

DOE Oil & Gas R&D Program Overview



*RPSEA Forum: Unconventional Plays/Research
Needs for Appalachian Basin
Morgantown, WV*

*Brad Tomer
Director, Strategic Center for Natural Gas & Oil
February 15, 2007*

National Energy Technology Laboratory

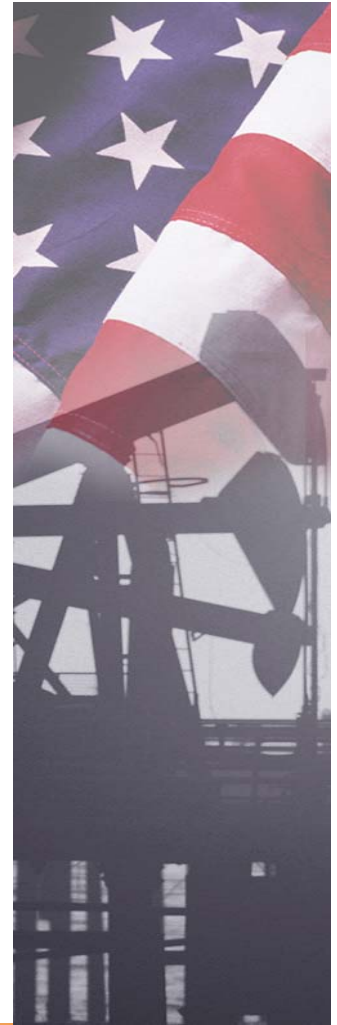


Office of Fossil Energy



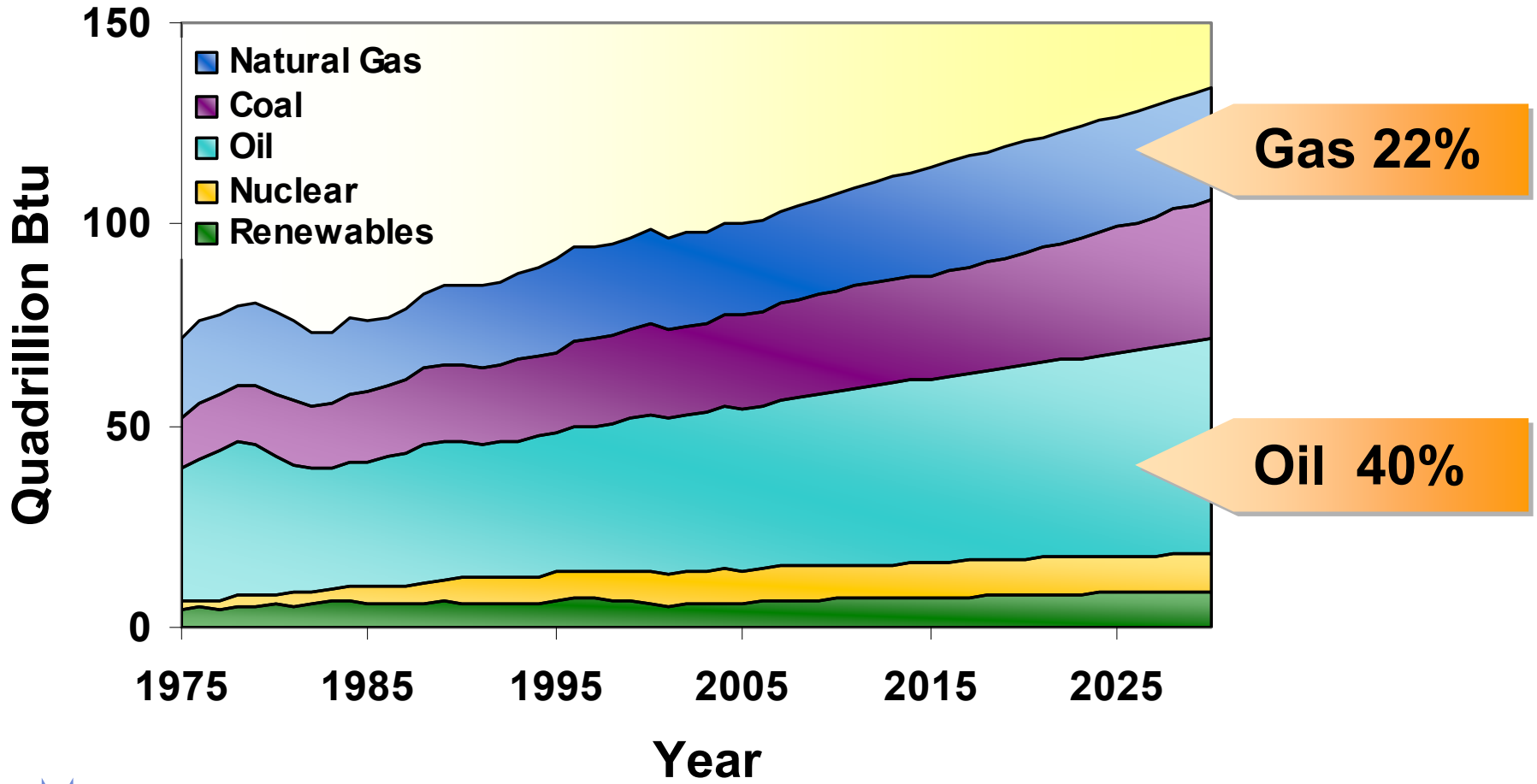
Oil and Gas R&D Provides Tremendous Value for America

