



2017 NETL CO₂ Capture Technology Project Review Meeting

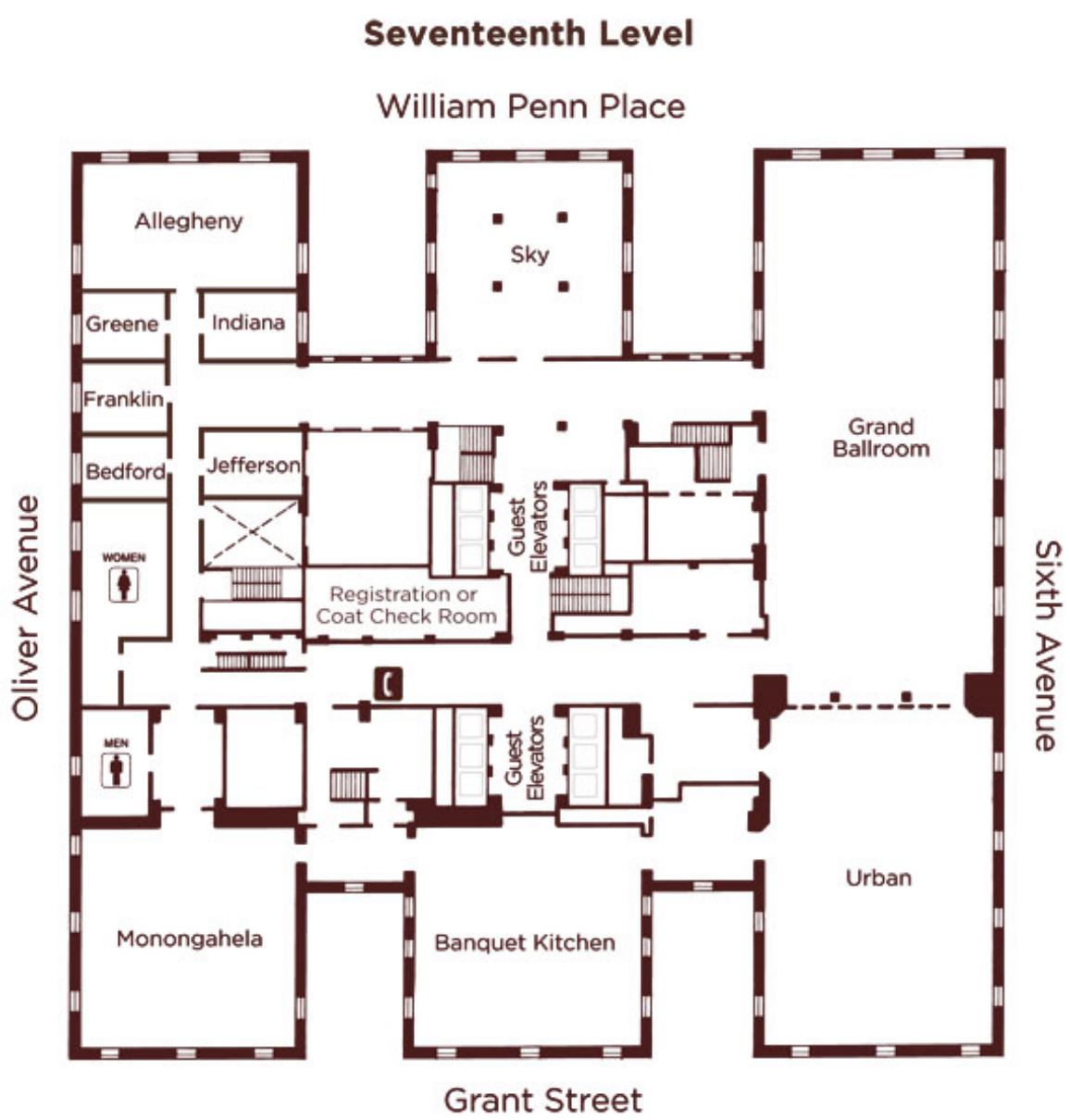
August 21-25, 2017



U.S. DEPARTMENT OF
ENERGY



Floor Plan



7:00 a.m. Registration – 17th Floor Foyer
Continental Breakfast – Urban Room

GRAND BALLROOM

Opening Session

Moderator: John Litynski, *U.S. Department of Energy, Office of Fossil Energy*

8:00 a.m. **Welcoming Remarks**
Lynn Brickett, *U.S. Department of Energy, National Energy Technology Laboratory*

