



Marcellus Shale: Producing Energy, Jobs & Opportunity for PA



Danielle Boston, Dir. of Public Outreach



About PIOGA



- The Pennsylvania Independent Oil and Gas (PIOGA) was formed on April 1st 2010 by the merger of POGAM & IOGA PA.
- Over 800 hundred companies and individuals, the largest oil and natural gas producers' association in the Commonwealth.
- Membership is comprised of producers, oilfield service companies and associated industries and businesses.
- Our producer members are active in conventional natural gas and coalbed methane development, shallow oil operations and Marcellus shale development.



Who we are: Independent Oil and Gas Producers

- Independent producers develop 90 percent of domestic oil and gas wells, produce 68 percent of domestic oil and produce 82 percent of domestic natural gas.
- The oil and gas industry supports 9.2 million US jobs and adds more than \$1 trillion/year to the national economy, not just through direct employment but also with purchases of goods and services from equipment suppliers, construction companies, management specialists, food service firms, and other businesses.



Long Oil and Gas Well History

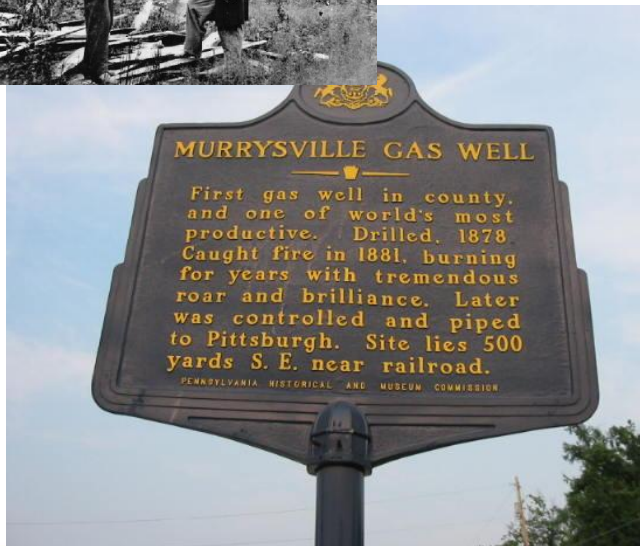


Oil:

- Drake Well in Titusville in 1859
- Transformed our World

Natural Gas:

- Long history of producing natural gas
 - Haymaker Well -1878
- Murrysville Gas Well





Rebirth of an Industry



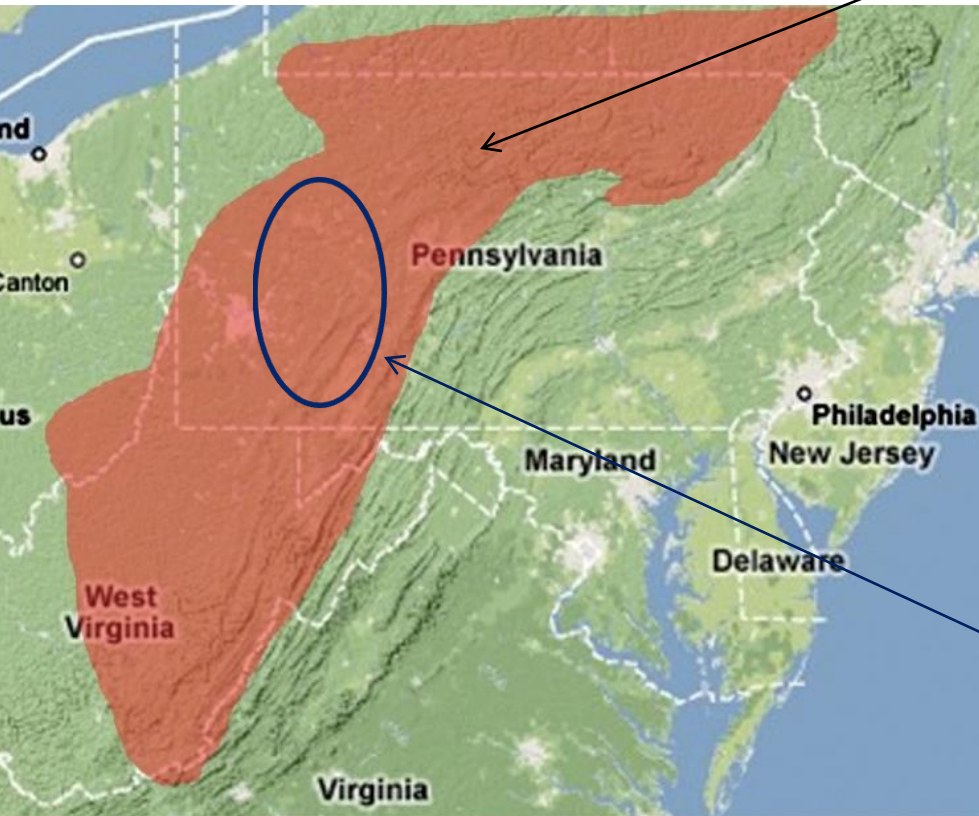


WHY IS THE MARCELLUS SHALE SO IMPORTANT



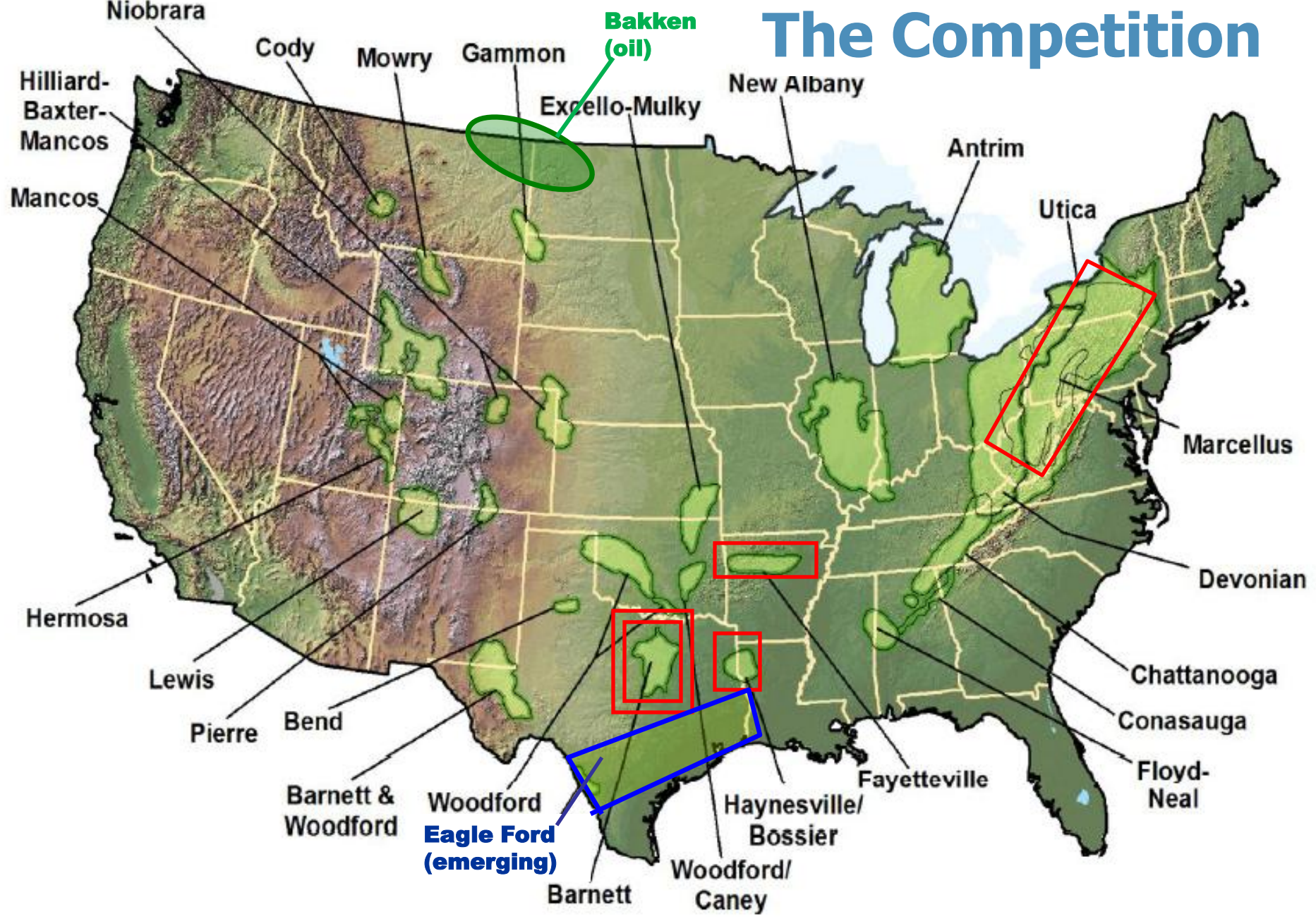


Marcellus Shale



- Marcellus fairway is 40,000 – 50,000 square miles
- Estimates of recoverable reserves up to **500 tcf**; current U.S. natural gas demand is 23 tcf per year
- Not all of the Marcellus will produce the same...
- Barnett core is 5,000 square mile
- Barnett is largest U.S. gas field, providing 6% of US natural gas

