

Discovering Shale Gas: An Investor Guide to Hydraulic Fracturing

Webinar: Review of Research Findings and Q&A
Thursday, March 8, 2012 at 11:00 AM ET
**Investor Responsibility Research Center Institute &
Sustainable Investments Institute**



Agenda

- Introductions
- Why This Research
- Research Review
- Q&A

Speakers

- **Heidi Welsh**, Executive Director, Sustainable Investments Institute
- **Jon Lukomnik**, Executive Director, Investor Responsibility Research Center Institute
- **Susan Williams**, Report Author and Analyst, Sustainable Investments Institute

About Si2

- Non-profit association launched 2010
- Funded by leading U.S. colleges, universities, pension funds
- Analysis of organized efforts to influence corporate social and environmental policies



Proxy Season Research

- **Briefing Papers**
In-depth annual analyses of key social and environmental topics raised by investors
- **Engagement Monitor**
Online tool for tracking investor activism
- **Action Reports**
Impartial analysis of shareholder proposals

Special Projects

At www.irrcinstitute.org and Si2 website:

- March 2012: “Discovering Shale Gas”
- Nov. 2011: “Corporate Governance of Political Expenditures” on S&P 500
- Oct. 2010: “How Companies Influence Elections” on S&P 500

At www.proxypreview.org with As You Sow:

- “Proxy Preview 2012” comprehensive forecast of shareholder proposals with profiles of activist groups

About IRRC Institute

- Not-for-profit organization in New York, NY established in 2005
- Funds, disseminates research at intersection of corporate responsibility and informational needs of investors.
- Examines the capital market context that impacts how investors and companies make decisions.



Recent Research

- *Finding Common Ground on Metrics that Matter, February 2012*
- *Mergers and Acquisitions and the Universal Investor, January 2012*
- *Key Performance Indicators for Investors to Assess Labor & Human Rights Risks Faced by Global Corporations in Supply Chains, January 2012*
- *Corporate Governance of Political Expenditures: 2011 Benchmark Report on S&P 500 Companies, November 2011*
- *The State of Engagement between U.S. Corporations and Shareholders, February 2011*

Why IRRC Institute Funded Hydraulic Fracturing Research

Huge Economic Potential

- For companies, investors
- For nation

Huge Risks

- Economic
- Environmental
- Social

Data and Analysis Need

- Existing info generated by industry, opponents
- Classic “lot of heat, little light” situation

Why IRRC Institute Funded Hydraulic Fracturing Research

“Discovering Shale Gas: *An Investor Guide To Hydraulic Fracturing*”

- Scrupulously objective
 - Editorial Advisory Board of industry, NGO, investors that included Apache Corp, ExxonMobil Production Co., Southwestern Energy Co., Investor Environmental Health Network, World Resources Institute, Boston Common Asset Management
- More comprehensive, nuanced than previous reports
- Designed as investor “desk guide”
- Much information for regulators, affected communities, public at large, companies

Why IRRC Institute Funded Hydraulic Fracturing Research

- **Management skills, rather than technology, are key issues; major ramifications for investors, companies, regulators, public.**
 - Rewards investors willing to do fundamental company research
 - Companies need site-specific solutions, mitigations
 - Geology, disclosure, chemicals, drill pad location, scheduling truck traffic, community involvement, etc.
 - Regulators, public need multi-faceted approach
 - Global issues: disclosure and monitoring standards
 - Site specific issues: definitions of “no go” areas, specific fracking methodology, facilities location, community impact.

Key Findings

1. Economic benefits are substantial.
2. Shale gas has unique management—but not unique technological —challenges.
3. Unclear if industry has will or short-term economic incentives to avoid more restrictions on drilling.
4. Rapid technological innovation to reduce environmental impacts is occurring.
5. The social impacts of shale gas development are difficult to mitigate and subjective to judge.

Game Changer

Recent technological advancements allow access to vast shale gas resources

- U.S. Energy Information Admin. estimates 25% increase in domestic natural gas production from 2009 to 2035
- Shale gas portion:
 - 2% (2001) > 30% (2011) > 49% (2035)
- 100 years supply at current rates of consumption

