Natural Gas, Water and the Clean Energy Economy

Presentation to the

Groundwater Protection Council Annual Forum

Christopher Smith
Deputy Assistant Secretary
Office of Oil and Natural Gas

27 September 2010

U.S. DEPARTMENT OF ENERGY

Oil and Natural Gas

Deepwater and shale present the two major oil and gas challenges /opportunities

Oil and Natural Gas

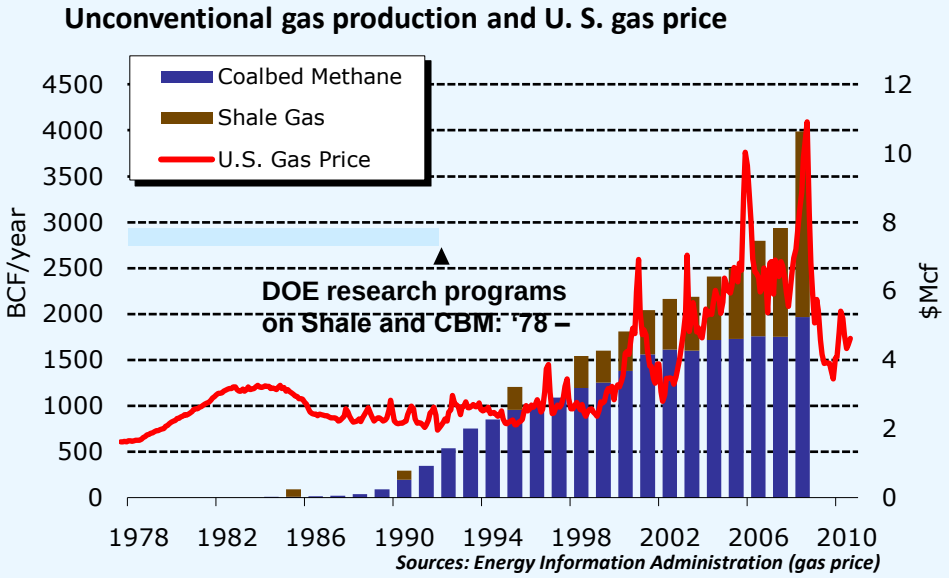
- Shale gas has the potential to significantly increase America's security of supply, reduce GHG emissions, and lower prices for American consumers.

- The world relies on the offshore to replace oil reserves
- The BP Deepwater horizon disaster exposed a major vulnerability

Industry has invested aggressively to develop the technology to commercialize oil and gas in increasingly difficult environments such as shale and the deepwater…

…but advances in environmental sustainability and safety have not kept pace

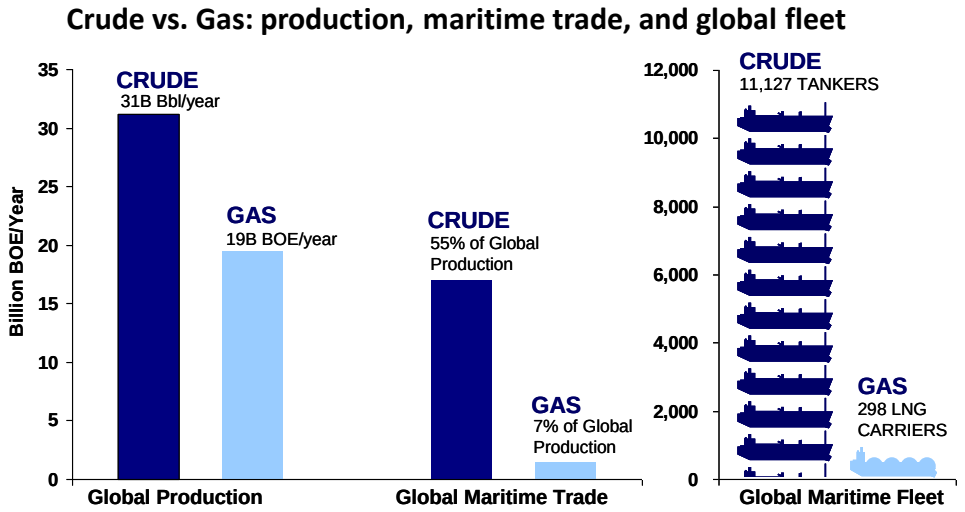
Natural Gas is a uniquely domestic source of energy for American consumers



Shale gas has lowered the price that Americans pay for energy.

