



2014 NETL CO₂ Capture Technology Meeting

Sheraton Station Square, Pittsburgh, PA



TUESDAY, JULY 29, 2014 - GRAND STATION I & II

7:00 a.m. **Registration - GRAND STATION FOYER**
Continental Breakfast - GRAND STATION III

GRAND STATION I AND II

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

8:10 a.m. **DOE/NETL CO₂ Capture R&D Program**
Michael Matuszewski, U.S. Department of Energy, National Energy Technology Laboratory

8:30 a.m. **Direction of CO₂ Capture R&D at EPRI**
Abhoyjit Bhowm, Electric Power Research Institute

8:50 a.m. **A Global Perspective on CO₂ Capture Developments**
John Gale, IEA Greenhouse Gas R&D Programme

9:10 a.m. **Norway's CLIMIT Program and Test Centre Mongstad**
Hans Jorg Fell, Gassnova

SYSTEM STUDIES AND MODELING

Moderator – *Andrew O’Palko, U.S. Department of Energy, National Energy Technology Laboratory*

9:30 a.m. **Techno-Economic Evaluation of State-of-the-Art and Advanced Post-Combustion Capture Plants**
Kristin Gerdes, U.S. Department of Energy, National Energy Technology Laboratory

9:55 a.m. **Incentivizing Carbon Capture Retrofits of the Existing PC and NGCC Fleet**
Kristin Gerdes, U.S. Department of Energy, National Energy Technology Laboratory

10:20 a.m. **BREAK - GRAND STATION III**

POST-COMBUSTION SORBENT-BASED CAPTURE

Moderator – *Andrew O’Palko, U.S. Department of Energy, National Energy Technology Laboratory*

10:40 a.m. **Rapid Temperature Swing Adsorption Using Polymeric-Supported Amine Hollow Fibers**
Christopher Jones, Georgia Institute of Technology

11:05 a.m. **Evaluation of CO₂ Capture from Existing Coal-Fired Plants by Hybrid Sorption Using Solid Sorbents**
Steve Benson and Srivats Srinivasachar, University of North Dakota, Institute for Energy Studies and EnvergeX

11:30 a.m. **A New Sorbent for Post-Combustion CO₂ Capture**
Gökhan Alptekin, TDA Research, Inc.

11:55 a.m. **LUNCH - ADMIRAL ROOM**

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

1:25 p.m. **BIAS Sorbent NCCC Testing/CCSI Modeling**
James Fisher II and David Miller, US. Department of Energy, National Energy Technology Laboratory

TUESDAY, JULY 29, 2014 - GRAND STATION I & II

- 1:50 p.m. **Bench-Scale Development and Testing of a Novel Adsorption Process for Post-Combustion CO₂ Capture**
Ravi Jain, InnoSeptra, LLC
- 2:15 p.m. **Advanced Solid Sorbents and Process Designs for Post-Combustion CO₂ Capture**
Thomas Nelson, RTI International
- 2:40 p.m. **Rapid Pressure Swing Adsorption for CO₂ Capture**
James Ritter, University of South Carolina
- 3:05 p.m. **Evaluation of Solid Sorbents as a Retrofit Technology for CO₂ Capture**
Sharon Sjostrom and Jayson Denney, ADA-ES, Inc.
- 3:30 p.m. **BREAK - GRAND STATION III**

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

- 3:50 p.m. **Optimizing the Costs of Solid Sorbent-Based CO₂ Capture Through Heat Integration**
Sharon Sjostrom and William Morris, ADA-ES, Inc
- 4:05 p.m. **Bench-Scale Development and Testing of Aerogel Sorbents**
George Gould, Aspen Aerogels, Inc.
- 4:20 p.m. **Pilot-Scale Evaluation of an Advanced Carbon Sorbent Process for Post-Combustion Carbon Capture**
Gopola Krishnan, SRI International
- 4:45 p.m. **Sorbent-Based Post-Combustion CO₂ Slip Stream Testing**
Jeannine Elliott, TDA Research, Inc.
- 5:10 p.m. **ADJOURN**
- 5:20 p.m. **Systems Analysis Guidance (PIs Only) - Grand Station I and II**
- 5:45 p.m. **CCSI Demonstration - Ellwood Room**

WEDNESDAY, JULY 30, 2014 - GRAND STATION I & II

- 7:00 a.m. **Registration - GRAND STATION FOYER**
Continental Breakfast - GRAND STATION III

POST-COMBUSTION SOLVENT-BASED CAPTURE

Moderator – *Steven Mascaro*, U.S. Department of Energy, National Energy Technology Laboratory

- 8:00 a.m. **National Carbon Capture Center: Post-Combustion**
John Wheeldon, National Carbon Capture Center
- 8:25 a.m. **Evaluation of Concentrated Piperazine for CO₂ Capture from Coal-Fired Flue Gas**
Gary Rochelle, The University of Texas at Austin
- 8:50 a.m. **Development of a Novel Gas Pressurized Stripping (GPS)-Based Technology for CO₂ Capture from Post-Combustion Flue Gases**
Shiaoguo (Scott) Chen, Carbon Capture Scientific, LLC

WEDNESDAY, JULY 30, 2014 - GRAND STATION I & II

9:15 a.m. **Low-Energy Solvents for Carbon Dioxide Capture Enabled by a Combination of Enzymes and Vacuum Regeneration**
Sonja Salmon, Novozymes North America, Inc.