- **Oil & gas R&D more important than ever**
 - Higher demand / inadequate supply = high prices
 - Extensive domestic supplies available but becoming more costly to obtain
 - **More remote, deeper, more complex reservoirs**
 - Inadequate investment in R&D over last decade
- **Technology will provide many benefits**
 - Lower costs, decreased risks, increased safety, increased supply, environmental protection
- **Monumental task requires partnership**
 - Multidisciplinary needs (e.g., electronics + metallurgy)
 - Public / private partnership has potential to bring together right mix of skills, organizations (Industry, Gov't., Academia), & funds



Demand for Energy Will Continue to Rise

Gas and Oil provide about two-thirds of energy consumed



U.S. Gas & Oil Supply Faces Challenges

- **Natural Gas**

- Imports rising (16% of consumption in 2005)¹
- Growing competition for limited LNG supply
- Flat production despite record drilling
- Remaining resource increasingly costly to produce
- 88% of pipeline system installed prior to 1970's²

- **Oil**

- Imports rising (67% now; 71% expected in 2030)¹
- Recoverability still low (~30% of in-place resources)

- **Environmental Issues**

- Competing land use/access restrictions
- Finding sites for new pipelines / facilities difficult
- More drilling w/today's technology & alternate sources (coalbed methane, shale oil, etc.) = more impact



Vast Domestic Resource Available

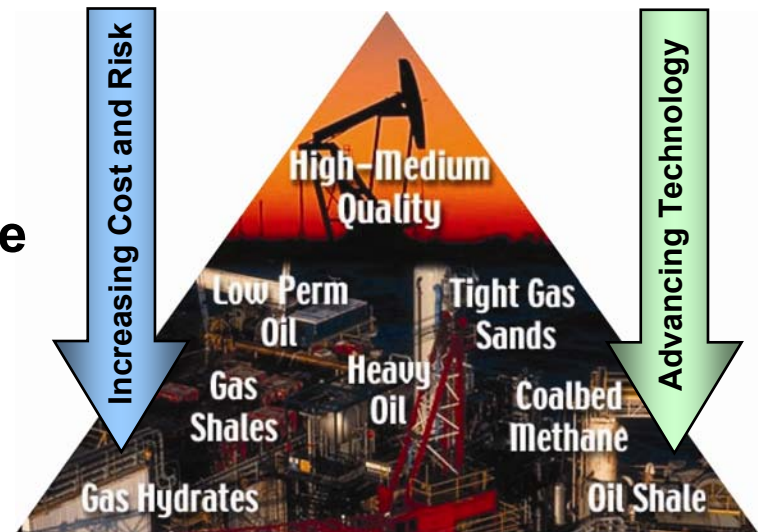
More Difficult & Costly to Produce Than in Past

