

# **AICHE FY13 Carbon Capture Peer Review Panel**

## **March 11–15, 2013**

### **John C. Tao, Ph.D. – Panel Chair**

Dr. John Tao has a wealth of experience in gas separations, coal conversion, and combustion technologies through 30-plus years at Air Products and Chemicals. He is currently president of O-Innovation Advisors, a management consulting company that offers partnering, licensing, and government contract services to startups as well as fortune 500 companies worldwide. Prior to starting O-Innovation Advisors, he was vice president of open innovation at Weyerhaeuser, where he managed the corporate intellectual asset management process, technology partnering, and early business development. At Air Products, he served as corporate director of technology partnerships. He was responsible for worldwide external technology development, intellectual asset management, licensing and technology transfer with outside organizations, and government contracts. He is familiar with oxy-fuel combustion technology and advanced oxygen separation using ion transport membranes. During his career at Air Products, Dr. Tao was involved in engineering management, R&D management, commercial development, venture management, and planning and business development.

Dr. Tao is a Fellow of the American Institute of Chemical Engineers (AIChE). He was a member of the Board of Directors for AIChE, the Industrial Research Institute, the Commercial Development and Marketing Association, and the Council of Chemical Research. He was the chairman of Chemical Industry Environmental Technology Projects, a board member of the Pennsylvania State University Research Foundation, and the chairman of the Management Committee of the Air Products and Imperial College Strategic Alliance, the Air Products Alliance with the Georgia Institute of Technology, and the Air Products/Pennsylvania State University Research Alliance. He served as a member of the Visiting Committee of the Department of Chemical and Petroleum Engineering at the University of Pittsburgh and on the advisory council for the Chemical Engineering department of the University of Pennsylvania. Dr. Tao has presented and published over 90 papers and holds 9 patents.

Dr. Tao received his B.S. and Ph.D. in chemical engineering from Carnegie-Mellon University, and an M.S. in chemical engineering from the University of Delaware.

### **Jon Gibbins, Ph.D.**

Dr. Jon Gibbins is currently professor of power plant engineering and carbon capture at the University of Edinburgh. He is also the Director of the United Kingdom's (UK's) Carbon Capture and Sequestration (CCS) Research Centre, which is supported by Research Councils UK in order to lead and coordinate a program of underpinning research on all aspects of CCS in support of basic science and UK government efforts on energy and climate change. Dr. Gibbins has worked on coal and biomass gasification and combustion for over 30 years, at Foster Wheeler, Imperial College, and the University of Edinburgh; he has worked on CCS since 2002. He is involved in a number of other academic, industrial and government initiatives on CCS in the UK and abroad.

Currently he is working toward delivering the combination of technical, policy, and economic advances that will move CCS rapidly to the stage where it can make an effective contribution to global climate change mitigation. Technical studies have been complemented by work on power-plant economics and pathways for CCS implementation. Through his own group and by his involvement in the earlier UK CCS Consortium project, the UK CCS Community Network, and the UK CCS Research

Council, Dr. Gibbins has also worked to help develop the academic CCS capacity necessary to support rapid CCS development and deployment. Dr. Gibbins has authored over 50 papers and more than 100 articles and reports on CCS and related topics.

Dr. Gibbins graduated with a B.S. degree in mechanical engineering from Imperial College of London, where he also earned a M.Phil. and Ph.D. in chemical engineering and chemical technology.

### **Mark Golightley**

Mr. Mark Golightley currently works for FirstEnergy Corp. (formerly Ohio Edison). He has worked in various capacities throughout his career in production at coal-fired power stations, in corporate engineering, and in environmental departments. His current responsibilities include troubleshooting performance and environmental issues at the Sammis plant, including the startup of baghouses and electrostatic precipitators.

During his tenure at FirstEnergy, he developed two patented processes for manufacturing gypsum and alpha plaster from flue-gas-desulfurization calcium sulfite. He has been involved in pilot-level testing, development, and demonstrating the patented processes. He also worked on designing and constructing a 30,000 ton per year alpha plaster plant and designing and constructing a 500,000 ton per year ex situ gypsum plant, which supplies gypsum to a new wallboard plant adjacent to the power plant (which was the second largest recycle project in the United States at that time). He has supported corporate coal-fired plant environmental control technologies, including studying technologies addressing SO<sub>2</sub>, sulfur trioxide, mercury, nitrogen oxide, and CO<sub>2</sub>. Prior to working for FirstEnergy, Mr. Golightley worked for Kaiser Aluminum.

