ENERGYINDEPTH

THE MARCELLUS SHALE

Powering America's Future, Thanks to Hydraulic Fracturing

Travis Windle
travis@energyindepth.org
202-346-8866

October 14, 2010

Background on Energy In Depth

- Created in late 2008 by the Independent Petroleum Assn. of America (IPAA)
- Based in Washington, D.C.
- Coalition of more than 40 state associations
- Full-scale communications and outreach effort – focused in particular on unconventional oil and natural gas

ENERGYINDEPTH

Hydraulic Fracturing

- ✓ For more than 60 Years, 1.1 Million Wells Hydraulically Fractured, 27 States
- ✓ 90 Percent of Oil and Natural Gas Wells Use HF Stimulation Technology
- ✓ All Additives Used in Process Fully Disclosed, Available via DEP
- ✓ What's in Fracturing Fluids?
  - ❑ *More than 99.5 percent water and sand*
  - ❑ *Other 0.05 percent consists of other commonly used additives*
- ✓ Steel and Cement Casing Protect Drinking Water/Ecosystems
  - ❑ *25 PA Code Chapter 78 recently upgraded to reflect best practices in well casing*

What State Regulators Say About Hydraulic Fracturing

OHIO: "After 25 years of investigating citizen complaints of contamination, [our] geologists have not documented a single incident involving contamination of ground water attributed to hydraulic fracturing." *(Scott Kell, deputy chief of Ohio DNR, 5/27/09)*

PENNSYLVANIA: "There has never been any evidence of fracking ever causing direct contamination of fresh groundwater in Pennsylvania or anywhere else." *(PA DEP's Scott Perry, Scranton Times-Tribune, 4/2/10)*

ALABAMA: "I can state with authority that there have been no documented cases of drinking water contamination caused by such hydraulic fracturing operations in our state." *(Barry H. "Nick" Tew, Jr., Oil & Gas supervisor for Alabama, 5/27/09)*

ENERGYINDEPTH

What is Hydraulic Fracturing?

- This technology has been in commercial use since 1949. It's been used more than 1.1 million times nationwide, and has never impacted groundwater
- The use of fluids – made up of more than 99.5% water and sand – to create a crack by hydraulic pressure
- The continued injection of fluids into the created crack ("fracture") to make it grow larger
- The placement of small granular sands into the crack to insure the crack remains open after the hydraulic pressure is no longer being applied

Why Frac a Well?

- Increase the rate at which the well is capable of producing oil or natural gas

- “Unconventional formations” and plays -- such as the Marcellus (PA), Barnett (TX), Bakken (ND), the Haynesville (LA), and the Fayetteville (AR) -- require hydraulic fracturing to be economic

Disclosure

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

Drilling for Natural Gas in the Marcellus Shale Formation
Frequently Asked Questions

Can drilling companies keep the names of chemicals used at drilling sites a secret?

No. Drilling companies must disclose the names of all chemicals to be stored and used at a drilling site ... as part of the permit application process. These plans contain copies of material safety data sheets **for all chemicals** ... This information is on file with DEP and is available to landowners, local governments and emergency responders.

