

“Fire in Ice: Implications for Energy Development and the Carbon Cycle?”
Workshop Summary

On November 12 and 13, 2003, the Shell Center for Sustainability, the James A. Baker III Institute for Public Policy and Rice University’s Environmental & Energy Systems Institute sponsored the workshop entitled *“Fire in Ice: Implications for Energy Development and the Carbon Cycle?”* The gathering focused on the important subject of gas hydrates and aimed to investigate the benefits from studying hydrates through an integrated approach which joins existing knowledge, methods and data from many academic disciplines, including geology, paleontology, oceanography, engineering, and biology.

The workshop, organized by the Rice Gas Hydrates Initiative, provided a forum for researchers from various specialties to come together and discuss the potential advantages and barriers to collaborative, cross-disciplinary research on gas hydrates and to gain understanding of the gaps that exist in the current state of knowledge. Participants included academic scholars, energy industry scientists, policy specialists and government leaders in the energy and climate fields, with particular interest in gas hydrates.

The day and a half workshop was heavily discussion based and targeted three specific areas of gas hydrates research: Global Carbon Cycle and Climate Change, Exploration and Production: First Efforts and Technical Issues, and Production Challenges and Kinetics. Topics addressed included Formation of Gas Hydrates in Nature; Methane Production and Consumption in Marine Sediments; Resource Potential in the Gulf of Mexico and the North Slope of Alaska; Assessment of the Resource Potential of Methane Hydrate in the Nankai Trough in offshore Japan; Flow Assurance; and Seafloor Stability.

It is postulated that more energy resides in gas hydrates than in conventional resources of existing oil and coal deposits. Gas hydrates may also represent a key component in the global carbon cycle and climate change. Thus, the goal of the workshop was to identify and discuss the key research challenges for gas hydrates in the areas of global climate change, exploration and production of gas hydrates as an energy resource, transportation of hydrocarbon, and seafloor stability. Participants tackled the specific questions related to how gas hydrate systems are linked to the global carbon cycle, how gas hydrate systems evolve over time, estimated resource size, the role of free gas, and obstacles to production and exploration.

Discussion periods emphasized the dynamic nature of gas hydrates systems and generated a consensus that the research community is only just beginning to understand and appreciate these dynamics. More active involvement of industry and serious collaboration between industry, academia and government (including joint industry projects – JIPs) are necessary to enhance knowledge in this important scientific field of inquiry. Knowledge gaps exist in several areas, including the fundamentals of how hydrates form and their role in the global carbon cycle, the thermodynamics of the actual hydrate structure, and the kinetics of hydrates systems.

Rice University hopes -- through this and other workshops and the formation of the Gas Hydrates Initiative -- to bring together experts from the interested fields of engineering, earth science, chemistry, and microbiology to forge a deeper understanding of the environmental role and energy potential of gas hydrates. In particular, we are seeking to build a research initiative that could develop a coherent model of natural gas hydrate systems that includes quantified inputs and outputs of methane from these systems.