8:05 a.m. **Future of Fossil Fuels-Impacts of Innovation and Demand**
John Litynski, *U.S. Department of Energy, Office of Fossil Energy*

8:15 a.m. **CO₂ Capture R&D at EPRI**
Abhoyjit Bhowan, *Electric Power Research Institute*

8:35 a.m. **Learning from Doing: CCUS Reference Cases**
Keith Burnard, *IEA Greenhouse Gas*

8:55 a.m. **TCM's First 5 Years of Operation and Norway Advancing to Full Scale CCS on Industrial Flue Gas Sources**
Bjorn-Erik Haugan, *Gassnova SF*

9:15 a.m. **TCM Mitigation Solutions to High Amine Emissions Due to Aerosols and Particulates Contained in Oil Refinery Flue Gases**
Thomas De Cazenove, *CO₂ Technology Centre Mongstad (TCM)*

9:35 a.m. **Retrofitting CCS to Coal-Fired Power Plants in Australia**
Geoff Bongers, *Gamma Energy Technology*

9:55 a.m. **International Test Center Network Update**
Frank Morton, *Southern Company Services, Inc.*

10:15 a.m. BREAK – SKY ROOM

NETL Research and Innovation Center – Carbon Capture

Moderator: Elaine Everitt, *U.S. Department of Energy, National Energy Technology Laboratory*

- 10:25 a.m. **Experimental Materials Development in Mixed Matrix Membranes for Post-Combustion Carbon Capture**
Surendar Venna, *U.S. Department of Energy, National Energy Technology Laboratory*
- 10:50 a.m. **Design of Novel Mixed Matrix Membrane Using High Throughout Computational Methods**
Jan Steckel, *U.S. Department of Energy, National Energy Technology Laboratory*
- 11:15 a.m. **Experimental Materials Development and Bench-Scale System Design for Pre-Combustion Solvents**
Nicholas Siefert, *U.S. Department of Energy, National Energy Technology Laboratory*
- 11:40 a.m. **Screening of Materials for Pre-Combustion Solvents Using a Combined Approach of Data Mining and Molecular Simulation**
Wei Shi, *U.S. Department of Energy, National Energy Technology Laboratory*
- 12:05 p.m. LUNCH – URBAN ROOM

Systems Studies and Modeling

Moderator: Andrew O'Palko, *U.S. Department of Energy, National Energy Technology Laboratory*

- 1:35 p.m. **Post-Combustion Capture Retrofit: Eliminating the De-Rate Study**
Jeff Hoffmann, *U.S. Department of Energy, National Energy Technology Laboratory*
- 2:00 p.m. **Systems Analysis: Process Assumptions and Data Gaps**
Alexander Zoelle, *U.S. Department of Energy, National Energy Technology Laboratory*
- 2:35 p.m. **SEA Post-Combustion Analysis Update**
Timothy Fout, *U.S. Department of Energy, National Energy Technology Laboratory*

CO₂ Compression

Moderator: Andrew O'Palko, *U.S. Department of Energy, National Energy Technology Laboratory*

- 2:50 p.m. **Advanced CO₂ Compression with Supersonic Technology (FE0026727)**
Mark J. Kuzdzal, *Dresser-Rand Company*
- 3:15 p.m. BREAK – SKY ROOM

