

**George Bush China-U.S. Relations Conference:
Development, Energy, and Security
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RESEARCH ROUNDTABLE FINAL REPORT

Session Title: *Deepwater Technology Research Roundtable*

Co-Chairs: U.S.: **Dr. John M. Niedzwecki**, Texas A&M University; **Dr. Jun Zhang**, Texas A&M University; Chinese: **Dr. Runpei Li**, Shanghai Jiao Tong University; **Dr. Wen-Yang Duan**, Harbin Engineering University

Other Collaborators: **Dr. Ove T. Gudmestad**, Statoil Norway; **Mr. George Gu**, ConocoPhillips; **Mr. Michael Verm**, Verm Energy Resource Management Co.; **Mr. Paul Hansen**, Chevron Energy Technology Company; **Dr. Yingxiang Wu**, Chinese Academy of Sciences; **Dr. Richard Mercier**, Offshore Technology Research Center; **Dr. Oliver A. Onyewuenyi**, Shell International Exploration and Production, Inc.; **Dr. Jinping Ou**, Dalian University of Technology; **Prof. Liping Sun**, Harbin Engineering University; **Dr. Per Teigen**, Statoil Norway; **Dr. Bin Teng**, Dalian University of Technology; **Dr. Hua Jun Li**, Ocean University of China; **Prof. Xuefeng Wang**, Shanghai Jiao Tong University; **Mr. Hau Yang**, China National Offshore Oil Corp. Ltd.; **Prof. Jianmin Yang**, Shanghai Jiao Tong University.

Session Summary: The search for additional petroleum and gas reserves in the US and now China has lead to deepwater exploration and development activities that require extending existing technologies to their limit and the development of new concepts and technologies to meet the challenges. The development of deepwater facilities and transport of the petroleum products to onshore or near-shore facilities, and then on to the consumer requires application of state-of-the-art technologies and the careful management of risk and safety considerations.

The intent of this roundtable session was to identify specific technical opportunities for collaboration and the exchange of views in order to discover a way forward. This included discussions concerning mutually beneficial exchanges of engineers and scientists, student internships, collaborative short courses on critical technologies, the development of consortia and funding through joint industry and government supported projects.

The invited presentations included companies working in China (StatoilHydro, Chevron, Shell and Verm Energy Resource Management Co.), China National Offshore Oil Corporation (CNOOC), the Chinese Academy of Sciences, Shanghai Jiao Tong University, Dalian University of Technology, Ocean University of China, and the Offshore Technology Research Center located at Texas A&M University. Unfortunately two representatives from Harbin Engineering University were unable to attend due to last minute visa problems. The presentations covered a wide range of topics from sub-sea CO₂ sequestration and new experimental facilities and developments, to plans and technology applicable to worldwide deepwater development related to offshore China.

Findings/Recommendations: This research roundtable built upon the 2005 Beijing conference where the discussion focused upon the questions:

1. Do we need deepwater platforms or should we focus on sub-sea completions and tie-backs?

2. Are there any unique deepwater or near-shore design challenges in offshore China?
3. How do we identify and fund mutually beneficial research?
4. How do we accelerate offshore technology beyond a few of the leading Chinese universities?

The presentations and discussions went into more detail on each of these questions. It was quite interesting to know the extent of the Chinese government's recent investment in facilities and at universities that focus on deepwater research and technology development. The discussions were refreshingly open and quite frank regarding collaboration and funding opportunities as seen from industry and academia.

The companies making presentations brought up a range of important issues that included:

- Technologies for controlling the costs of deep water drilling
- Business model for companies involved in exploration and production
- Hiring practices related to local content of the various nations developing their resources
- Sustainability and environmental biodiversity concerns related to recovery of oil and gas
- Sub-sea CO₂ sequestration
- Short and longer term technology needs

The Chinese university representatives reviewed their recent investments in laboratory testing facilities and discussed their technical capabilities, as did the Offshore Technology Research Center. The new research facilities being constructed at Shanghai Jiao Tong University (SJTU) and their record of accomplishments in ocean engineering and naval architecture clearly puts them in concert with the deepwater industry. Dalian Institute of Technology and Harbin Engineering University have also benefited from government support to expand their testing facilities and work in complementary areas. Several Texas A&M University faculty members have been invited to expand interactions and in particular to further explore opportunities for collaborative research in the new SJTU model basin.

Representatives from CNOOC gave a lucid and well articulated presentation on their approach to offshore oil and gas recovery, and their business model. Rather than using specialized contractors the company intends to develop each of the capabilities and address the equipment needs within the company. The insight that they provided was much appreciated and lead to more excellent discussion contrasting the approaches taken by other major oil companies.

The invited panel members from Shanghai Jiao Tong University (SJTU), Dalian Institute of Technology (DIT), ConocoPhillips and the Norwegian company StatoilHydro brought up a range of important issues. They focused their comments and follow-up discussion on the outlook of leading Chinese researchers and academics and the perspective of a major international company working in China. Response to their comments included some industry participants voicing frustrations concerning utilization of the "technology caught in the pipeline." One US industry representative commented that Joint Industry Projects (JIP's) were viewed as a second order funding mechanism and that first order technology needs were addressed with the companies directly reaching out as needed. The funding mechanisms for China and US university researchers were discussed, as well as the new REPSEA initiative, earlier DEEPSTAR project funding, and cooperative NSF grants.

The conclusion regarding deepwater platforms and sub-sea completions was that some optimal combination, depending on the field, needs to be determined and this could lead to collaborative research. Offshore China has high current regions and regions susceptible to typhoons and ice, so ships with quick disconnect systems and sub-sea systems are of great interest, as well as variations of other world-wide platform designs.

Future Collaborations: Both NSF and the National Natural Science Foundation of China will be approached on the issue of funding a follow-on workshop to be held at Shanghai Jiao Tong University. As a result of an invitation by Professor Runpei Li, Director of the new SJTU model basin inaugurated in early October 2007, Dr. Jun Zhang and I continue work on proposal details for collaborative research. There is clearly a desire by both the Chinese and US university researchers to develop stronger ties through collaborative research projects. We at Texas A&M University, in concert with our Chinese colleagues and the offshore industry, intend to continue our dialogue with leading research universities focused on various deepwater research activities. The proposal for the next conference to be held in China is being discussed and should include highlights of collaborative research that will have been completed.