

Executive Summary

The geographic area Region VII Planning & Development Council serves is on the cusp of great economic growth. The extraction of natural gas from the Marcellus Shale formation is fueling the economy with many higher wage, benefitted jobs. Landowners have benefitted from royalties and selling pipeline right-of-ways. The dollars have spun into the fabric of the community, creating a solid economic boom. Region VII identified this potential in a previous CEDS and has been pro-active by providing forums to disseminate knowledge to the stakeholders. This opportunity is so important a section on Marcellus Shale follows this Executive Summary.

More important for the long term economic growth and sustainability of the region is the completion of the Appalachian Highway system, Corridor H. When finished this 4 lane road will connect central West Virginia with markets to the North, East, West and South. It will be a direct link to the inland port located at Front Royal Virginia. Being connected to the inland port means containers can be delivered there by truck and then shipped to the deep sea port at Norfolk, Virginia by rail. Our producers will not have to suffer the down time of fighting Washington, D.C. and Baltimore traffic to get goods to the worldwide market.

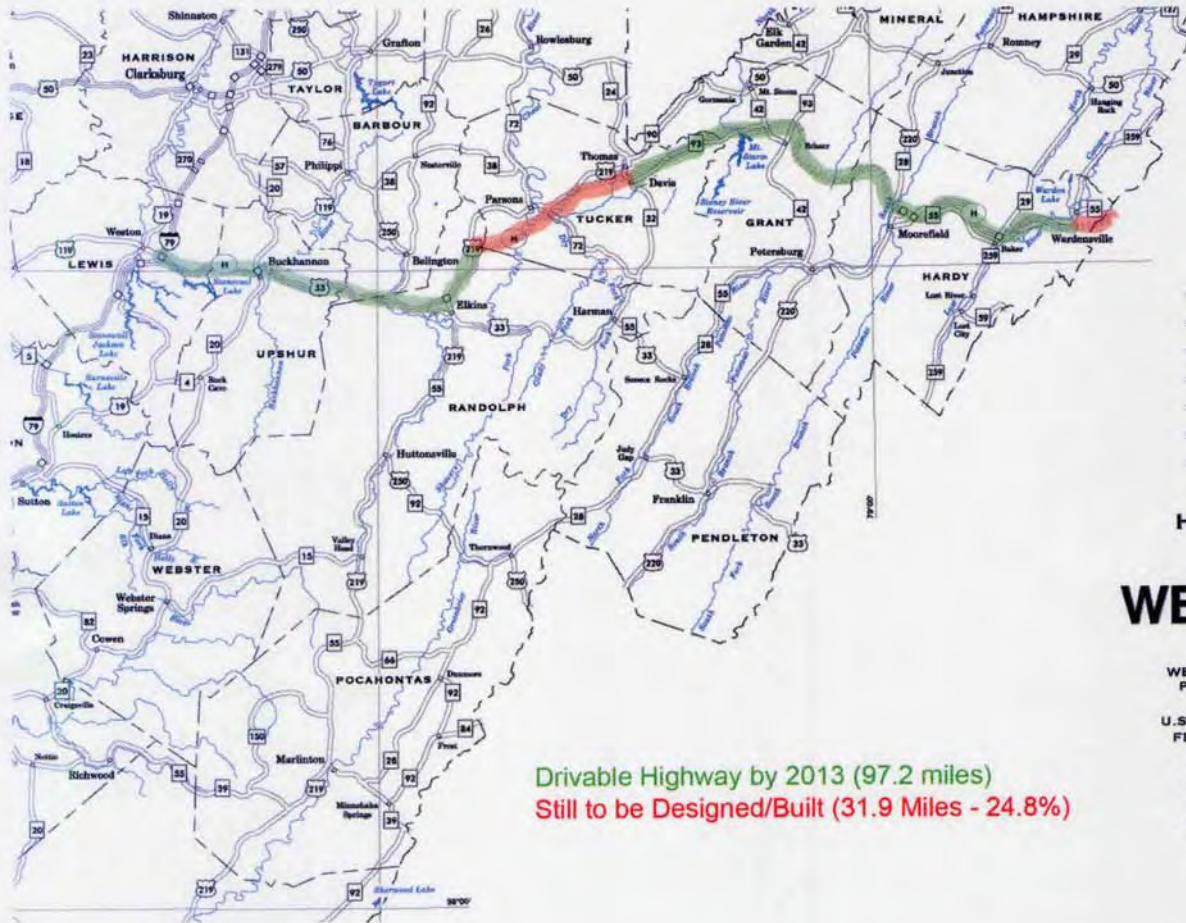
Corridor H has been identified as the number 1 opportunity, constraint and issue to this region's economy for 10 years in the CEDS process. Funding has been the critical issue. West Virginia has on hand their portion of funding; however, Appalachian Regional Commission allotments to West Virginia have not been enough to implement construction. Recently, Senator Rockefeller and Senator Manchin have spearheaded a bill to allow funds that other states are not ready to spend be used in highway projects that are ready to go. The funds would be repaid with future allotments due to the project ready states. This could jump the completion date up from 2038 to 2023. It would mean great opportunity to the 7 county region this EDD serves. An information section follows immediately on Corridor H and ARC's role.

