The U. S. Energy Policy Act of 2005 And Section 999:

An Industry led Public/Private Partnership for R&D in the Ultra-Deepwater in the Gulf of Mexico and in Unconventional Onshore Natural Gas and Other Petroleum Resources of the United States.

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What is Section 999?

Specifically, the law directs --

- Research, development, demonstration, and commercial application of technologies for ultra-deepwater and unconventional natural gas and other petroleum resource

- Maximize the U.S resource value by:
  - Increasing supply
  - Reducing the cost
  - Increasing E&P efficiency
  - Improving safety and minimizing environmental impacts

Secure Energy for America
What is the Program’s Focus?

The Program has four program elements:

- Ultra-deepwater 35%
  (> 1500 Meters water or 15,000’ OCS drilled depth)
- Unconventional Onshore 32.5%
  (Economic accessibility)
- Small Producers 7.5%
  (< 1000 BOEPD)
- Complementary Program 25%

Managed by NETL
Alaska
University of Alaska Fairbanks

California
Aerovironment, Inc.
Campbell Applied Physics
Chevron Corporation
Conservation Committee of California Oil & Gas Producers
Delco Ohm Energy, LLC
Drilling & Production Company
Lawrence Berkeley National Laboratory
Lawrence Livermore National Laboratory
Natural Carbon, LLC
Stanford University
University of Southern California
Watt Mineral Holdings, LLC

Colorado
Altira Group LLC
Bill Barrett Corporation
Brownstein Hyatt Farber Schreck, LLP
Colorado School of Mines
Colorado Oil & Gas Association
DCP Midstream, LLC
The Discovery Group, Inc.
Energy Corporation of America
EnCana Corporation
Gunnison Energy Corporation
HWP Process Technologies, Inc.
Independent Petroleum Association of Mountain States
Leele Operating Company
Nico Resources
Robert L. Bayless, Producer LLC
Spatial Energy
University of Colorado at Boulder

Connecticut
APS Technology, Inc.

Florida
Florida International University

Idaho
Idaho National Laboratory

Illinois
Gas Technology Institute

Kansas
The University of Kansas

Kentucky
NGAS Resources, Inc.

Louisiana
Louisiana State University

Massachusetts
Massachusetts Institute of Technology
Woods Hole Oceanographic Institution

Michigan
University of Michigan

Mississippi
Jackson State University
Mississippi State University

Montana
Nance Resources

New Mexico
Corrections Company
Harvard Petroleum Corporation
Independent Petroleum Association of New Mexico
Los Alamos National Laboratory
New Mexico Institute of Mining and Technology
New Mexico Oil & Gas Association
Sandia National Laboratories
Strata Production Company

North Dakota
Western Standard Energy Corporation

Ohio
NGO Development Corporation
The Ohio State University
Wright State University

Oklahoma
Chesapeake Energy Corporation
Devon Energy Corporation
Interstate Oil and Gas Compact Commission
K. Stewart Energy Group
Oklahoma Independent Petroleum Association
Petroleum Technology Transfer Council
The Fleischaker Companies
The University of Oklahoma
The University of Tulsa
Williams

Pennsylvania
The Pennsylvania State University

South Carolina
University of South Carolina

Texas
Acute Technological Services, Inc.
Anadarko Petroleum Corporation
Apache Corporation
Apex Spectral Technology
BP America, Inc.
Baker Hughes Incorporated
BJ Services
Cameron/Curtiss-Wright EMD
Capstone Turbine Corporation
CARBO Ceramics, Inc.
City of Sugar Land
ConocoPhillips Company
CSI Technologies, Inc.
Deepwater Structures, Inc.
Deepwater XLP Technology, LLP
Det Norske Veritas (USA)
Energy Valley, Inc.
ExxonMobil Corporation
GE/VetcoGray
Granite, Inc.
Greater Fort Bend Economic Development Council
GSI Environmental, Inc.
Halliburton
Houston Advanced Research Center
Houston Offshore Engineering, LLC
Houston Technology Center
Intelligent Agent Corporation
Knowledge Reservoir, LLC
Marathon Oil Company
M&H Energy Services
Merrick Systems, Inc.
Nalco Company
NanoRidge Materials, Inc.
National Oilwell Varco, Inc.
Nautilus International, LLC
Noble Energy, Inc.
OM Consulting Ltd.
Oxane Materials, Inc.
Petris Technology, Inc.
Petrosa America, Inc.
Pioneer Natural Resources Company
QQ Inc.
Quanella, LLC
Rice University
Rock Solid Images
RTI Texas
Schlumberger Limited
Shell International Exploration & Production
Simmons & Company International
SiteLark, LLC
Southern Methodist University
Southwest Research Institute
StatOilHydro
Stress Engineering Services, Inc.
Technip
Technology International
Tejas Research & Engineering, LP
Tenaris
Texas A&M University
Texas Energy Center
Texas Independent Producers and Royalty Owners Association
Texas Tech University
The University of Texas at Austin
Titanium Engineers, Inc.
TOTAL Exploration Production USA
University of Houston
VersaMarine Engineering, LLC
Weatherford International Ltd.