Carbon Capture Pilot-Scale Research

Moderator: Andrew O'Palko, U.S. Department of Energy, National Energy Technology Laboratory

- 3:35 p.m. **Advanced Technology Testing at the National Carbon Capture Center (FE0022596)**
John Carroll, Southern Company Services, Inc.
- 4:00 p.m. **Pilot Test of a Nanoporous, Super-Hydrophobic Membrane Contactor Process for Post-Combustion Carbon Dioxide Capture (FE0012829)**
Shiguang Li, Gas Technology Institute
- 4:25 p.m. **Ion Advanced Solvent CO₂ Capture Pilot Project (FE0013303)**
Erik Meuleman, Ion Engineering, LLC
- 4:50 p.m. **Application of a Heat Integrated Post-Combustion CO₂ Capture System with Hitachi Advanced Solvent into Existing Coal-Fired Power Plant (FE0007395)/ An Advanced Catalytic Solvent for Lower Cost Post-Combustion CO₂ Capture in a Coal-Fired Power Plant (FE0012926)**
Kunlei Liu, University of Kentucky Center for Applied Energy Research
- 5:25 p.m. ADJOURN

Tuesday August 22, 2017

- 7:00 a.m. Registration – 17th Floor Foyer
Continental Breakfast – Urban Room

GRAND BALLROOM

Carbon Capture Pilot-Scale Research

Moderator: Andrew Jones, U.S. Department of Energy, National Energy Technology Laboratory

- 8:00 a.m. **Integrated Testing of a Membrane Carbon Dioxide Capture Process with a Coal-Fired Boiler (FE0026414)**
Tim Merkel, Membrane Technology & Research, Inc.
- 8:25 a.m. **Pilot Test of Novel Electrochemical Membrane System for Carbon Dioxide Capture and Power Generation (FE0026580)**
Hossein Ghezeli-Ayagh, FuelCell Energy, Inc.

8:50 a.m. **Pilot Scale Evaluation of Pre-Combustion Carbon Capture Process (FE0013105)**
Gokhan Alptekin, *TDA Research, Inc.*

9:15 a.m. **Sorbent-Based Post-Combustion CO₂ Slipstream Testing (FE0012870)**
Jeannine Elliott, *TDA Research, Inc.*

9:40 a.m. BREAK – SKY ROOM

10:00 a.m. **Waste Heat Integration with Solvent Process for More Efficient CO₂ Removal from Coal-Fired Flue Gas (FE0007525)**
Shintaro Honjo, *Mitsubishi Heavy Industries America, Inc.*

10:25 a.m. **Dilute Source Carbon Dioxide Capture: Management of Atmospheric Coal-Produced Legacy Emissions (FE0026861)**
Dan Kahn, *Carbon Engineering, Ltd.*

Carbon Capture Laboratory/Bench-Scale Research

Moderator: Andrew Jones, *U.S. Department of Energy, National Energy Technology Laboratory*

10:50 a.m. **Zeolite Membrane Reactor for Pre-Combustion Carbon Dioxide Capture (FE0026435)**
Jerry Lin, *Arizona State University*

11:15 a.m. **Sorption-Enhanced Mixed Matrix Membranes for H₂ Purification and CO₂ Capture (FE0026463)**
Haiqing Lin, *University of Buffalo, The State University of New York*

11:40 a.m. LUNCH – URBAN ROOM

Moderator: José Figuerola, *U.S. Department of Energy, National Energy Technology Laboratory*

1:10 p.m. **Development of a Novel Biphasic CO₂ Absorption Process with Multiple Stages of Liquid-Liquid Phase Separation for Post-Combustion Carbon Capture (FE0026434)**
Yongqi Lu, *Illinois State Geological Survey, University of Illinois at Urbana-Champaign*

1:35 p.m. **Large Bench-Scale Development of Non-Aqueous Solvent CO₂ Capture Process for Coal-Fired Power Plants (FE0026466)**
S. James Zhou, *RTI International*

