Industry and Government Model for Ultradeepwater Technology Development

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Coal, Oil, and Natural Gas Will Remain Indispensable

Source: IEA REFERENCE CASE
GOM Offshore Production Increasingly from Deepwater

US GOM Offshore

Source: OCS Report MMS 2006-022
Industry Production from Deep Water is Moving Deeper at an Increasing Pace
Increasing Lag Between Discovery and Development

Proven Reserves Add Value

Number of deepwater field discoveries and new hydrocarbons found (MMS reserves, MMS resources, and industry-announced discoveries).

E&P Technology Development: Are We Short Sighted?

- Industry Research Divisions closed in late 80s and early 90s.
- Technology development outsourced to service providers.
- Service providers very reactive to industry needs.
- Industry needs (and technology funding) driven by short and medium term goals.
  - Short term payouts
  - Fear of failure
  - Incremental improvements, some breakthroughs
- **What is our long term vision and shouldn’t technology development be aligned with achieving this vision?**

Figure courtesy StatoilHydro
Presentation Objectives

- What is RPSEA?
- RPSEA ultra-deepwater program
- Leveraged technology development
- Technology Development Organizations
Under the direction of the Secretary of Energy, a non-profit consortium shall carry out a program of research, development, demonstration and commercial application of technologies for ultra-deepwater and other petroleum resource exploration and production......
What is RPSEA?

A collaborative non-profit partnership, managed by industry and academia, engaging all stakeholders in the value chain to benefit consumers and enhance domestic productivity and competitiveness.

Specifically, the law directs --
Research, development, demonstration, and commercial application of technologies for ultra-deepwater and unconventional natural gas and other petroleum resources maximize the U.S resource value by:

- Increasing supply
- Reducing the cost
- Increasing E&P efficiency
- Improving safety and minimizing environmental impacts

Research Partnership to Secure Energy for America
Current Program Structure/Funding

- Program Funding From Federal Oil and Gas Royalties
  - RPSEA Program Consortium
    - Unconventional GTI $16.25 M
    - Ultra-deepwater Chevron (DeepStar) $17.5 M
    - Small Producer Program NMIT $3.75 M
- Total Program: $50 M/yr for 10yrs.

Department of Energy
- $37.5 M
- Fossil Energy Office
- NETL
  - Complementary In-House R&D Program
  - $12.5 M

10 yr., $500M directed spending.
Unique Features of this New Model

- Industry led and jointly steered by academia, government and industry.
- Cost share required.
- R&D, demonstration and commercialization
- Stable 10 year directed spending
- Mandated technology transfer
Ultra-Deepwater Resources.— Awards from allocations under section 999H(d)(1) shall focus on the development and demonstration of individual exploration and production technologies as well as integrated systems technologies including new architectures for production in ultra-deepwater.
DeepStar Significant Contributions Since 1992

- DeepStar is the **sole deepwater technology development forum in US**
- Solely funded by industry
- Provides a **unique arena** where technical staff/experts/from the US E&P Industry can meet all year-long (without requiring Confidentiality Agreement (or non-CA)!)
- It is **very efficient**, delivers results, and has a very smooth line of decision and management.
- Unlike other forums, it is **structured by “disciplines”** (ex: subsea facilities) vs “theme” (subsea boosting)
- Unlike other DW forums, it is a “**think tank where DW technological gaps are identified**, through conceptual/feasibility studies”: it identifies the needs for the industry
- Delivers SOR and/or analysis pointing to **enhancing/enabling technologies**, to developed outside DeepStar
Water Depths Range from 5,000 to 10,000’
Majority of Play in Sub-Salt Environment
Salt Canopies Range from 7,000’ - 20,000’ Thick
Target Depths Range from 25,000’ – 35,000’ subsea
GOM Deepwater Trends

- Walker Ridge / Keathley Canyon
  - Sub-salt
  - Deeper wells
  - Tight formations
- Alaminos Canyon
  - Viscous crude
  - Lacking infrastructure
- Eastern Gulf – Gas Independence Hub
  - Higher pressure
  - Higher Temperature
  - CO2 / H2S
- Higher Drilling Costs
- Challenging Economics
2009 Ultra Deepwater Needs

- Drilling, completion and intervention breakthroughs
- Appraisal & development geoscience and reservoir engineering
- Significantly extend subsea tieback distances & surface host elimination
  - Economic small field (~100 mmboe) developments
- Dry trees/direct well intervention and risers in 10,000’ wd
- Continuous improvement / optimize field development
  - Per wellbore recovery
  - Cost reduction
  - Reliability improvements
  - Efficiency improvements
- Associated safety and environmental trade-offs
Types of Projects Funded in 2007 & 2008

- HP carbon fiber wrapped production riser design
- Dry tree system for drilling & production Subsea power generation
- Fatigue testing of high strength riser materials
- Subsea flow measurement
- Well intervention
- Subsalt imaging
- Metocean modeling
Value of Collaborative Technology Development

An opportunity to:
Leveraged expertise and resources
Pursue longer term vision

“DeepStar is a particularly good initiative because the environment here in the Gulf is so competitive that it does not stimulate cooperation among the operators. …this is a missed opportunity. The real competition is to get the blocks. Once you have the blocks, you need to cooperate to secure the technologies to develop the discoveries”

Petrobras, Offshore Magazine June, 2005
# UDW Technology Development Program Comparison

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<thead>
<tr>
<th>Annual Funding / Industry Leverage ($ Million US)</th>
<th>DeepStar</th>
<th>RPSEA</th>
<th>itf</th>
<th>DEMO 2000</th>
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<tbody>
<tr>
<td>$3.5 MM to $5 MM 100% Industry Funding – common $ pool</td>
<td>~$15 MM US DOE w/ 20% (R&amp;D) or 50% (D&amp;C) Industry Match</td>
<td>100% Industry Funding – Project by project</td>
<td>25% Norwegian Government</td>
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<th>Geographic Focus</th>
<th>Worldwide w/ emphasis on US GOM</th>
<th>US GOM (&gt;4,500 feet water depth)</th>
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<th>Norway / Norwegian Industry</th>
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<th>Types of Projects</th>
<th>R&amp;D</th>
<th>R&amp;D, Demonstration &amp; Commercialization</th>
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<th>Solicitation Types</th>
<th>Projects selected by members &amp; funded from pool then RFPs to given scope</th>
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<th>Open Calls to Themes Evaluation and Funding Decision by individual Members</th>
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What Questions Can I Answer?

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Secure Energy for America