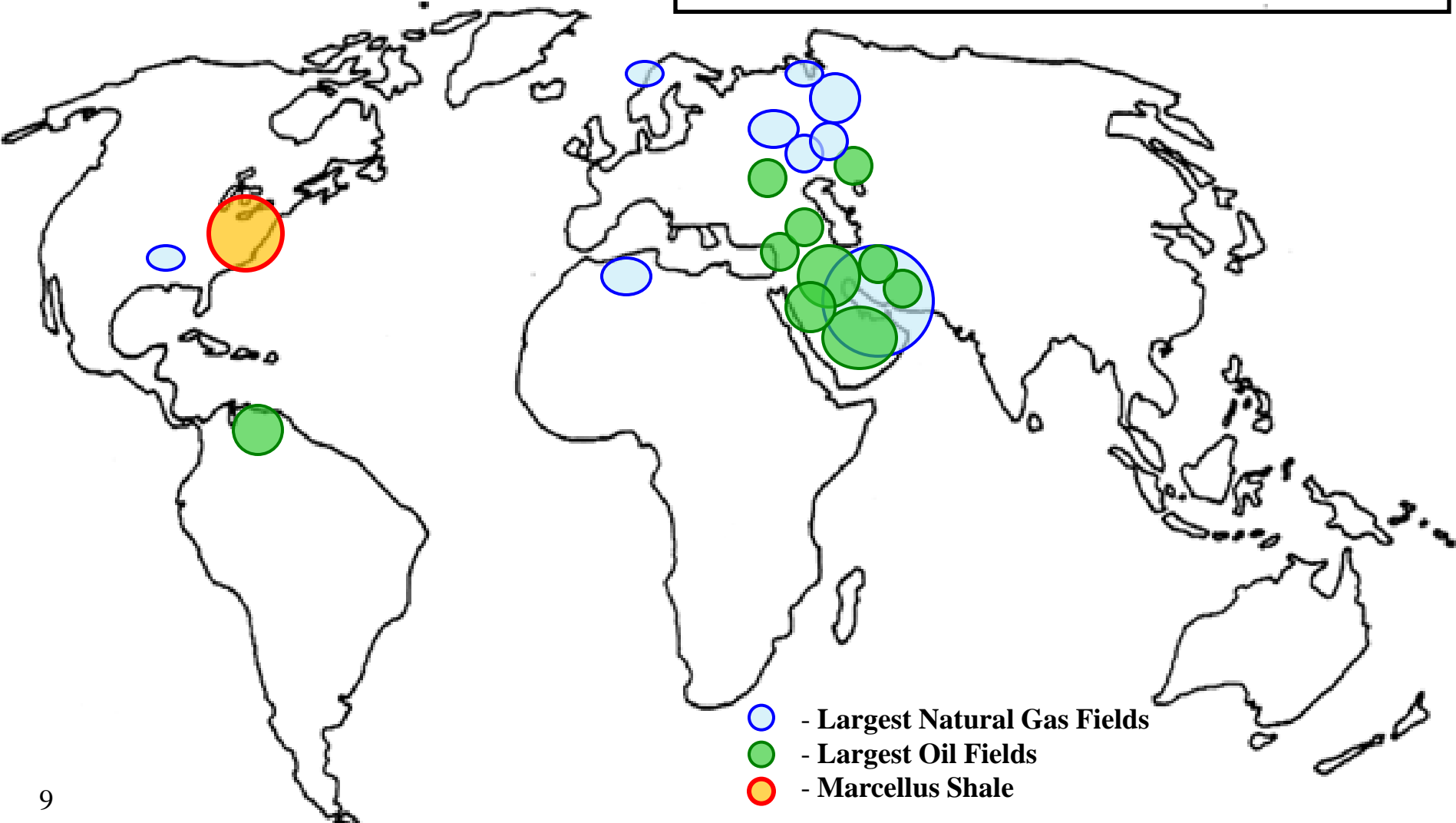
The Competition



How the Marcellus compares to the largest oil and gas fields in the world

(Bubble size approximates reserves)

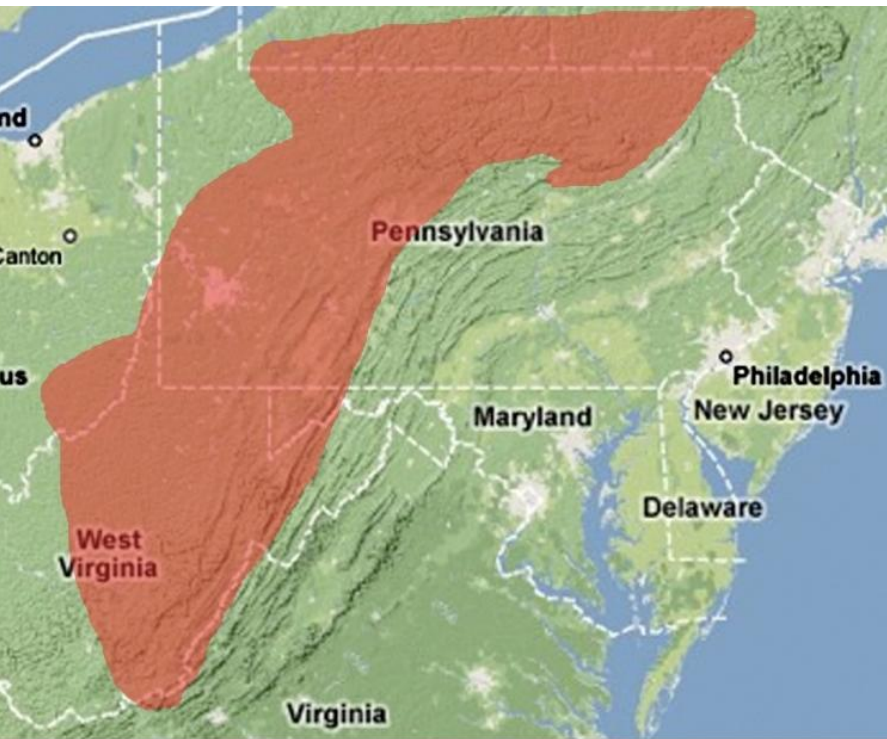
Marcellus reserves could exceed those of the largest oil field in the world (Saudi Arabia) and be the 2nd largest natural gas field (largest in Qatar/Iran)





Marcellus Shale

Unconventional Shale Gas



“If you want to succeed you should strike out on new paths, rather than travel the worn paths of accepted success.”

John. D. Rockefeller



Why Marcellus Shale Now?



