

5-22-2017

Conference Program

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Recommended Citation

Jen Wilcox, Holly Krutka, Simona Liguori, and Niall Mac Dowell, "Conference Program" in "CO2 Summit III: Pathways to Carbon Capture, Utilization, and Storage Deployment", Jen Wilcox (Colorado School of Mines, USA) Holly Krutka (Tri-State Generation and Transmission Association, USA) Simona Liguori (Colorado School of Mines, USA) Niall Mac Dowell (Imperial College, United Kingdom) Eds, ECI Symposium Series, (2017). http://dc.engconfintl.org/co2_summit3/55

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Program

CO2 Summit III: Pathways to Carbon Capture, Utilization, and Storage Deployment

May 22-26, 2017

Grand Hotel San Michele, Cetraro (Calabria), Italy

Conference Chairs:

Jen Wilcox, Colorado School of Mines

Holly Krutka, Tri-State Generation and Transmission Association

Conference Co-Chairs:

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Monday, May 22, 2017

17:30 - 19:00	Conference Check-in
19:00 - 19:30	Welcome reception
19:30 - 21:00	Dinner

NOTES

- Audiotaping, videotaping and photography of presentations are prohibited.
- Speakers – Please ensure your talk adheres to your given time allotment. Talks that go over their allotment reduce time for valuable discussion and can disrupt the conference program.
- Turn your cellular telephones to vibrate or off during technical sessions.
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- Please do not smoke at any conference functions.
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Tuesday, May 23, 2017

07:30 - 08:30 Breakfast

08:30 - 08:50 **Conference welcome and opening ceremony**
Introduction to conference format and goals –
Jen Wilcox and Niall Mac Dowell

Plenary 1

08:50 - 09:30 **The Role of CCS for Attaining Long-term Climate Stabilization**
Massimo Tavoni, Politecnico Milano, Italy

Plenary 2

09:30 - 10:10 **Research Opportunities for Negative Emissions and CO₂ Utilization at the Gigatonne Scale**
Arun Majumdar, Stanford University, USA

10:10 - 10:30 Open discussion

10:30 - 11:00 Coffee Break

Technical Session 1: Communication, Policy, and Economics Around CCUS Deployment

11:00 - 11:20 **A Preliminary Political Economy of Net-negative Emissions Technologies**
David M. Reiner, University of Cambridge, United Kingdom

11:20 - 11:40 **Manufacturing our Future: Industries, European Regions and Climate Action**
Jonas Helseth, Bellona Europa, Belgium

11:40 - 12:00 **Towards Industry, Policy, and Civil Society Action on Carbon Removal**
Noah Deich, Center for Carbon Removal, USA

12:00 - 12:30 **Pathways to CCS Commercialization**
Wilfried Maas, Shell, Netherlands

12:30 - 12:50 Open discussion

12:50 - 14:20 Lunch and open time

Plenary 3

14:20 - 15:00 **Carbon Dioxide Removal**
Howard J. Herzog, Massachusetts Institute of Technology, USA

Plenary 4

15:00 - 15:40 **Land Use Implications of Negative Emissions from BECCS**
Sabine Fuss, Mercator Research Institute on Global Commons and Climate Change, Germany

Tuesday, May 23, 2017 (continued)

15:40 - 16:00 Open discussion

16:00 - 16:30 Coffee break

Technical Session 2: Opportunities and Examples of CDR

16:30 - 16:50 **The Transition of CCS from Fossil Fuel CO₂ Control to Negative Emissions**

Roger D. Aines, Lawrence Livermore National Laboratory, USA

16:50 - 17:10 **Can BECCS Deliver Sustainable and Resource-efficient Negative Emissions?**

Mathilde Fajardy, Imperial College London, United Kingdom

17:10 - 17:30 **Sustainable BECCS Pathways Evaluated by an Integrated Assessment Model**

Etsushi Kato, Institute of Applied Energy, Japan

17:30 - 17:50 **Negative Emissions on South East Asia: Renewable Energy Optimization with BECCS for Indonesia**

Florian Kraxner, International Institute for Applied System Analysis, Austria

17:50 - 18:10 **Slicing the Pie: How Big Could Carbon Dioxide Removal Be?**

Peter Psarras, Colorado School of Mines, USA

18:10 - 18:30 Open discussion

18:30 - 19:30 Reception and poster session (5-minute presentations by poster presenters)
Wine, beer, and light snacks

