AIChE FY11 Carbon Capture Peer Review Panel
July 18–21, 2011

Ravi Prasad, Ph.D. – Panel Chair

Ravi Prasad of Helios-NRG, LLC, and formerly a corporate fellow of Praxair, Inc., has 60 U.S. patents and broad industrial experience in developing and commercializing new technologies, launching technology programs ($2–$50 million), supporting business development, building cross-functional 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 also established and led programs for ceramic membrane oxygen technology; co-developed 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 co-authored 30 publications, is co-author of a book on membrane gas separation, and has presented at more than 20 conferences and invited lectures.

Dr. Prasad has a BS in mechanical engineering from the Indian Institute of Technology in Kanpur, India; and an MS and PhD in mechanical engineering and chemical engineering from the State University of New York, Buffalo.

Mark Golightley

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 Sammis plant, including the start-up of baghouses and electrostatic precipitators. He has addressed flue gas desulfurization problems of a large magnesium-lime wet scrubber concerning operations and by-product disposal. He developed two patented processes for manufacturing gypsum and alpha plaster from flue gas desulfurization calcium sulfite. He has operated pilot level testing developing and demonstrating the patented processes, designing and constructing a 30,000 ton/yr alpha plaster plant, designing and constructing a 500,000 ton/yr ex-situ gypsum plant supplying gypsum to a new wallboard plant adjacent the power plant (the second largest recycle project in the US at that time). He has also supported corporate coal-fired plant environmental control technologies, including studying technologies addressing SO2, SO3, Hg, NOx, and CO2. Prior to working for FirstEnergy, Mr. Golightley worked for Kaiser Aluminum.

Mr. Golightley has a BS in chemical engineering and a BA in education from the University of Toledo. He is a registered professional engineer in the state of Ohio.

Chris Higman

Chris Higman is currently an independent consultant for gasification and other syngas technologies. He is owner of Higman Consulting, GmbH and has over 40 years experience in the sale, design, development, execution, and management of capital investment projects in the water supply, power, and chemical process industries in a wide range of countries. Special emphasis is in the field of gas production, treatment, and synthesis processes. Past duties have included process and mechanical design and sales of process plants. This has included project management, construction, and start-up management of such projects in different countries. Recent activities (over the last five years) have included consulting to the gasification industry on various aspects of the technology including acid gas removal and availability issues.

Mr. Higman started working on gasification projects when he commissioned a gas plant in South Africa. Nine years later he joined Lurgi, where he spent the next 27 years, mostly involved with gasification and related technologies. At Lurgi, he held position of VP of Gas Technology, VP of Corporate Development, Managing Director of Lurgi India, and Director of Systems Technology. Mr. Higman's responsibilities in the various positions included a large number of ammonia, methanol, hydrogen, GTL, and other plants, mostly based on gasification. This included all the associated gas treatment facilities including acid gas removal. These projects included locations in Germany, Portugal, China, India, and South Africa among others. Activities as Vice President, Corporate Development included responsibility for the technical and market due diligence for an acquisition in the United States.

He co-authored the fundamentals book, "Gasification." He is also author to various papers on gasification technology and is a contributor to "Ullmann's Encyclopedia of Industrial Chemistry." Mr. Higman has also been a visiting lecturer at the College of Petroleum and Energy Studies in Oxford. He has a number of patents in the field.

He received a BA in mathematics at Oxford and an MS of mechanical engineering at the University of Witwatersrand, Johannesburg. He is a member of the AIChE.

Daniel J. Kubek

Daniel Kubek is a consultant specializing in synthesis gas and natural gas purification and separation. His clients include the Electric Power Research Institute–CoalFleet, for whom he provides technical guidance on integrated processes for gasification projects; and the Gasification Technologies Council, for which 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 adsorption 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 is the holder of eight patents and has co-authored 17 technical publications. Mr. Kubek received a BS degree in chemical engineering from Rutgers University and earned an MS in chemical engineering from Purdue University.

Veronika A. Rabl, Ph.D.

Veronika Rabl is a recognized expert in energy efficiency, demand response, electric technologies, and energy industry issues. During her career she 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.

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, Dr. Rabl 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. 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.

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.

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 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 for Individuals.