- Marcellus Shale known for more than 100 years
- Number of factors make it economically feasible
 - ✓ Horizontal drilling
 - ✓ Proximity to northeast population centers
 - ✓ Energy cost trends
 - ✓ More than 500 trillion cubic feet of natural gas



Benefits for Pennsylvania



- Pennsylvania imports 74% of natural gas
- Quantity in Marcellus could supply future gas needs for the northeast and beyond



Think Bigger than just Pennsylvania

Natural Gas is the Future

- Secure
- Green
- Domestic
- Good business sense





Preparation

Mineral and property leasing



- Gas producers must obtain mineral rights to produce natural gas
- Land professionals work with property owners on approvals for companies to develop the well location
- Lease terms reflect market/geologic conditions



Exploration

Seismic



- Will formation produce marketable quantities of natural gas?
- Seismic trucks send/capture 2-D vibrations/geophysical data



Exploration

3-D *Seismic*

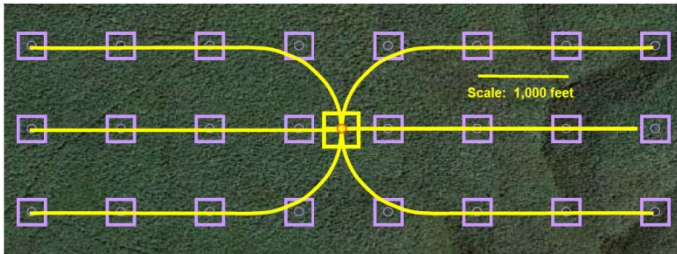


- 3-D seismic information captured through grid of holes/small charges
- Results captured, computer produces mapping/ geophysical program
- Can improve probability of successful well development



Drilling

Horizontal Drilling



- Horizontal drilling: more product, a smaller footprint
- Multiple wells on single pad
- Horizontal bores in different directions, up to 5,000 feet
- Marcellus wells developed both vertically and horizontally