- 2:00 p.m. **A High Efficiency, Ultra-Compact Process for Pre-Combustion CO₂ Capture (FE0026423)**
Vasilios Manousiouthakis, *University of California, Los Angeles*
- 2:25 p.m. **Lab-Scale Development of a Hybrid Capture System with Advanced Membrane, Solvent System, and Process Integration (FE0026464)**
David Luebke, *Liquid Ion Solutions*
- 2:50 p.m. BREAK – SKY ROOM

Moderator: Steve Mascaro, *U.S. Department of Energy, National Energy Technology Laboratory*
- 3:10 p.m. **Energy Efficient Go-Peek Hybrid Membrane Process for Post-Combustion Carbon Dioxide Capture (FE0026383)**
Shiguang Li, *Gas Technology Institute*
- 3:35 p.m. **Evaluation of Amine-Incorporated Porous Polymer Networks (APPNS) as Sorbents for Post-Combustion CO₂ Capture (FE0026472)**
Hong-Cai Joe Zhou, *Texas A&M University*
- 4:00 p.m. **Novel CO₂-Selective Membranes for CO₂ Capture from less than 1% CO₂ Sources (FE0026919)**
Winston Ho, *The Ohio State University*
- 4:25 p.m. **Bench-Scale Testing of Next Generation Hollow Fiber Membrane Modules (FE0026422)/CO₂ Capture by Cold Membrane Operation with Actual Power Plant Flue Gas (FE0013163)**
Alex Augustine, *American Air Liquide, Inc.*
- 5:00 p.m. ADJOURN
- 5:15 p.m. Poster Session for Carbon Capture and Carbon Use and Reuse Projects
– Sky Room

Wednesday August 23, 2017

- 7:00 a.m. Registration – 17th Floor Foyer
Continental Breakfast – Urban Room

GRAND BALLROOM

Moderator: Michael Matuszewski, CCSI²

- 8:00 a.m. **CCSI² Program Overview & CCSI Toolset Introduction**
Michael Matuszewski, CCSI²
- 8:25 a.m. **Coordinator, Industry, and Academic Stakeholder Board**
John Shinn, CCSI²
- 8:50 a.m. **Multi-Scale Modeling: Micro-Encapsulated Carbon Sorbent Technology**
Debangsu Bhattacharyya, West Virginia University
Benjamin Omell, U.S. Department of Energy, National Energy Technology Laboratory
Janine Carney, U.S. Department of Energy, National Energy Technology Laboratory
Zhijie Xu, Pacific Northwest National Laboratory
- 9:40 a.m. BREAK – SKY ROOM
- 10:00 a.m. **Modeling Amine Aerosol Formation with Piperazine Solvent**
Yue Zhang, University of Texas at Austin
- 10:25 a.m. **Modeling Packing Performance Parameters**
Di Song, University of Texas at Austin
- 10:50 a.m. **Solvent Pilot System Test Campaign Guidance: Collaboration with National Carbon Capture Center & Test Centre Mongstad**
Debangsu Bhattacharyya, West Virginia University
Brenda Ng, Lawrence Livermore National Laboratory
James Gattiker, Los Alamos National Laboratory
- 11:40 a.m. **CCSI Toolset Support: Open Source Management**
Keith Beattie, Lawrence Berkeley National Laboratory
- 12:05 p.m. LUNCH – URBAN ROOM

NETL Research and Innovation Center – Carbon Use and Reuse

Moderator: Andrew Aurelio, U.S. Department of Energy, National Energy Technology Laboratory

- 1:35 p.m. **Combining Experiment and Computation to Design CO₂ Conversion Nanocatalysts**
Douglas Kauffman, U.S. Department of Energy, National Energy Technology Laboratory

Carbon Use and Reuse

Moderator: Andrew Aurelio, U.S. Department of Energy, National Energy Technology Laboratory

