Transforming the Climate Change Discussion: The Role of Direct Air Capture

Session co-chairs: Ryan Lively, Georgia Institute of Technology, and Mica Taborga Claure, ExxonMobil Research and Engineering

Imagine a technology that can pick CO_2 right out of the air. Direct air capture technology, also referred to as DAC, has the potential to reduce the amount of CO_2 in the atmosphere and mitigate the effects of climate change. While the payoffs have global impacts, the challenge is big, and academia, start-ups, industry, and policy experts are coming together to enable the deployment of DAC in all fronts.

Our first speaker, Simon Pang from Lawrence Livermore National Laboratory, will introduce direct air capture technology with an overview, some challenges, and an outlook for DAC. Next, Rodrigo Blanco Gutierrez from ExxonMobil Research and Engineering will elaborate on an industrial approach for scaling up DAC technology. The third speaker, Maxime Tornier from Climeworks Engineering (based in Europe), will provide a start-up perspective on DAC technology and an R&D outlook. Finally, Colin McCormick from Carbon Direct and Georgetown University will present thoughts on DAC policy and regulatory perspectives that enable DAC deployment.

Speakers:

The Unique Challenges Posed by Direct Air Capture for Chemistry and Engineering
Simon Pang, Staff Scientist, Lawrence Livermore National Laboratory, Livermore, CA
Bio: Simon Pang is a staff scientist in the Materials for Energy and Climate Security group at Lawrence Livermore National Laboratory. His research interests lie in capture and conversion of carbon dioxide from ambient air as well as other technological solutions for engineering the circular carbon economy and achieving carbon neutrality. He was a co-author on LLNL's recent *Getting to Neutral* report, which examined options for achieving carbon neutrality in California.

A Fundamentals-based Approach for Scale-up of DAC Technology
Rodrigo Blanco Gutierrez, Advanced Research Associate, ExxonMobil Research & Engineering, Clinton, NJ

Bio: Rodrigo Blanco obtained Chemical Engineering from Universidad de las Americas – Puebla (Mexico) in 1999, MSc in Process Integration from University of Manchester (UK) in 2000 and PhD degree from Imperial College London (UK) in 2006. He worked as an Improvement Engineer at Dow Chemical (Mexico) and started focusing on modeling through his PhD and R&D position at Praxair. At Process Systems Enterprise he continued the development and application of models to different customers in the oil, chemical, industrial gases, minerals and food industry. He is currently in the Process Intensification section at ExxonMobil Engineering and Research focusing on the scale-up of various technologies.

The Rules are Easy, the Game is Hard: The Development of Successful DAC Technologies

Maxime Tornier, R&D Project Manager, Climeworks, Zurich, Switzerland

Bio: As an experienced R&D specialist, Maxime has worked across multiple technical disciplines in both large and small oganisations. Maxime joined Climeworks in the fall of 2019 and is responsible for the development of future disrutpive integrated products and technologies. Before joining the Swiss start-up, he worked at Dyson as a Senior researcher where he led multi-disciplinary research projects as well as Airbus supporing early innovation programs

Who Pays for DAC? The Policy and Market Landscape

Colin McCormick, Chief Innovation Officer at Carbon Direct and an Adjunct Associate Professor, Georgetown University, Washington, DC

Bio: Colin McCormick is the Chief Innovation Officer at Carbon Direct and an Adjunct Associate Professor at the Walsh School of Foreign Service, Georgetown University. Trained as an experimental physicist, he has a wide range of experience in energy and climate technology development, science and technology policy, and data science. His current focus areas include technology development priorities for carbon dioxide removal, pathways for industrial deep decarbonization, and remote sensing methods for greenhouse gas emissions monitoring.

He has consulted with the World Resources Institute, the World Bank, the Global Green Growth Institute, WattTime, and the Energy Futures Initiative. His recent publications include *Clearing the Air: A Federal RD&D Initiative and Management Plan for Carbon Dioxide Removal Technologies* (with Energy Futures Initiative); *ICEF 2018 Roadmap: Direct Air Capture of Carbon Dioxide* (with Columbia University); *Technological Carbon Removal in the United States* (with the World Resources Institute); and *Getting to Neutral: Options for Negative Carbon Emissions in California* (with Lawrence Livermore National Laboratory).

Colin served as Senior Technical Advisor at the US Department of Energy during the Obama Administration, where his portfolio included R&D strategy and coordination across the applied energy offices, including building technologies, vehicle technologies, renewable energy, power transmission and control, fossil energy, and nuclear energy. Prior to this he worked as an energy and security analyst at the Federation of American Scientists, a staff member with the House Science and Technology Committee, and a AAAS Congressional Fellow in the Office of Rep. Ed Markey. Colin holds a PhD in atomic and optical physics from UC Berkeley and was a postdoctoral researcher at the National Institute of Standards and Technology (NIST).