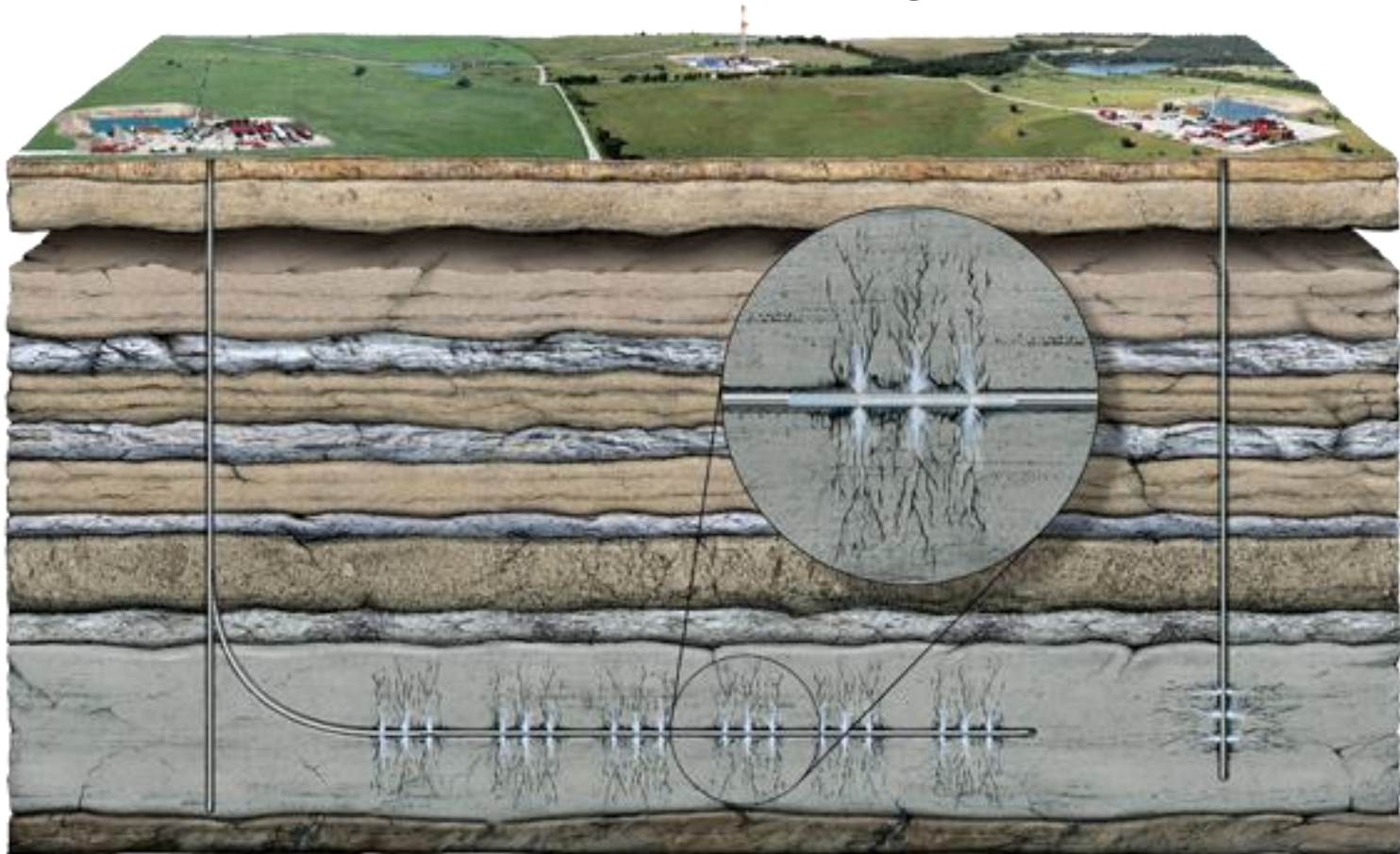
Drilling

Horizontal Drilling





Horizontal Drilling



Drilling in the Marcellus Shale

Typical Vertical Well

6,500-7,500 feet deep

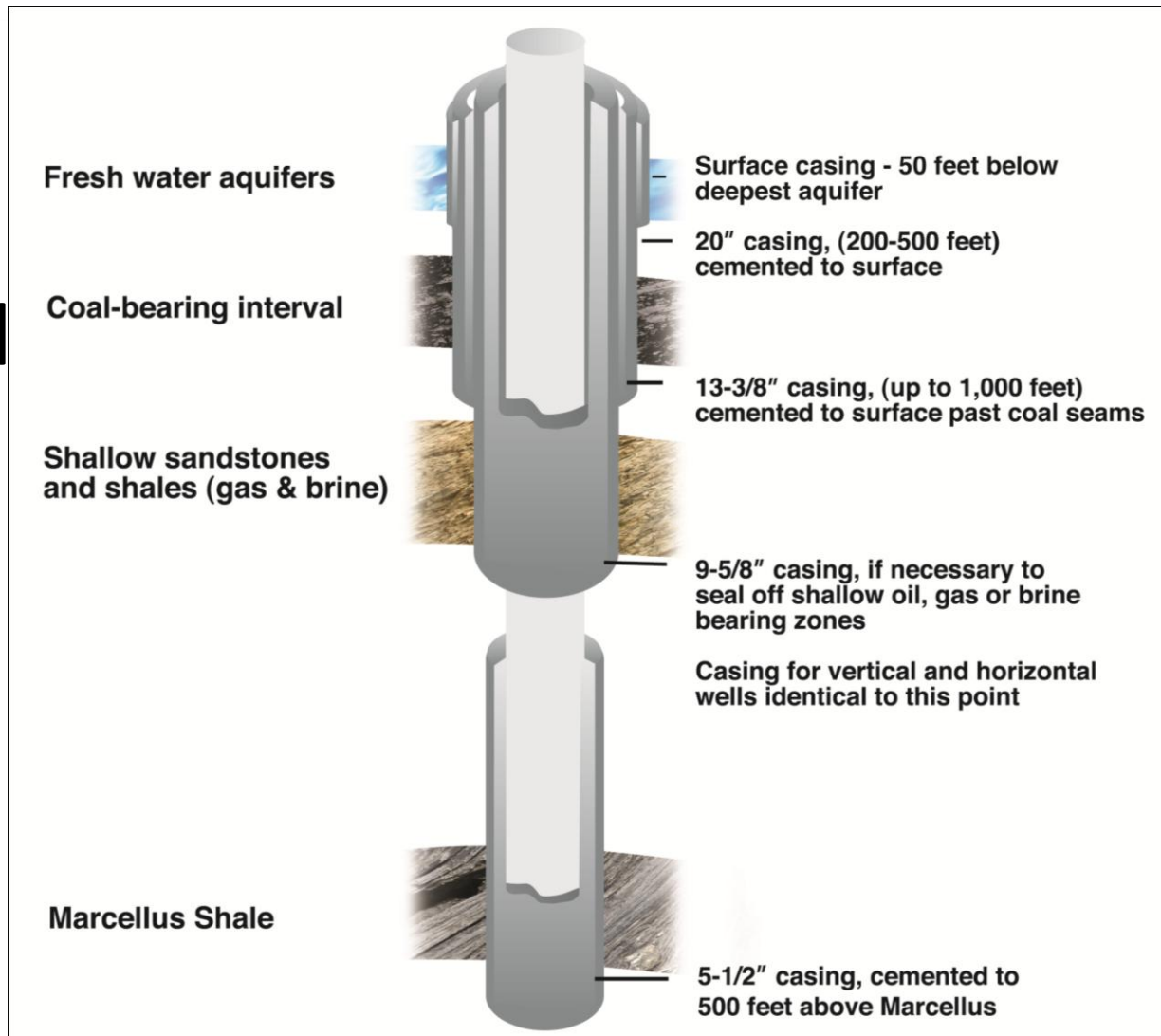
Typical Horizontal Well

6,500-7,500 feet deep, then out horizontally another 2,500-3,500 feet



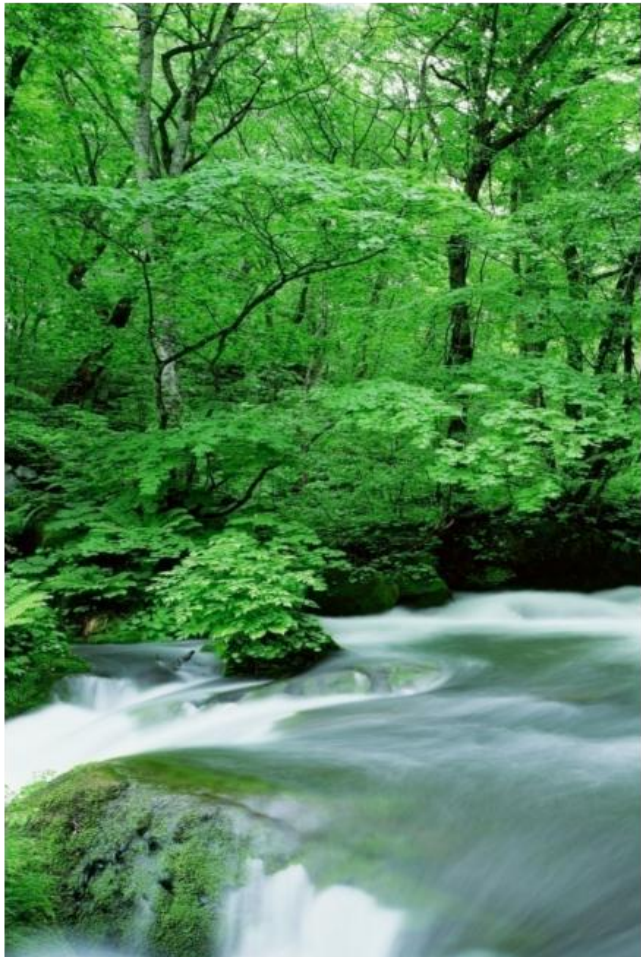
Casing The Well

Groundwater Protection





Environmental Protection



- State regulations drive all aspects of drilling process
- Improved predictability of permitting approach with PaDEP
- Support for substantial permit fee increases in 2008
- Industry best management practices ensure safe drilling process



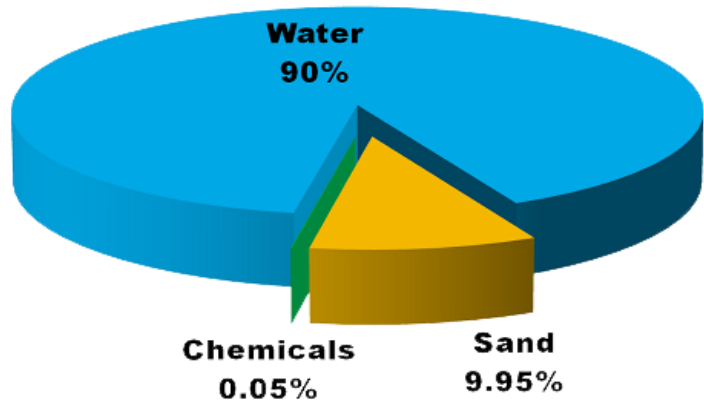
Fracture Stimulation



- Wells stimulated through fracture process
- Water, sand and lubricants are used to prop open shale fractures
- Water allocation approval required
- Wastewater sent to permitted treatment facilities



Water *Fracture Stimulation*



- Fracture stimulation essential to extraction of gas from tight shale formation
- Water is primary constituent in fracture stimulation process
- Clean sand added as “propping agent” to hold shale fractures open
- Lubricants/chemicals represent minute proportion of fracture blend
- Most chemicals found in common consumer goods and cosmetic products
- Flowback water safely collected and transported to permitted treatment facilities



What's in frac fluid?



- Surfactants
- Biocides
- Scale inhibitors
- Friction reducers
- Proppants
- ✓ DEP has list of fracturing chemicals available on public website
- ✓ MSDS Sheets on-site at every well location



Water Disposal/Treatment



- Treatment capacity adequate to meet current needs
- New TDS Regulations now in effect
- Increase of Reuse/Recycling of Water
- Combination of technologies: injection wells, crystallization, advanced oxidation, membrane filtration in development



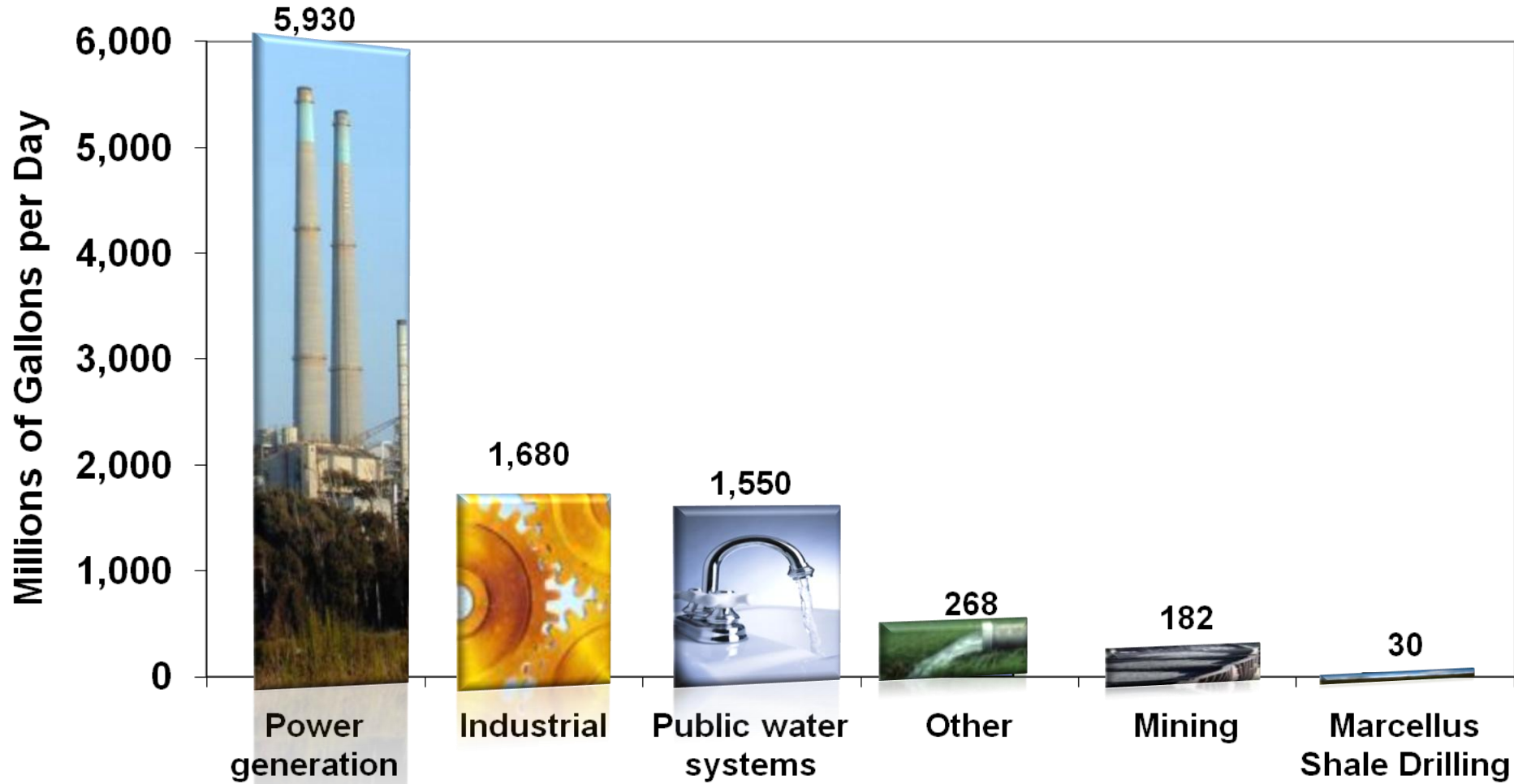
Water Usage Facts



- Marcellus Shale well development in early stages
- Peak drilling activity not likely for more than 10 years
- At peak (30 million gallons/day), water use less than *ONE PERCENT* of state's daily water consumption
- Statewide daily water use at peak drilling level less than half used to irrigate Pennsylvania golf courses



