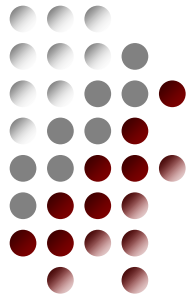
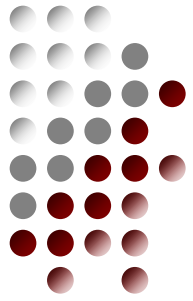


Hydraulic Fracturing



Source: Anadarko Petroleum Corporation

What is hydraulic fracturing?



- A process in which a fluid is injected at high pressure into low permeability rock (shale) containing oil or methane gas deposits to fracture the rock and release liquid or gas.
- The fluid uses a mixture of water, proppants (sand or ceramic beads) and chemicals.
- The pressure creates fractures kept open by the proppants which allow oil and gas to flow from the pore spaces to production wells.

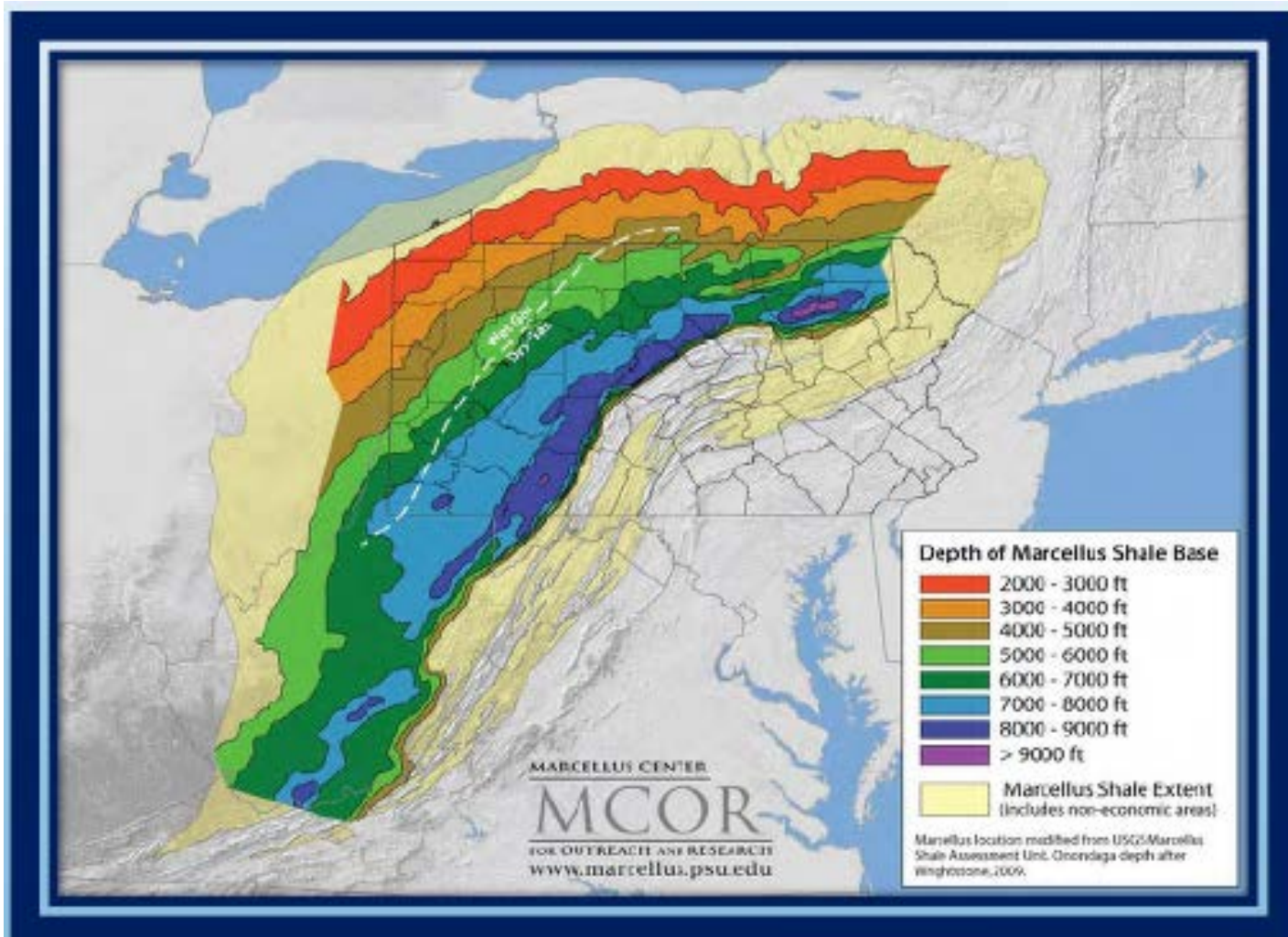
Lower 48 states shale plays



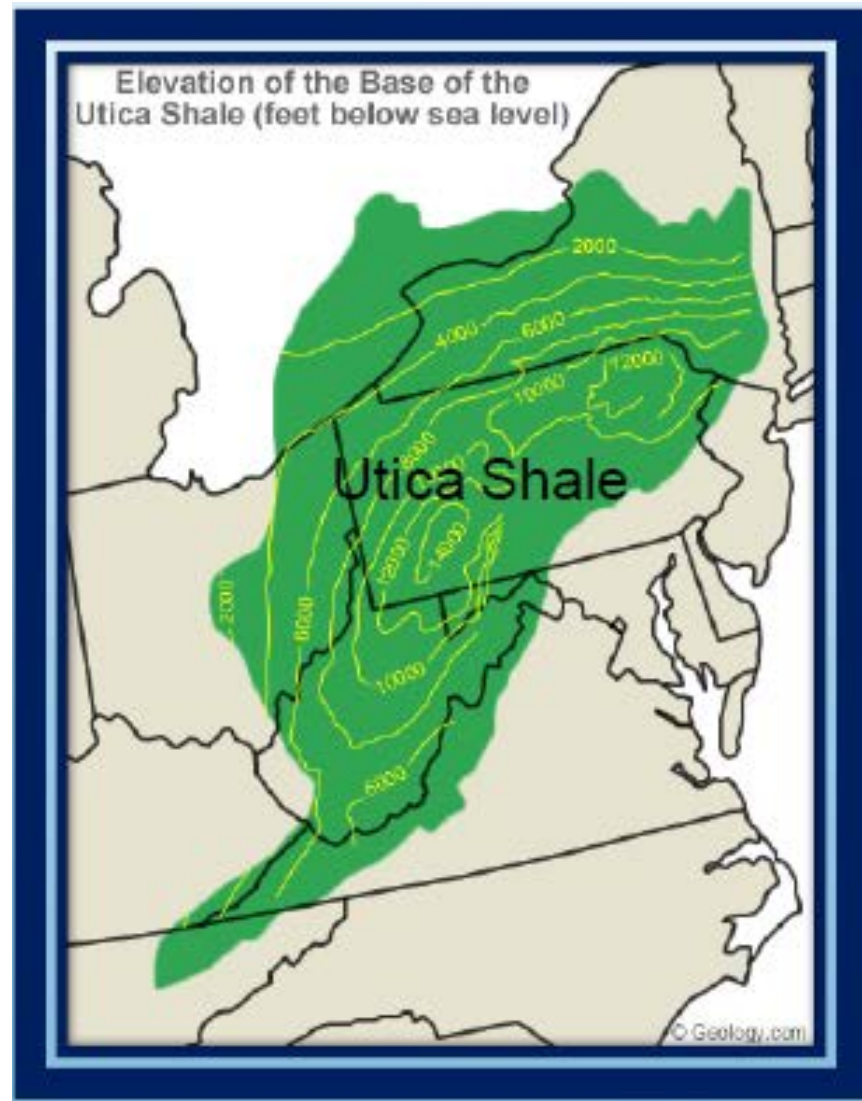
Source U.S. Energy Information Administration based on data from various published studies.

