratory, U.S. Department of Energy,* ***USA***	**99. Conversion of Coal in a Fluidized Bed Chemical Looping Reactor with and without Oxygen Uncoupling** *Kirsten M. Merrett, 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, University of Kentucky, Lexington,* ***USA***
Wednesday, 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,* ***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** *Andrew Tong, The Ohio State University,* ***USA***	**141. The World's First Coal to Biomass Conversion Using Advanced Wood Pellets** *Les Marshall, Ontario Power Generation* ***Canada***

Wednesday, 9:00	**57. 600MW Supercritical Tower-Type Pulverized Coal-fired Boiler for Burning High-alkali Content Zhundong Coal** *Hai Zhang, Key Laboratory for Thermal Science and Power Engineering of the Ministry of Education, Department of Energy and Power Engineering, Tsinghua University, and Shanghai Boiler Works Co., Ltd, Shanghai Electric Group,* ***CHINA***	**113. Precon-centration of Coal-Based Rare Earth Element Feedstocks Using X-Ray Sorter Technology** *Dr. Gerald Luttrell, Virginia Technical University,* ***USA***	**95. Evaluation of a Spouted Bed Reactor for Chemical-Looping-Combustion of Solid Fuels** *Johannes George van der Watt, UND Institute for Energy Studies, University of North Dakota,* ***USA***	**29. Rheological Properties and Stability Characteristics of Biochar-Algae-Water Slurry Fuels Prepared by Wet Milling** *Mingming Zhu, Centre for Energy (M473), The University of Western Australia,* ***AUSTRALIA***
Wednesday, 9:20	**162. Management of Boiler Slagging in an Open-Pass Coal Boiler after Low-NO_x Retrofit** *Kevin Davis, Reaction Engineering International,* ***USA***	**143. Study of Western Pennsylvania Fireclays for Rare-Earth Element Content** *Dr. Robert Uhrin, XLight Corporation,* ***USA***	**134. Chemical Looping Oxidative Dehydrogenation: A Greener Route to Ethylene Production** *Vasudev Pralhad Haribal, and Luke Neal, Department of Chemical and Biomolecular Engineering, North Carolina University,* ***USA****	**168. Ethanol from Biomass Using Homogenous Catalysis** *Dr. Girish Srinivas, TDA Research, Inc.,* ***USA***
Wednesday, 9:40	**65. A Study on Pulverized Coal Ignition Using a Two-stage Flat-flame Burner with a Transition from a Reducing Environment to Oxidizing Environment** *Dishant Khatri, Department of Energy, Environmental & Chemical Engineering, Washington University in St. Louis,* ***USA***	**138. LIBS Sensor for a Rapid Source Characterization of Rare Earth Elements** *Jinesh Jain, National Energy Technology Laboratory, U.S. Department of Energy,* ***USA***	**OPEN**	**172. The Biomass-to-Syngas Chemical Looping Process for Thermal Chemical Conversion of Biomass** *Andrew Tong, Ohio State University,* ***USA***
10:00 a.m. – Break in the Exhibit Center				
10:30 a.m. Four Concurrent Technical Sessions – Wednesday				
	Session 19 **Beach Room** **Supercritical CO_2 II**	**Session 20** **Gulf Room** **Carbon Capture Utilization &**	**Session 21** **Palm Room** **Modeling I** *Dr. Edmundo*	**Session 22** **Bay Room** **Recovery of Rare Earth Elements II**

	Joshua Stanislowski, UNDEERC **and** *Bhupesh Dhungel, Air Liquide*	**Sequestration III** *Dr. Erik Meuleman, ION Engineering*	*Vasquez, Consultant, Boiler Combustion and Emission Controls*	*Prof. Eric Eddings, University of Utah*
Wednesday, 10:30	**26. Study of Magnetic Bearing Instability Issues in Supercritical CO_2 Turbomachinery** *Dokyu Kim, 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, 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,* ***POLAND***	**139. Determination and Recovery of Rare Earths from Coal Combustion By-Products** *Evan Granite, U.A. Department of Energy,* ***USA***
Wednesday, 10:50	**108. Corrosion of Alloys in Direct-fired Supercritical CO_2 Power Cycles** *Ömer N. Doğan, National Energy Technology Laboratory, U.S. Department of Energy,* ***USA***	**51. New Method for Numerical Modeling of CO_2 Sequestration in Dollar Bay Forma-tion, Florida, USA** *Ram Kumar, Depart-ment of Chemical & Biomedical Engineering, University of South Florida,* ***USA***	**45. Large Eddy Simulation of Dynamic Ash Deposition and Erosion in the Pulverized Coal Boiler** *Min-min Zhou, The University of Utah,* ***USA*****	**153. Production of Critical Rare Earth Element Concentrates from Coal Sources** *R. Honaker, Department of Mining Engineering, University of Kentucky,* ***USA***
Wednesday, 11:10	**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***	**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, 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, Energy Systems, Battelle,* ***USA***
Wednesday, 11:30	**166. About Control Algorithm of Gas-Fired CHP with Economic Goal Function (Result: 2.5 Increase of Income Within 10 Years)** *Dr. Janusz Lichota, Wrocław University of Technology,* ***POLAND***	**22. Synthesis of Calcium-based CO_2 Sorbents by Wet-mixing Combustion Method for Carbonate Looping Cycle** *Linyi Xiang, State Key Laboratory of Coal Combustion, School of Energy and Power*	**35. Ash Deposition Modeling In Low Temperature Heat Exchangers for Pulverized Coal Fired Power Plant Applications** *Sandeep Aryal, Santosh Tamang and Kwangkook Jeong,*	**104. Simultaneous Extraction of Clean Coal and Rare Earth Elements from Coal Middlings Using Alkali-Acid Leaching Process** *V. Kumar, Institute of Mining Engineering, University of British*