Oil and Gas are different…

- Unlike oil, gas is not a globally fungible commodity
- Transportation constrains ensure that natural gas will remain a fundamentally regional commodity.

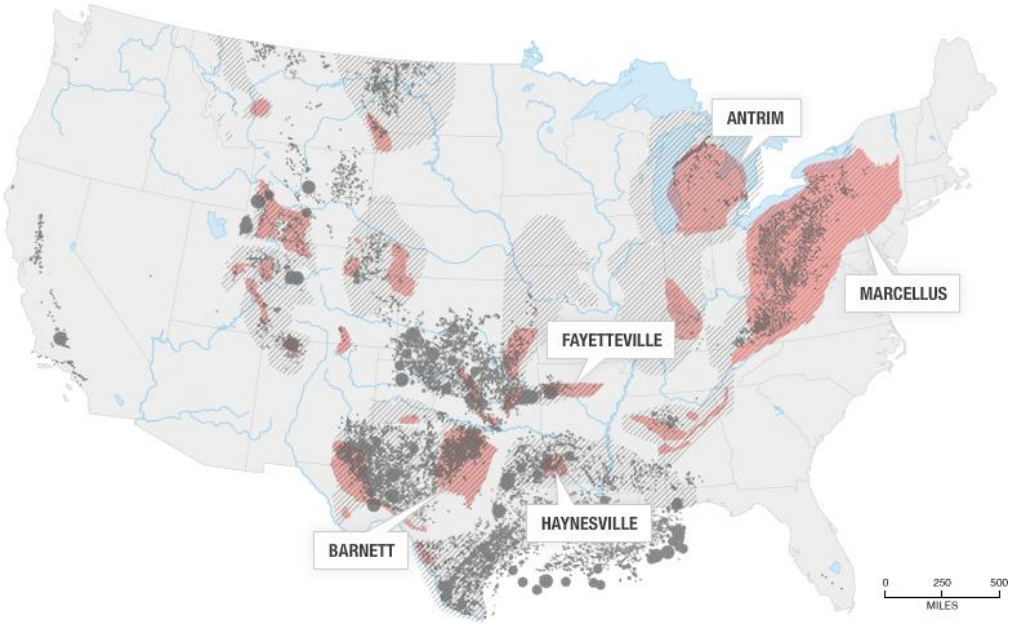


Sources: EIA, BP Statistical Review of World Energy, June 2009, Pacific L.A. Marine Terminal LLC, GIIGNEL

Shale has changed the natural gas game in the United States

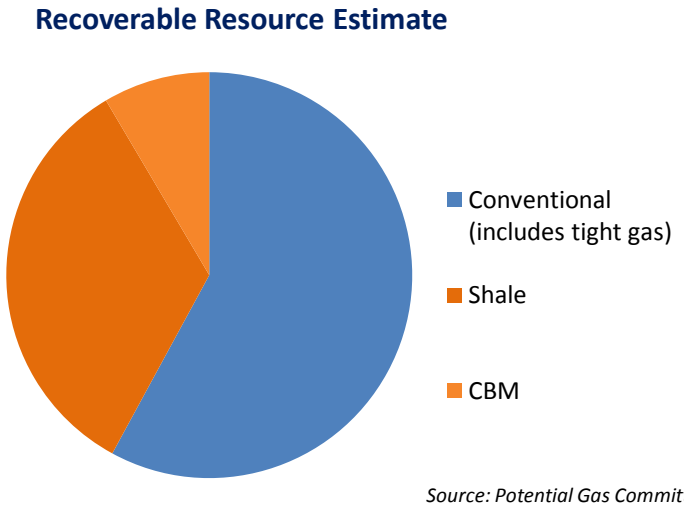
Oil and Natural Gas

Shale resources are found throughout the U.S.