Update: May 9, 2011

New York and the Northeast's Marcellus Play

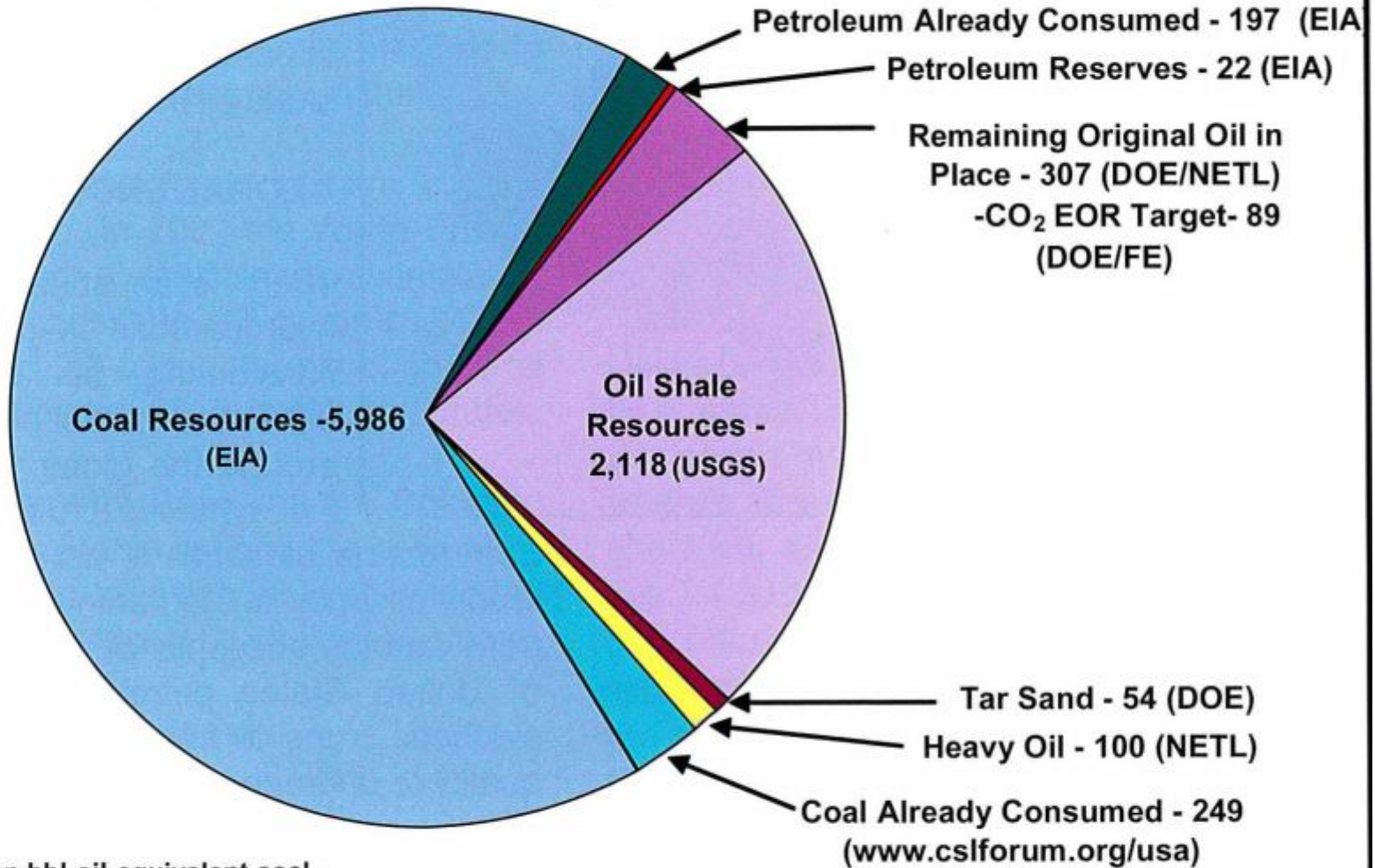


Ohio's Utica Shale Play



USGS 2010

U.S. Solid and Liquid Fuels Resources
 (Total endowment 9,033 billion bbls oil equivalent*)



