



## **CCUS CONFERENCE WEEK 2022** (Final Program of Nov. 10<sup>th</sup>, 2022)

### **“Whole Value Chain Carbon Capture, Utilization, and Storage (CCUS)”**

**Venue: CSM & Golden Hotel, 800 11th St, Golden, CO 80401, USA**

**Time: Monday Nov. 14<sup>th</sup> - Friday Nov. 18<sup>th</sup>, 2022**

**Provided by: Petroleum Research School of Norway (NFIP), The Colorado-Norway Clean Energy Research and Educational Collaboration (ColNor), NorTex Petroleum Cluster, Rice University and Co-Hosted by Colorado School of Mines and Royal Norwegian Consulate General in San Francisco.**

**Sponsored by: Norwegian Research Council Research School Funding Program and RCN/Climit.**

#### **Conference Objectives:**

1. Emphasize Technological Solutions to the Dual Challenge of Climate Change & Energy Needs
2. Provide a Whole Value Chain Approach Overview within CCUS
3. Demonstrate how CCUS may assist in reducing energy poverty while mitigating climate change
4. Accelerate CCUS collaboration between Norway, Europe, South America, Asia, and USA
5. Provide opportunity for experts in industry and academia to collectively discuss CCUS research
6. Provide PhD students with current CCUS research status and the way forward
7. Emphasize how captured anthropogenic CO<sub>2</sub> may mitigate climate change and provide reliable, affordable, and sustainable energy for the future utilizing CCUS in oil production
8. Provide oil industry opportunities to communicate needs to next generation energy engineers

#### **Scientific Program:**

- Day 1:** Climate Perspectives and CO<sub>2</sub> Capture
- Day 2:** CO<sub>2</sub> Capture and CO<sub>2</sub> Transport
- Day 3:** CO<sub>2</sub> Storage
- Day 4:** CO<sub>2</sub> Utilization in Hydrates and in Enhanced Oil Recovery (EOR)  
- Tour of CSM CCUS and EOR Laboratories
- Day 5:** CO<sub>2</sub> EOR and Whole Value Chain CCUS Future Development

#### **Social Program:**

- Day 1:** - Reception at Golden Hotel
- Day 4:** - Conference Dinner at The Golden Hotel
- Day 5:** - Tour of the Coors Brewery; dependent on individual reservations

**Day 1: Monday Nov. 14<sup>th</sup>****Climate Perspectives and CO<sub>2</sub> Capture****08:30** Registration and Coffee**09:00** *Opening Address*Anders Tornquist, Norwegian Honorary Consul in Colorado  
*Welcome and Symposium Objectives*Arne Graue, Prof. of Physics, University of Bergen, Norway

Chair of the Boards: Petroleum Research School of Norway, ColNor and NorTex Petroleum Cluster

John Bradford, Vice President for Global Initiatives, Colorado School of Mines**Climate Perspectives****09:30** *CCUS Assessment: CCUS in the US - CCS in Europe - Global Importance of CCUS*Arne Graue, Prof. of Physics, University of Bergen, Norway

Chair of the Boards: Petroleum Research School of Norway, ColNor and NorTex Petroleum Cluster

**10:00** *Reflections on IPCC Perspectives*Klaus Lackner, Arizona State University**10:30** *Coffee***11:00** *Global Climate Concerns – The Air We Breathe: It Is Not What it Used To Be*Russell Schnell, National Oceanic and Atmospheric Administration (NOAA)**11:30** *Economic Determinants of Success in CCUS*Ian Lange, Colorado School of Mines**12:00** *Lunch***13:00** *SDG & CCUS*Mike Matson, Boston Consulting Group**13:30** *Inflation Reduction Act & Future CCUS in USA*Morgan Bazilian, Colorado School of Mines**14:00** *Policies and Economics of CCUS*Ken Medlock, Baker Institute**14:30** *The Business Case for Carbon Capture, Utilization, and Storage*Anna Littlefield, Colorado School of Mines**15:00** *Coffee*

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15:30 *North American Projects and Policy Landscape vs. Energy Needs in Undeveloped Countries*  
Michael J. Nasi, Jackson Walker's Climate Change & Carbon Management Group

16:30 *Energy Balance of the Climate System: Contribution of Clouds and Aerosol to Uncertain Futures*  
James Wilson, University of Denver

17:30 *End of Day*

19:00 - 21:00 *Reception at Golden Hotel*

## Day 2: Tuesday Nov. 15<sup>th</sup>

### CO<sub>2</sub> Capture and CO<sub>2</sub> Transport

#### CO<sub>2</sub> Capture

09:00 *CO<sub>2</sub> Capture Technologies – An Overview*  
Robert Braun, Colorado School of Mines

09:30 *Post Combustion Capture*  
Ryan Richards and Mike McGuirk, Colorado School of Mines

10:00 *CO<sub>2</sub> Capture from the Air*  
Klaus Lackner, Arizona State University

10:30 *Coffee*

11:00 *Precombustion and Oxyfuel Capture Technologies*  
Greg Jackson, Colorado School of Mines

11:30 *Reactive Capture Integrates CO<sub>2</sub> Capture and Conversion*  
Joshua Schaidle, NREL

12:00 *Lunch*

#### CO<sub>2</sub> Transport

13:00 *CO<sub>2</sub> Pipeline Infrastructure -Overview and Numerical Simulations*  
Bailian Chen, Los Alamos National Lab