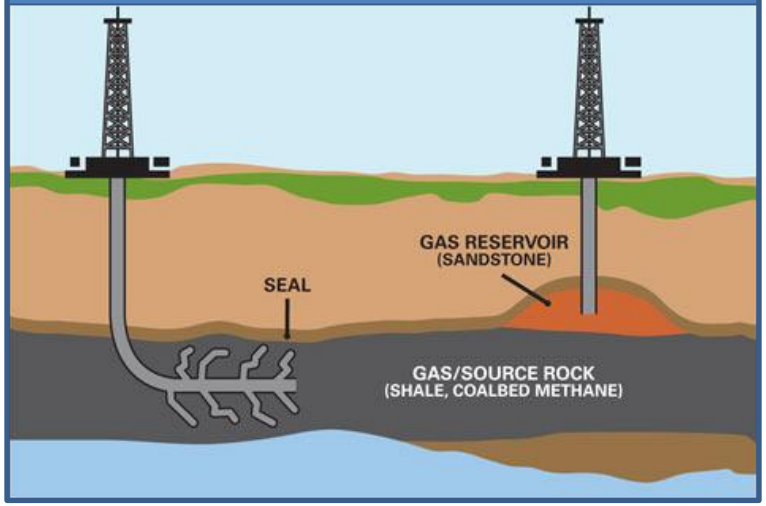
- Communities are concerned about **the environmental sustainability of shale gas production**
- As with the deepwater, **communities are largely reliant on a limited body of safety/sustainability R&D which has been funded by the same companies that profit from the development of the resource**.

Shale's resource potential is large…

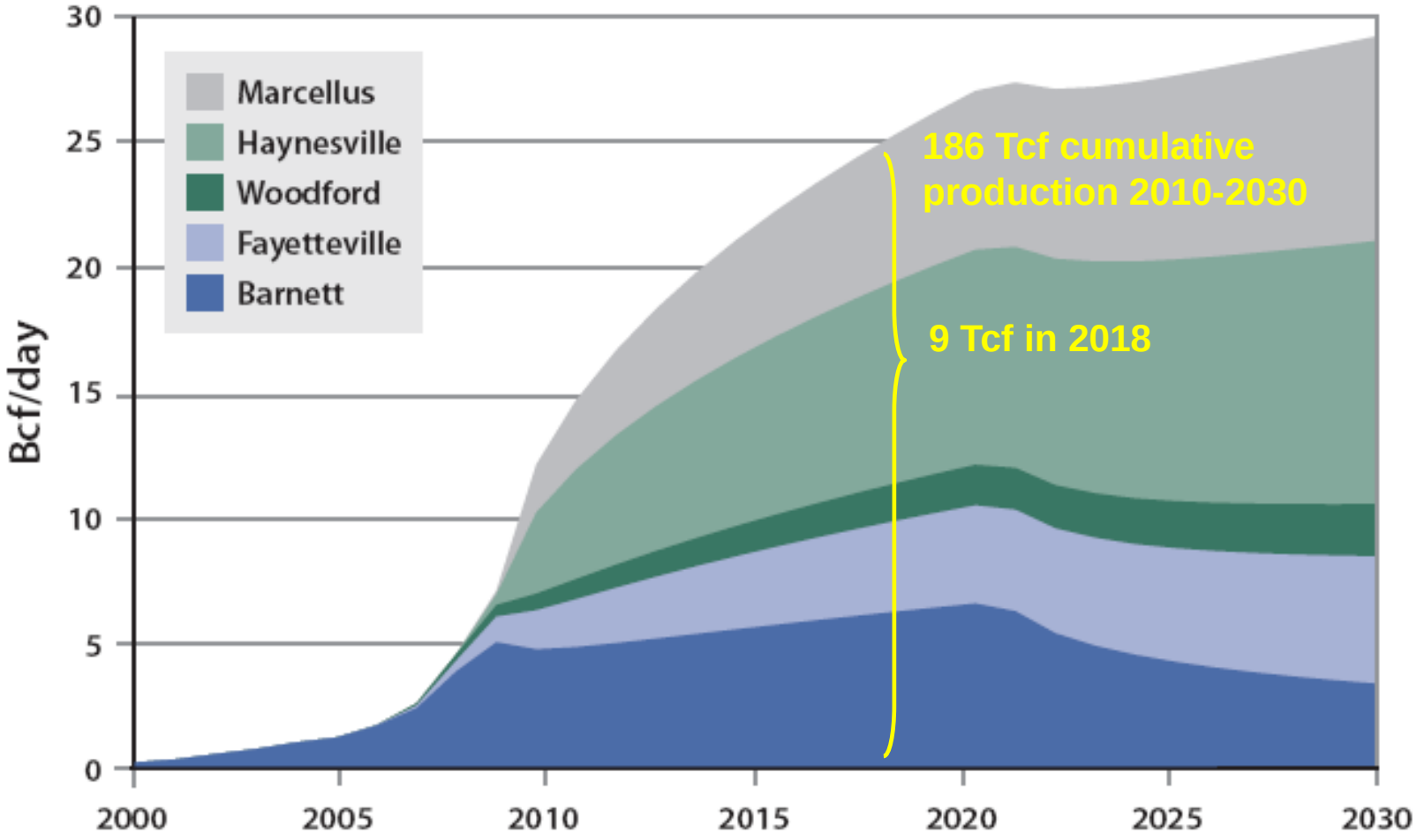


Source: Potential Gas Committee

…and you don't have to look for it.