Water infrastructure and wireless infrastructure is also an important concern for our region, but these issues are not unique to our area. In this Region, it is imperative that Corridor H is finished and the natural gas production from Marcellus Shale be properly managed for the prosperous future of our citizens.








Respectfully Submitted

Rosemary Wagner, Executive Director
Region VII Planning & Development Council

Corridor H

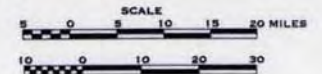


LEGEND

-  INTERSTATE ROUTE
-  APPALCHIAN ROUTE
-  U.S. ROUTE
-  WV ROUTE
-  COUNTY ROUTE
-  PROPOSED DIVIDED HIGHWAY
-  PROPOSED HIGHWAY

**HIGHWAY BASE MAP
STATE OF
WEST VIRGINIA**

PREPARED BY
WEST VIRGINIA DIVISION OF HIGHWAYS
PLANNING AND RESEARCH DIVISION
IN COOPERATION WITH
U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION



Drivable Highway by 2013 (97.2 miles)
Still to be Designed/Built (31.9 Miles - 24.8%)

September 13, 2011

Steve Foster: Corridor H will be a highway to the world

CHARLESTON, W.Va. -- Eighty-thousand jobs. That is what the Cambridge Systematic Economic Impact Study estimates that the completion of Corridor H will create throughout Appalachia. This highway, which will run from Interstate 79 at Weston to the Virginia Inland Port at Front Royal, Va., will be 75 percent complete within our state within two years. We must finish it.

President Obama has laid out a new \$450 billion plan to follow the other stimulus packages. But completion of Corridor H will create more jobs with less money than any of the proposals made this week.

Sens. Jay Rockefeller and Joe Manchin, both D-W.Va., and Richard C. Selby, R-Ala., have a bill before the Senate that would complete Corridor H.

Some of the 13 states that make up the Appalachian Development Highway System are sitting on a total of \$2 billion. Those funds can only be used for roads in the Appalachian Development Highway System, such as Corridor H. This bill would force states who do not use their appropriated funds within five years to lend their money (handed down from the federal government) to other states within the system who are ready to complete their respective roads. Loans would be repaid with future appropriations for Appalachian roads.

The House of Representatives should immediately take up a similar bill.

West Virginia exported \$6.4 billion last year, up from \$4.8 billion the year before. What makes West Virginia uncompetitive in the export market is transportation costs. But the commonwealth of Virginia has constructed a huge port in Norfolk (once home to the Atlantic Naval Fleet). As the deepest, largest port on the East Coast, it will be able to accommodate deep-draft ships from Asia that will pass through the newly dredged Panama Canal, scheduled to be completed in 2014.