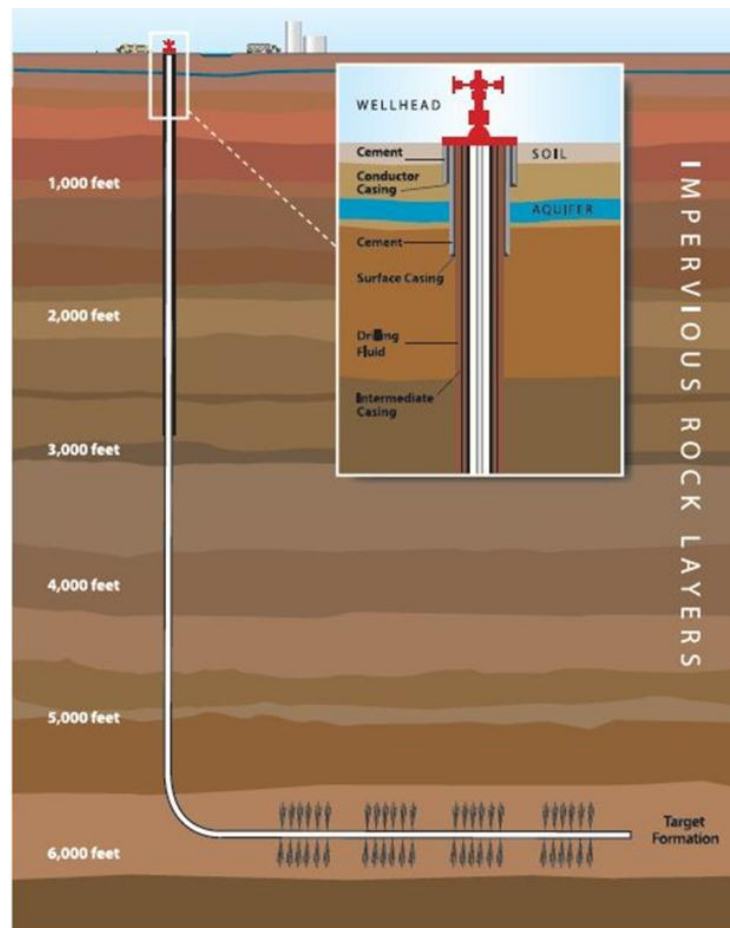
Substantial Economic Benefits

- Energy independence, enhanced national security
- Increased corporate profits, economic development & job creation
- Increased revenues for governments & income for residents
- Industries that use natural gas for fuel or feedstock investing in U.S. plants

Unconventional Resource, Increased Risks

- Regulatory: *de facto* bans & restrictions, more regulation likely
- Reputational: High profile incidents with Cabot Oil & Gas, Chesapeake Energy
- Legal: 3 dozen lawsuits, 10 class action

Hydraulic Fracturing and Horizontal Drilling of Shale Gas



Example of hydraulic fracturing for shale development, February 2012
Reproduced courtesy of the American Petroleum Institute

Challenges

- Unique management challenges, but not unique technological challenges
- 3 key issues make it challenging to secure more public support
 - Technical
 - Scale
 - Location

Technical

- 1 – 8 million gallons of water, thousands more gallons of chemicals than conventional vertical gas well.
- Implications for:
 - water consumption
 - wastewater management
 - chemical transport, storage and management
 - truck traffic