		Engineering, Huazhong University of Science, ***CHINA***	*Arkansas State University,* ***USA*****	*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*
- **CO_2 Capture,** *Dr. Erik Meuleman, ION Engineering*

1:30 p.m. – Plenary Session – Palm/Bay Rooms

- **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. Rick Honaker, Department of Mining Engineering, University of Kentucky,* ***USA***
  - *James Fisher, Somerset Coal,* ***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 – Wednesday

	Session 23 **Beach Room** **Innovative Power Applications** *David Tucker, National Energy Technology*	**Session 24** **Gulf Room** **Chemical Looping III – Process and Component Analysis** *Dr. Andrew Tong,*	**Session 25** **Palm Room** **Modeling II** *Dr. Edmundo Vasquez, Consultant, Boiler Combustion and*	**Session 26** **Bay Room** **Upgrading/ Beneficiation** *Dr. Dave Osborne, Somerset International*

	Laboratory, U.S. Department of Energy	*Ohio State University,* **and** *Vasudev Pralhad Haribal, North Carolina State University*	*Emission Controls*	*Australia Pty Ltd.,* ***Australia***
Wednesday, 4:00	**171. Increased Plant Economics with Ammonia Based Desulfurization** *Robert Nicolo, Jiangnan Environmental Technology, Inc. (JET),* ***USA***	**92. Chemical Looping Coal Gasification Economic Assessment for IGCC Applications and Sub-pilot Scale Demonstrations** *Andrew Tong, The Ohio State University,* ***USA***	**89. Progress in a Model to Predict the Complex Refractive Indices of Natural Coal Ash at High Temperature** *Teri Draper, Department of Chemical Engineering; and Joseph Brindle, Institute for Clean and Secure Energy, 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***
Wednesday, 4:20	**149. Integrated Approach to Plant Water and ELG** *Jim Dougherty, Babcock Power Environmental, Inc.,* ***USA***	**94. Reactive Jet Attrition Analysis of Oxygen Carriers in Chemical-Looping-Combustion Systems** *Johannes Van der Watt, Institute for Energy Studies, University of North,* ***USA***	**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, Adelphi University,* ***USA***	**46. The Changing Role of Technical Standards in Coal Preparation and Handling** *Dave Osborne, Somerset International Australia Pty Ltd.,* ***AUSTRALIA***
Wednesday, 4:40	**114. Development of a Continuous Fluidized Bed Reactor for Thermochemical Energy Storage Application** *Manuel Würth, 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,* ***USA***	**165A. Accelerating the Development and Minimizing Risk in the Scale-up of Carbon Capture Processes: A Suite of Opensource Computational Tools and Models – Part A – Model Fundamentals** *Benjamin Omell, National Energy Technology Laboratory, U.S. Department of Energy,* ***USA***	**126. Coal Preparation Research in Australia's Commonwealth and Scientific Research Organisation (CSIRO)-Multislope Screen Research** *Michael O'Brien, Enhanced Coal Processing, Mining and Processing Technologies/Coal Mining Program, Queensland Centre for Advanced Technologies (QCAT), CSIRO,* ***AUSTRALIA***
Wednesday, 5:00	**167. Research on High-Temperature Heat Storage Material (500 C, 930 F) Based on Process of Phase Change** *Dr. Janusz Lichota,*	**120. Hot Flow Demonstration of a Carbon Stripper for Chemical Looping Combustion** *Ben Jensen, Institute for Energy Studies,*	**165B. Accelerating the Development and Minimizing Risk in the Scale-up of Carbon Capture Processes: A Suite of Opensource Computational Tools**	**107. Coal Preparation Research in Australia's Commonwealth and Scientific Research Organisation (CSIRO)-Dense Medium**

	Wrocław University of Technology, ***POLAND***	*University of North Dakota,* ***USA***	**and Models – Part B – Model Applications** *Benjamin Omell, National Energy Technology Laboratory, U.S. Department of Energy,* ***USA***	**Cyclone Circuits** *Michael O'Brien Enhanced Coal Processing, Mining and Processing Technologies/Coal Mining Program, Queensland Centre for Advanced Technologies (QCAT),* ***AUSTRALIA***
Wednesday, 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***	**OPEN**	**169. Kinetics Modeling of the Oxidation of Iron-Titanium Composite Metal Oxides in Chemical Looping Systems: A General Approach** *Yu-Yen Chen, Sourabh Nadgouda, Andrew Tong, and Liang-Shih Fan, Ohio State University,* ***USA***	**2. Lignite Drying at the Kemper IGCC Power Plant** *Brent Duncan, Gasification Technology, Southern Company,* ***USA***
5:40 p.m. – Conclusion of the Technical Program				
5:40 p.m. – Conference Committee Meeting – Palm Room				