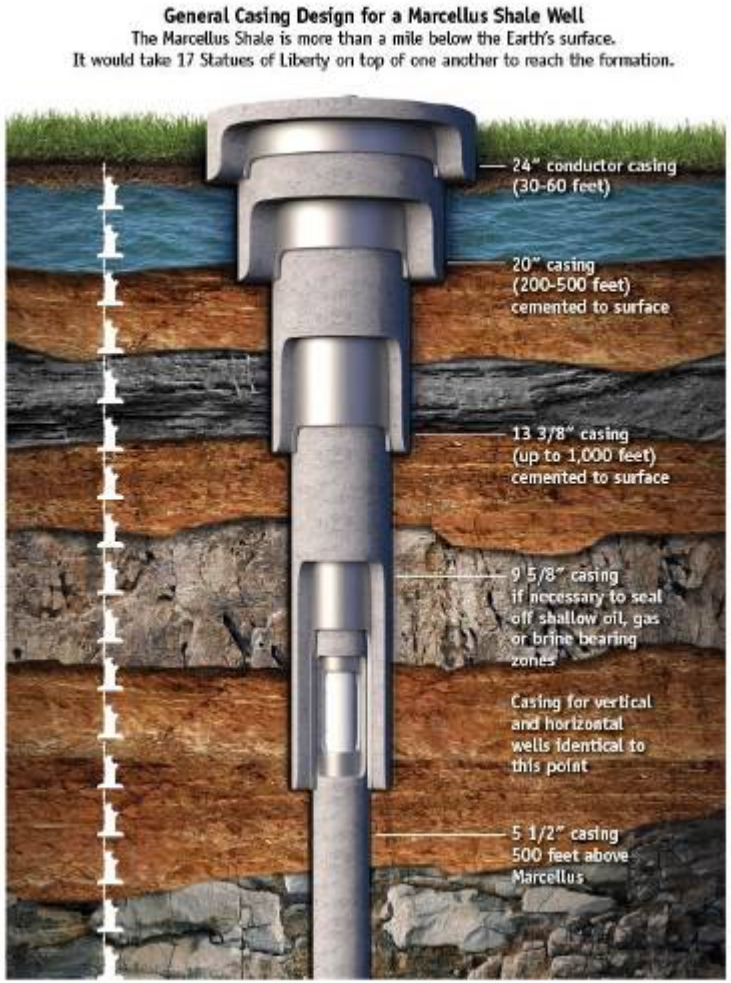
Source: Marcellus FAQ fact sheet, PA DEP; accessed on 4/20/10

Chemicals Used by Hydraulic Fracturing Companies in Pennsylvania
For Surface and Hydraulic Fracturing Activities
Prepared by the Department of Environmental Protection
Bureau of Oil and Gas Management
Compile[illegible]ndustry

1,2,4-Trimethylbenzene	Glycol Ethers (includes 2BE)
1,3,5 Trimethylbenzene	Guar gum
2,2-Dibromo-3-Nitrilopropionamide	Hemicellulase Enzyme
2.2-Dibromo-3-Nitrilopropionamide	Hydrochloric Acid
2-butoxyethanol	Hydrotreated light distillate
2-Ethylhexanol	Hydrotreated Light Distilled
2-methyl-4-isothiazolin-3-one	Iron Oxide
5-chloro-2-methyl-4-isothiazotin-3-one	Isopropanol
Acetic Acid	Isopropyl Alcohol
Acetic Anhydride	Kerosine
Acie Pensurf	Magnesium Nitrate
Alchohol Ethoxylated	Mesh Sand (Crystalline Silica)
Alphatic Acid	Methanol
Alphatic Alcohol Polyglycol Ether	Mineral Spirits
Aluminum Oxide	Monoethanolamine
Ammonia Bifluoride	Naphthalene
Ammonia Bisulfite	Nitrilotriacetamide
Ammonium chloride	Oil Mist
Ammonium Salt	Petroleum Distallate Blend
Ammonia Persulfate	Petroleum Distillates
Aromatic Hydrocarbon	Petroleum Naphtha
Aromatic Ketones	Polyethoxylated Alkanol (1)
Boric Acid	Polyethoxylated Alkanol (2)
Boric Oxide	Polyethylene Glycol Mixture
Butan-1-01	Polysaccharide
Citric Acid	Potassium Carbonate
Crystalline Silica: Cristobalite	Potassium Chloride
Crystalline Silica: Quartz	Potassium Hydroxide
Dazomet	Prop-2-yn-1-01
Diatomaceus Earth	Propan-2-01
Diesel (use discontinued)	Propargyl Alcohol
Diethylbenzene	Propylene
Doclecylbenzene Sulfonic Acid	Sodium Ash
E B Butyl Cellosolve	Sodium Bicarbonate
Ethane-1,2-diol	Sodium Chloride
Ethoxlated Alcohol	Sodium Hydroxide
Ethoxylated Alcohol	Sucrose
Ethoxylated Octylphenol	Tetramethylammonium Chloride
Ethylbenzene	Titaniaum Oxide
Ethylene Glycol	Toluene
Ethylhexanol	Xylene
Ferrous Sulfate Heptahydrate	
Formaldehyde	
Glutaraldehyde	