Dr. Rabl received her undergraduate degree from Charles University, Prague, her MS from the Weizmann Institute of Science, and her PhD from Ohio State University.

James C. Sorensen

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. Prior to founding Sorensenergy, LLC, he worked for Air Products and Chemicals, including positions 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' ITM Oxygen program. Prior responsibilities included project management of Air Products' baseload LNG projects, commercial management of SNG production, and general management of the Membrane Systems department.

Mr. Sorensen's technical interests include IGCC, oxyfuel combustion, gas-to-liquids (GTL), and air separation and hydrogen/syngas technology. His programmatic interests include 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.

Mr. 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. Mr. Sorensen 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. He received BS and MS degrees in chemical engineering from California Institute of Technology and Washington State University, respectively, and an MBA from the Harvard Business School.

John C. Tao, Ph.D.

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 recently 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 was most recently the 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. He was a member of the BOD for AIChE, Industrial Research Institute, Commercial Development and Marketing Association, 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 Tehcnology, 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 a BS and PhD in chemical engineering from Carnegie-Mellon University, and an MS in chemical engineering from the University of Delaware.

Michael von Spakovsky, Ph.D.

Michael von Spakovsky has more than 18 years of teaching and research experience in academia and over 17 years of industry experience in mechanical engineering, power utility systems, aerospace engineering, and software engineering. In January of 1997, Dr. von Spakovsky joined the Mechanical Engineering faculty at Virginia Polytechnic Institute and State University as Professor and director of the Energy Management Institute (now the Center for Energy Systems Research). He teaches undergraduate and graduate level courses in thermodynamics, kinetic theory, fuel cell systems, and energy system design.

Prior to teaching at the Virginia Polytechnic Institute and State University, Professor Spakovsky worked at the National Aeronautics and Space Administration; in the power utility industry, first as an engineer and then as a consultant; and as both an educator and researcher at the Swiss Federal Institute of Technology in Lausanne, where he led a research team in the modeling and systems integration of complex energy systems and taught classes in the thermodynamics of indirect and direct energy conversion systems.

His research interests include computational methods for modeling and optimizing complex energy

systems, methodological approaches for the integrated synthesis, design, operation, control, and diagnosis of such systems (stationary power as well as, for example, high performance aircraft systems), theoretical and applied thermodynamics with a focus on the unified quantum theory of mechanics and thermodynamics, and fuel cell applications for both transportation and distributed power generation.

Professor von Spakovsky has been a contributing author of more than 170 publications, including articles in scholarly journals and conference proceedings, and has given talks, seminars, and short courses (e.g., on fuel cells) worldwide. Included among his various professional activities and awards is membership in the American Institute of Aeronautics and Astronautics, fellow of the ASME, member of the Executive Committee for the ASME's Advanced Energy Systems Division, elected member of Sigma Xi and Tau Beta Pi, associate editor of the International Journal of Fuel Cell Science and Technology, editor-in-chief of the International Journal of Thermodynamics, and chairman of the executive committee for the International Center of Applied Thermodynamics. He holds a BS in aerospace engineering from Auburn University, and an MS and PhD in mechanical engineering from the Georgia Institute of Technology.

Ronald H. Wolk

Ronald Wolk is a principal at Wolk Integrated Technical Services, which he formed in 1994. His previous positions included Director of the Advanced Fossil Power Systems at the Electric Power Research Institute (EPRI) from 1980 to1994, program manager of the Clean Liquid and Solid Fuels program at EPRI (1974–1980), and Associate Laboratory Director at Hydrocarbon Research, Inc. He has extensive experience in assessing, developing, and commercializing advanced electricity generation and fuel conversion technologies, including fuel cell, gas turbine, distributed power generation, central station coal-fired power generation, and integrated gasification combined cycle technology systems. His current work includes the evaluation of advanced fuel cells and CO2 capture systems.

Mr. Wolk has served on the National Research Council's (NRC's) Committee on R&D Opportunities for Advanced Fossil Fuel Energy Complexes and has worked with the NRC on issues related to fuel cells and coal gasification. He has over 200 published articles, papers, patents, and technical presentations.

Mr. Wolk holds BChE and MSChE degrees from the Polytechnic Institute of Brooklyn (now the Polytechnic Institute of New York University).