Golightley received B.S. degrees in education and chemical engineering from the University of Toledo. He is a registered professional engineer in the State of Ohio.

### **Daniel J. Kubek**

Mr. Daniel Kubek is a consultant specializing in synthesis gas and natural gas purification and separation. His clients include the Electric Power Research Institute's CoalFleet, for whom he provides technical guidance on integrated processes for gasification projects; and the Gasification Technologies Council, where he serves as an advisor on technical issues related to gasification, particularly in the areas of hydrogen sulfide removal and carbon capture.

Mr. Kubek was with UOP for 18 years as senior technology manager. His technical expertise is based in separations technology and engineering. His primary work was in solvent absorption, molecular sieve thermal-swing adsorption, membrane permeation, and pressure-swing absorption technologies, as applied to natural gas and synthesis gas processing. He was the process manager responsible for all process design packages for multiple gasification projects and served as development manager for UOP's gas processing business. Before joining UOP, he spent 17 years with Union Carbide. In 2005, Mr. Kubek was awarded UOP's Don Carlson Award for Career Technical Innovation. From 1996 to 2006, he served as UOP's representative to the Gasification Technologies Council's Board of Directors. He holds 8 patents and has coauthored 17 technical publications.

Mr. Kubek received a B.S. degree in chemical engineering from Rutgers University and holds an M.S. in chemical engineering from Purdue University.

### **Ah-Hyung (Alissa) Park, Ph.D.**

Professor Ah-Hyung (Alissa) Park is the Lenfest Junior Professor in Applied Climate Science of Earth and Environmental Engineering and Chemical Engineering at Columbia University. She is the Associate Director of the Lenfest Center for Sustainable Energy. Her research interests include carbon capture and storage, sustainable energy conversion systems, particle technology, and multiphase flows. The specific ongoing research efforts of Park's group include:

1. The fundamental studies of novel organic-inorganic hybrid nanomaterials for application in CO<sub>2</sub> capture and storage.
2. Tailored synthesis of engineered carbon-neutral filler materials as a means of carbon sequestration and production of liquid fuels from biomass and solid municipal wastes with integrated carbon capture technology.
3. Production of hydrogen and liquid fuels from biomass and solid municipal wastes with integrated carbon sequestration.

Professor Park has received a number of awards and honors, including the National Science Foundation CAREER Award in 2009.

Professor Park received her B.S. and M.S. degrees in chemical engineering from the University of British Columbia and a Ph.D. from The Ohio State University.

### **Ravi Prasad, Ph.D.**

Dr. Ravi Prasad of Helios-NRG, LLC, and formerly a corporate fellow of Praxair, Inc., holds 60 U.S. patents and broad industrial experience in developing and commercializing new technologies, launching technology programs (\$2–\$50 million), supporting business development, building crossfunctional teams, and setting up joint development alliances. He was a founding member of an alliance involving Praxair, British Petroleum, Amoco, Phillips Petroleum, Statoil, and Sasol to develop ceramic membrane synthesis gas (syngas) technology for gas-to-liquid processes.

Dr. Prasad established and led programs for ceramic membrane oxygen technology; codeveloped proposals to secure major DOE programs worth \$35 million in syngas and \$20 million in oxygen; identified novel, solid-state oxygen generation technology; and conceived and implemented a coherent corporate strategy in nanotechnology. He has championed many initiatives in India, including small onsite hydrogen plants, small gasifiers, and aerospace business opportunities; and developed implementation plans resulting in a new research and development center in Shanghai. Dr. Prasad is the director and a board member of the National Hydrogen Association, a member of the steering committee for Chemical Industry Vision 2020, and has been a recipient for Chairman's and Corporate Fellows' awards for technology leadership. He has authored or coauthored 30 publications, is coauthor of a book on membrane gas separation, has presented at more than 20 conferences, and delivered invited lectures.