ENERGYINDEPTH

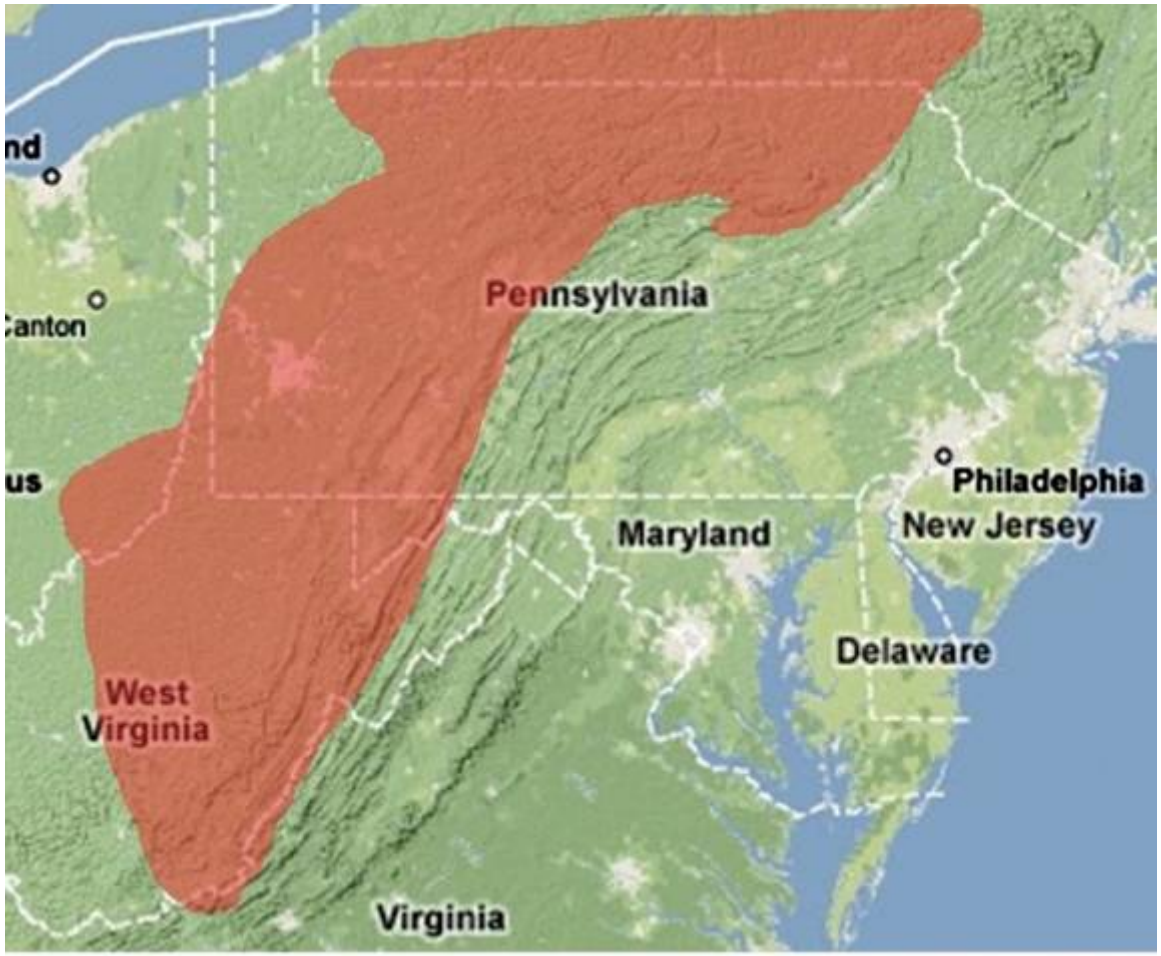
Typical Well – Production Casing



- Purpose
  - Provide zonal isolation
  - Provide well control
  - Well path to productive intervals
- Cement Requirements
  - Set by State regulations
  - Set by BLM regulations
  - Operator requirements
- Cement
  - Protects casing from corrosion
  - Provides zonal isolation
  - Completion and production
  - Support casing in wellbore