Corridor H ends where Interstate 66 and Interstate 81 come together at the Virginia Inland Port. West Virginia's exports will then ship via double-stacked container rail directly to Norfolk, where 10 shipping lines will connect our products to the world.

The 3,090 miles of the Appalachian Development Highway System was created for commerce -- to connect our mountains with the world. Corridor H is the last of these roads in West Virginia (Interstate 68, U.S. 19, U.S. 50 and U.S. 119/Corridor G are others). And with the export of coal, timber, agriculture products and manufactured goods, West Virginia will create jobs, while the easier access to our region will increase tourism.

Corridor H is a jobs plan. It's one that everyone agrees upon, and money is available to finish it. Sens. Rockefeller, Manchin and Selby should be commended for their collective foresight; 80,000 jobs depend on it.

Foster is chairman of the Robert C. Byrd Corridor H Highway Authority.



ARC's Mission

*ARC's mission is to be a strategic partner and advocate
for sustainable community
and economic development in Appalachia.*

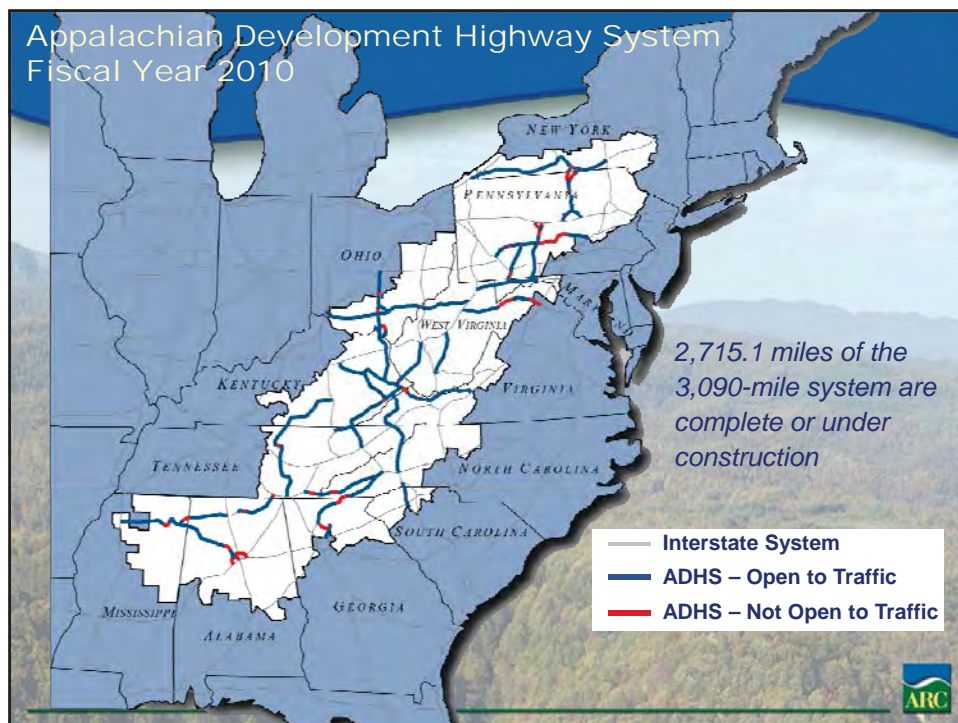
*Our goal is to bring Appalachia into socioeconomic parity
with the rest of the nation.*

The ARC logo is located in the bottom right corner of the slide. It features a blue square with a white wave and the letters "ARC" in green.