MIT's Future of Natural Gas Report



Source: MIT, The Future of Natural Gas, Interim Report, June 2010

Development of unconventional gas resources presents unique challenges in terms of water:

- Access to water for fracturing
- Ecologically sound completion of wells through groundwater zones
- Conduct of hydraulic fracturing operations in pay zone
- Handling, treatment, and re-use of water from operations

Deepwater and shale present the two major oil and gas challenges /opportunities

Oil and Natural Gas

UNCONVENTIONAL GAS

- Technically complex
- **Complex regulatory/community environment**

DEEPWATER

- **High technical complexity**
- Uniform regulatory/community environment

Challenge: Create a more informed public debate which promotes good decision making and protects the public interest

Department of Energy Activities

U.S. DEPARTMENT OF ENERGY

Conduct shale gas research related to the challenges associated with minimizing the environmental impact of development, including advancement of water treatment and management technologies to address water requirements, fracture fluid flowback, and produced water.

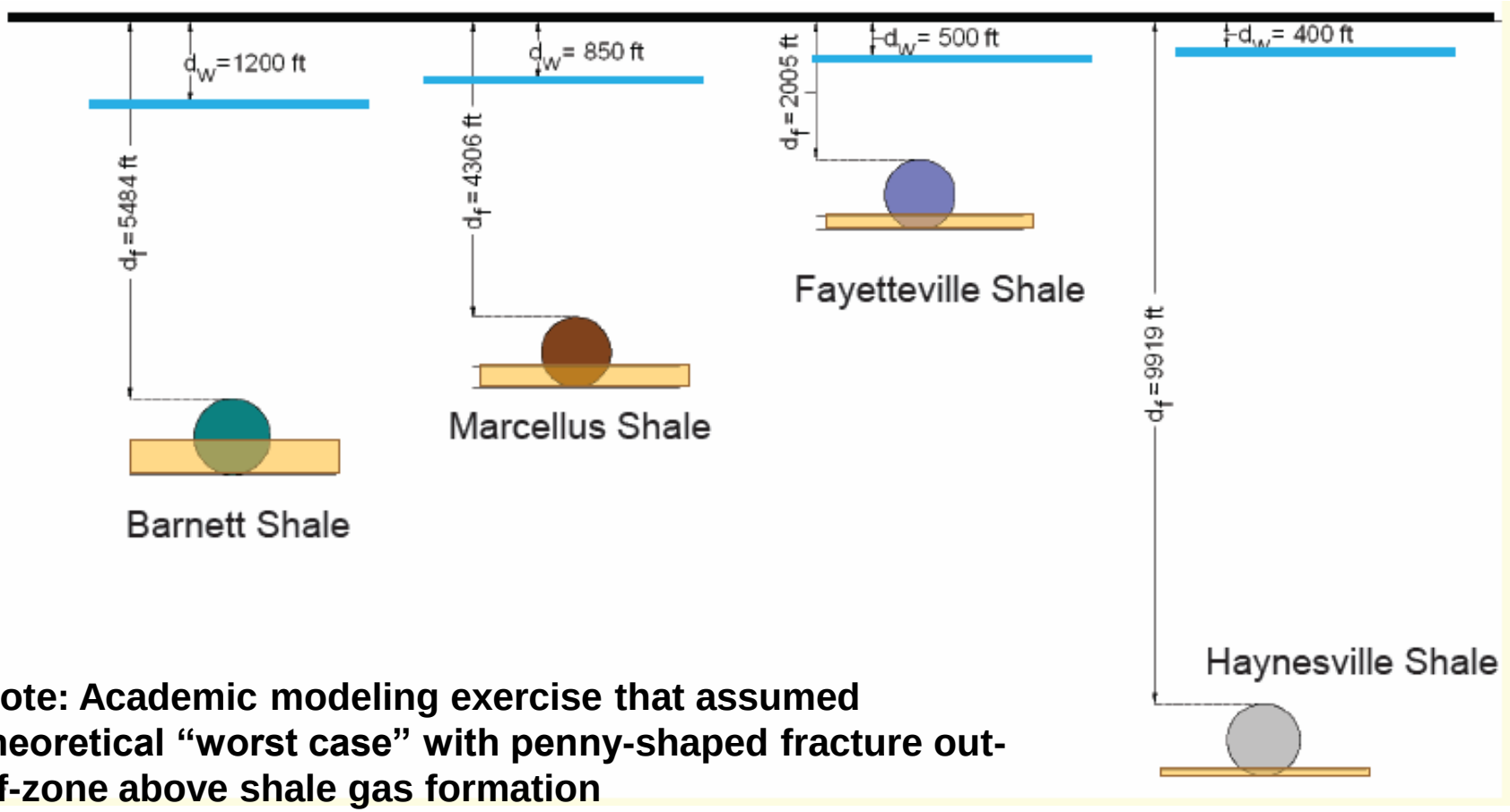
- Base budget
- EPAct Section 999

Sponsor research to complement EPA and DOI

Sponsor efforts to increase collaboration between industry, NGOs, federal and state governments

Modeling Can Provide Insights on Potential Risk

Modeled for 400,000 gallon job at 120 BPM

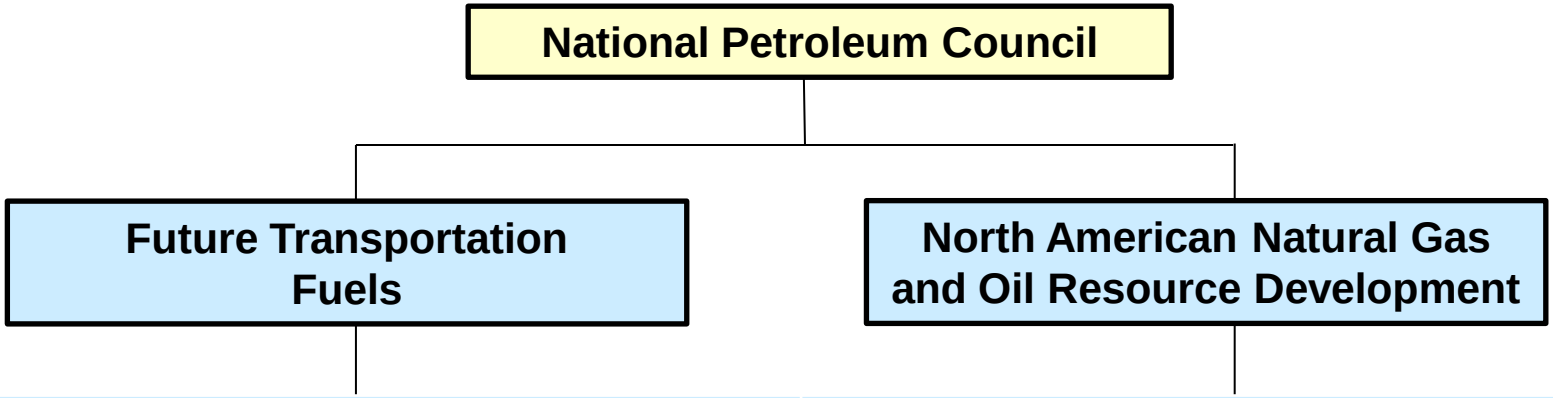