ENERGYINDEPTH

Marcellus Map

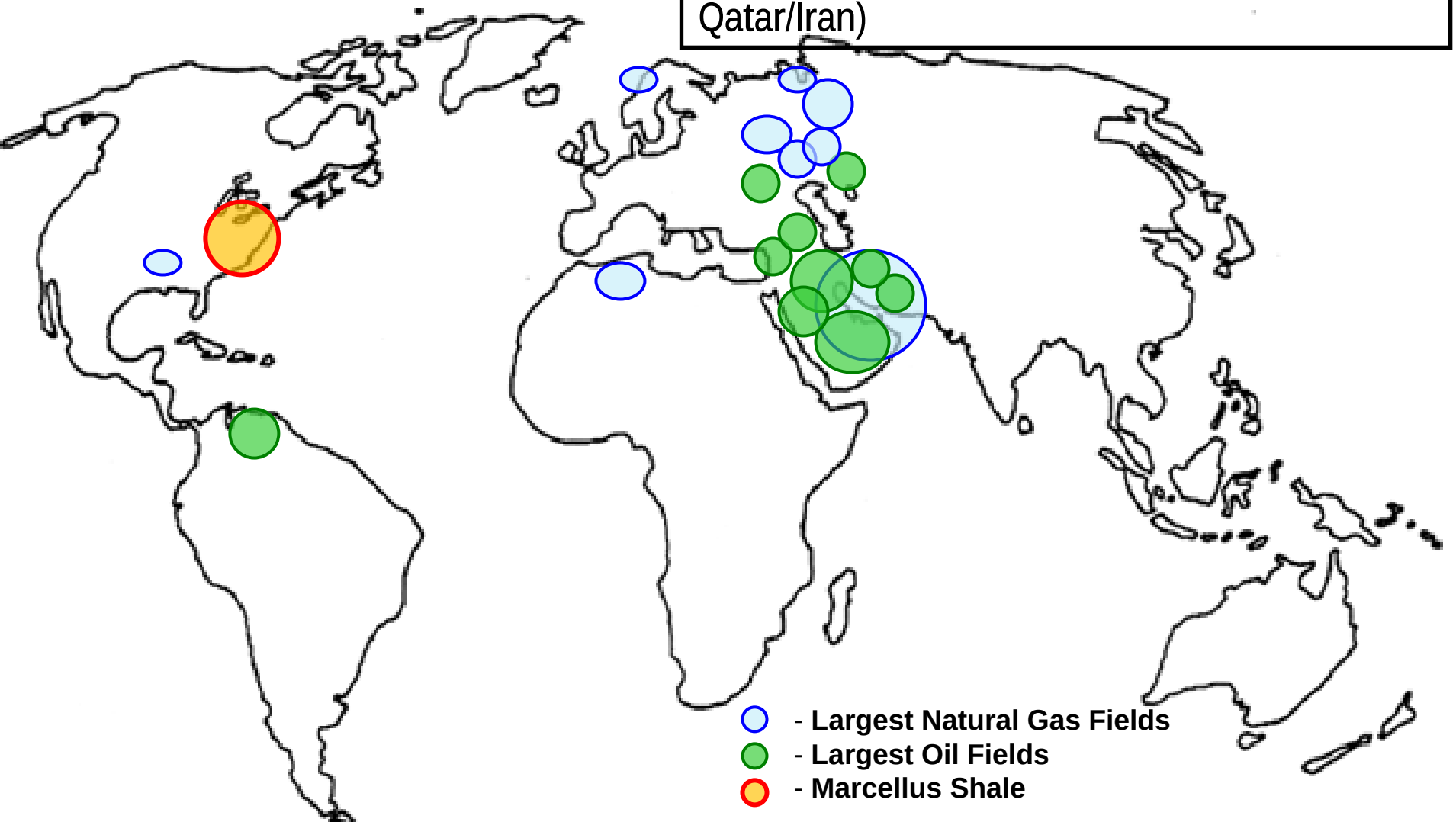


ENERGYINDEPTH