Units are in billion bbl-oil-equivalent coal -
 10K BTU/lb; oil - 6M BTU/bbl

*not including energy losses in transformation to liquid fuel

Source: U.S. DOE NPOS



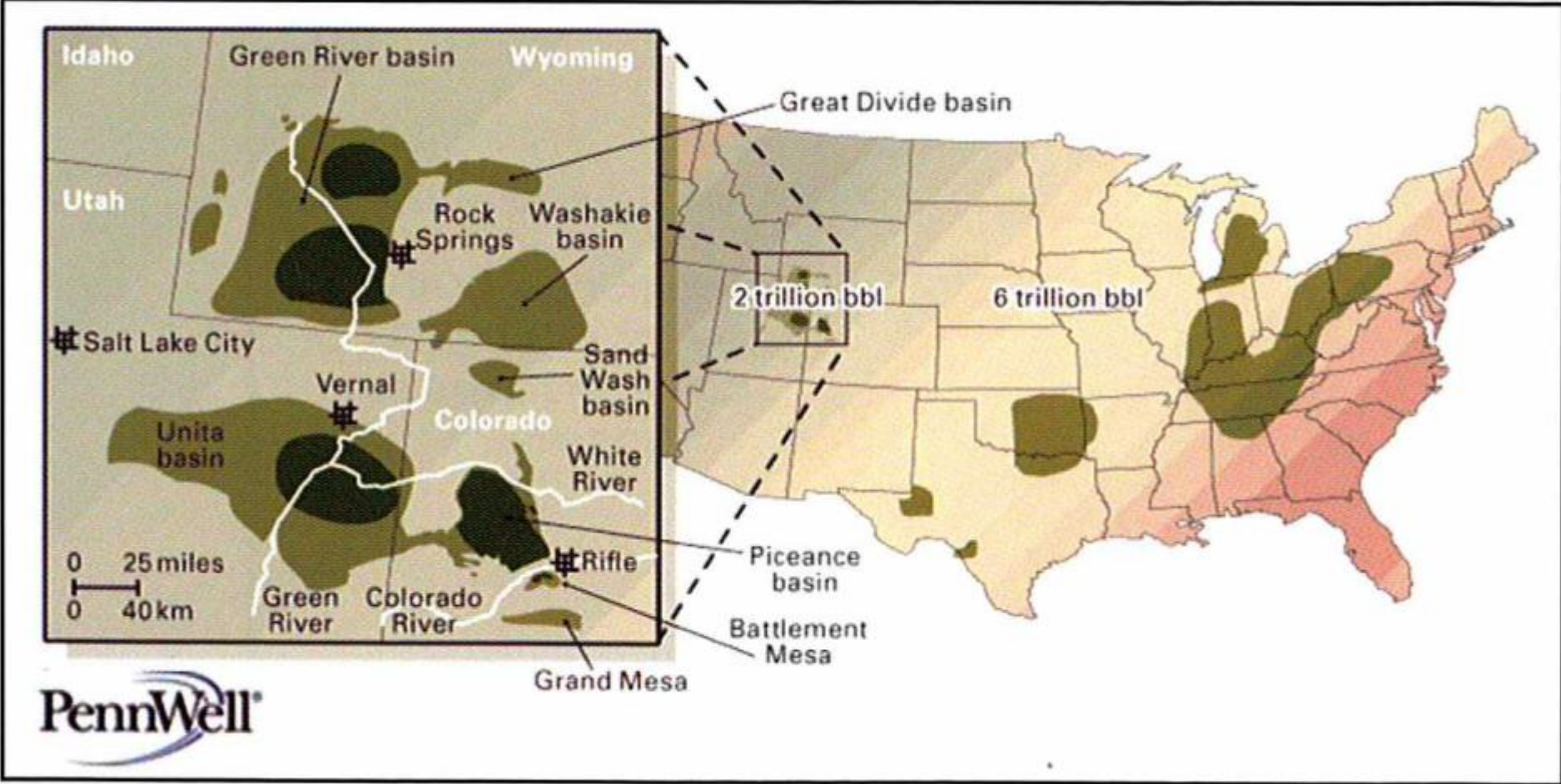