Note: Academic modeling exercise that assumed theoretical "worst case" with penny-shaped fracture out-of-zone above shale gas formation

Source: DOE NETL, Siriwardane and Bromhal, Internal Assessment, March 2010

NPC Studies and Focus Areas

Oil and Natural Gas



Fuels

- Advise on policy options and examine pathways and prospects through 2030 and 2050 for integrating new fuels and vehicles into the marketplace.
- Address reducing GHG emissions by 50% over 2005 levels in U.S. transportation sector by 2050.
- Consider technological advances, market dynamics, environmental mandates, cost/benefit tradeoffs, and impacts on land and water use.
- Target completion: October 2011

Resource

- Assess natural gas and oil resource base and productive capacity through 2035; and provide views to 2050.
- Explain role of technology in making this resource producible, and describe demand for natural gas in the U.S. through 2035.
- Identify how increased use of natural gas could result in lower GHG emissions in all sectors of the economy.
- Develop policy options for prudent development of resources.
- Target completion: March 2011

Supporting the President's Goals

Energy

- "The nation that leads the clean energy economy will be the nation that leads the global economy. And America must be that nation."

Innovation

- "We need to encourage innovation… And no area is more ripe for such innovation than energy."

  - State of the Union, January 27, 2010

U.S. DEPARTMENT OF

ENERGY