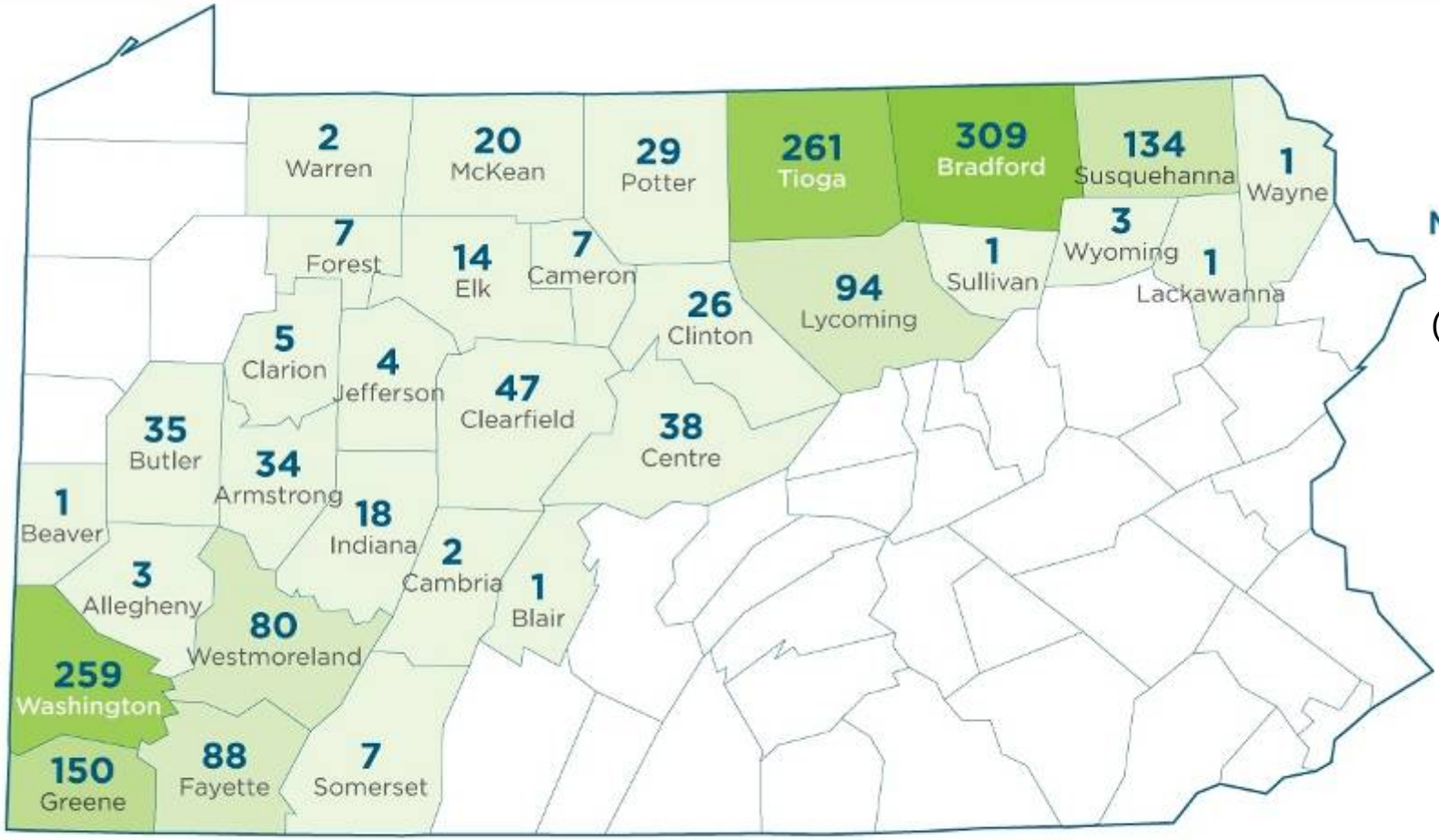
How the Marcellus compares to the largest oil and gas fields in the world

