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● **Research**
● **Partnership to**
● **Secure Energy**
● **for America**
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Industry and Government Model for Ultradeepwater Technology Development

Christopher Haver

RPSEA Offshore VP

DeepStar Director

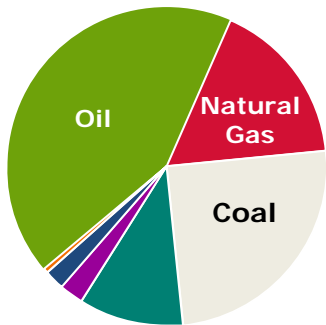
Chevron ETC

May, 2008

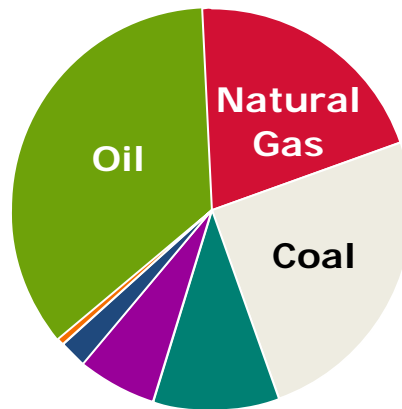
Secure Energy for America

Coal, Oil, and Natural Gas Will Remain Indispensable

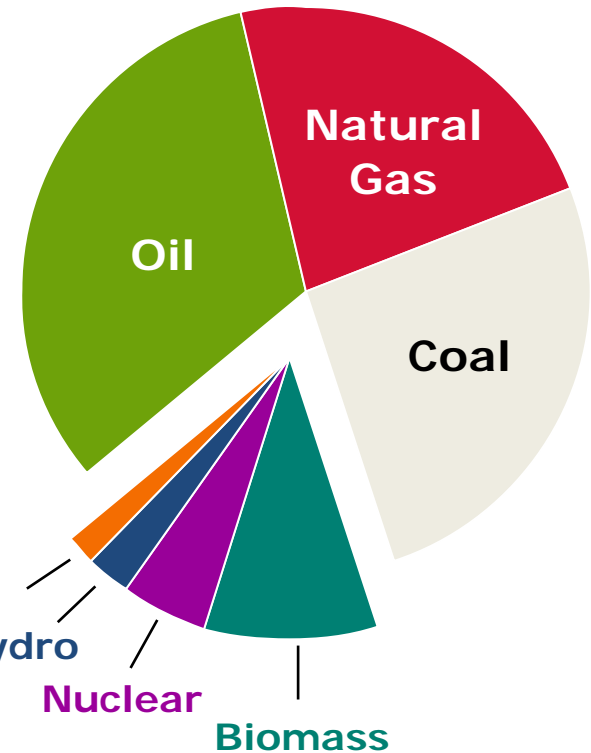