Regional Development Roles



Appalachian Development Highway System Fiscal Year 2010



Corridor H Update

Corridor H runs from I-79 at Weston to Virginia State Line near Wardensville

Total ADHS	132 miles
Open to Traffic	61 miles
Under Construction	30 miles
Design and ROW	10 miles
Location Study	30 miles

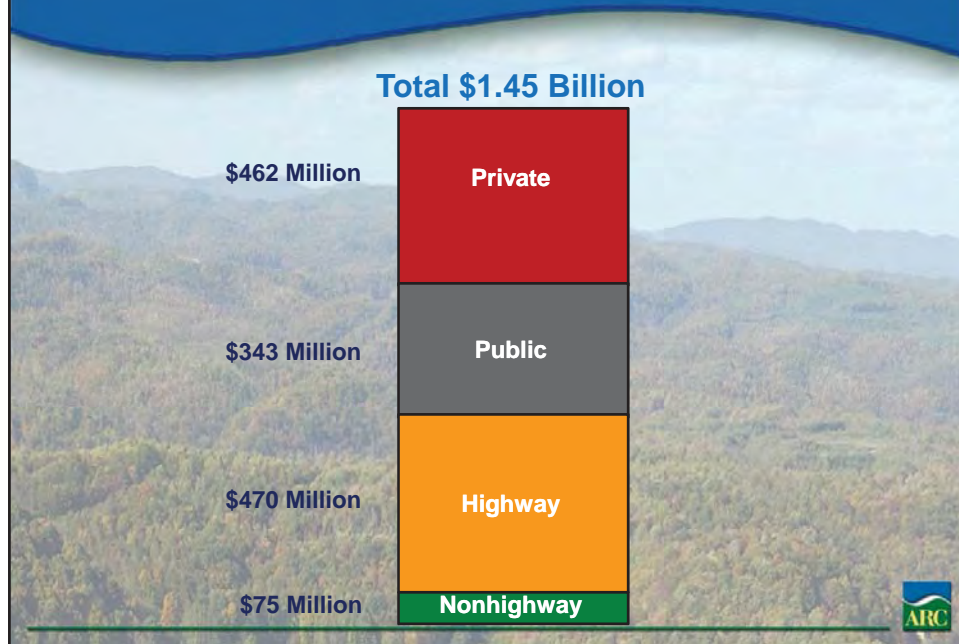
September 30, 2010



ARC Nonhighway Funding



Return on Investment, Fiscal Year 2010

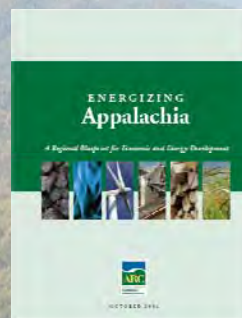


Energy Blueprint

Energy Goal:

Develop the Appalachian Region's energy potential to increase the supply of locally produced, clean, affordable energy, and to create and retain jobs.

- Promote Energy Efficiency
- Increase Use of Renewable Resources
- Support Development of Conventional Energy Resources



Marcellus Shale

This release can be found in the USGS Newsroom at: <http://www.usgs.gov/newsroom/article.asp?ID=2893>.



News Release

August 23, 2011	Brenda Pierce	703-648-6421	bpierce@usgs.gov
	James Coleman	703-648-6400	jcoleman@usgs.gov
	Alex Demas	703-648-4421	apdemas@usgs.gov

USGS Releases New Assessment of Gas Resources in the Marcellus Shale, Appalachian Basin



The Marcellus Shale contains about 84 trillion cubic feet of undiscovered, technically recoverable natural gas and 3.4 billion barrels of undiscovered, technically recoverable natural gas liquids according to a new assessment by the U. S. Geological Survey (USGS).

These gas estimates are significantly more than the last USGS assessment of the Marcellus Shale in the Appalachian Basin in 2002, which estimated a mean of about 2 trillion cubic feet of gas (TCF) and 0.01 billion barrels of natural gas liquids.

The increase in undiscovered, technically recoverable resource is due to new geologic information and engineering data, as technological developments in producing unconventional resources have been significant in the last decade. This Marcellus Shale estimate is of unconventional (or continuous -type) gas resources.

Since the 1930's, almost every well drilled through the Marcellus found noticeable quantities of natural gas. However, in late 2004, the Marcellus was recognized as a potential reservoir rock, instead of just a regional source rock, meaning that the gas could be produced from it instead of just being a source for the gas. Technological improvements resulted in commercially viable gas production and the rapid development of a major, new continuous natural gas and natural gas liquids play in the Appalachian Basin, the oldest producing petroleum province in the United States.