9:40 a.m. **CO₂-Binding Organic Liquids Gas Capture with Polarity-Swing-Assisted Regeneration**
David Heldebrant, Battelle Pacific Northwest Division

10:05 a.m. **BREAK - GRAND STATION III**

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

10:25 a.m. **Bench-Scale Process for Low-Cost CO₂ Capture Using a Phase-Changing Absorbent**
Tiffany Westendorf, GE Global Research

10:40 a.m. **Bench-Scale Development of a Nonaqueous Solvent CO₂ Capture Process**
Luke Coleman, RTI International

10:55 a.m. **Novel Flow Sheet for Low Energy CO₂ Capture Enabled by Biocatalyst Delivery System**
John Reardon, Akermin, Inc.

11:10 a.m. **Development of Mixed-Salt Technology for Carbon Dioxide Capture from Coal Power Plants**
Indira Jayaweera, SRI International

11:25 a.m. **An Advanced Catalytic Solvent for Lower Cost Post-Combustion CO₂ Capture in a Coal-Fired Power Plant**
Cameron Lippert, University of Kentucky, Center for Applied Energy Research

11:40 a.m. **LUNCH - ADMIRAL ROOM**

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

1:10 p.m. **Slipstream Pilot-Scale Demonstration of a Novel Amine-Based Post-Combustion Technology for Carbon Dioxide Capture from Coal-Fired Power Plant Flue Gas**
Krish Krishnamurthy, Linde, LLC

1:35 p.m. **Status of the Carbon Dioxide Absorber Retrofit Equipment (CARE) Program**
Andrew Awtry, Neumann Systems Group

2:00 p.m. **Application of a Heat-Integrated Post-Combustion CO₂ Capture System with Hitachi Advanced Solvent into Existing Coal-Fired Power Plants**
Heather Nikolic and Jesse Thompson, University of Kentucky, Center for Applied Energy Research

2:25 p.m. **Waste Heat Integration with Solvent Process for More Efficient CO₂ Removal from Coal-Fired Flue Gas: 2014 Update**
Todd Wall, Southern Company Services, Inc.

2:50 p.m. **BREAK - GRAND STATION III**

Moderator – *Mike Mosser*, U.S. Department of Energy, National Energy Technology Laboratory

3:10 p.m. **Pilot-Scale Silicone Process for Low-Cost Carbon Dioxide Capture**
Benjamin Wood, GE Global Research

WEDNESDAY, JULY 30, 2014 - GRAND STATION I & II

- 3:35 p.m. **ION Advanced Solvent CO₂ Capture Pilot Project**
Alfred (Buz) Brown, ION Engineering, LLC
- 4:00 p.m. **Supersonic Post-Combustion Inertial CO₂ Extraction System**
Vladimir Balepin, ATK
- 4:15 p.m. **Transformational Technology Development: Approach and Successes**
David Luebke, US. Department of Energy, National Energy Technology Laboratory
- 4:40 p.m. **Taking Fundamentally New Materials for CO₂ Capture Toward Applications: A Synergistic Effort**
Berend Smit, Lawrence Berkeley National Laboratory
- 5:05 p.m. **ADJOURN**
- 5:15 p.m. **Poster Session/Reception – Grand Station III**

THURSDAY, JULY 31, 2014 - GRAND STATION I & II

- 7:00 a.m. **Registration - GRAND STATION FOYER**
Continental Breakfast - GRAND STATION III

POST-COMBUSTION MEMBRANE-BASED CAPTURE

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

- 8:00 a.m. **Electrochemical Membranes for CO₂ Capture and Power Generation**
Hossein Ghezal-Ayagh, FuelCell Energy, Inc.
- 8:25 a.m. **Composite Hollow Fiber Membranes for CO₂ Capture**
Dhaval Ajit Bhandari, GE Global Research
- 8:50 a.m. **Low Pressure Membrane Contactors for Carbon Dioxide Capture**
Richard Baker, Membrane Technology and Research
- 9:15 a.m. **Novel Inorganic/Polymer Composite Membranes for CO₂ Capture**
Winston Ho, The Ohio State University
- 9:40 a.m. **Combined Pressure, Temperature Contrast, and Surface-Enhanced Separation of CO₂ for Post-Combustion Carbon Capture**
Michael Wong, Rice University
- 10:05 a.m. **BREAK - GRAND STATION III**

Moderator – *José Figueroa, U.S. Department of Energy, National Energy Technology Laboratory*

- 10:25 a.m. **Bench-Scale Development of a Hybrid Absorption Membrane CO₂ Capture Process**
Brice Freeman, Membrane Technology and Research, Inc.
- 10:40 a.m. **Mixed Matrix Membranes for Post-Combustion Capture**
Erik Albenze, U.S. Department of Energy, National Energy Technology Laboratory
- 11:05 a.m. **Pilot Testing of a Membrane System for Post-Combustion CO₂ Capture**
Tim Merkel, Membrane Technology and Research, Inc.

