ABSTRACT
The energy generation landscape in the United States is changing. Record supplies of shale gas and growing renewable generation are offsetting coal power amid various proposals to reduce carbon dioxide (CO2) emissions. The changing situation emphasizes the need to understand the potential of different energy sources and conversion, including the ability to capture and store CO2. State-of-the-art technology can successfully scrub CO2 emissions from today’s coal or natural gas power plants, sending CO2 to permanent geologic storage. However, existing power plants were not originally designed to reduce or capture CO2. As a result, carbon capture retrofit to existing plants is costly, and adds an efficiency penalty. New approaches to energy generation are being developed that can reduce these penalties and accommodate renewable intermittency – producing synergies for both renewable and fossil power generation. This talk will describe the factors motivating the development of advanced energy systems, emphasizing the multiple criteria new generation must meet, including high-efficiency, zero water use, CO2 control, and accommodation for renewable intermittency. Technical highlights from current research in advanced energy technologies will describe pressure-gain combustion, chemical looping, supercritical CO2 power cycles, and others.

Dr. George Richards, Senior Fellow
Energy Conversion Engineering
National Energy Technology Laboratory, U.S.

Engineering at the National Energy Technology Laboratory. He has more than 30 years of experience in energy system development, and has lead research on gas turbines, fuel cells, gasification, combustion, chemical looping, magnetohydrodynamics, and geothermal energy. He received his Ph.D. from Purdue University in Mechanical Engineering, and currently serves as an associate editor for AIAA Journal of Propulsion and Power.