13:30 *Offshore Challenges - Ships or Pipeline*  
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- 14:00 *Future of Energy and the Path to Net Zero*  
Robert Balch, Petroleum Recovery Research Center at New Mexico Tech
- 14:30 *CCUS in the USA and Industry Opportunities*  
Jessica Raines, Baker Hughes (TBC)
- 15:00 *Coffee*
- 15:30 *Panel Debate: USA and the World on CCUS – Energy Poverty, Climate Change & CCUS - Technology Solutions or Climate Ideology?*  
Panelists (TBC):
- Mike Matson, Boston Consulting Group
  - Josh Schaidle, US National Renewable Energy Laboratory (NREL)
  - Ken Medlock, Baker Institute
  - Jessica Raines, Baker Hughes
  - Robert Balch, Petroleum Recovery Research Center at New Mexico Tech
- Moderator: Arne Graue, Univ. of Bergen, Norway
- 17:00 *End of Day*

### Day 3: Wednesday Nov. 16<sup>th</sup>

#### CO<sub>2</sub> Storage

- 09:00 *Overview of CO<sub>2</sub> Storage Options*  
Steve Melzer, Melzer Consulting
- 09:30 *Regulatory Challenges in CO<sub>2</sub> Storage*  
Michael Moore, USEA
- 10:00 *Ongoing and Planned Large Scale CO<sub>2</sub> Storage Projects Worldwide*  
Joey Minervini, Global CCS Institute
- 10:30 *Coffee*
- 11:00 *CO<sub>2</sub> Atlas Developments and CO<sub>2</sub> Storage Achievements*  
Erik Rundell, Norwegian Petroleum Directorate
- 11:30 *How Mega-scale CCUS projects are forming up in the US per policy, regulations and incentives*  
Michael Moore, USEA
- 12:00 *Lunch*



- 13:00 ***Carbon and Related Markets Growing Around Mega-Scale Project Development***  
**Michael Moore, USEA (TBC)**
- 13:30 ***The Longship Project: Whole Value Chain CCUS Demonstration Project on the Norwegian Continental Shelf***  
**Erik Rundell, Norwegian Petroleum Directorate**
- 14:00 ***Practical Aspects of CO<sub>2</sub> injection for geological sequestration***  
**Luis Zerpa, Colorado School of Mines**
- 14:30 ***4D VSP (Vertical Seismic Profiling) Monitoring at the Farnsworth CO<sub>2</sub>-EOR Field***  
**Lianjie Huang, Los Alamos National Lab**
- 15:00 ***Coffee***
- 15:30 ***EVOLVE Carbon Solutions - Building the Workforce of Today for Tomorrow's Environment***  
**Christine Ehlig-Economides, University of Houston**
- 16:15 ***CO<sub>2</sub> Storage, Monitoring, Verification and Accounting***  
**Bjørn Paulsson, Paulsson Inc.**
- 17:00 ***End of Day***

**Day 4: Thursday Nov. 17<sup>th</sup>****CO<sub>2</sub> Utilization in Hydrates and in Enhanced Oil Recovery (EOR)****- Tour of CSM CCUS and EOR Laboratories**

- 09:00 ***Fundamentals of Hydrates, Climate Perspectives, and Energy Potentials***  
**Carolyn Koh, Colorado School of Mines**
- 09:30 ***CO<sub>2</sub> Storage in Hydrates with Associated Methane Production***  
**Arne Graue, University of Bergen**
- 10:00 ***Field Experiences from CO<sub>2</sub> Injections in Hydrates: North Slope CO<sub>2</sub>-CH<sub>4</sub> Exchange Project***  
**Arne Graue, University of Bergen**
- 10:30 ***Coffee***
- 11:00 ***CO<sub>2</sub> EOR Assessment***  
**Matt Dahan, Denbury**
- 12:00 ***Lunch***



## CO<sub>2</sub> Utilization in EOR as CCUS

**13:00** *CO<sub>2</sub> for EOR – Historical Perspectives, Current State of the Art Technology Status, and Technological Challenges*

Hossein Kazemi, Colorado School of Mines

**14:00** *Physical Processes and Modeling Studies of CO<sub>2</sub> Storage in Subsurface Formations*

Yu-Shu Wu, Colorado School of Mines

**14:30** *Global Strategies to Meet the Dual Challenge*

Arne Graue, University of Bergen

**15:00** *Coffee*

**15:30** *CSM Lab Tour*

**17:00** *End of Day*

**19:00** *Conference Dinner at the Golden Hotel*

## Day 5: Friday Nov. 18<sup>th</sup>

### CO<sub>2</sub> EOR, Policy, Economics and Whole Value Chain CCUS Future Development

#### - Tour of Coors Brewery

**09:00** *How Foam Develops Apparent Viscosity in CO<sub>2</sub> EOR*

George Hirasaki, Rice University

**09:30** *CO<sub>2</sub> Foam EOR for Mobility Control*

Arne Graue, University of Bergen

**10:00** *CO<sub>2</sub> Foam EOR Field Pilots in Texas*

Zachary Alcorn, University of Bergen

**10:30** *Coffee*

**11:00** *Current CO<sub>2</sub> EOR Perspectives*

Hossein Kazemi, Colorado School of Mines

**12:00** *Lunch*



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13:00 *Synthesize Student Learning and Discussion*  
John Bradford, Colorado School of Mines

14:00 - Tour of the Coors Brewery; dependent on individual reservations  
Coors Brewery no longer offers Group Tours. Each individual that would like to participate in a  
tour of the brewery needs to reserve tickets themselves at:  
<https://www.coorsbrewerytour.com/tour-information#id=coors-brewery-tour>

14:00 *End of Conference*