Comparable Water Usage in Pa



General approximation for illustrative purposes
Susquehanna River Basin total water demand
According to the Gas Technology Institute



Roadways



- Significant short-term transportation challenges
- Drill rig, support equipment, water trucks, water tanks, workers
- Road bonding common in municipalities
- Industry spends hundreds of thousands to millions of dollars repairing/improving roads



Infrastructure



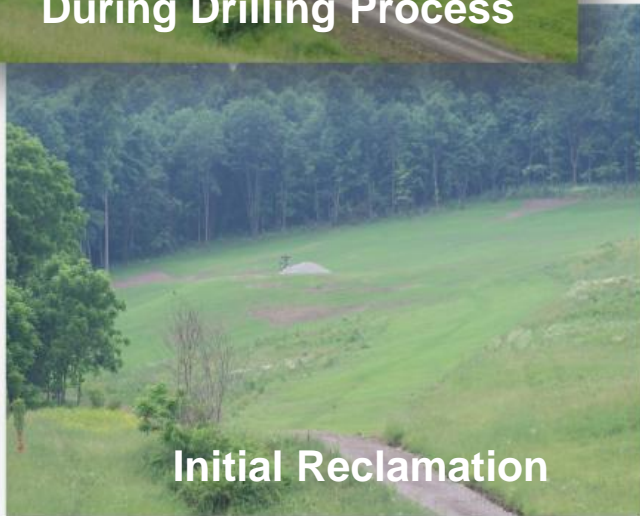
- Pipelines needed to transport gas to market
- Gathering lines link wells to processing
- Processed gas re-enters larger transmission lines
- ROW for lines negotiated with property owners
- ROW maintained to ensure safety of delivery system



Restoration



- Small wellhead on a constructed pad, less than one acre
- Property restored to meet owner's desires
- Similar to home construction





Restoration





Economic Development



- New jobs, new opportunities for Pennsylvania
- Full range of professions, skilled trades: drilling, engineering, surveying, construction, earthmoving, environmental protection, transportation, equipment maintenance, legal, many more
- Industry has significant workforce challenges



Pennsylvania's Existing Oil and Natural Gas Industry (2008 Baseline Study)

- November 2008, Pennsylvania Economy League Study
- Total annual economic output: \$7.1 billion
- Total workforce (direct, indirect and induced): 26,000
- Average wage increase, 2005-2007: 27 percent
- Royalty payments: \$215 million in 2007, \$589,000/day



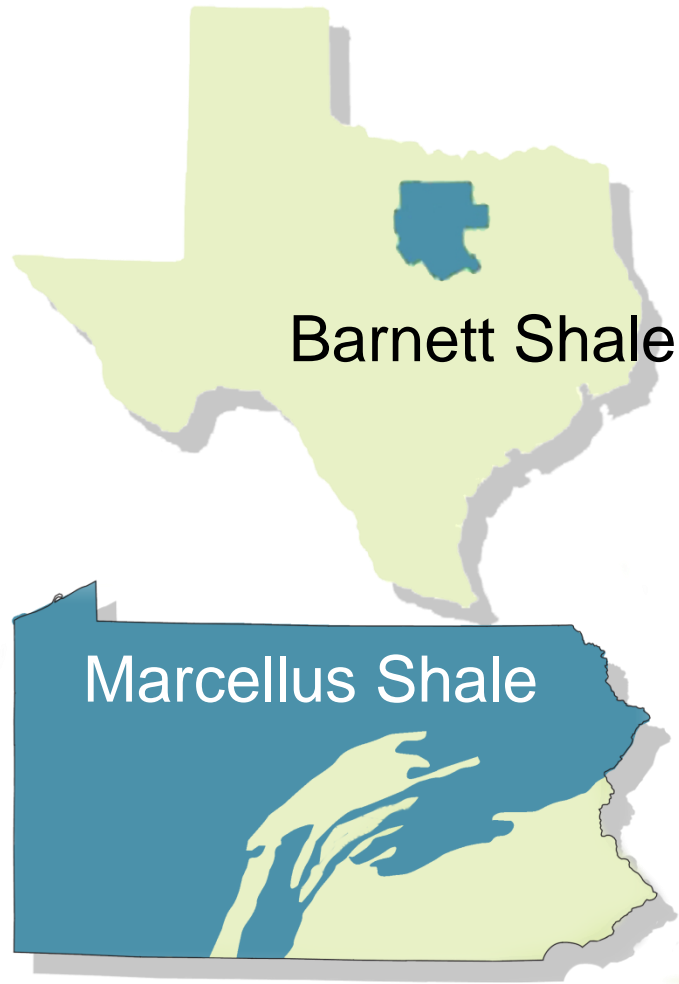
Summary of Current/ Future Economic Impacts

	<u>2011</u>	<u>2015</u>	<u>2020</u>
Economic Value:	\$10.1 Billion	\$14.4 Billion	\$18.8 Billion
State/Local Taxes*	\$987 Million	\$1.4 Billion	\$1.87 Billion
Total Jobs:	111,413	160,205	211,909
Key Date:	2014, when Pennsylvania becomes natural gas exporter		

**Approximately 30 percent of total tax burden remains at local level.*



Barnett Shale Success



- Barnett Shale development/2006 economic study
- Continued/expanding production in 5,000 square mile region
- Technology transferred to Marcellus Shale which covers 95,000 square mile region
- Development initiated in 1982



Barnett Shale Success

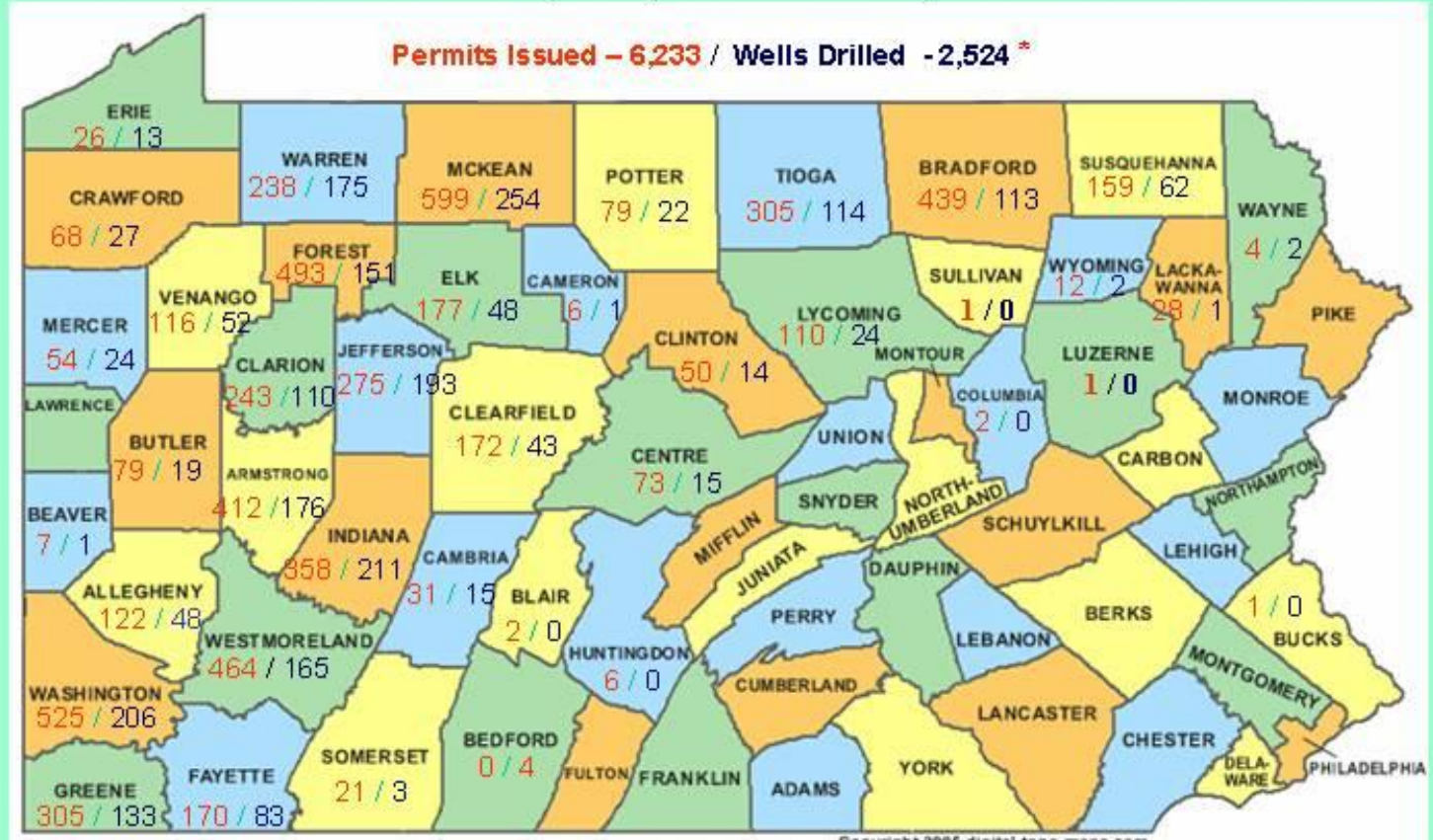


- Current total permanent jobs: 55,000
- Estimated total jobs supported through industry: 108,000
- Total economic output of industry: \$10 billion annually
- Estimated retail sales in region: \$3 billion annually
- Percentage of total economic output in region: Five percent