Fracking Operation



Source: www.marcellus-shale.us

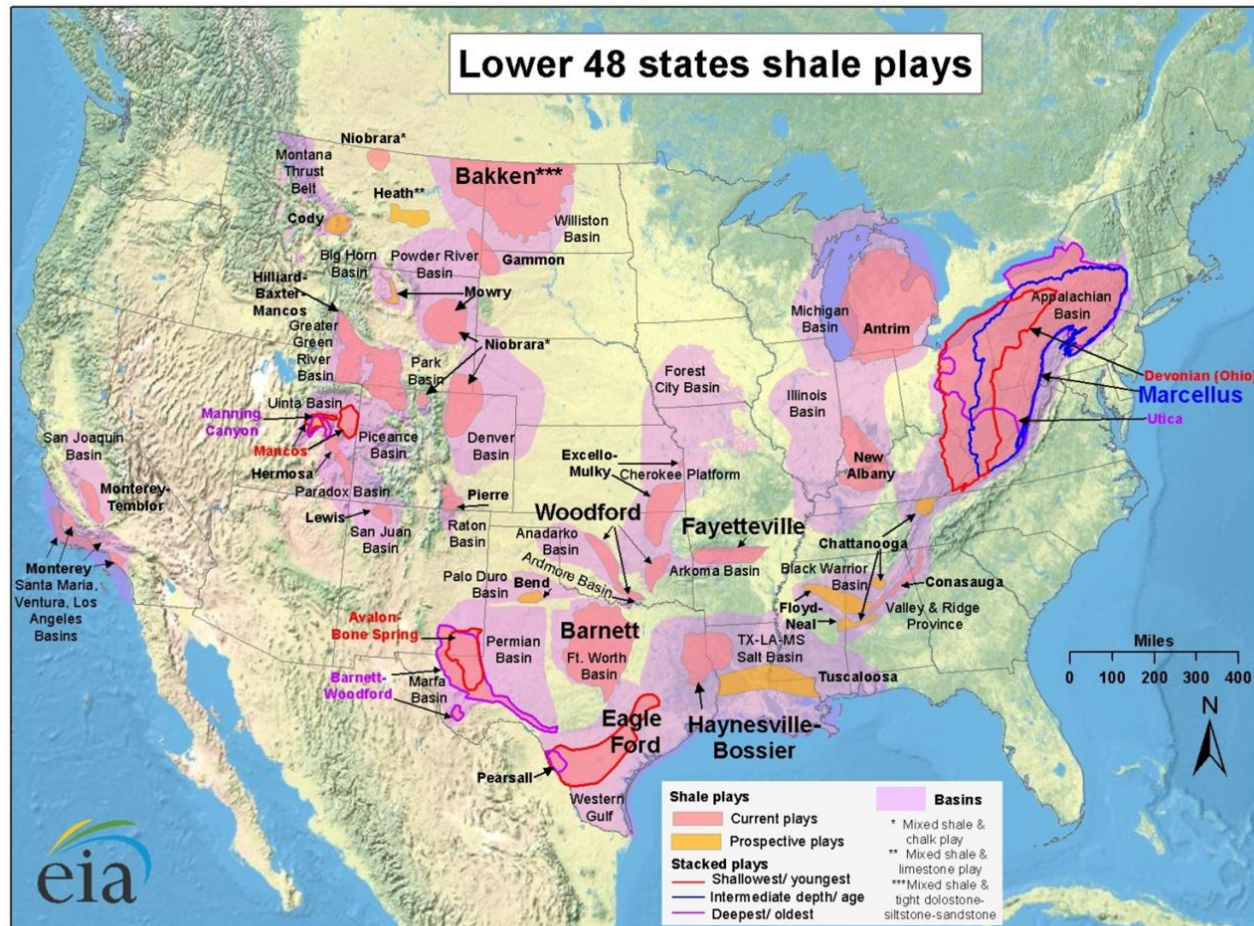
Technical

- Multiple Well Pads
 - Reduced costs, land footprint
 - Addresses some environmental impacts, but concentrates others: air emissions, truck traffic

Scale

- Some states anticipating thousands of shale gas wells to be drilled within a few years.
- If contamination problems occur at only a small percentage of shale gas wells, numerous residents, communities can be affected by development.

Key U.S. Shale Gas Plays



Source: Energy Information Administration based on data from various published studies.
Updated: May 9, 2011

Location

- Development spreading to areas not familiar with natural gas development, including Northeast.
- Communities new to natural gas development proving less tolerant, more scrutinizing of the associated impacts than communities where gas production occurred historically.

Environmental Impacts

- Land
- Fresh water
- Wastewater disposal
- Air

Shale Gas Drilling



Source: www.marcellus-shale.us

Gas Processing Plant



Source: www.marcellus-shale.us

Fresh Water

- Potential contamination of drinking water
 - Most potential avenues occur near surface
 - Practices to reduce risks widely known but poor implementation has caused contamination
- Chemical additives in fracturing fluids
 - Reducing toxicity
 - Full public disclosure

Water Impoundments



Source: www.marcellus-shale.us

Air

- Local air quality
- Climate change
- Most disputed of environmental impacts
 - Fugitive emissions?
- Technological fixes

Social Impacts

- Difficult to mitigate and more subjective
- Benefits already noted
- Concerns include:
 - Altering character of community
 - Accelerating ancillary development
 - Influx of temporary workers
 - Truck traffic
 - Noise
 - Communities divided
- Even if environmental concerns are addressed, some communities may remain opposed to industrialization

Key Questions for Investors to Pose

- Disclosure:
 - Form 10-Ks & 10-Qs
 - Other stakeholder communications
 - Investor presentations
- Management Practices:
 - Boards of directors & senior management
 - Company taking sufficient action?
 - Compliance > approach best practice?
 - Commitment to continuous improvement?
 - Positioned to adapt to a changing operating environment?
- Investment Strategies:
 - Company ready to capitalize on new market opportunities?

Profiled Companies

- **10 Companies:**

- Anadarko Petroleum
- Cabot Oil & Gas
- Carrizo Oil & Gas
- Chesapeake Energy
- Chevron
- ExxonMobil
- Hess
- Range Resources
- Southwestern Energy
- WPX Energy (formerly Williams Cos.)

- **Snapshot of:**

- Company's level of involvement
- Disclosure of associated risks and mitigation measures
- Track record
- Level of board oversight
- Related shareholder activity

Economic Effects to Date

- Natural gas prices
 - \$2.50/million BTU in February 2012
 - \$13/million BTU in July 2008
- Dry shale gas plays >”liquids rich” or oil
- Dry shale gas plays:
 - Time for regulators to catch up
 - More difficult for companies to absorb any higher costs of regulation
 - Drilling will continue

Broad Issues

- Global development
- U.S. marketplace
- Implications for renewable energy
- Climate change implications
- Infrastructure planning & cumulative impacts

Conclusions:

Industry-wide Commitment

- Best practices
- Continuous improvement
- Transparency



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