1980
288 Quadrillion
BTU



2004
445 Quadrillion
BTU



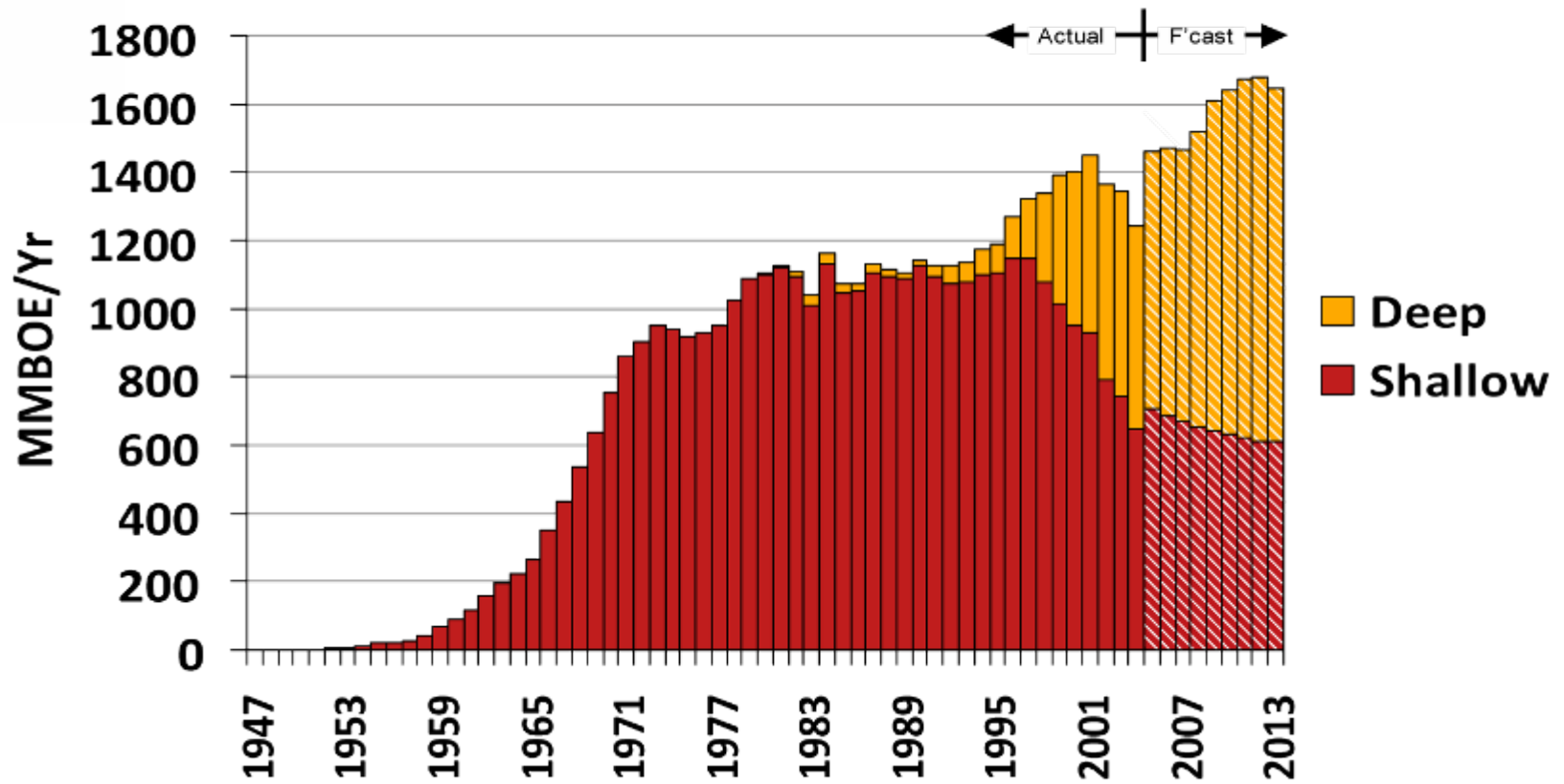
2030
678 Quadrillion
BTU



Source: IEA REFERENCE CASE

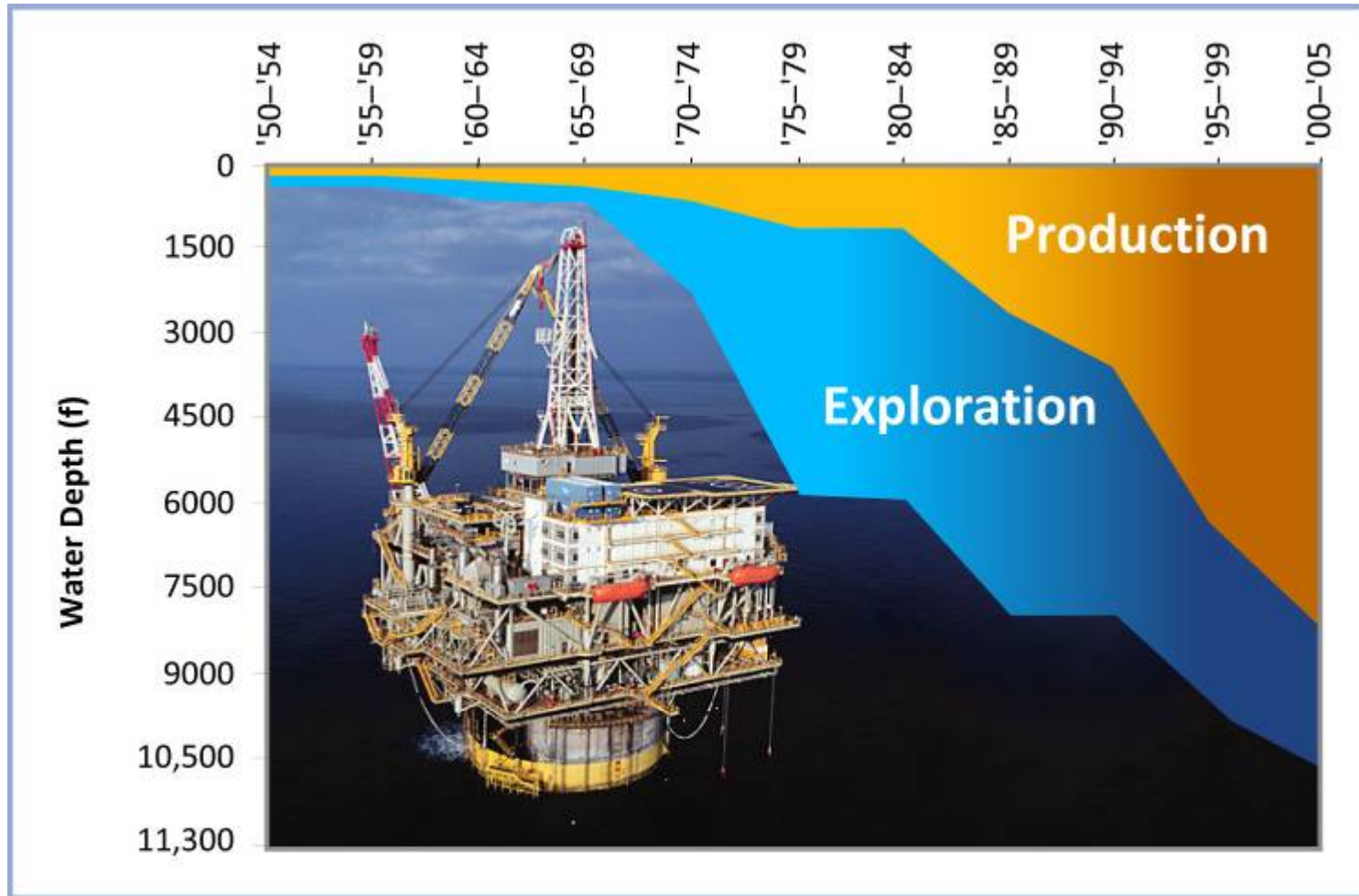
GOM Offshore Production Increasingly from Deepwater