Project Facts

Technology Advances Offer Promise to Boost U.S. Oil Supplies to 430 Billion Barrels

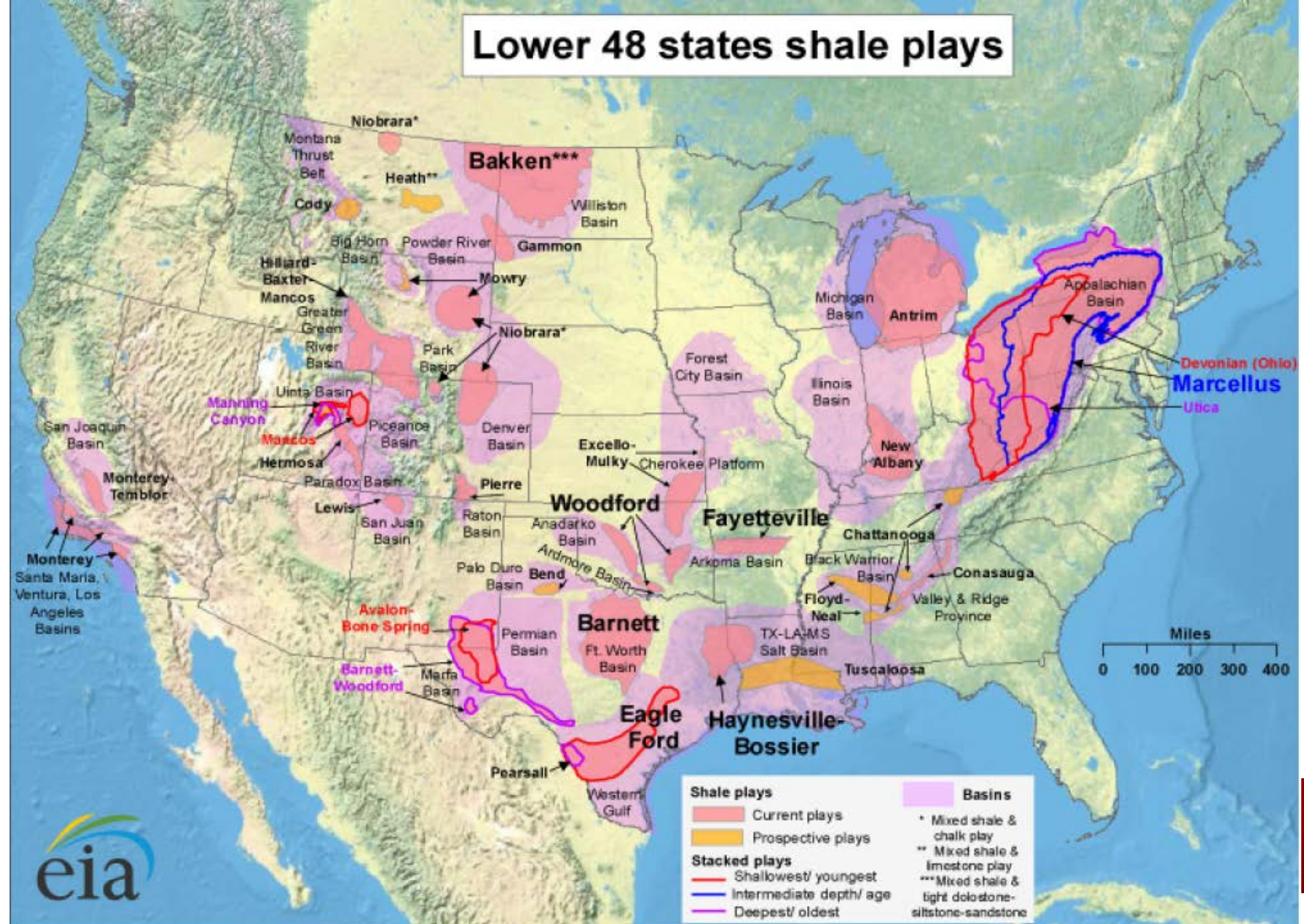
Updated Table of U.S. Oil Resources Recovery Potential