Oil

- **100's Billion bbl in-place: Remaining after current recovery methods**
 - Awaiting advanced technologies
- **10's Billion bbl in-place: Oil Sands**
 - Awaiting technology development
- **1000's Billion boe in-place: Oil Shale**
 - Economic and environmental hurdles

Gas

- **100's Tcf in-place: Ultra-Deep Gas**
 - Recoverable, but not economic
- **1000's Tcf in-place: Tight Gas Sands**
 - 2% recoverable now; how much higher?
- **100,000's Tcf in-place: Methane Hydrates**
 - Recoverability not established



National Energy Technology Laboratory

- **Only DOE national lab dedicated to fossil energy**
 - Fossil fuels provide 85% of U.S. energy supply
- **One lab, five locations, one management structure**
- **1,200 Federal and support-contractor employees**
- **Research spans fundamental science to technology demonstrations**



Alaska



Oklahoma



Oregon



Pennsylvania



West Virginia



NETL Mission Areas

Strategic Center for Coal



Strategic Center for Natural Gas and Oil



Project Management Center



Strategic Center for Natural Gas & Oil

History of Partnership Approach

- **Implement R&D programs for DOE Office of Fossil Energy**
 - E&P; EOR; Methane Hydrates; Res Life Extension; Environmental
- **Careful planning with significant industry input**
 - Technology roadmaps, advisory committees, consortiums, merit/peer reviews
- **Cost-shared R&D conducted with partners**
 - Industry, federal agencies, national labs, universities
- **Historically modest oil and gas program budget**
 - \$65–\$80 million / year total
- **Extensive experience**
 - > 35 years in oil and gas R&D
 - R&D successes linked to:
 - 25% of U.S. gas production
 - 13% of US oil production



Oil and Gas Exploration & Production

Protecting the Environment while Lowering Costs

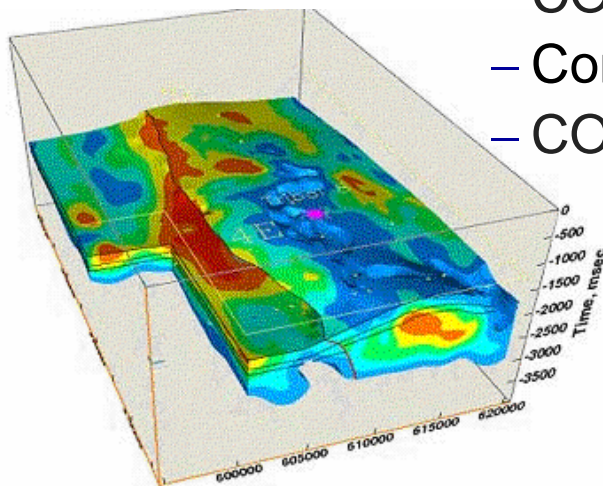
- **Drilling, Completion & Stimulation**

- Increase rate of penetration
- More durable tools, innovative concepts
- Enable Greater CT Drilling Efficiencies



- **Enhanced Oil Recovery**

- CO₂ Injection
- Conformance control
- CO₂ EOR Potential 43 billion barrels



- **Advanced Diagnostics & Imaging Systems**

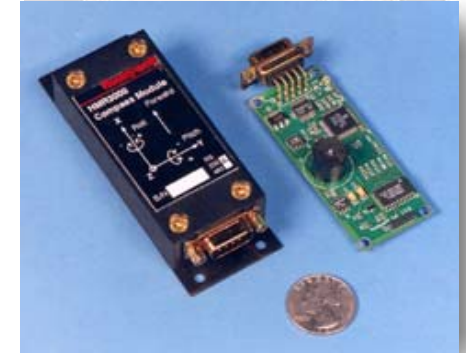
- Improved characterization
- Advanced seismic for natural fracture detection and EOR (4D)

