Hydrogen: a new 'universal' energy carrier for the carbon-free future?
Co-chairs: Jesse Jenkins, Princeton University, and Iryna Zenyuk, University of California, Irvine

Hydrogen is a carbon-free energy carrier that is expected to play a pivotal role in a net-zero greenhouse gas emissions energy system. A versatile fuel, hydrogen can be used to for space heating, industrial process heat, direct reduction of iron, ammonia production, long-duration energy storage, power generation, as a transportation fuel, or as an intermediate energy carrier to be converted to synthetic gaseous or liquid fuels. Furthermore, hydrogen can be produced from a variety of sources that emit little or no greenhouse gas emissions, such as electrolysis with carbon-free electricity and methane reforming with carbon capture and storage (CCS), and even result in negative greenhouse gas emissions if produced by biomass gasification with CCS. This versatility makes hydrogen a critical piece of the carbon-free future, and also demands innovation and ingenuity from all corners of the engineering world.

Our first speaker, Ryan Jones (Evolved Energy Research), a macro-scale energy systems researcher, will speak to the critical role of hydrogen as an energy carrier and final fuel in a net-zero emissions energy system. Neha Rustagi (DOE) will then speak about the Department of Energy's hydrogen R&D, demonstration and deployment programs and the Hydrogen Eartshot, the DOE's effort to reduce the cost of clean hydrogen by 80% and catalyze a clean hydrogen industry. Xiong Peng (Lawrence Berkeley National Lab) will speak about cutting-edge innovation efforts to develop cheaper, higher efficiency electrolyzers for production of hydrogen from carbon-free electricity. The fourth speaker, Josh Schaidle (National Renewable Energy Laboratory), will speak about biomass gasification for hydrogen production with negative emissions to round out the panel.

Speaker bios:

Ryan Jones, Co-Founder, Evolved Energy Research
Bio: Ryan Jones has deep analytical expertise in electricity operations, reliability, and long term planning. His work has focused on jurisdictions with increasing levels of renewable energy, exploring implications from the perspective of system operators, as well as renewable developers and energy technology companies. Through this work creating and using a broad set of analytical tools, Ryan has developed a unique conceptual understanding of the long-term challenges and opportunities of deep decarbonization. He holds a bachelor's degree, summa cum laude, in environmental studies and physics from Emory University, and a master's degree from Stanford University in atmosphere/energy.

Neha Rustagi, Technology Manager, Hydrogen and Fuel Cell Technologies Office, Office of Energy Efficiency and Renewable Energy, U.S. Department of Energy
Bio: Neha is the technology manager at the Department of Energy's Hydrogen and Fuel Cell Technologies Office within the Office of Energy Efficiency and Renewable Energy (EERE). In this capacity, she leads the Office Systems Analysis portfolio that funds activities to identify emerging opportunities for hydrogen and fuel cell technologies and characterizes their impact

(e.g. cost, emissions). Neha also leads activities to implement the H2@Scale initiative at DOE. Overall, the Fuel Cell Technologies Office is responsible for the strategy and execution of hydrogen and fuel cell activities, including oversight and coordination of about $150 million per year of R&D programs. She was a Science and Technology Policy Fellow at DOE in 2014-15 and has been a technology manager since 2015. She received a B.S. in biological/biosystems engineering from the University of Maryland, and an M.S. in mechanical engineering from the University of Colorado Boulder.

Xiong Peng, Research Scientist/Engineer, Lawrence Berkeley National Laboratory
Bio: Xiong's research focuses on system optimization, including materials synthesis, electrode design, transport layers and flow channel engineering for unitized regenerative fuel cells. His other research also investigates advanced electrode fabrication methods at large-scale and ultra-low catalyst loadings for membrane based water electrolyzers. He received a B.S in chemical engineering from Dalian University of Technology, and a Ph.D in chemical engineering from the University of South Carolina.

Josh Schaidle, Distinguished Member of the Research Staff, National Renewable Energy Laboratory
Bio: Josh s the director of the Chemical Catalysis for Bioenergy (ChemCatBio) Consortium and is a distinguished member of the research staff at NREL. He also serves as the chief of staff for the Bioenergy Science and Technology Directorate and lead for the Catalytic Carbon Transformation platform at NREL. Research within this platform ranges from atomistic-scale modeling of catalytic surfaces and reactor flow dynamics to pilot-scale verification of waste- and biomass-to-fuels and chemicals processes coupled with techno-economic analysis and life cycle assessment. He seeks to advance the catalysis and bioenergy fields by working at the interface of foundational science and applied engineering, leveraging a combined experimental and computational approach. He received a B.S. from the University of California, Santa Barbara, and a PhD from the University of Michigan.