19:30 - 21:00 Dinner

Wednesday, May 24, 2017

07:30 - 08:30 Breakfast

Plenary 5

08:30 - 09:10 **Adsorption Processes for CO₂ Capture: An Overview**
Paul Webley, The University of Melbourne, Australia

Plenary 6

09:10 - 09:50 **A Membrane Approach to CO₂ Capture**
Richard W. Baker, Membrane Technology Research, USA

09:50 - 10:10 Open discussion

10:10 - 10:40 Coffee break

Technical Session 3: Advanced Conversion and CO₂ Separation Processes

10:40 - 11:00 **Membrane Condenser: Direct and Indirect Support to CO₂ capture**
Enrico Drioli, ITM-CNR, Italy

11:00 - 11:20 **Advanced Membrane Operations in CO₂ Capture**
Giuseppe Barbieri, ITM-CNR, University of Calabria, Italy

11:20 - 11:40 **Designing Materials and Processes for CO₂ Capture with Solid Sorbents**
Adam H. Berger, Electric Power Research Institute, USA

11:40 - 12:00 **Carbon Dioxide Reforming with Natural Gas and Coal using Chemical Looping**
Andrew Tong, The Ohio State University, USA

12:00 - 12:20 Open discussion

12:20 - 13:40 Lunch and open time

Plenary 7

13:40 - 14:20 **International Efforts of the National Carbon Capture Center**
Roxann Laird, Southern Company Services, USA

Plenary 8

14:20 - 15:00 **Carbon Management at Shenhua – R&D Initiatives and CCUS Demonstrations**
Anthony Ku, National Institute of Clean-and-Low-Carbon Energy, China

15:00 - 15:20 Open discussion

15:20 - 15:50 Coffee break

Wednesday, May 24, 2017 (continued)

Technical Session 4: System Integration Approaches

Sponsored by Beijing-based National Institute of Clean and Low-Carbon Energy (NICE)

- 15:50 - 16:10 **On the Operation of CCS Within a Diverse Energy System**
Niall Mac Dowell, Imperial College London, United Kingdom
- 16:10 - 16:30 **Carbon Capture and Geologic Sequestration from Intermittent Use of Fossil Fuels**
Susan D. Hovorka, University of Texas at Austin, USA
- 16:30 - 16:50 **Reversible Solid Oxide Cells as a Flexible, Dispatchable Resource for Grid-Energy Storage and Natural Gas Production Using CO₂ and CH₄**
Robert Braun, Colorado School of Mines, USA
- 16:50 - 17:10 **Integration of carbon capture with renewable energy in power generation and steel manufacturing**
Ali Abbas, The University of Sydney, Australia
- 17:10 - 17:30 **A bio-physical and net-energy comparison of CCS and renewable energy baseload systems**
Sgouris Sgouridis, Masdar Institute, United Arab Emirates
- 17:30 - 18:00 Open discussion
- 18:00 - 19:30 Reception and poster session (5-minute presentations by poster presenters)
Wine, beer, and light snacks
- 19:30 - 21:00 Dinner

Thursday, May 25, 2017

07:30 - 08:30 Breakfast

Plenary 9

08:30 - 09:10 **Cement, CCS and CO₂ Uptake, Including an Update on the EU LEILAC Project**

Paul Fennell, Imperial College London, United Kingdom

Plenary 10

09:10 - 09:50 **To Utilize or Not to Utilize? A Life-Cycle Assessment Perspective on Carbon Dioxide Utilization**

Andre Bardow, Aachen University, Germany

09:50 - 10:10 Open discussion

10:10 - 10:40 Coffee break

Technical Session 5: CO₂ Capture from Industrial Sources and CO₂ Utilization

10:40 - 10:55 **What We Talk About When We Talk About CCUS: New Tactics for Communicating the Opportunities and Risks**

Marcus H. T. Extavour, XPRIZE, USA

10:55 - 11:15 **CO₂ Capture from Industrial Sources by High-temperature Sorbents**

Matteo C. Romano, Politecnico di Milano, Italy

11:15 - 11:35 **Lifecycle CO₂ emissions from US bioethanol production with CCS**

Sean T. McCoy, Lawrence Livermore National Laboratory, USA

11:35 - 11:55 **CCUS as a Regional Economic Development Tool: Planning and Design Considerations**