- 2:00 p.m. **Upcycled 'CO₂-Negative' Concrete for Construction Functions (FE0029868)**
Gaurav Sant, *University of California, Los Angeles*
- 2:20 p.m. **A Microalgae-Based Platform for the Beneficial Reuse of Carbon Dioxide Emissions from Power Plants (FE0026396)**
Mark Crocker, *University of Kentucky*
- 2:40 p.m. **Microalgae Commodities from Coal-Fired Power Plant Flue Gas CO₂ (FE0026490)**
John Benemann, *MicroBio Engineering, Inc.*
- 3:00 p.m. **CO₂ to Bioplastics: Beneficial Reuse of Carbon Emissions from Coal-Fired Power Plants Using Microalgae (FE0029623)**
Mark Crocker, *University of Kentucky*
- 3:20 p.m. BREAK – SKY ROOM
- 3:40 p.m. **Electrochemical Conversion of Carbon Dioxide to Alcohols (FE0029868)**
Feng Jiao, *University of Delaware*
- 4:00 p.m. **Nano-Engineered Catalyst Supported on Ceramic Hollow Fibers for the Utilization of CO₂ in Dry Reforming to Produce Syngas (FE0029760)**
Shiguang Li, *Gas Technology Institute*
- 4:20 p.m. **High Energy Systems for Transforming CO₂ to Valuable Products (FE0029787)**
Osman Akpolat, *Gas Technology Institute*
- 4:40 p.m. **Low Temperature Process Utilizing Nano-Engineered Catalyst for Olefin Production from Coal-Derived Flue Gas (FE0029570)**
Jadid Samad, *Southern Research Institute*
- 5:00 p.m. **A New Process for CO₂ Conversion to Fuel (FE0029866)**
Gokhan Alptekin, *TDA Research, Inc.*
- 5:20 p.m. ADJOURN

7:00 a.m. Registration – 17th Floor Foyer
Continental Breakfast – Urban Room

GRAND BALLROOM

Discovery of Carbon Capture Substances and Systems

Moderator: Ted McMahon, U.S. Department of Energy, National Energy Technology Laboratory

8:00 a.m. **Low-Viscosity, Water-Lean CO₂ BOLs with Polarity-Swing Assisted Regeneration (FWP-70924)**

David Heldebrant, Pacific Northwest National Laboratory

8:25 a.m. **High-Efficiency, Integrated Reactors for Sorbents, Solvents, and Membranes Using Additive Manufacturing (FWP-FEW0225)**

Joshuah Stolaroff, Lawrence Livermore National Laboratory

8:50 a.m. **Amine-Appended Metal-Organic Frameworks as Switch-Like Adsorbents for Energy-Efficient Carbon Capture**

Jeffrey Long, Lawrence Berkeley National Laboratory

Carbon Capture Laboratory/Bench-Scale Research

9:15 a.m. **Cryogenic Carbon Capture (FE0028697)**

Larry Baxter, Sustainable Energy Solutions

9:40 a.m. BREAK – SKY ROOM

Moderator: David Lang, U.S. Department of Energy, National Energy Technology Laboratory

10:00 a.m. **Microencapsulation and Advanced Manufacturing to Enable New Solvents for Carbon Capture (FWP-FEW0194)**

Joshuah Stolaroff, Lawrence Livermore National Laboratory

10:25 a.m. **Hybrid Encapsulated Ionic Liquids for Post-Combustion Carbon Dioxide Capture (FE0026465)**

Joan Brennecke, University of Texas at Austin

10:50 a.m. **Novel Process that Achieves 10 MOL/KG Sorbent Swing Capacity in a Rapidly Cycled Pressure Swing Adsorption Process (FE0026433)**

Ryan Lively, Georgia Institute of Technology

11:15 a.m. **Lab-Scale Development of a Solid Sorbent for CO₂ Capture Process for Coal-Fired Power Plants (FE0026432)**
Mustapha Soukri, RTI

11:40 a.m. LUNCH – URBAN ROOM

Carbon Capture Laboratory/Bench-Scale Research

Moderator: Bruce Lani, U.S. Department of Energy, National Energy Technology Laboratory

1:10 p.m. **Bench-Scale Development of a Hybrid Membrane-Absorption CO₂ Capture Process (FE0013118)**
Brice Freeman, Membrane Technology & Research, Inc.