Deep Trek Program

Tools for Extreme Environments

- **Purpose**

- Develop high-pressure / high-temperature materials and electronics
- Build family of deep drilling tools and sensors
- Demonstrate integrated deep drilling system

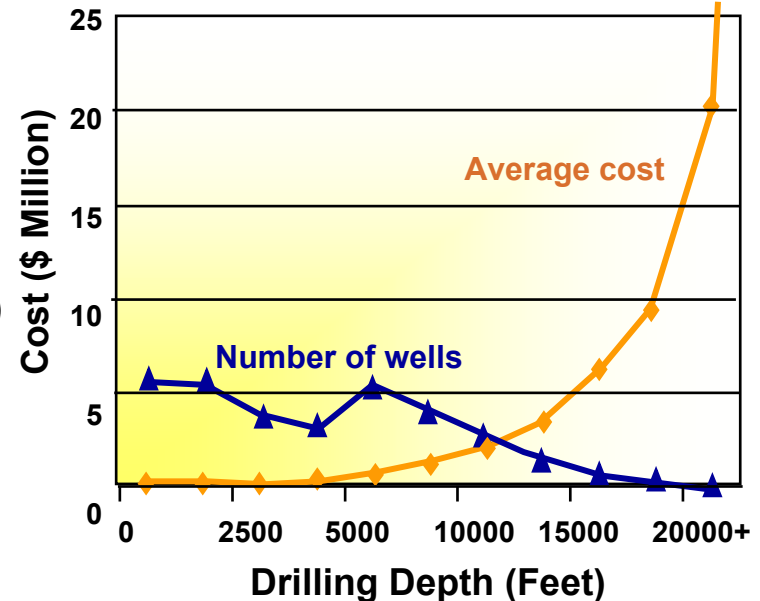


- **Projects**

- High-T electronics (Honeywell, GE, OSU)
- High-T / high-P MWD (Schlumberger)
- Super cement (Cementing Solutions)
- Downhole vibration monitoring & control (APS Technology)
- Adv. bits & fluids benchmarking (TerraTek)
- Downhole turbine generator (Dexter Magnetics)
- Deep EM telemetry (E-Spectrum)

- **Program status**

- Roadmap workshop March 2001
- Project awards 2002, 2003, 2005 & 2006



Oil and Gas E&P

Helping the Small Producer

- **Stripper Well Consortium**

- Reduce premature abandonment of wells
- 65 members participate in technology development & deployment
- Several new low-cost technologies already commercialized



- **Petroleum Technology Transfer Council**

- Assure full utilization of technologies
- 10 regional producer advisory groups
- 150 workshops / year
- 18,000 industry contacts

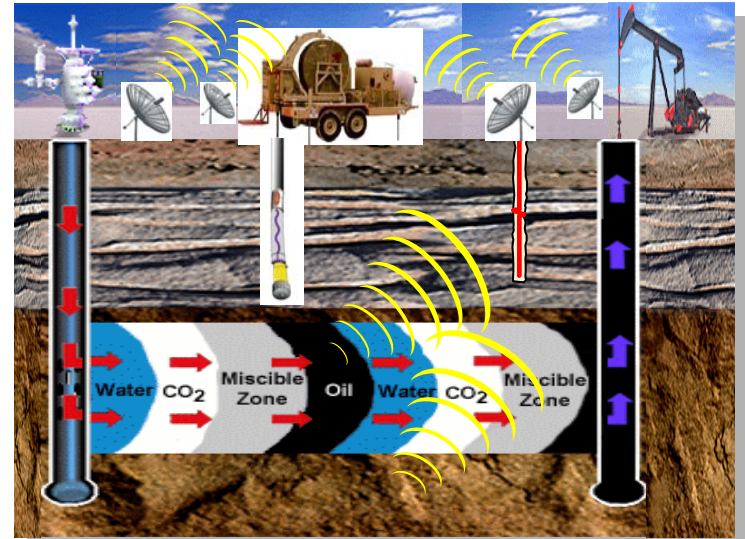


Reservoir Life Extension Program

Microhole Technologies



*For High Efficiency
Mature Field Development*



For New E&P Imaging Paradigms

- Will allow new wave of development drilling for mature fields based on drilling cost reductions approaching 50%
- Low environmental impact for improved sensitive area access
- New paradigms in “high-res” seismic imaging to reduce E&P risk