Original, Developed and Undeveloped Domestic Oil Resources (Billion Barrels)*						
	Original Oil In- Place	Developed to Date	Remaining Oil In-Place****	Future Recovery**		
				Conventional Technology	EOR*** Technology	Total
I. Crude Oil						
1. Discovered	582	(208)	374	-	110	110
• Light Oil	482	(189)	293	-	90	90
• Heavy Oil	100	(19)	81	-	20	20
2. Undiscovered	360	-	360	119	60	179
3. Reserve Growth	210	-	210	71	40	111
4. Residual Oil Zone	100	-	100	-	20	20
II. Tar Sands	80	-	80	-	10	10
TOTAL	1,332	(208)	1,124	190	240	430

Northwest Colorado, Northeast Utah, Southwest Wyoming



Lower 48 states shale plays



Source U.S. Energy Information Administration based on data from various published studies.

Update: May 9, 2011

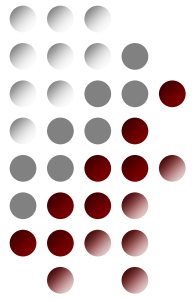
OIL SHALE

AMERICA'S UNTAPPED ENERGY SOURCE

FACTS ABOUT OIL SHALE
BENEFITS FOR THE NATION AND REGION
CHALLENGES FACING ITS DEVELOPMENT
MISCONCEPTIONS LAID TO REST

NOSA

Pros/Cons re “Fracking”



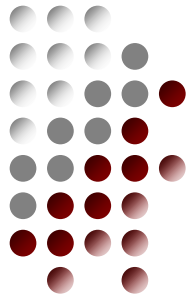
Pros

- Responsible operators in compliance with government regulations eliminate dependence on foreign energy sources
- More gas and oil can be produced cheaply until sufficient renewable energy resources are developed
- Job creation for production companies
- Job creation for communities and related industries

Cons

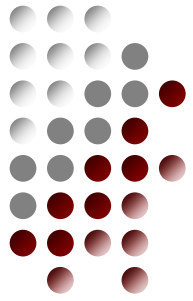
- Improper well construction or overly aggressive “frack” threatening groundwater, destabilizing substrate and impacting soils
- Potential for vast amounts of water diverted from beneficial uses (in Colorado, 78% of all water is used for agriculture)
- In the semi-arid Western US, water supplies are limited and costly
- Potential for spills and leaching of waste into surface/groundwater
- Potential for communication with groundwater aquifers
- Potential emissions of methane from gas wells or leaking pipes
- Well site sizes are large, sometimes close to residential homes
- Increased heavy truck traffic on roads and noise

Sources of Water for “Fracking”



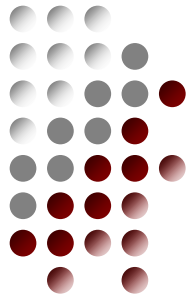
- Water sources may come from ground or surface water; water withdrawal over certain volumes requires permitting
- Millions of gallons of water used per production well
- Storage of water on-site in 20,000 gallon tanks, on-site impoundments, or centralized impoundments serving multiple sites
- Recycling “flowback” water produced in fracturing process, ranging from 25 to 75 percent recovery
- Flowback may contain both naturally occurring contaminants, chemical additives, VOCs, radionuclides, ions and high TDS values