US GOM Offshore



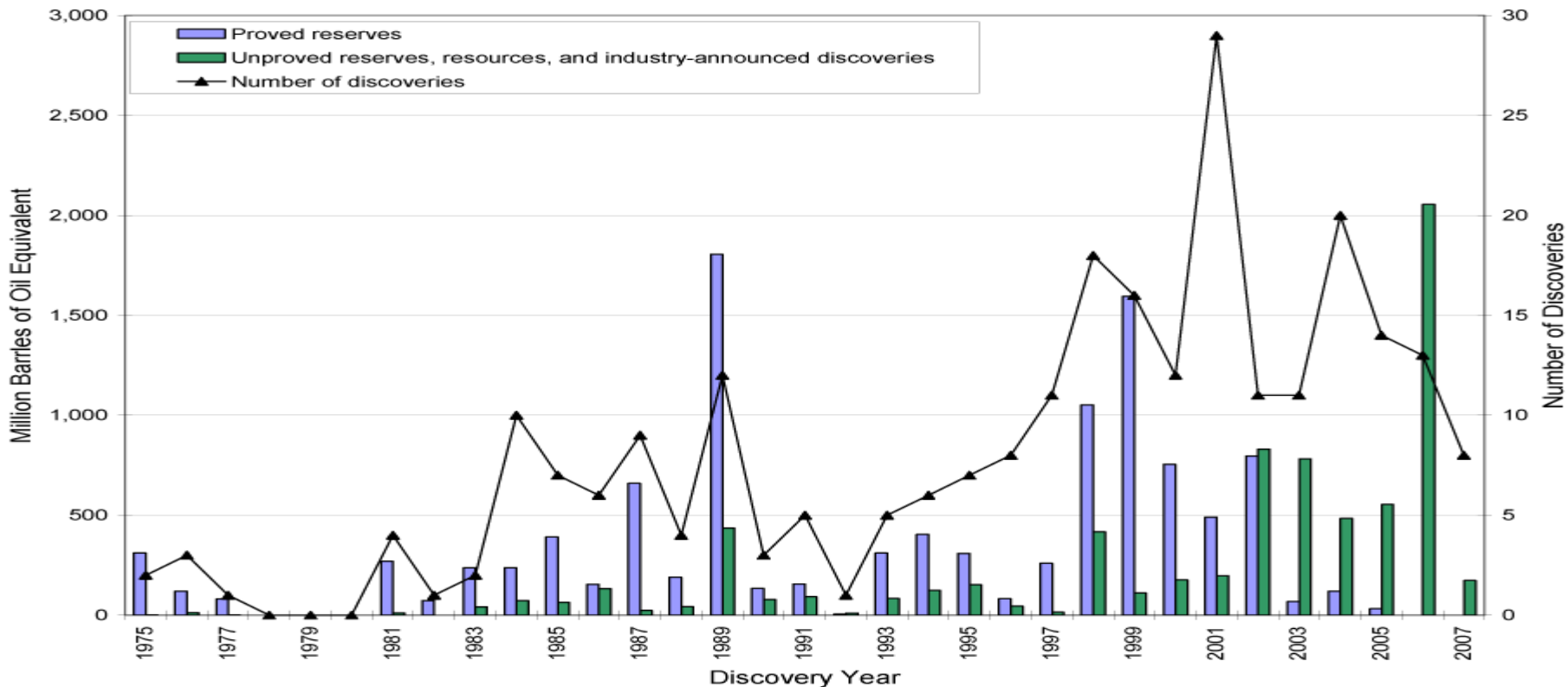
Source: OCS Report MMS 2006-022

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

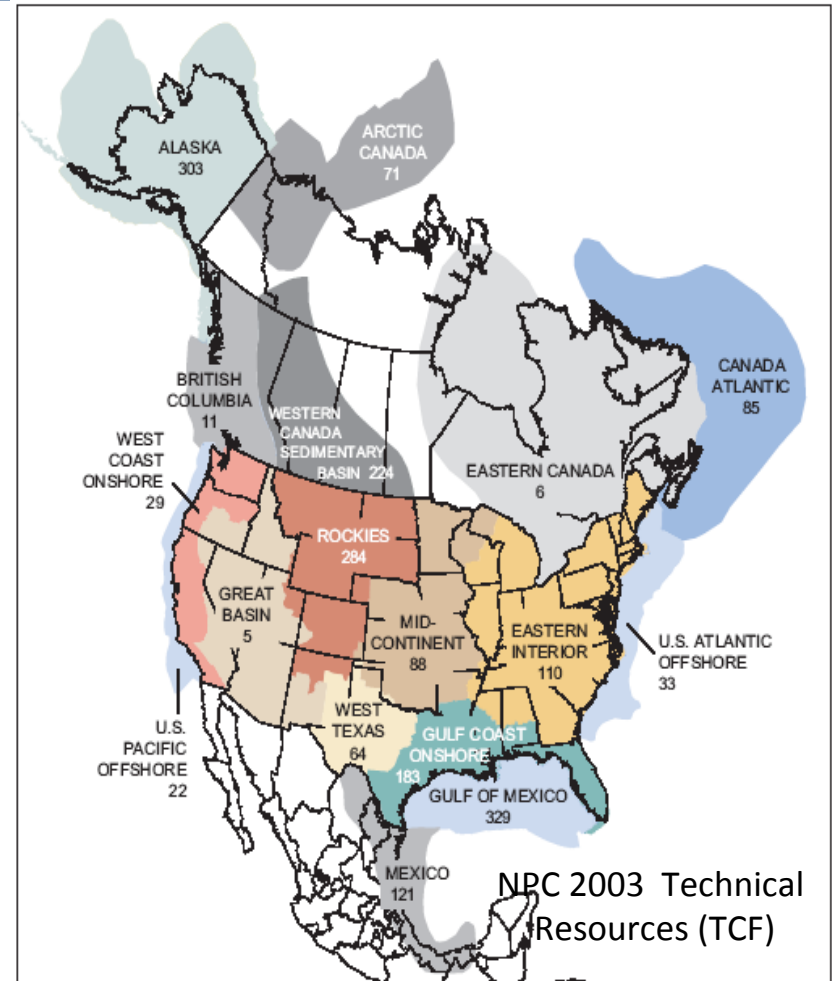
- What is RPSEA?
- RPSEA ultra-deepwater program
- Leveraged technology development
- Technology Development Organizations



The Energy Policy Act of 2005

- Section 999:

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.