Oil and Gas Environmental Program

Technology and policy solutions for environmental barriers that limit domestic production

- **Federal Lands Access**

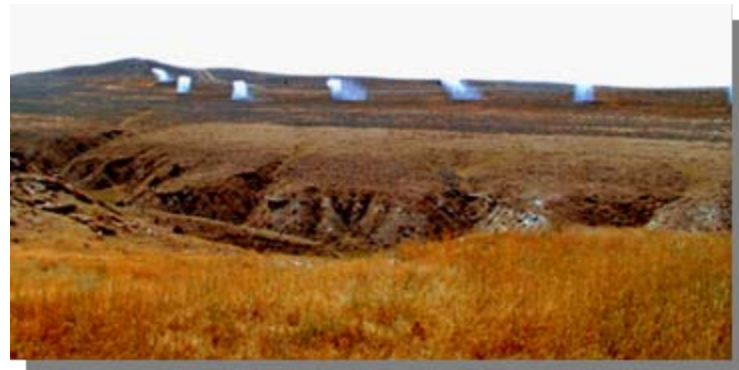
- Reduce permitting Times
- Science-based Stipulations

- **Coal Bed Natural Gas - Water Issues**

- Treatment technologies
- Educational materials

- **Air and Water Emissions**

- Treatment technologies
- Measurement techniques
- Streamline permitting
- Educational materials



Methane Hydrates



- **Program addresses**
 - Safety & seafloor stability
 - Global climate impacts
 - Production technologies

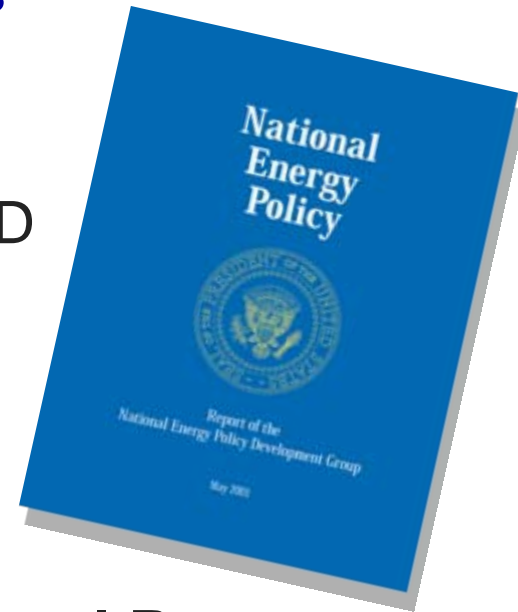
- **Huge resources:**
 - 200,000 Tcf domestic gas-in-place
 - *If 1% can be rendered economic will double nation's supply of gas*
- **Sustainable energy future**
 - Gas becomes key transition fuel
 - Improved economy
 - Reduced dependence on foreign energy



Energy Policy Act of 2005

DOE Oil & Gas RD&D Items

- **Sec 965 – DOE Core Program**
 - DOE to conduct a program of Oil & Gas RD&D
 - E&P, RLE, T&D, oil shale, environmental
- **Sec 968 – Methane Hydrate Research**
 - DOE-led multi-agency program
 - Resource, safety, environmental impacts
- **Sec 999 – Ultra-deepwater & Unconventional Program**
 - Royalty trust fund
 - Consortium for ultra-deep water, unconventional, small producers
 - Complementary research at NETL



Ultra-Deepwater and Unconventional Natural Gas and Other Petroleum Resources

Sec. 999B(j) Program Review and Oversight

- **National Energy Technology Laboratory, on behalf of the Secretary, shall ...**
 - (1) issue a competitive solicitation for the program consortium,
 - (2) evaluate, select, and award a contract or other agreement to a qualified program consortium, and
 - (3) have primary review and oversight responsibility for the program consortium, including review and approval of research awards proposed to be made by the program consortium