Handling/Disposing of Flowback



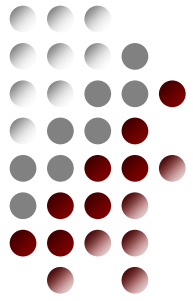
- Production water and flowback water are stored in tanks and water impoundment ponds prior to and during treatment, recycling, and disposal
- Impoundments may be temporary or long-term.
- In some states, underground injection is preferred method for disposal for flowback
 - Concerns re injection capacity, transportation cost, hauling wastewater to injection site
- Potential for use of publicly owned treatment works (POTW) or commercial treatment facilities in populated areas
 - POTWs not designed to treat fracking wastewaters, however, may be used to pre-treat frack waters prior to disposal by injection
- Releases, leaks and/or spills involving storage and transportation of flowback and produced water impacting drinking water aquifers and surface water

Chemicals used in “fracking”



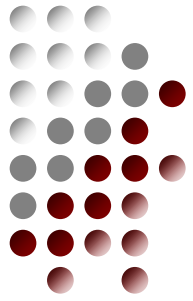
- To date, oil and gas companies that frack have submitted to the USEPA lists of chemicals used in the “fracking” process.
- The lists of chemicals can be found on the Colorado COGCC, Pennsylvania DEP and Ohio DNR websites or on www.Fracfocus.org
- More stringent regulation of “fracking” chemicals is expected to be coming within the next year.

Regulation Scheme



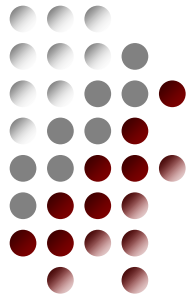
- Federal: environmental regulation, 40 CFR Code of Federal Regulations, administered by USEPA
<http://www.epa.gov/lawsregs/regulations/index.html>
- State: laws governing oil and gas extraction activities and environmental protection are regulated by the appropriate state regulatory agency (e.g., Colorado, the Colorado Oil and Gas Conservation Commission; Ohio, DNR; Pennsylvania, DEP)
- County: environmental protection (primarily public health) is regulated by designated Health Departments
- Municipal: local governments regulate environmental protection under charters, codes and ordinances, subject to state law on preemption

Federal Regulation



- Rules are expected following further study of “fracking” procedures, chemicals and environmental impacts. EPA planned to release initial research findings in 2012 and a final report in 2014, but continuing political and administrative delays, requests for submission of further studies, and bureaucratic wrangling with industry has hampered the release of any comprehensive federal assessment on hydraulic fracking to date
- New regulations are in place on air emissions from “fracking”
- EPA plans to issue guidance on the use of diesel fuels in “fracking”

Federal Exemptions



- The oil and gas industry, including hydraulic fracturing operations, enjoys exemptions from several major federal environmental statutes, strengthened by the Energy Policy Act of 2005:

SDWA

RCRA

EPCRA

CWA

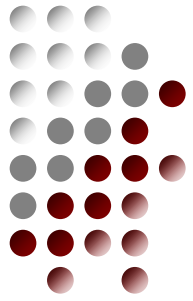
CAA

CERCLA

NEPA

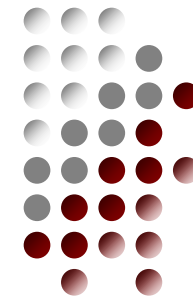
- Part C SDWA permits regulations for State Underground Injection Control (UIC Programs) where states must require a permit, inspections, monitoring, recordkeeping designed to prevent endangering drinking water sources

SDWA/Energy Policy Act 2005



- Congress amended the SDWA in 2005 when it passed the Energy Policy Act. The amendments added two exclusions to the definition of underground injection: “(i) the underground injection of natural gas for purposes of storage; and (ii) the underground injection of fluids or propping agents (other than diesel fuels) pursuant to hydraulic fracturing operations related to oil, gas, or geothermal production activities.”
- Thus, regardless of whether the underground injection of water, proppants, and otherwise toxic chemicals associated with hydraulic fracturing actually endangers drinking water sources, the practice is exempt under the SDWA so long as diesel fuel is not used.