2009 All Permits/Wells Drilled

Department of Environmental Protection
 Bureau of Oil and Gas Management
All Permits Issued & Wells Drilled
 (January – December 2009)



Updated 01/05/2009

* As reported by Operators

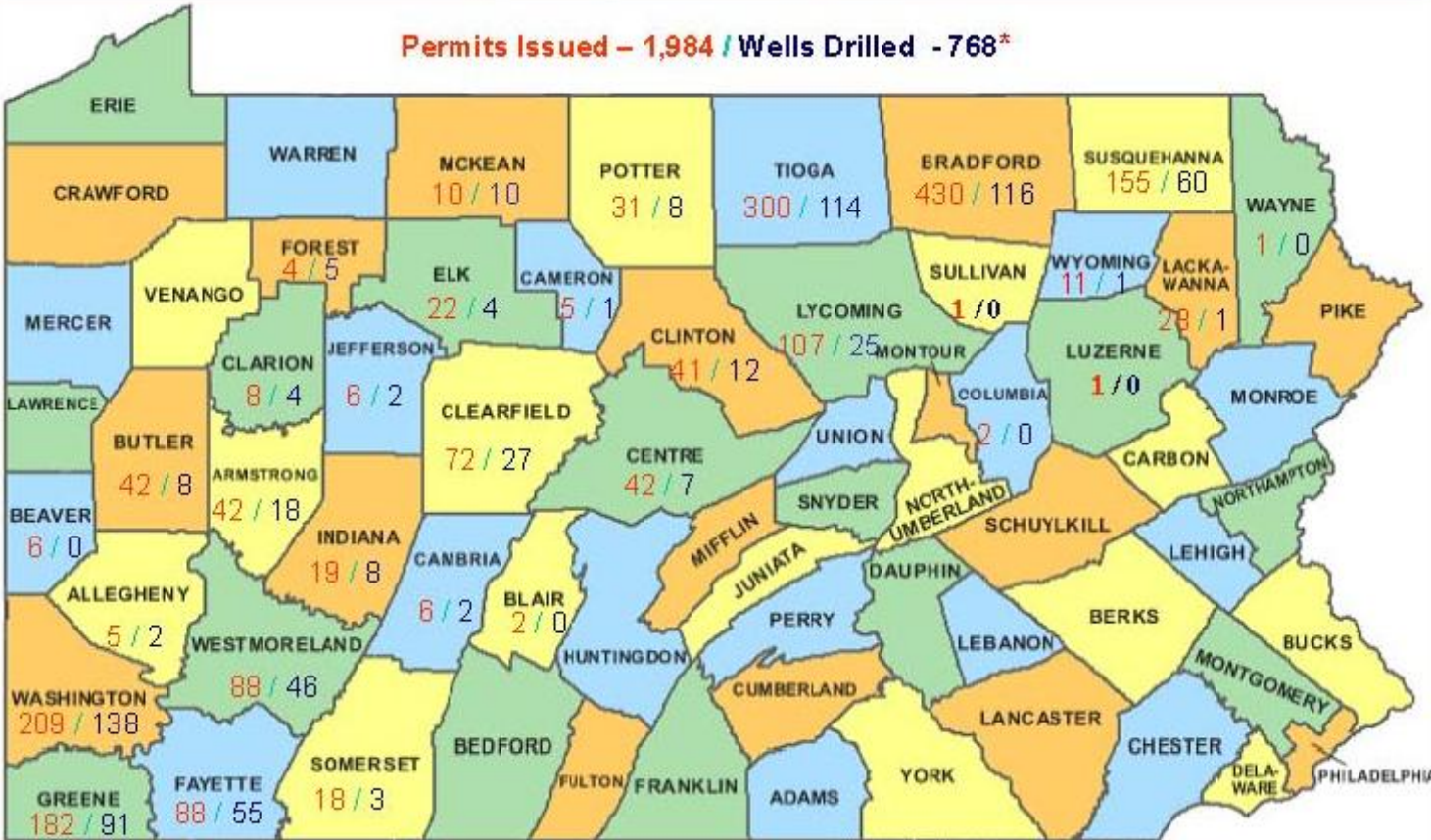
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2009 Marcellus Permits/Wells Drilled

Department of Environmental Protection
 Bureau of Oil and Gas Management
Marcellus Shale Permits Issued & Wells Drilled
 (January – December 2009)

Permits Issued – 1,984 / Wells Drilled - 768*



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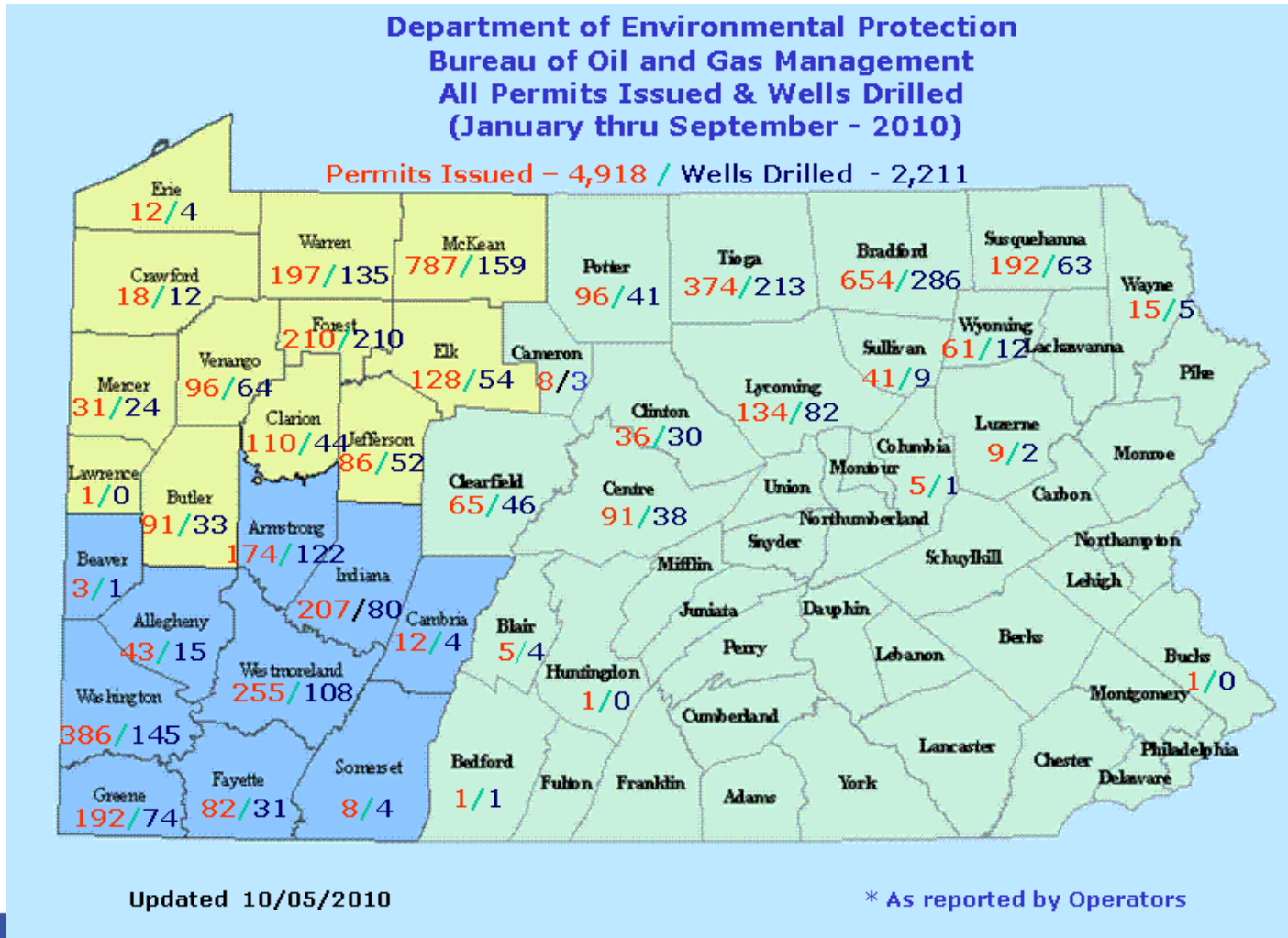
Updated 01/25/2010