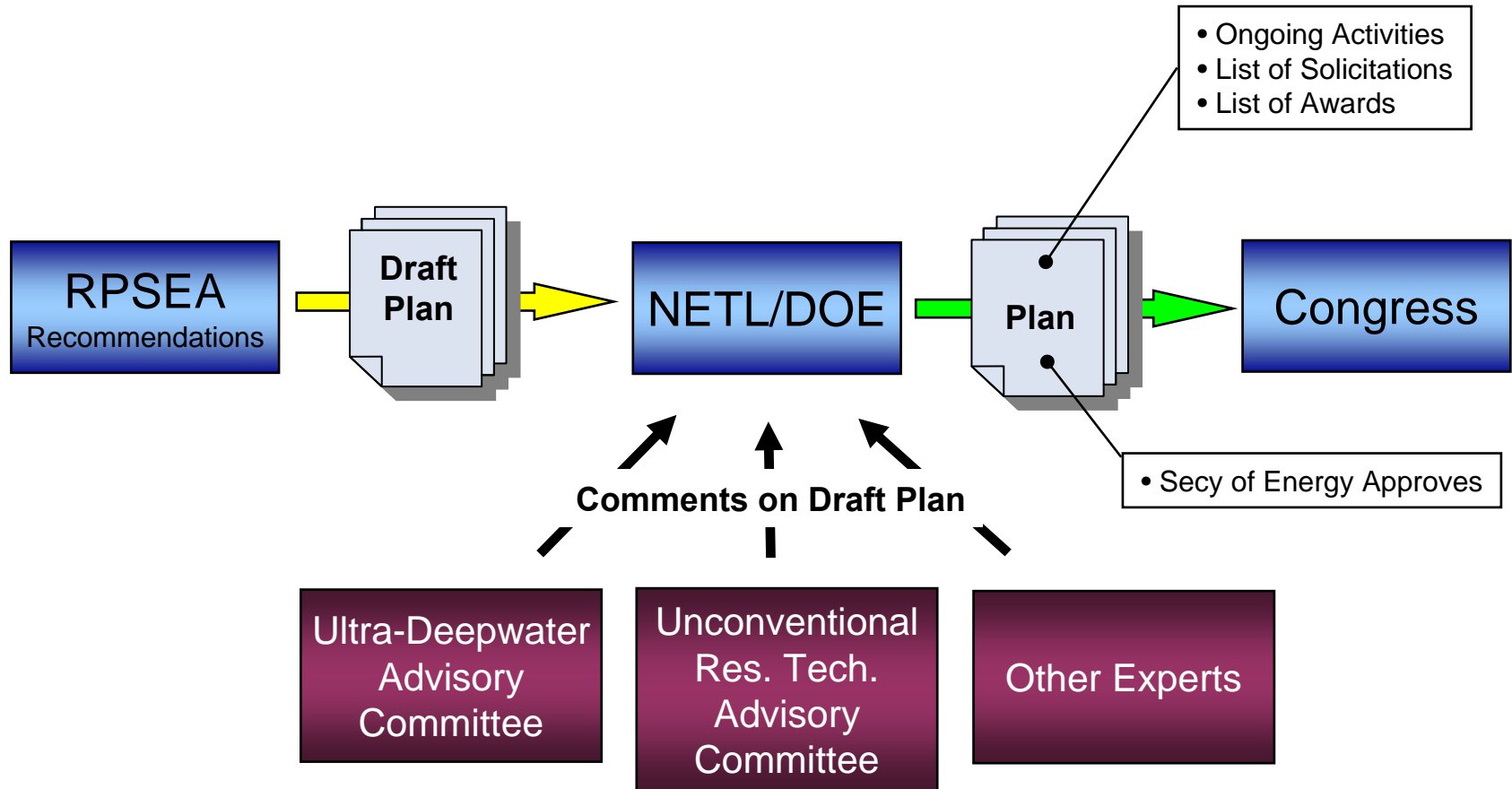
Ultra-Deepwater and Unconventional Natural Gas and Other Petroleum Resources