Kevin O'Brien, Illinois Sustainable Technology Center, USA

11:55 - 12:15 **Metastable hydrated carbonates for algae biofuel production**

Valentina Prigiobbe, Stevens Institute of Technology, USA

12:15 - 12:35 **Catalyzing a CO₂-neutral Society**

Mark Saeys, Ghent University, Belgium

12:35 - 12:50 **Maximizing the Mitigation Potential of Curtailed Wind: A Comparison Between Carbon Capture and Utilization, and Direct Air Capture Processes for the UK**

Habiba A. Daggash, Imperial College London, United Kingdom

12:50 - 13:10 Open discussion

Thursday, May 25, 2017 (continued)

13:10 - 15:30 Lunch and open time

Plenary 11

15:30 - 16:10 **Harnessing Peridotite Alteration for Carbon Capture and Storage**
Peter Kelemen, Columbia University, USA

Plenary 12

16:10 - 16:50 **Status, Challenges, and Potential Capacity of Reliable Geologic Storage of CO₂**
Susan D. Hovorka, University of Texas at Austin, USA

16:50 - 17:10 Open discussion

17:10 - 17:40 Coffee break

Technical Session 6: Reliable CO₂ Storage Technologies

17:40 - 18:00 **The Potential of Carbon Storage in the Ocean as Bicarbonate**
Phil Renforth, Cardiff University, United Kingdom

18:00 - 18:20 **Pathways to Accelerated Carbon Mineralization in Mine Tailings**
Gregory M. Dipple, University of British Columbia, Canada

18:20 - 18:40 **Carbonation of Industrial Residues for CCUS: Fundamentals, Energy Requirements and Scale-up Opportunities**
Renato Baciocchi, University of Rome Tor Vergata, Italy

18:40 - 19:00 Open discussion

19:00 - 21:30 Conference banquet and award ceremony

Friday, May 26, 2017

07:30 - 08:30	Breakfast
08:30 - 09:00	Closing remarks and next steps - Jen Wilcox and Niall Mac Dowell
09:00 - 10:30	<u>Technical Session 7: Frontiers Special Issue Development</u>
10:30 - 11:00	Coffee break
11:00 - 12:00	<u>Technical Session 7 continued: Frontiers Special Issue Development</u>
12:00 - 13:30	Lunch
13:30	Conference conclusion

Poster Presentations

1. **Cost-effective, near-term deployment of carbon capture and storage from biorefineries in the United States**
Daniel L. Sanchez, Carnegie Institution for Science, USA
2. **Opportunities for industrial CO₂ capture and utilization in the US**
Peter Psarras, Colorado School of Mines, USA
3. **Analysis of reversible solid oxide cell technology for grid-energy storage and synthetic natural gas production with CO₂**
Evan P. Reznicek, Colorado School of Mines, USA
4. **What are the key processes of CO₂ storage to represent in energy systems models? A dynamic model of CO₂ storage in the UK Bunter Sandstone**
Clea Kolster, Imperial College London, United Kingdom
5. **Can BECCS efficiently and sustainably remove CO₂ from the atmosphere?**
Mathilde Fajardy, Imperial College London, United Kingdom
6. **Power-to-transport: Using curtailed wind to run CCU processes**
Habiba A. Daggash, Imperial College London, United Kingdom
7. **CO₂ capture from the industry sector**
Praveen Bains, Stanford University, USA
8. **Design and operations optimization of membrane separation for flexible carbon capture from natural gas combined cycle systems**
Mengyao Yuan, Stanford University, USA
9. **Geospatial analysis of BECCS deployment potential in the U.S.**
Ejeong Baik, Stanford University, USA
10. **Applying potential BECCS solutions to the US coal sector: New coal boom or bust?**
Florian Kraxner, International Institute for Applied Systems Analysis (IIASA), Austria
11. **The water-energy-carbon-land nexus: Optimising the BECCS supply chain**
Solène Chiquier, Imperial College London, United Kingdom
12. **Photocatalytic membrane reactor for CO₂ conversion**
Giuseppe Barbieri, ITM-CNR, Italy
13. **H₂ production in Palladium-based Membrane Reactor**
Nora Buggy, Colorado School of Mines, USA
14. **Mineral carbonation opportunities in the western United States**
Christopher M. Caskey, Colorado School of Mines, USA