THURSDAY, JULY 31, 2014 - GRAND STATION I & II

11:30 a.m. **CO₂ Capture by Cold Membrane Operation with Actual Coal-Fired Power Plant Flue Gas**
Trapti Chaubey, Air Liquide

11:55 a.m. **LUNCH - ADMIRAL ROOM**

Moderator – *José Figueroa*, U.S. Department of Energy, National Energy Technology Laboratory

1:25 p.m. **Pilot Test of a Nanoporous, Super-Hydrophobic Membrane Contactor Process for Post-Combustion Carbon Dioxide Capture**
S. James Zhou, Gas Technology Institute

PRE-COMBUSTION CAPTURE

Moderator – *Dani Petrucci*, U.S. Department of Energy, Office of Fossil Energy

1:50 p.m. **Pre-Combustion Carbon Dioxide Capture by a New Dual-Phase Ceramic Carbonate Membrane Reactor**
Jerry Lin, Arizona State University

2:15 p.m. **High-Temperature Polymer-Based Membrane Systems for Pre-Combustion CO₂ Capture**
Kathryn Berchtold, Los Alamos National Laboratory

2:40 p.m. **Identifying Pd-Based Ternary Membranes for Carbon and Sulfur Applications**
Amanda Lewis, Pall Corporation

3:05 p.m. **Hydrogen-Selective Exfoliated Zeolite Membranes**
Aparna Iyer, University of Minnesota

3:30 p.m. **BREAK - GRAND STATION III**

Moderator – *Dani Petrucci*, U.S. Department of Energy, Office of Fossil Energy

3:50 p.m. **National Carbon Capture Center: Pre-Combustion CO₂ Capture**
Tony Wu, Southern Company Services

4:15 p.m. **CO₂ Capture From IGCC Gas Streams Using the AC-ABC Process**
Gopola Krishnan, SRI International

4:40 p.m. **ADJOURN**

FRIDAY, AUGUST 1, 2014 - GRAND STATION I & II

7:00 a.m. **Registration - GRAND STATION FOYER**
Continental Breakfast - GRAND STATION III

PRE-COMBUSTION CAPTURE

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

8:00 a.m. **Hybrid PDMS Testing and Techno-Economic Model**
Nicholas Siefert, US. Department of Energy, National Energy Technology Laboratory

8:25 a.m. **Robust and Energy Efficient Dual Stage Membrane-Based Process for Enhanced CO₂ Recovery**
Richard Ciora, Media and Process Technology, Inc.

FRIDAY, AUGUST 1, 2014 - GRAND STATION I & II

- 8:40 a.m. **Pilot Testing of a Highly Effective Pre-Combustion Sorbent-Based Carbon Capture System**
Gökhan Alptekin, TDA Research, Inc.
- 9:05 a.m. **Development of a Pre-Combustion CO₂ Capture Process Using PBI Hollow-Fiber Membranes**
Gopola Krishnan, SRI International
- 9:30 a.m. **BREAK - GRAND STATION III**

OXY-COMBUSTION AND CHEMICAL LOOPING

Moderator – *Steve Richardson, U.S. Department of Energy, National Energy Technology Laboratory*

- 9:50 a.m. **Praxair's Oxygen Transport Membranes for Oxy-Combustion and Syngas Applications**
Sean Kelly, Praxair, Inc.
- 10:15 a.m. **Oxy-PFBC Technology Development**
Mark Fitzsimmons, Aerojet Rocketdyne
- 10:40 a.m. **Staged, Pressurized Oxy-Combustion for Carbon Capture**
Richard Axelbaum, The Consortium for Clean Coal Utilization, Washington University, St. Louis
- 11:05 a.m. **Alstom's Chemical Looping Combustion Technology with CO₂ Capture for New and Existing Coal-Fired Power Plants**
Herbert Andrus, Alstom Power, Inc.
- 11:30 a.m. **Commercialization of the Iron-Based Coal-Direct Chemical Looping Process for Power Production with In Situ Carbon Dioxide Capture**
Luis Velazquez-Vargas, The Babcock & Wilcox Power Generation Group, Inc.
- 11:55 a.m. **ADJOURN**