State Regulation



Generally, states are free to regulate hydraulic fracturing as they see fit, so long as minimum requirements of federal regulations are met. Many, like New York, are still engaged in extensive and protracted studies

Colorado Oil and Gas Conservation Commission

http://cogcc.state.co.us/Announcements/Hot_Topics/Hydraulic_Fracturing/COGCC%20Hydraulic%20Fracturing%20Rules.htm

Air pollution regulation: Division of Air Pollution Control www.epa.ohio.gov/dapc/regs/regs.aspx

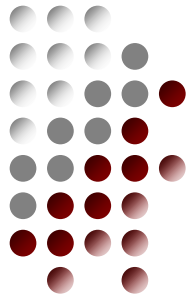
Drinking and Ground Water Regulations: Division of Drinking and Ground Waters
www.epa.ohio.gov/ddagw/rules.aspx

Hazardous Waste Regulations: Division of Hazardous Waste
www.epa.ohio.gov/dhwm/laws_regs.aspx

Solid and Infectious Waste Regulations: Division of Solid and Infectious Waste Management
www.epa.state.oh.us/dsiwm/pages/rules.aspx

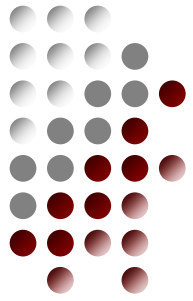
Wastewater Regulations: Division of Surface Water www.epa.ohio.gov/dsw/rules/index.aspx

Colorado



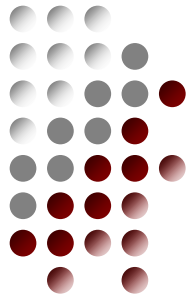
- COGCC regulations require:
 - Permit indicating proposed well location
 - Location of other water sources within 400 feet
 - “Enhanced recovery” operations must be approved
 - Injection of fluids require description of casing, the type of fluid, a chemical analysis of the fluid and the proposed “stimulation program”
 - Well casings must prevent migration of oil, gas, water
 - Pits must meet public health and safety standards and an Earthen Pit Permit, and must be lined
 - Spills must be controlled and contained upon discovery and reported, within 24 hours in some cases
 - Waste from drilling operations may be injected, or disposed

New Colorado Regulations



- In April of 2012, the revised Rules of the COGCC became effective in an effort “to increase the transparency of hydraulic fracturing operations in the State of Colorado and, at the same time, afford appropriate protections for vendor, service provider and operator trade secrets.”
- Operators are required to:
 - complete a public record chemical disclosure
 - exception: trade secrets under the CUTSA are only disclosed to the COGCC and are not public record
 - landowners within 500 feet of a proposed well must receive notice, including a COGCC information sheet on “fracking”
 - provide the COGCC written notice of intended operations at least 48 hours before commencing operations

