CO$_2$ SUMMIT: TECHNOLOGY AND OPPORTUNITY

June 6 - 10, 2010

Vail Marriott Mountain Resort
715 West Lionhead Circle
Vail, Colorado, USA

Program Chair:

Dr. Frank Zhu, UOP LLC, USA
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Featured Keynote Speakers:

Dr. Geo. A. Richards
Focus Area Leader
National Energy Technology Laboratory, US DOE
“Clean Energy in USA”

Dr. John Carras
Director of Coal Technology, CSIRO Australia
“Low Emissions Coal Technology in Australia”

Dr. Ke Liu
VP/CTO
National Institute of Clean Energy, China
“Future of Clean Energy”

Mr. Prabhakar Nair
Director, Renewable Energy/Chemicals, UOP
“Challenges & Opportunities in Developing a Sustainable Biomass Infrastructure”

Dr. Nazeer Bhore
Sr. Technology Advisor
ExxonMobil Corporation
“Role of Technology in Clean Energy”

Dr. Joseph Powell
Chief Scientist, Shell
“Biofuels and Bio-based Chemicals”

Mr. Wes Bolsen
VP/CMO, Coskata Inc.
“Syngas to Ethanol Technology”

Prof. Jae Lee
The City College of New York, USA
“Theory and applications of Process Intensifications”

Co-sponsored by
Sunday, June 6, 2010

16:00 – 18:00  Conference check-in (Colorado Ballroom Foyer)
18:00 – 19:00  Welcome Reception (Colorado Ballroom Salon 3)
19:00 – 21:00  Dinner (Colorado Ballroom Salon 2)

NOTES

• Technical Sessions will be held Colorado Ballroom Salon 2.

• Poster Sessions will be held in Colorado Ballroom Salon 1 on Monday and Tuesday, Salon 3 on Wednesday.

• Breakfasts on Monday, Tuesday and Wednesday will be in Colorado Ballroom Salon 3, and in the Ocotillo Restaurant on Thursday.

• Lunches on Monday, Tuesday and Wednesday will be in Colorado Ballroom Salon 3, and at the Lower Pool Deck on Thursday.

• Dinners on Monday, Tuesday and Wednesday will be in Colorado Ballroom Salon 3.

• Audiotaping, videotaping and photography of presentations are prohibited.

• Speakers – Please leave at least 5 minutes for questions and discussion.

• Please do not smoke at any conference functions.

• Turn your cellular telephones to vibrate or off during technical sessions.

• Be sure to make any corrections to your name/contact information on the Master Participant List or confirm that the listing is correct. A corrected copy will be sent to all participants after the conference.
Monday, June 7, 2010

07:00 – 08:00 Breakfast

08:00 – 08:15 Welcoming Remarks and Opening of the Conference

08:15 – 09:00 Conference Plenary: Energy Production in a Carbon-Constrained World
Geo Richards, DOE, USA

Session 1: Clean Coal & CCS – 1

09:00 – 09:45 Keynote: Low Emissions Coal Technology in Australia
John Carras, CSIRO, Australia

09:45 – 10:15 Coffee Break

C. Wylock, S. Dehaeck, E. Boulay, P. Colinet and B. Haut, University Libre de Bruxelles, Belgium

10:50 – 11:25 Solid fuels conversion using the iron-based chemical looping process
R. H. Kim, F. Li, F. Wang, D. Sridhar, L. Zeng and L.-S. Fan, The Ohio State University, USA

11:25 – 12:00 Greenhouse gas capture and mitigation techniques for different industries

12:00 – 12:35 Towards sustainable energy: synthesis of clean fuels from coal, biomass and municipal solid wastes with integrated carbon capture and storage
A.-H. A. Park, H. Zhao and K. Fricker, Columbia University, USA

12:35 – 16:30 Lunch and free time

Session 2: Clean Coal & CCS – 2

16:30 – 17:10 A multi-objective evaluation of PC plants with aqueous amine carbon capture systems
J. Eslick (ORISE/NETL), D. C. Miller (US DOE/NETL), A. Cozad (Carnegie Mellon University), N.V. Sahinidis (Carnegie Mellon University)

17:10 – 17:45 Enhanced photosynthetic growth, bio-oil and electricity production using chlorella vulgaris and pseudomonas pudita
P. Mitra, A. Viguera, and G. A. Hill, University of Saskatchewan, Canada

17:45 – 18:15 Coffee Break
<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
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<tbody>
<tr>
<td>18:15 – 18:45</td>
<td>Sustainable and innovative processes for carbon capture and recycling</td>
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<tr>
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<td>M. Alvarez-Guerra, A. Irabien, University of Cantabria, Spain</td>
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<tr>
<td>18:45 – 19:15</td>
<td>CO₂ conversion to organic compounds and polymeric precursors</td>
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<td>J. L. de Miranda, A. A. Barbosa, H. B. P. Ferreira, and C. J. A. Mota</td>
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<td>Federal University of Rio de Janeiro, Brazil</td>
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<tr>
<td>19:30 – 21:00</td>
<td>Dinner</td>
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<td>21:00 – 22:00</td>
<td>Poster Session and Social Hour</td>
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Tuesday, June 8, 2010

07:00 – 08:00  Breakfast
08:00 – 08:15  Announcements
08:15 – 09:00  Conference Plenary: The Role of Technology in Energy Outlook
               Nazeer Bhore, ExxonMobil, USA