Utah
Novatek, LLC
The University of Utah

Vermont
New England Research, Inc.

Virginia
Advanced Resources International, Inc.
American Gas Association
Independent Petroleum Association of America
Integrated Ocean Drilling Program

Washington
Quest Integrated, Inc.

West Virginia
West Virginia University

Wyoming
EnerCrest, Inc.
WellDog, Inc.

Newfoundland, Canada
Centre for Marine CNG, Inc.
UDW Program Approach

Four base-case field development scenarios

The Challenges

- Walker Ridge/Keathley Canyon
  - subsalt
  - deeper wells
  - tight formations

- Alaminos Canyon
  - viscous crude
  - lacking infrastructure

- Eastern Gulf – Gas Independence Hub
  - higher pressure & temperature
  - CO₂/H₂S

- Overall
  - higher drilling costs
  - challenging economics
Unconventional Onshore Themes

- **Gas Shales**
  - Rock properties/Formation Evaluation
  - Fluid flow and storage
  - Stimulation
  - Water management
- **Coalbed Methane**
  - Produced water management
- **Tight Sands**
  - Natural fractures
  - Sweet spots
  - Formation Evaluation
  - Wellbore-reservoir connectivity
  - Surface footprint

Cost Reduction in All Aspects of Operations

Secure Energy for America
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<th>CBM 10%</th>
<th>Gas Shales 45%</th>
<th>Tight Sands 45%</th>
<th>Total Cost to RPSEA</th>
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**2008 Program Priorities**

- **H** High Priority
- **M** Medium Priority
- **L** Low Priority

**2007 Projects**

**2008 Projects**
RPSEA Unconventional Gas Projects

Cross-Cutting Technical Projects
2007
- UT – Fracturing
- LBNL – Self Teaching Expert System
- UT – Refracturing
- TAMU – Fracture Design
- TAMU – Decision Model
- LBNL – High Resolution Imaging
- PSU – Microwave Coals
- Carter – Saws
- U of Tulsa – Novel Fracturing Fluids
- Stanford – Condensate

2008
- HARC – Environmentally Friendly Drilling
- LBNL – Coupled Reservoir Model
- TAMU – Fracture Conductivity
- BEG – Multi – Azimuth Seismic
- Caltech – Gas Isotopes

$32 Million Research Portfolio

Anchor Projects - Integrated Basin Analysis
2007 Technical/Resource Projects
2008 Technical/Resource Projects

CSM - Coal Bugs
Utah GS - Paleozoic Shales
U of Tulsa – Wamsutter
CSM – Gas Composition
U of Utah – TGS
CSM – Produced Wtr.
CSM – Piceance TGS
CSM – Strat Control

GTI – Barnett and Appalachia Produced Water
GE – Frac Water Reuse
BEG – Marcellus Natural Fractures
GTI – New Albany
Alabama - Shales

Cross Cutting Technical Projects
2008
The Technology Challenges of Small Producers

Focus Area – Advancing Technology for Mature Fields

- Target – Existing/Mature Oil & Gas Accumulations
  - Maximize the value of small producers’ existing asset base
  - Leverage existing infrastructure
  - Return to production of older assets
  - Minimal additional surface impact
  - Minimize and reduce the existing environmental impact
- Lower cost and maximize production
Small Producer Program - 2007 Projects & 2008 Selections

- Thirteen projects addressing concerns of small producers operating mature assets
  - Produced water treatment
  - Reservoir Characterization (3)
  - Enhanced oil and gas recovery (5)
  - Environmental impact & increased efficiency (3)
  - Improve recovery and sweep efficiency

- Projects each involve a consortium of researchers and small producers

- Small Producer Research Advisory Group (RAG) actively involved
## 2007 & 2008 Portfolio Overview

### 2007 Program Selections

<table>
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Questions?