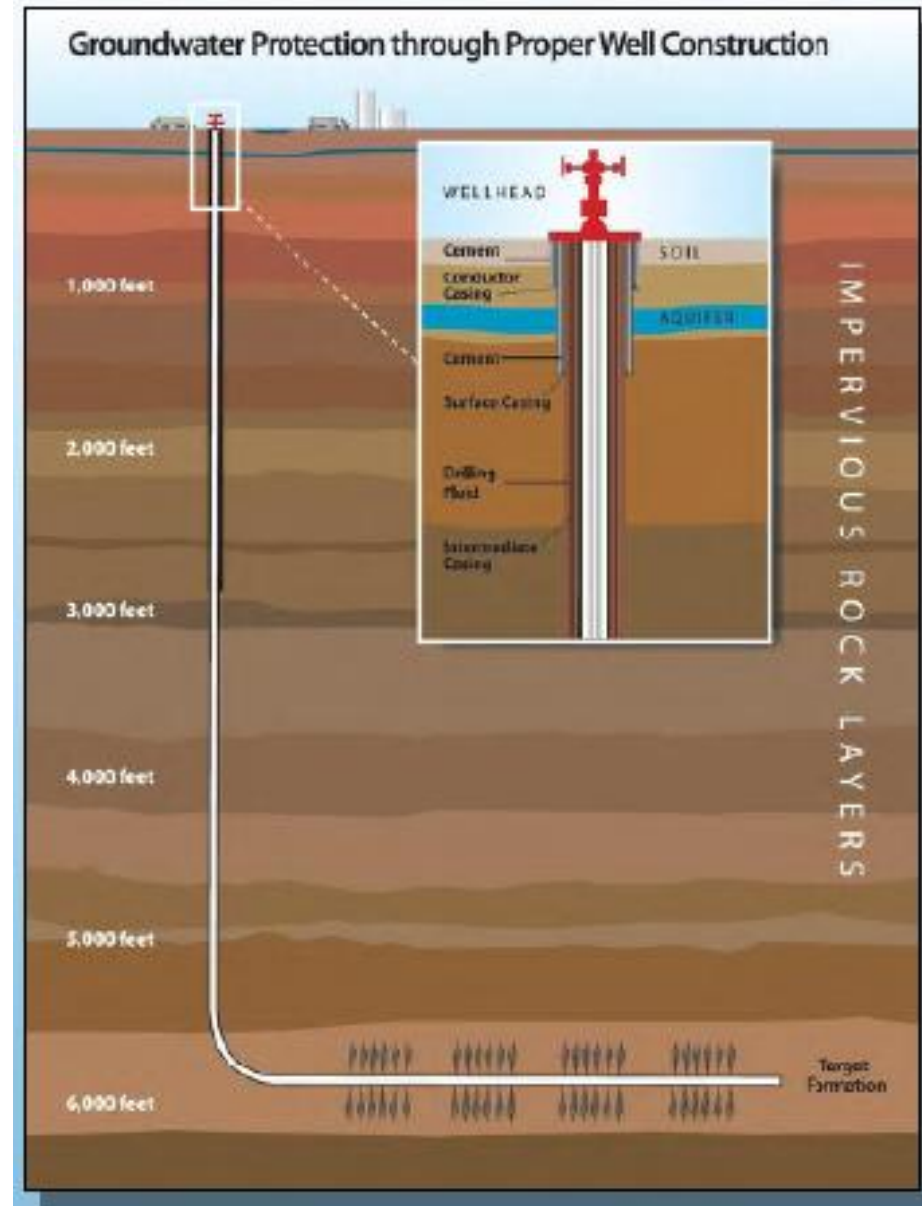
Colorado's New Water Sampling Rule



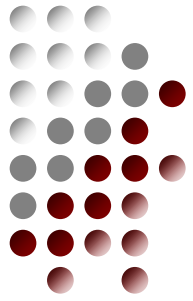
- In January, 2013, COGCC approved pioneering new groundwater protection rules.
- The regulations mark another innovative step in Colorado's pacesetting regulation of oil and gas enhanced recovery operations.
- The new rules require operators to sample up to 4 water wells within a half-mile both *before* drilling activities, and once the year *after*, then six years *after*, to provide assurances that water supplies are not affected, or identify problems in the rare instance of impact.
- Only a few other states have mandatory groundwater testing programs in place, and only after drilling begins

Risk to Groundwater

- Little to no evidence of direct impact to groundwater. Of 1000 incidents investigated in Ohio, none were found to have been caused by “fracking”.
- Potential for contamination of groundwater if mechanical integrity of the well is compromised.
- An issue is the lowering of aquifer water levels by water withdrawal for “fracking” which may:
 - Affect water quality by exposing minerals to oxygen-rich environment;
 - Increased salination and risk for potential chemical contamination;
 - Cause upswelling of lower quality water from deeper within aquifers.

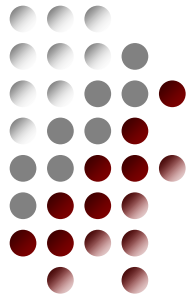


Additional Resources



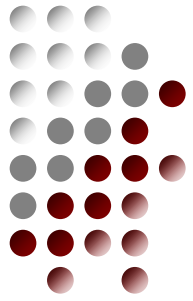
- *USGS:* www.usgs.gov
- *Colorado Oil and Gas Conservation Commission* <http://cogcc.state.co.us/>
- *Ohio Department of Natural Resources:* www.ohiodnr.com
- *Ohio EPA:* www.epa.ohio.gov
- *Penn State Marcellus Center:* www.marcellus.psu.edu
- *Frac Focus:* www.fracfocus.org
- *Other websites with information:*
 - www.TheMarcellusShale.com
 - www.TheUticaShale.com
 - www.GoMarcellusShale.com
 - www.MarcellusCoalition.org
 - <http://oilshalegas.com/piceancebasin.html>

Additional Resources



- Hydraulic Fracturing Regulation In The United States: The Laissez-Faire Approach Of The Federal Government And Varying State Regulations
 - *Vermont J. Env. Law*: <http://www.vjel.org/journal/pdf/VJEL10203.pdf>
 - Professor William J. Brady & James P. Crannell
- EPA Releases Progress Report on Impacts of Hydraulic Fracturing on Drinking Water Resources
 - http://www.spencerfane.com/environmental_law_solutions/blog.aspx?entry=250
- Recently Enacted Fracking Ban in Colorado Challenged, Highlighting Divide Between State and Local Governments on Energy Production
 - http://www.spencerfane.com/environmental_law_solutions/blog.aspx?entry=249
- Groundbreaking EPA Enforcement at Hydraulic Fracturing Sites
 - http://www.spencerfane.com/environmental_law_solutions/blog.aspx?entry=39

Conclusion: Questions? Contact Information



abrought@spencerfane.com

(816) 292-8886



wbrady@spencerfane.com

(303) 839-3992



kwhitby@spencerfane.com

(314) 333-3929