(*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)



PA Marcellus Wells Drilled by County



Total: 1,681 Marcellus Wells

ENERGYINDEPTH

PA Economic Impact -- 2010 and Beyond

	2009	2010	2020
Economic Value Added:	$3.87 billion	$8.04 billion	$18.85 billion
State/Local Taxes:	$ 389 million	$785 million	$1.87 billion
Cumulative Employment:	44,098	88,588	211,909
Wells Drilled:	710	1,743	3,587
Output (bcfe/day):	0.3	1.0	13.5

ENERGYINDEPTH

PA Economic Impact -- Continued

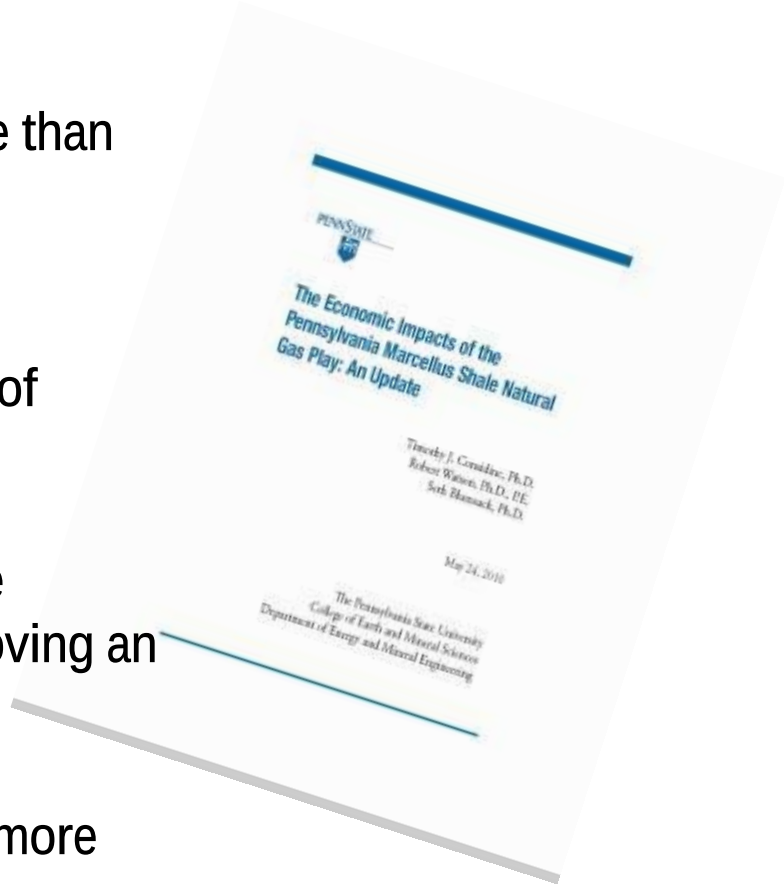
Other Key Report Findings

- In 2008 alone, natural gas companies paid more than $1.8 billion in lease and bonus payments to Pennsylvania landowners

- 2020 output levels are seven times the amount of current PA consumption

- At full development, the Marcellus would be the second largest natural gas field in the world, proving an energy equivalent to 87 billion barrels of oil

- Only one state (Texas) is projected to produce more natural gas than PA by 2020