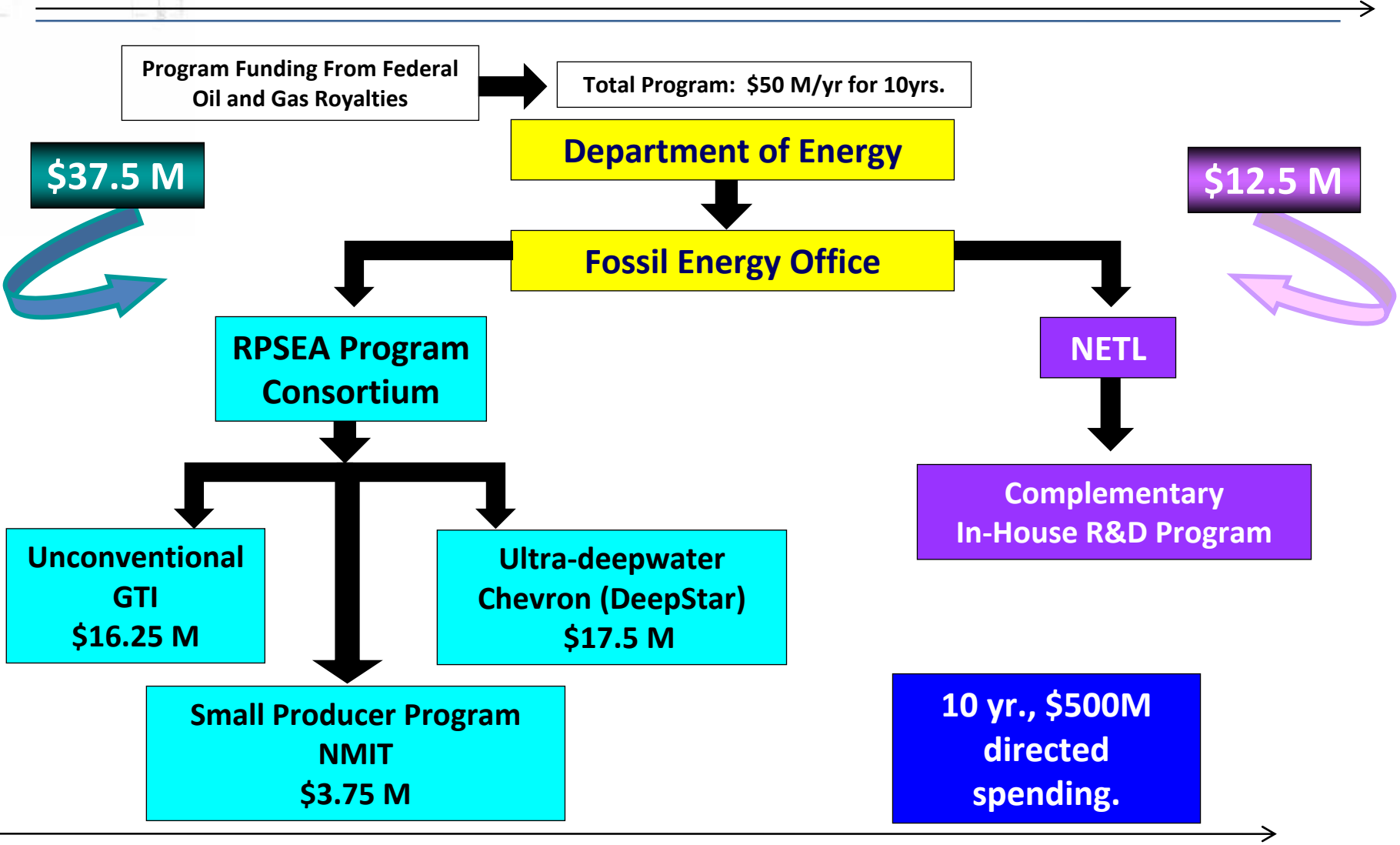
Specifically, the law directs --

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

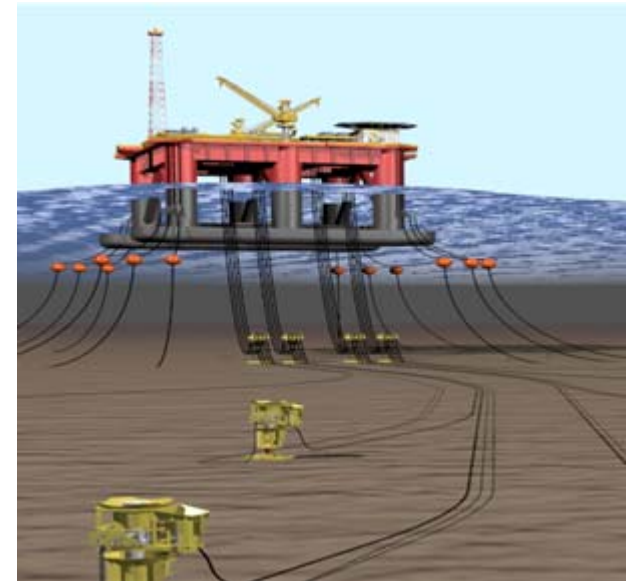
Research Partnership to Secure
Energy for America

Current Program Structure/Funding



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 Program “Technology and Architecture Focus”