1:35 p.m. **Development of Mixed-Salt Technology for Carbon Dioxide Capture from Coal Power Plants (FE0012959)**
Indira Jayaweera, SRI International

2:00 p.m. **Development of a Pre-Combustion CO₂ Capture Process Using High-Temperature PBI Hollow Fiber Membranes (FE0012965)**
Indira S. Jayaweera, SRI International

2:25 p.m. **Evaluation of Piperazine with Advanced Flash Regeneration for CO₂ Capture from Coal-Fired Flue Gas (FE0005654)**
Gary Rochelle, University of Texas at Austin

2:50 p.m. BREAK – SKY ROOM

Moderator: Sai Gollakota, U.S. Department of Energy, National Energy Technology Laboratory

3:10 p.m. **Accelerating the Development of “Transformational” Solvents for CO₂ Separations (FWP-65872)**
David Heldebrant, Pacific Northwest National Laboratory

3:35 p.m. **Robust and Energy Efficient Dual-Stage Membrane-Based Process for Enhanced Carbon Dioxide Recovery (FE0013064)**
Richard Ciora, Media and Process Technology, Inc.

4:00 p.m. **Combined Sorbent/WGS-Based CO₂ Capture Process with Integrated Heat Management for IGCC Systems (FE0026388)**
Andrew Lucero, Southern Research Institute

4:25 p.m. **Electrochemically-Mediated Sorbent Regeneration in CO₂ Scrubbing Processes (FE0026489)**

T. Alan Hatton, *Massachusetts Institute of Technology*

4:50 p.m. ADJOURN

Friday August 25, 2017

7:00 a.m. Registration – 17th Floor Foyer
Continental Breakfast – SKY ROOM

MONONGAHELA ROOM

NETL Research and Innovation Center – Oxy-Combustion and Chemical Looping

Moderator: John Rockey, *U.S. Department of Energy, National Energy Technology Laboratory*

8:00 a.m. **Overview of Chemical Looping Efforts at the National Energy Technology Laboratory**

Doug Straub, *U.S. Department of Energy, National Energy Technology Laboratory*

8:25 a.m. **An Analysis of In Situ Phase Changes Occurring in Natural Hematite Exposed to Simulated High Temperature Redox Gas Cycling Encountered in Chemical Looping**

James Bennett, *U.S. Department of Energy, National Energy Technology Laboratory*

Oxy-Combustion and Chemical Looping

Moderator: John Rockey, *U.S. Department of Energy, National Energy Technology Laboratory*

8:50 a.m. **Commercialization of the Iron-Based Coal Direct Chemical Looping Process for Power Production with In Situ Carbon Dioxide Capture (FE0009761)**

Luis Velazquez-Vargas, *The Babcock & Wilcox Company*

9:15 a.m. **10 Megawatts Electric Coal Direct Chemical Looping Large Pilot Plant: Pre-Front End Engineering and Design Study (FE0027654)**