Program Administration

- **NETL selected RPSEA to administer program**
 - Contract effective January 4, 2007
- **RPSEA will:**
 - Carry out research pursuant to annual plan
 - **Plan is developed by Sec'y. of Energy based on RPSEA Draft**
 - Issue research project solicitations
 - Make project awards
 - Disburse research funds to performers
- **NETL will:**
 - Manage the contract between RPSEA & DOE
 - Work with RPSEA to develop draft annual plan
 - Move annual plan through DOE approval process
 - Review / approve research awards made by RPSEA



Annual Plan to be Submitted to Congress



Federal Advisory Committees

- **General Requirements**

- Individuals appointed by the Secretary of Energy
- Extensive research experience or operational knowledge
- Not Federal employees or board members, officers or employees of the Program Consortium
- Serve without compensation beyond expenses

- **Ultra-Deepwater**

- Representative of interests in ultra-deepwater production including environmental protection & safe operations

- **Unconventional Resources Technology**

- Reflect breadth of areas of potential gas supply
- Majority representing independent producers



Section 999 Funding Distribution

Allocations of Funding Amounts:

- 35% for Ultra-Deepwater
- 32.5% for Unconventional Resources
- 7.5% for Small Producer Challenges
- 25% for Complementary Research by NETL

Other Direction:

- 2.5% of each award for technology transfer
- $\leq 10\%$ for consortium administration



SCNGO Management Responsibilities

- **Continue to implement core oil and gas RD&D programs**
 - Methane hydrate, EOR, RLE, Environmental, Infrastructure, etc.
- **Integrate / coordinate all elements of Section 999**
 - Manage RPSEA Contract
 - **Near- to mid-term focus**
 - Support Complementary R&D at NETL
 - **Long-term, lab-scale R&D focus**
 - Interface w/FE HQ on all processes & advisory committees
- **Facilitate an effective public / private partnership**
 - Develop technologies to increase domestic oil and gas production at a reasonable price while protecting the environment



SCNGO Consortium Management Team

RPSEA Project Management Team

- Roy Long – Team Lead
- Gary Covatch – COR, Deepwater
- Ginny Weyland – Unconventional
- Jim Barnes – Small Producers

SCNGO Management Team

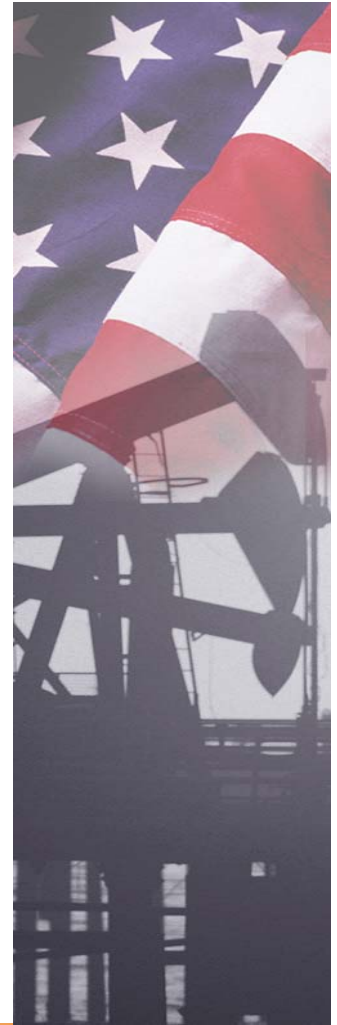
- Brad Tomer – Director
- Margaret Lou – Deputy Director
- Jim Ammer – Division Director, Natural Gas & Oil
Project Management Division



Closing Thoughts

Gas and Oil Program Provides Value for America

- **Government role in oil & gas R&D becoming more important**
 - Lower industry investment in R&D
 - High prices with more difficult future supplies
- **New supplies will be more difficult/costly**
 - More remote, smaller reservoirs, deeper, more complex, unconventional resources, greater concern for environmental impact
- **Technology has many benefits**
 - Lower costs, decrease risks, protect environment, increased safety, increased supply
- **Monumental task requiring partnership approach**
 - Multidisciplinary needs (electronics, metallurgy, physics, engineering, chemistry)