*As reported by Operators

www.digitaltopomaps.com



2010 All Permits/Wells Drilled

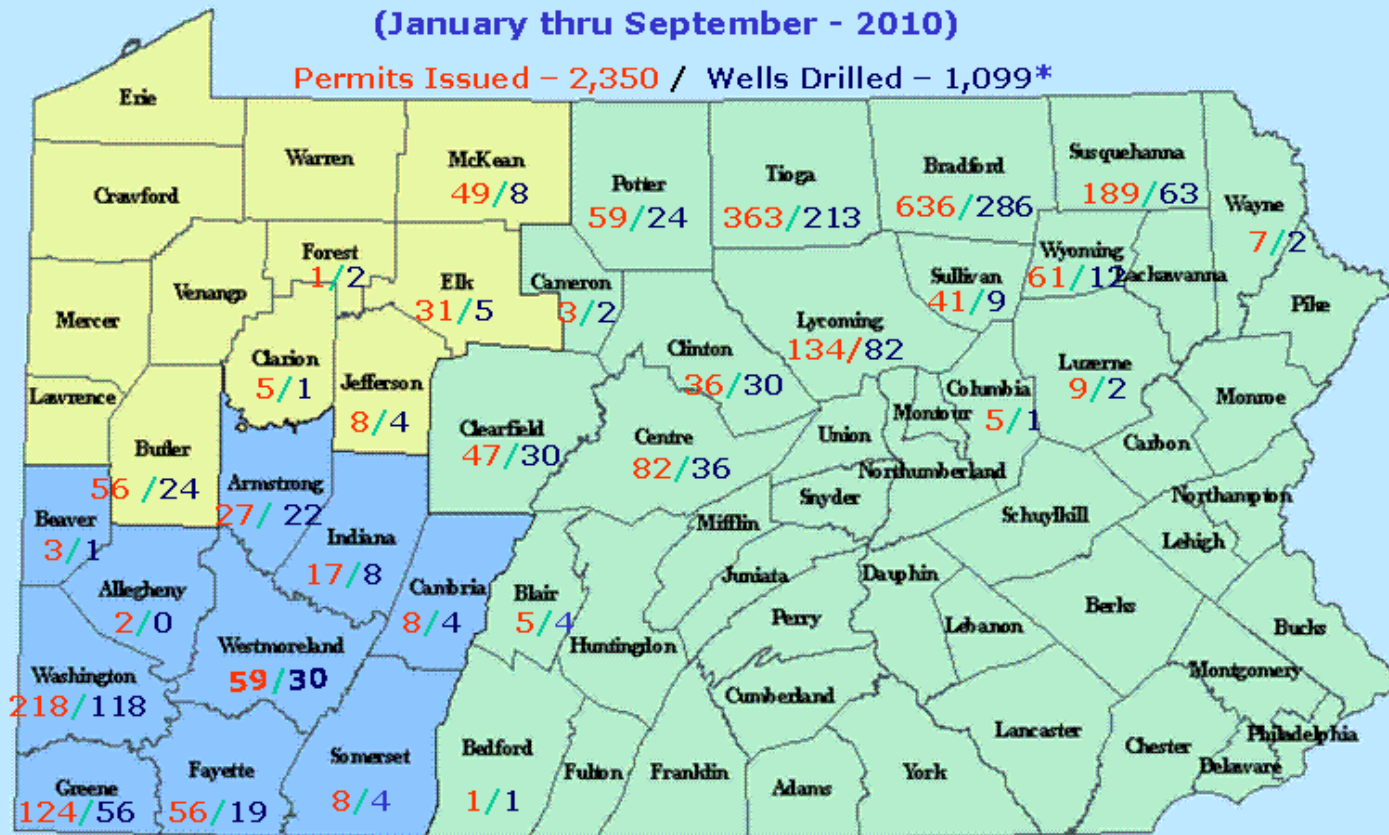




2010 Marcellus Permits/Wells Drilled

Department of Environmental Protection
 Bureau of Oil and Gas Management
 Marcellus Shale Permits Issued & Wells Drilled
 (January thru September - 2010)

Permits Issued - 2,350 / Wells Drilled - 1,099*



Updated 10/05/2010

* As reported by Operators

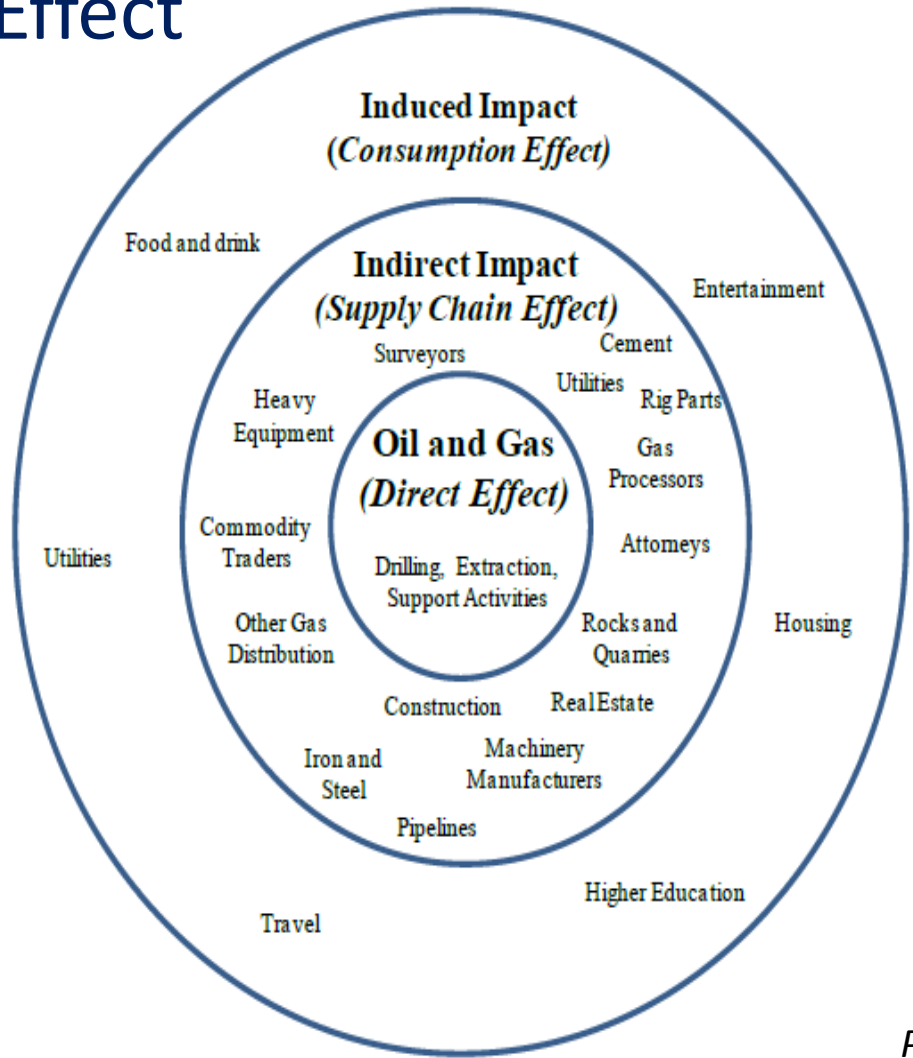


The Ripple Effect





The Ripple Effect





E&P companies working in PA

75 Producers now developing the Marcellus

Alta Resources, LLC
Anadarko Petroleum Corp.
Antero Resources
Atlas Energy Inc.
Burnett Oil Company
Cabot Oil and Gas Corp.
Carrizo Oil & Gas, Inc.
Chesapeake Energy Corp.
Chief Oil and Gas LLC
Citrus Energy
CNX Gas Corp.
Dominion E&P, Inc.
East Resources, Inc.
Energy Corp. of America

EOG Resources, Inc.
EQT Production Company
EXCO Resources (PA)
Hess Corporation
J-W Operating Company
Marathon Oil
Newfield Exploration
Novus Operating, LLC
Penn Virginia
PGE Company, LLC
PDC Mountaineer, LLC
Petroleum Development Corp.
Phillips Production Company
Quest Resource Corporation
Range Resources

Rex Energy Corporation
Samson Resources Company
Seneca Resources Corp.
Shell
Southwestern Energy
Statoil
Snyder Brothers
Talisman USA Inc.
Turm Oil, Inc.
Ultra Resources Inc.
Williams Companies
XTO Energy, Inc.