Andrew Tong, *The Ohio State University*

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- 9:40 a.m. Poster Session for Oxy-Combustion and Chemical Looping Projects/Break
– SKY ROOM
- 10:40 a.m. **Integrated Oxygen Production and CO₂ Separation Through Chemical Looping Combustion with Oxygen Uncoupling (FE0025076)**
Kevin Whitty, *University of Utah*
- 11:05 a.m. **Advanced Oxy-Combustion Technology Development and Scale Up for New and Existing Coal-Fired Power Plants (FE0009702)**
Richard Axelbaum, *Washington University, St. Louis*
- 11:30 a.m. **Integrated Flue Gas Purification and Latent Heat Recovery for Pressurized Oxy-Combustion (FE0025193)**
Richard Axelbaum, *Washington University, St. Louis*
- 11:55 a.m. LUNCH – SKY ROOM
- Moderator: Robin Ames, *U.S. Department of Energy, National Energy Technology Laboratory*
- 1:25 p.m. **Enabling Technologies for Oxy-Fired Pressurized Fluidized Bed Combustor Development (FE0025160)**
Mark Fitzsimmons, *Gas Technology Institute*
- 1:50 p.m. **Oxy-Combustion Pressurized Fluidized Bed with Carbon Dioxide Purification (FE0009448)**
Mark Fitzsimmons, *Gas Technology Institute*
- 2:15 p.m. **Flue Gas Water Vapor Latent Heat Recovery for Pressurized Oxy-Combustion (FE0025350)**
Dexin Wang, *Gas Technology Institute*
- 2:40 p.m. **Characterizing Impacts of High Temperatures and Pressures in Oxy-Coal Combustion Systems (FE0025168)**
Andrew Chiodo, *Reaction Engineering International*
- 3:05 p.m. **Pre-Project Planning for a Flameless Pressurized Oxy-Combustion Pilot Plant (FE0027771)**
Joshua Schmitt, *Southwest Research Institute*
- 3:30 p.m. **High Efficiency Thermal Integration of Supercritical CO₂ Brayton Power Cycles for Oxy-Fired Heaters (FE0025959)**
Jeffrey Phillips, *Electric Power Research Institute*
- 3:55 p.m. ADJOURN

Poster Presentations-Carbon Capture and Carbon Use and Reuse

Rapid Design and Testing of Novel Gas-Liquid Contacting Devices for Post-Combustion CO₂ Capture via 3-D Printing (SC0012056)

Erik Meuleman, *ION Engineering, LLC*

Membrane-Integrated Sorbent Adsorption Process for Carbon Capture (SC0011885)

Gokhan Alptekin, *TDA Research, Inc.*

Algae-Based CO₂ Capture from Power Plants and Conversion to Value Added Products (SC0015719)

Fred Harrington and Ravi Prasad, *Helios-NRG, LLC*

Minimizing Solvent Oxidation with NO₂ Pre-Scrubbing (SC0015890)

Andrew Sexton, *Trimeric Corporation*

Electrochemical Conversion of CO₂ to Fuels for Power-to-Gas Energy Storage (SC0015879)

Trent Molter, *Sustainable Innovations, LLC*

Mitigation of Aerosol Emissions from Solvent-Based Post-Combustion CO₂ Capture Systems (SC0015737)

Srivats Srinivasachar, *Envergex, LLC*

Conversion of CO₂ to Alkyl Carbonates Using Ethylene Oxide as Feedstock (SC0013233)

C.B. Panchal and Richard Doctor, *E3Tec Service, LLC*

Electrochemical Reduction of Carbon Dioxide to Useful Chemical Intermediates

Philip Cox, *Mainstream Engineering*

Passive CO₂ Separation Membrane for Hot Flue Gases (SC0017124)

Matthew Merrill, *Luna Innovations, Inc.*

Computational Designing and Screening of Solid Materials for CO₂ Capture

Wei Shi, *U.S. Department of Energy, National Energy Technology Laboratory*

An Integrated Experimental and Modeling Approach to Mixed Matrix Membranes

David Hopkinson, *U.S. Department of Energy, National Energy Technology Laboratory*

Continuous Flow Processing of Inorganic Membranes on Polymeric Hollow Fiber Supports

Surendar Venna, *U.S. Department of Energy, National Energy Technology Laboratory*

High Throughput Computational Screening of Metal Organic Framework Based Mixed Matrix Membranes

Samir Budhathoki, *AECOM*

Predicting Foaming Behavior in Solvents Based on Physical Properties

Surya Prakash Tiwari, *U.S. Department of Energy, National Energy Technology Laboratory*

