The Methane Hydrate Advisory Committee

Advisory Committee to The Secretary of Energy

May 21, 2014

The Honorable Ernest J. Moniz
Secretary of Energy
1000 Independence Avenue, SW
Washington, D.C. 20585

Dear Mr. Secretary:

The Methane Hydrate Advisory Committee (MHAC) is composed of international experts in methane hydrate research from academia and industry. Our charge is to provide you with guidance to sustain and improve the Methane Hydrates R&D Program in the U.S. Recent advancements have identified ways of exploring for and producing from high concentration methane hydrate deposits. Our primary priority must now be to demonstrate, through a long term production test, the technical feasibility of producing methane hydrates.

We recommend the following focused 10-year investment.

1) **Perform a production test on land in the Arctic within 4 years.** The State of Alaska has temporarily set aside unleased onshore state lands just north of the Prudhoe Bay Unit for a potential methane hydrate test. This is an extraordinary and temporary opportunity to perform a long term methane hydrate production test. Estimated Cost: $40-60 million.

2) **Characterize hydrate concentrations at sea within 4 years.** Significant concentrations of methane-hydrate in sand-rich marine reservoirs have been found. We must sample locations to confirm hydrate occurrence, concentration, and estimate our ability to produce marine hydrates in the Gulf of Mexico and the Atlantic. These results will allow us to plan a long term marine production test. Estimated Cost: $30-50 million for a given basin.

3) **Perform a production test at sea within 10 years.** The major hydrate resource is in the marine environment. A production test can determine whether these resources are technologically recoverable and identify the optimal production technology. Estimated Cost: $100-200 million.

4) **Maintain U.S. leadership position in methane hydrates research.** We should continue the DOE laboratory and University partnerships that focus on technological developments, experimental analysis, model analysis, analysis of field data, and analysis of the role of hydrates in climate change. Estimated Cost: $10-$20 million per year.

The current $15 million per year budget should be incremented by $10 million in each of the next 4 years to achieve these goals. This will allow the land-based production test to be completed while continuing progress on the other goals above. If the land-based production test demonstrates the viability of this resource, we will be well poised to pursue a production test at sea.

We should do this now because methane hydrates represent an opportunity of the scale of today's gas and oil shale. It is estimated that the technically recoverable reserves are ~85 TCF in onshore Alaskan hydrates and ~13,000 TCF in the offshore Gulf of Mexico and Atlantic margin. Furthermore, methane hydrates may contribute to long-term energy security within the United States and abroad. Many key global economies lack clean and secure energy supplies but have potentially enormous hydrate resources. Japan, India, China, and South Korea each have significant methane hydrate deposits and each have enormous and rapidly growing energy demands.

As we explore how to safely pursue this energy resource, we must continue to research the impact of methane hydrate dissociation on the environment. Warming and destabilization of near surface methane hydrates could be contributing an increasing amount of methane to the water column (leading to ocean acidification) and potentially to the atmosphere (contributing a potent greenhouse gas). The most vulnerable regions are in the Arctic where warming is expected to be most pronounced and development is rapidly proceeding. We must also understand how methane hydrate dissociation impacts slope stability and how the production of hydrates affects the marine environment.

We emphasize that the United States leadership position in methane hydrates research is at risk. The DOE has spent $152 million since the inception of its methane hydrate program in 2000. In that period, the U.S. has mounted two short-term Arctic production tests and a single offshore drilling program. The Japanese most likely invested more in their 2013 marine field production test than the U.S. has during its entire 15 year program and India spent more than $60 million on its marine hydrate programs and comprehensively investigate more than two-dozen locations. Maintaining scientific and technical leadership today will place the U.S.in a more competitive position decades from now as we begin to exploit this resource.

In summary, methane hydrates are an enormous resource with the potential to significantly contribute to U.S and other's energy independence. The MHAC would like to present to you and your senior leadership our strategy and a roadmap to realize this resource. We feel that outreach and education is critically important and we would also like to discuss strategies to expand these efforts. We attach an Appendix that provides some further detail regarding the content of this letter.

Sincerely yours,

Peter B. Flemings (Chair) and Miriam Kastner (Vice-Chair)
On behalf of the Methane Hydrates Advisory Committee

The Methane Hydrates Advisory Committee (MHAC) (2013-2015)

Chair: Peter B. Flemings (http://www.ig.utexas.edu/people/staff/flemings/)

Professor Peter Flemings holds the Jackson Chair in Geosystems with the Department of Geological Sciences at the University of Texas, Austin. He studies the interactions between fluid flow and geological processes. He has led an effort to incorporate multi-phase flow into geological models of hydrate formation and dissociation. Peter served as an advisor to the Secretary of Energy's well-integrity team during the BP Macondo well failure.

Vice Chair: Miriam Kastner

Miriam Kastner is the Distinguished Professor of Geology at the University of San Diego, Scripps Institution of Oceanography. She is an oceanographer and geochemist. She combines mineralogical and geochemical expertise to tackle a range of geological problems. She has sailed on countless marine science expeditions, many of them focused on hydrate research. She has served on dozens of key national and international advisory panels and editorial boards for prestigious journals, acting as an outspoken advocate for science of the highest quality.

Dr. Thomas Blasingame	Texas A&M University, College Station, TX
Mr. Richard Charter	National OCS Coalition, Bodega Bay, CA
Dr. Sarah M. Forbes	World Resources Institute, Washington, DC
Dr. David Goldberg	Columbia University, Palisades, NY
Dr. Robert N. Harris	Oregon State University, Corvallis, OR
Dr. Matthew J. Hornbach	Southern Methodist University, Dallas, TX
Dr. Carolyn Koh	Colorado School of Mines, Golden, CO
Dr. Michael Max	Hydrate Energy International, Inc., Washington, DC
Dr. George J. Moridis	Lawrence Berkeley National Lab, Berkeley, CA
Dr. Mark D. Myers	University of Alaska Fairbanks, Fairbanks, AK
Dr. Craig Shipp	Shell International Exploration and Production Inc., Houston, TX
Mr. Robert Swenson	Alaska Department of Natural Resources, Fairbanks, AK