Visit Our Websites

ABOUT DOE | ORGANIZATION | NEWS | CONTACT US

U.S. DEPARTMENT OF ENERGY

SCIENCE & TECHNOLOGY | ENERGY SOURCES | ENERGY EFFICIENCY | THE ENVIRONMENT | PRICES & TRENDS | NATIONAL SECURITY | SAFETY & HEALTH

FOSSIL ENERGY

Fossil Energy

- Clean Coal & Natural Gas Power Systems
- Carbon Sequestration
- Hydrogen & Other Clean Fuels
- Oil & Natural Gas Supply & Delivery
- Natural Gas Regulation
- U.S. Petroleum Reserves

IN YOUR STATE

Select a State

OFFICES & FACILITIES

Select a Facility

EMAIL UPDATES

Register to receive Fossil Energy ENEWS HERE by: 4/1/04 000

QUICK REFERENCE

FOSSIL ENERGY NEWS SPOTLIGHT

New DOE Report Gauges Future Freshwater Needs for Power Plants

DOE's National Energy Technology Laboratory has updated its groundbreaking 2004 study estimating future freshwater requirements for the U.S. electric power generation sector. Bringing a much-needed regional focus, the new report identifies a dichotomy between national and local freshwater needs and pinpoints where critical water issues could develop. [Read more](#)

OFFICE OF FOSSIL ENERGY

Ensuring that you can continue to rely on a clean, affordable energy from our traditional fuel resources is the primary mission of DOE's Office of Fossil Energy. Fossil fuels supply 85% of the nation's energy, and we are working on such priority projects as: carbon-free coal plants, more productive oil and gas fields, and the continuing readiness of federal emergency oil stockpiles.

Need more about:

- Food Energy Organization
- Business & Funding

Fossil Energy website:
www.fe.doe.gov

National Energy Technology Laboratory

Site Map

NETL

THE ONLY U.S. NATIONAL LABORATORY DEVOTED TO FOSSIL ENERGY TECHNOLOGY

ABOUT NETL

KEY ISSUES & MANDATES

ONGOING RESEARCH

TECHNOLOGIES

EDUCATION & BUSINESS

CAREERS & FELLOWSHIPS

NEWSROOM

CONTACT NETL

Tackling U.S. Energy Challenges

Secure and Reliable Energy

Domestic coal, oil, and natural gas resources can contribute enormously to our Nation's economic strength, energy security, and quality of life through the 21st century.

[View Secure & Reliable Energy Supplies](#)

NEWS & FEATURES

- Final Energy Efficiency Analysis of Advanced Carbon Capture (PCC) CAPS
- Solicitation for "Novel" Technologies & Commercial Feasibility Studies for CO2 Capture & Sequestration: An Energy & Future Carbon Capture Review Conference Report
- Solicitation for "Novel" Technologies Sector: Technical Review Conference
- NETL and the Energy R&D, Innovation, & Entrepreneurship
- Tax Credit Guidelines

EVENTS CALENDAR

- 21st International Symposium on Coal Utilization & Fuel Systems
- 2004 International Coalbed Methane Symposium
- Terraviva '04 Conference 2004
- Society of Petroleum Engineers 2004 Annual Technical Conference & Exhibition
- 2004 Environmental Science Conference

PUBLICATIONS &

2005 NETL Accomplishments Report

We are pleased to announce the release of NETL's 2005 Accomplishments Report, a summary of the results of NETL's work over the past fiscal year.

A Certification in order to ensure that the public is presented a clear understanding of the U.S. Department of Energy's perspective on the current state of necessary control technologies for coal-fired power plants and their associated costs, DOE/NETL, in cooperation with the RA Federation of Separators Data, has issued the final certification to the PRSC's April 18 press release that U.S. Department of Energy Says Mercury Control Technology Available, Cost Low; Speakers Urge Legislators to Protect Pennsylvania

NETL website:
www.netl.doe.gov