A Sampling of Service & Support Companies working in PA *Hundreds of Service Companies*

Allis-Chalmers Energy, Inc.
AOP Clearwater
ARM Group Inc.
BJ Services
Complete Production
Crescent Directional Drilling
Epic Energy Resources
Exterran Energy Solutions
Frac Tech Services, LLC.

Halliburton Energy Services
HRT, Inc. & PA Brine
Key Energy Services, Inc.
MI Swaco
Moracco Welding
Packers Plus
Red Oak Water Transfer
RETTEW
Schlumberger Oilfield
Services

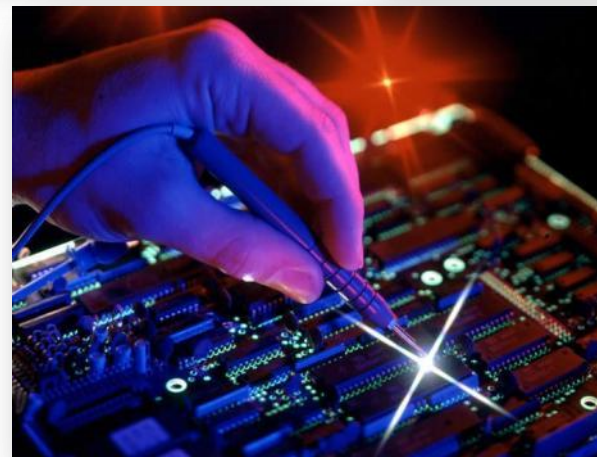
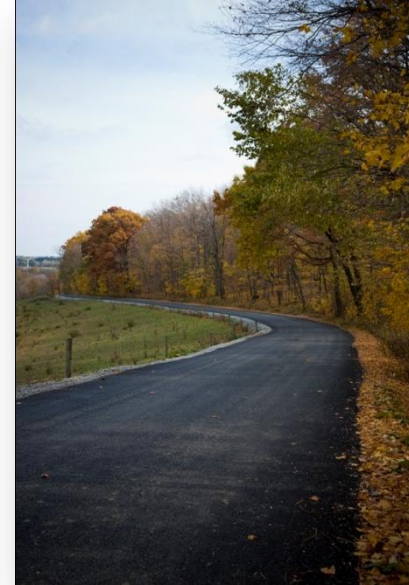
Select Energy Services
Superior Well Services
Tetra Technologies, Inc.
TeraAqua Resource Mgmt
UGI Energy Services, Inc.
Universal Well Services
Weatherford International
Weston Solutions, Inc.

- **Most of the business opportunities will be with the Service & Support Companies**
- **An average of 20-30 contract companies are utilized to drill a single well**



Business Opportunities

- Advertising
- Accounting/CPAs
- Apparel & Footwear
- Architects
- Attorneys & Government Relations
- ATVs & UTVs
- Business Consulting
- Cleaning Services
- Communication & Electronics
- Completions
- Compression
- Concrete / Aggregate / Paving
- Drilling Contractors





Business Opportunities

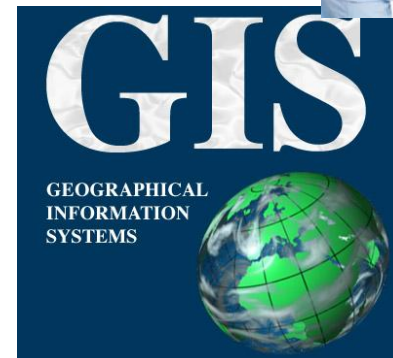


- Economic Development
- Electrical & Plumbing
- Employment Services
- Energy Conservations Services
- Energy Management Services
- Engineers
- Environmental/Regulatory Consultants
- Equipment Manufacturers
- Equipment Suppliers
- Excavation/Construction
- Fencing
- Finance/Investment
- Food & Beverage



Business Opportunities

- Frac Sand & Waste Water Transportation
 - Truck
 - Railroad
 - Barge
- Fuel
- Gas Measurement
- Gas Transmission/Distribution
- Geological & Geophysical Services
- GIS/Mapping Services
- Graphics/Design/Printing
- Health Care Services
- Housing/Hotels
- Information-Data Services
- Insurance
- Laboratory Services
- Land Services





Business Opportunities



- Landscaping
- Logging/Timber
- Machine Shop Services
- Midstream Pipeline
- Natural Gas Development
- Paint
- Pipe/Equipment Insulation
- Real Estate (Commercial and Residential)
- Refrigeration Sales, Installation & Service
- Safety
- Security
- Signage



Business Opportunities

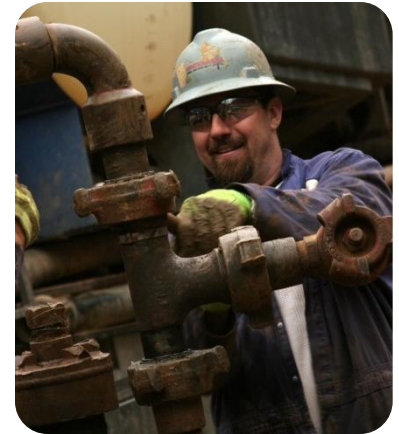


- Suppliers
- Supply Chain Management
- Surveying
- Technical Training
- Title Services
- Trailer Sales and Rentals
- Transportation
- Trucking/Hauling
- Universities / Education & Research
- Vehicle Repair, Rental, Sales
- Waste / Water Treatment
- Welding & Fabricating
- Well Service



What it takes to service this industry?

- ✓ 24/7 operations, 365 days a year
- ✓ Mobile operations
- ✓ Employees that are:
 - Drug & Alcohol Free
 - Mechanical aptitude
 - Physically fit, Labor
 - Flexibility with hours – 24/7 operations
 - Being punctual for shift
 - Ability to travel
 - Valid Drivers license
 - Enjoy working outdoors in **all types of weather**
- ✓ Safety and Environmental protection – top priority





What it takes to service this industry?



“Safety, quality of work and cost competitiveness cannot be compromised; many local businesses have proven to be “task ready” and are rewarded with work as a result, local can mean best value! “

-Quote by an Industry Rep working in PA



Participate in the Community Business-to-Business Expos

NW Marcellus Shale Showcase

Cross Creek Resort, Titusville

October 6-7

North Central Business Expo

St. Marys, PA

October 14, 2010






Expo Service Directories..

DIRECTORY

Central Susquehanna
**Oil & Gas
Expo**



www.CentralSusquehannaOilandGasExpo.com



Natural Gas
Potter, Cameron &
McKean Counties **EXPO**



DIRECTORY

Tri-County
**Oil &
Gas
Expo**

of Fayette, Greene and Washington Counties
www.TriCountyOilandGasExpo.com

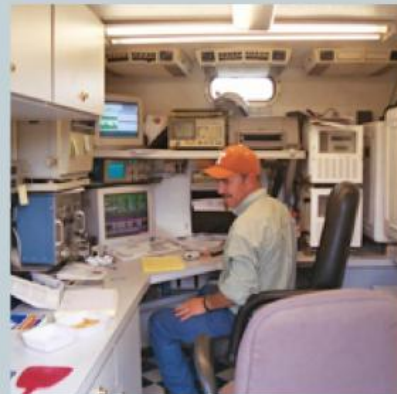


Join Community/State Organizations

- Chamber of Commerce
- State Trade Association - PIOGA
- Business development groups



PA's Oil & Natural Gas Industry - *We look forward to doing business with you..*





Formula for Success:

Rise Early,

Work Hard,

Strike Oil!

- J. P. Getty



TODAY'S Formula for Success:

Rise Early,

Work Safely & Responsibly,

Produce (lots) of Natural Gas!



THANK YOU!

**PENNSYLVANIA: THE KEYSTONE TO AMERICA'S
ENERGY FUTURE**