Ionic Liquid/Polyether Compatibility in Cross-Linked Ion Gel Membranes

Megan Macala, *AECOM*

CO₂ Rejecting Membranes (CRM) for Concentrating Dilute CO₂ Flue Gas Streams

Indira Jayaweera, *SRI International*

Effects of Plant Location on Costs of CO₂ Capture

Keith Burnard and Monica Garcia, *IEA Greenhouse Gas R&D Programme*

Multi-Component Liquid Analyzer for Solvent-Based CO₂ Capture Systems, Near Real-Time Feedback During Campaign in Industrial Environment

Erik Meuleman, *ION Engineering, LLC*

Polyamine-Based Facilitated Transport Membranes for Post-Combustion CO₂ Capture

James S. Baker, *U.S. Department of Energy, National Energy Technology Laboratory*

Enabling a Solid-State Carbon Dioxide Network

Kevin S. Blinn, *RRTC, Inc.*

Process Intensification for Carbon Capture

Kenneth Lux, *Altex Technologies Corporation*

In-Situ Evaluation of CaSiO₃ Carbonation

Daniel Kopp, *Rutgers, The State University of New Jersey*

Poster Presentations-Oxy-Combustion and Chemical Looping

Method for Separation of Coal Conversion Products from Sorbents/Oxygen Carriers (SC0013832)

Srivats Srinivasachar, *Envergex, LLC*

Methodology for Attrition Evaluation of Oxygen Carriers in Chemical Looping Systems (SC0011984)

Srivats Srinivasachar, *Envergex, LLC*

Application of Spouting Fluidized Bed to Coal-Fueled Pressurized Chemical Looping Combustion (FE0025098)

Kunlei Liu, *University of Kentucky, Center for Applied Energy Research*

sCO₂ Cycles for Indirect Fossil Applications (FE0025348)

Aaron McClung, *Southwest Research Institute*

Characterizing Impacts of Dry Coal Feeding in High Pressure Oxy-Coal Combustion Systems (FE0029162)

Kevin Davis, *Reaction Engineering International*

Development of Enabling Technologies for a Pressurized Dry Feed Oxy-Coal Reactor (FE0029157)

Bradley Adams, *Brigham Young University*

Development of Enabling Technologies for Chemical Looping Combustion and Chemical Looping with Oxygen Uncoupling (FE0029160)

Kevin Whitty, *University of Utah*

Enabling Staged Pressurized Oxy-Combustion: Improving Flexibility and Performance at Reduced Cost (FE0029087)

Jeffrey Phillips, *Electric Power Research Institute*

Oxy-Combustion System Process Optimization (FE0029090)

Gokhan Alptekin, *TDA Research, Inc.*

Technology Demonstration of a High-Pressure Swirl Oxy-Coal Combustor (FE0029113)

Arifur Chowdhury, *University of Texas at El Paso*

Catalytic Removal of Oxygen and Pollutants in Exhaust Gases from Pressurized Oxy-Combustors (FE0029161)

Yongqi Lu, *Illinois State Geological Survey, University of Illinois at Urbana-Champaign*

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PITTSBURGH, PA

626 Cochrans Mill Road

P.O. Box 10940

Pittsburgh, PA 15236-0940

412-386-4984

FAX: 412-386-4604

GPS Coordinates: 40.300521,-79.977682

R&D Gate GPS: 40.305078, -79.974987

ALBANY, OR

1450 Queen Avenue SW

Albany, OR 97321-2198

541-967-5892

FAX: 541-967-5936

GPS Coordinates: 44.623157,-123.120658

MORGANTOWN, WV

3610 Collins Ferry Road

P.O. Box 880

Morgantown, WV 26507-0880

304-285-4764

FAX: 304-285-4403 or 304-285-4469

GPS Coordinates: 39.67234,-79.977347