**Session 3: Renewable Energy 1**

09:00 – 09:45  Keynote: Challenges & Opportunities in Developing a Sustainable Biomass Infrastructure
               Prabhakar Nair, UOP, USA
09:45 – 10:15  Coffee Break
10:15 – 10:40  Bio-energy greenhouse gases life cycle assessment review
               H. Chum, E. S. Warner, G. A. Heath, and M. K. Mann, NREL, USA
10:40 – 11:05  A Mobile Pyrolyzer for Converting Agricultural and Forestry Residues into Liquid Bio-Oil and Bio-Char
               F. Berruti, The University of Western Ontario, Canada
11:05 – 11:30  GHG Impact of Using fast pyrolysis oil for electricity and biofuel generation
               T. Kalnes, UOP, USA
11:30 – 11:55  Characterization and Genetic Engineering of a Strain of Saccharomyces Cerevisiae Capable of Utilizing Xylose for Growth and Ethanol Production
               A. Fulton, University of Saskatchewan, Canada
11:55 – 12:20  Analysis of Global Warming Mitigation by White Reflecting Surfaces
               F. Rossi, A. Nicolini, University Of Perugia, Italy
12:20 – 12:45  Microalgae Biomass Production Potential in the US
               J. Quinn, T. Bradley, Colorado State University, USA
12:45 – 16:30  Lunch and free time

**Session 4: Renewable Energy 2**

16:30 – 17:15  Keynote: Biofuels and Bio-Based Chemicals: Opportunities & Barriers
               Joseph Powell, Shell, USA
17:15 – 17:40  Unlocking Biofuels with Microchannel Technology
               J. McDaniel, D. Kilanowski, Velocys, Inc.
               T. Dritz, Green Columbus, USA
17:40 – 18:00  Coffee Break
18:00 – 18:25  Net Energy and Greenhouse Gas Emissions Evaluation of Biodiesel Derived from Microalgae
               L. Batan, J. C. Quinn, B. D. Willson, T. H. Bradley, Colorado State University, USA
18:25 – 18:50  Use of Genetically Modified Saccharomyces Cerevisiae to Convert Starch Directly into Bioethanol
               B. Liao, G. A. Hill, W. J. Roesler, University of Saskatchewan, Canada
**Tuesday, June 8, 2010 (continued)**

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<tr>
<th>Time</th>
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<tr>
<td>18:50 – 19:15</td>
<td>Compatible Powertrain Fuel from Municipal Solid Waste Plastic</td>
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<td>M. Sarker, M. M. Rashid, M. Molla, Natural State Research, Inc., USA</td>
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<tr>
<td>19:30 – 21:00</td>
<td>Dinner</td>
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<tr>
<td>21:00 – 22:00</td>
<td>Poster Session and Social Hour</td>
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Wednesday, June 9, 2010

07:00 – 08:00  Breakfast
08:00 – 08:15  Announcements
08:15 – 09:00  Conference Plenary: Painting the Future Picture Energy from Different Angles
               Ke Liu, National Institute of Clean Energy, China

**Session 5: Process Efficiency and Innovation**

09:00 – 09:45  Keynote: Towards Sustainable CO₂ Capture
               Jae Lee, The City College of New York, USA
09:45 – 10:15  Coffee Break
10:15 – 10:40  Lifecycle Energy Modeling—Input into Upstream Design Process
               P. Chandrahasan, T. Mallinson, N. Patwa, Siemens Energy Inc., USA
10:40 – 11:05  Monitoring Consumption – the first step in developing an online energy
               management solution
               P. Feder, Honeywell Process Solutions, USA
11:05 – 11:30  Achieving Process Energy Efficiency Via Innovations
               G. Werba, F. Zhu, UOP, USA
11:30 – 11:55  Exergy analysis and heat integration of an oxy-combustion process for
               coal-fired power plants with CO₂ capture
               F. Chao, T. Gundersen, Norwegian University of Science and
               Technology, Norway
11:55 - 12:20  Efficient Combustion—The Chemical Engineer’s Quest?
               D. Hildebrandt, D. Glasser, B Sempuga, B Patel, B Hausberger,
               University of the Witwatersrand, South Africa
12:20 - 12:45  Integrated Assessment of Strategies Proposed to Reduce CO₂
               Emissions
               C. Tsouris, K. A. Williams, Oak Ridge National Laboratory, D. Aaron,
               Georgia Institute of Technology, USA
12:45 – 15:30  Lunch and free time
15:30 – 16:30  Poster Session

**Session 6: Developing Industrial Projects**

16:30 – 17:15  Keynote: Efficient Syngas-to-Ethanol Technology
                Wes Bolsen, Coskata Inc., USA
17:15 – 17:40  Life Cycle Analysis of Oil Sands
                Robert Braiser, B. Keesom, Jacobs Consultancy, USA
17:40 – 18:00  Coffee Break
18:00 – 18:25  How to Make Cements and Concretes with Lower CO₂ Emissions
                E. Garnier, Lafarge Central Research, France
### Wednesday, June 9, 2010 (continued)

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<thead>
<tr>
<th>Time</th>
<th>Event</th>
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<tr>
<td>18:25 – 18:50</td>
<td>Minimization of Embodied Energy and CO$_2$ emission in reinforced concrete</td>
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<td>E. Simiu, F. A. Potra, D.H. Yeo, NIST, USA, R. D. Gabbai, Catholic University of America, USA</td>
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<td>18:50 – 19:15</td>
<td>Compression and Pumping Technologies and Experience for EOR/CCS Applications</td>
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<td>B. Wadas, GE, USA</td>
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<td>19:15 – 19:40</td>
<td>Improving efficiency of fired heaters in the oil refineries,</td>
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<td>A. Garg, Furnace Improvement Services, USA</td>
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<td>20:00 – 22:30</td>
<td>Banquet</td>
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### Thursday, June 10, 2010

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<tr>
<th>Time</th>
<th>Event</th>
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<tbody>
<tr>
<td>07:00</td>
<td>Networking Breakfast and Departures</td>
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