ENERGYINDEPTH

The Marcellus Multiplier

SITE CONSTRUCTION & PREPARATION

PRODUCTION & SITE COMPLETION

WELL PRODUCTION

PIPING

TRANSPORTATION & LOGISTICS

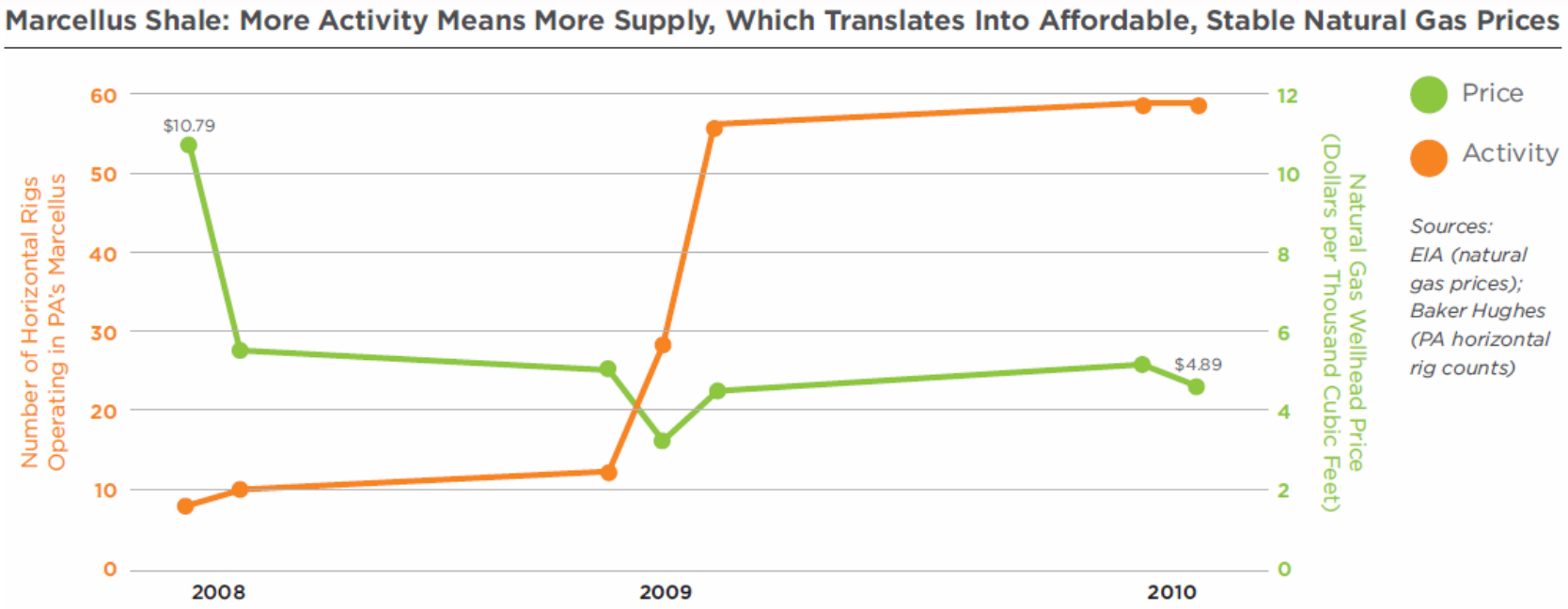
WATER MANAGEMENT

FAST FACTS

- $4 million is invested in producing each well
- At 3K/yr., PA can expect to see $12 billion invested in well site operations alone
- Each mile of Marcellus pipeline represents at least $1 million investment into PA's economy

ENERGYINDEPTH

Consumer, Community Benefits



- ✓ More Production = Stable Prices
- ✓ PA becoming natural gas independent
- ✓ Cleaner-burning fuel improves air quality
- ✓ New PA Jobs: 44,000 in 2009, 212,000 by 2020
- ✓ $1.8 Billion to Landowners in 2010
- ✓ Small/Family Business Revitalization

ENERGYINDEPTH

Questions? Comments? Suggestions?

Travis Windle
travis@energyindepth.org

EnergyInDepth.org

ENERGYINDEPTH