Dr. Prasad has a B.S. in mechanical engineering from the Indian Institute of Technology in Kanpur, India; and an M.S. and Ph.D. in mechanical engineering and chemical engineering from the State University of New York, Buffalo.

## **Veronika A. Rabl, Ph.D.**

Dr. Veronika Rabl is a recognized expert in energy efficiency, demand response, electric technologies, and energy industry issues. Currently, she is an independent consultant specializing in energy efficiency, demand response, and greenhouse gas mitigation, and integration of these technologies into power system design and operation. Until 2001 she served as director and general manager, retail energy products and services, at the Electric Power Research Institute (EPRI), leading the product portfolio strategy for retail and power markets. During her career at EPRI, she directed a range of technical and business areas, including strategic planning, market research, marketing, demand-side management, electric transportation, power quality, distribution systems, and metering. She joined EPRI in 1981 to create a demand response technology portfolio, developing thermal storage systems, energy management and distributed load control equipment, home automation, communication systems, and customer interface products.

Dr. Rabl's recent work includes group leadership and preparation of demand management recommendations for the Virginia State Corporation Commission; a comprehensive examination of energy conservation effects of distribution voltage reduction; assessment of carbon tax and cap-and-trade impacts on markets for electric and hybrid vehicles; and leadership in organizing a workshop on knowledge gaps and implementation barriers to timely deployment of most promising greenhouse gas management technologies. During her career she has provided technical and business leadership for design, analysis, engineering, and implementation of energy technologies and programs in all sectors of the economy. She has authored numerous papers and has been an invited speaker and lecturer at many energy-related events in the United States and abroad. She is a member of IEEE-USA Energy Policy Committee and IEEE Lead Technical Member of the Engineering Founder Societies' Technology for Carbon Management Initiative. Dr. Rabl was also selected to serve as Expert Reviewer of the International Panel on Climate Change IPCC Working Group III Special Report on Renewable Energy Sources and Climate Change Mitigation. She is a recipient of the IEEE-USA Professional Achievement Award.

Dr. Rabl received her undergraduate degree from Charles University, Prague, an M.S. from the Weizmann Institute of Science, and a Ph.D. from The Ohio State University.

## **James C. Sorensen**

Mr. James Sorensen is a consultant with a primary focus on clean coal and supporting technologies, including integrated gasification combined cycle (IGCC), oxyfuel combustion, and coal-to-liquids. He is the former chief operating officer and now a senior advisor of GTLpetrol. Prior to founding Sorensenergy, LLC, he worked for Air Products and Chemicals as director of new markets with responsibility for Syngas Conversion Technology Development and Government Systems; and director of gasification and energy conversion. In the latter position, he had commercial responsibility for numerous studies involving air separation unit (ASU)/gas turbine integration for IGCC. Mr. Sorensen was responsible for the sale of the ASU for the Tampa Electric Polk County IGCC facility, which included the first commercial application of the Air Products cycle for nitrogen integration of the ASU with the gas turbine. He was also involved with gas turbine integration associated with Air Products' ion transport membrane (ITM) oxygen program. Prior responsibilities included project management of Air Products' baseload liquefied natural gas (LNG) projects, commercial management of synthetic natural gas (SNG) production, and general management of the Membrane Systems department.

Sorensen's technical interests include IGCC, oxyfuel combustion, gas-to-liquids (GTL), and air separation and hydrogen/syngas technology. His programmatic interests include Electric Power Research Institute (EPRI) CoalFleet, Fossil Energy R&D, DOE's Clean Coal Power Initiative, DOE's

FutureGen program, and commercial projects. His areas of expertise include project conception and development, consortium development and management, technology and government sales and contracting, (R&D program management), technology consulting and training, commercial contract development, and intellectual property. Sorensen is the founding chairman of the Gasification Technologies Council, and is vice chairman of both the Council on Alternate Fuels and Energy Futures International. He holds eight U.S. patents, one of which involves ASU/gas turbine integration for IGCC. He is also well published in the area of clean coal.

Sorensen received his B.S. and M.S. degrees in chemical engineering from California Institute of Technology and Washington State University, respectively, and an MBA from the Harvard Business School.