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



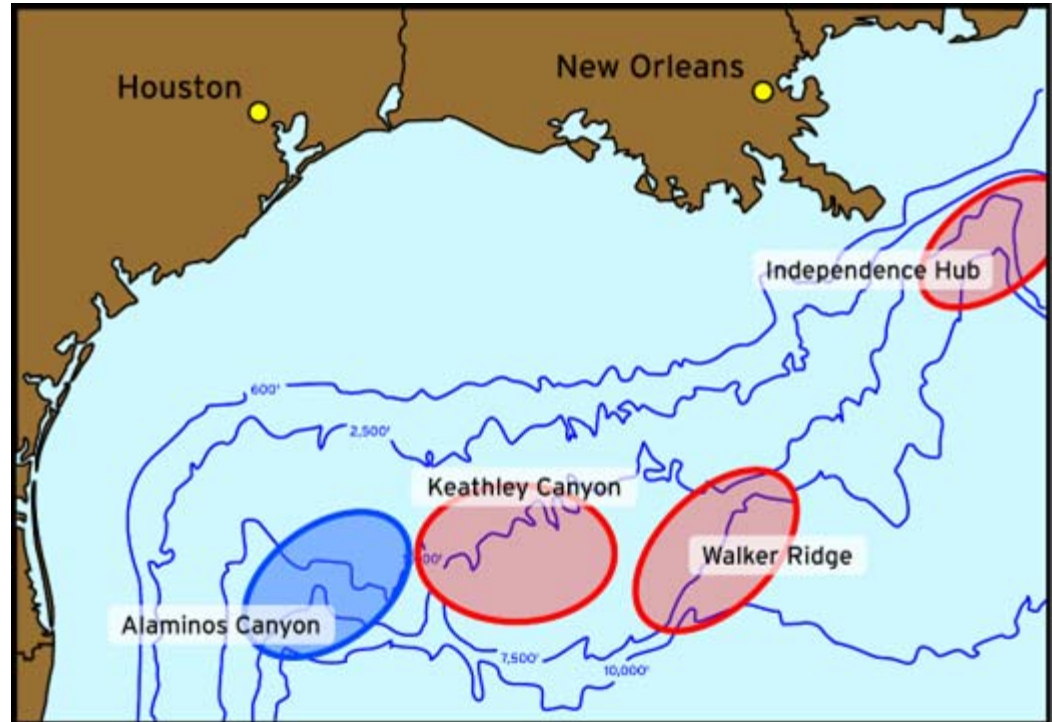
Deepwater Gulf of Mexico Challenges

- 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

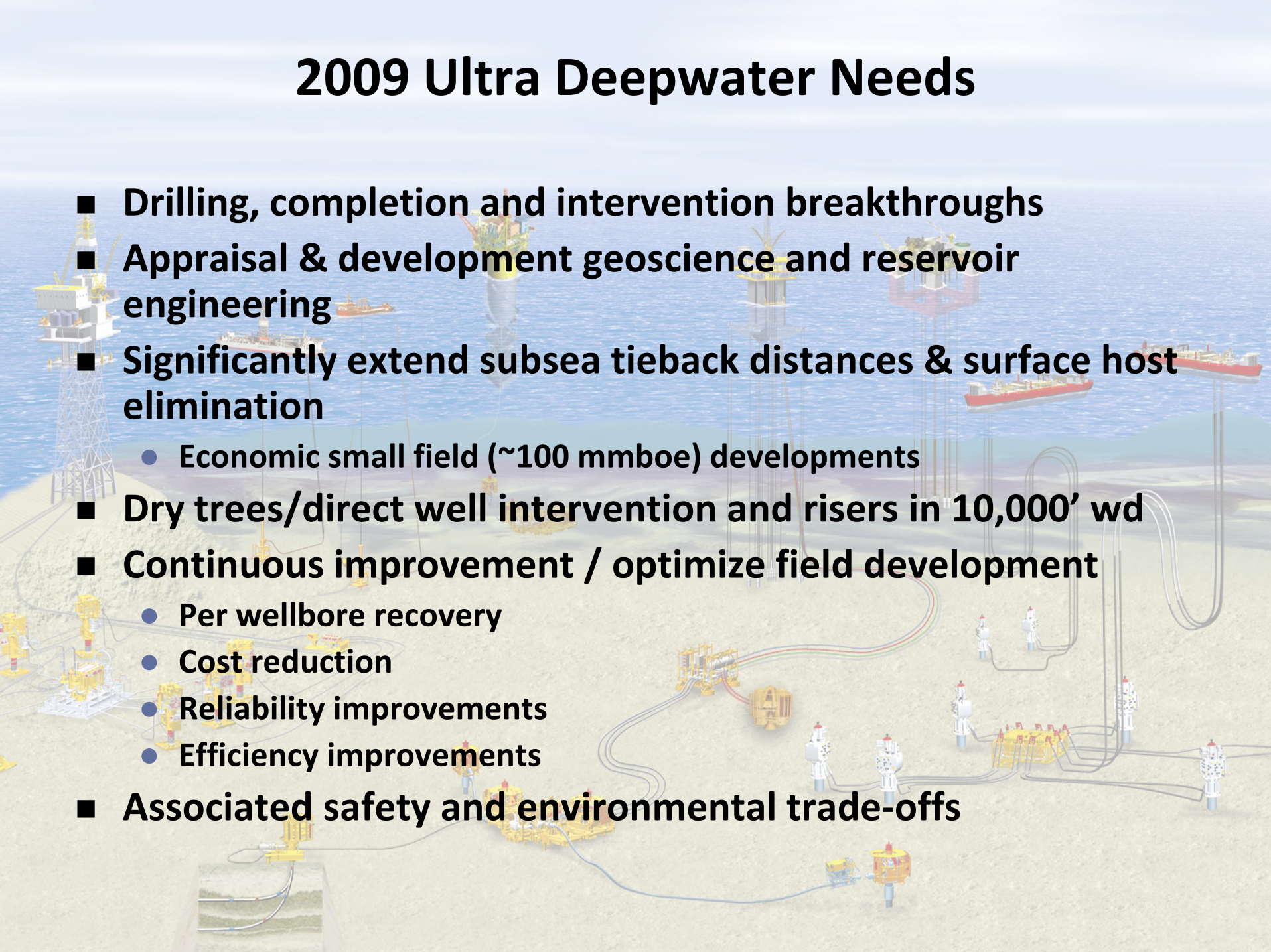


GOM Deepwater Trends

- 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 mmboc) 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

	 <p>DeepStar</p>	 <p>RPSEA Research Partnership to Secure Energy for America</p>	 <p>itf</p>	 <p>DEMO 2000</p>
Annual Funding / Industry Leverage (\$ Million US)	\$3.5 MM to \$5 MM 100% Industry Funding – common \$ pool	~\$15 MM US DOE w/ 20% (R&D) or 50% (D&C) Industry Match	100% Industry Funding – Project by project	25% Norwegian Government
Geographic Focus	Worldwide w/ emphasis on US GOM	US GOM (>4,500 feet water depth)	Worldwide w/ emphasis on North Sea	Norway / Norwegian Industry
Types of Projects	R&D	R&D, Demonstration & Commercialization	Development & Implementation	TD & Pilots
Solicitation Types	Projects selected by members & funded from pool then RFPs to given scope	RFPs to given scope and themes	Open Calls to Themes Evaluation and Funding Decision by individual Members	Open calls Eval. by operators Pilot host required

What Questions Can I Answer?



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