This USGS assessment is an estimate of continuous gas and natural gas liquid accumulations in the Middle Devonian Marcellus Shale of the Appalachian Basin. The estimate of undiscovered natural gas ranges from 43.0 to 144.1 TCF (95 percent to 5 percent probability, respectively), and the estimate of natural gas liquids ranges from 1.6 to 6.2 billion barrels (95 percent to 5 percent probability, respectively). There are no conventional petroleum resources assessed in the Marcellus Shale of the Appalachian Basin.

These new estimates are for technically recoverable oil and gas resources, which are those quantities of oil and gas producible using currently available technology and industry practices, regardless of economic or accessibility considerations. As such, these estimates include resources beneath both onshore and offshore areas (such as Lake Erie) and beneath areas where accessibility may be limited by policy and regulations imposed by land managers and regulatory agencies.

The Marcellus Shale assessment covered areas in Kentucky, Maryland, New York, Ohio, Pennsylvania, Tennessee, Virginia, and West Virginia.

USGS is the only provider of publicly available estimates of undiscovered technically recoverable oil and gas resources of onshore lands and offshore state waters. The USGS worked with the Pennsylvania Geological Survey, the West Virginia Geological and Economic Survey, the Ohio Geological Survey, and representatives from the oil and gas industry and academia to develop an improved geologic understanding of the Marcellus Shale. The USGS Marcellus Shale assessment was undertaken as part of a nationwide project assessing domestic petroleum basins using standardized methodology and protocol.

The new assessment of the Marcellus Shale may be found [online](http://energy.usgs.gov/Miscellaneous/Articles/tabid/98/ID/95/Assessment-of-Undiscovered-Oil-and-Gas-Resources-of-the-Devonian-Marcellus-Shale-of-the-Appalachian-Basin-Province.aspx) (<http://energy.usgs.gov/Miscellaneous/Articles/tabid/98/ID/95/Assessment-of-Undiscovered-Oil-and-Gas-Resources-of-the-Devonian-Marcellus-Shale-of-the-Appalachian-Basin-Province.aspx>). The previous Marcellus Shale assessment can be found [online](http://pubs.usgs.gov/fs/fs-009-03/) (<http://pubs.usgs.gov/fs/fs-009-03/>). To find out more about USGS energy assessments and other energy research, please visit the USGS Energy Resources Program website (<http://energy.usgs.gov/>)

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JUST BENEATH THE SURFACE

Marcellus Shale Drilling- Fact and Fiction

Region VII, Canaan Valley Institute

Friday, August 19, 2011

© Independent Oil & Gas Association of West Virginia 2011

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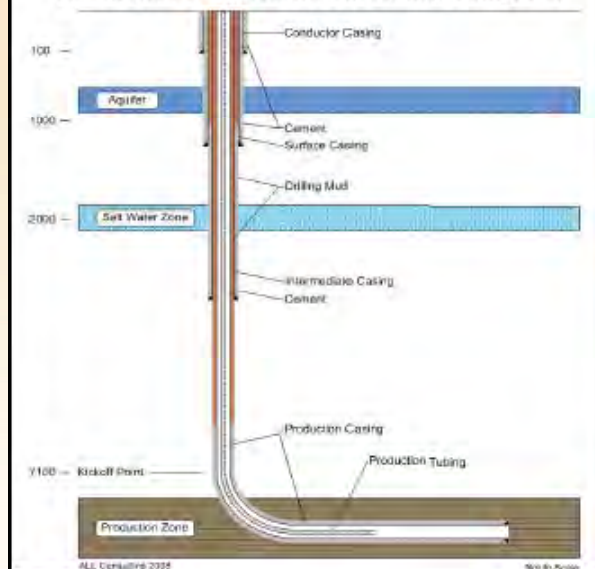
- Created by IOGA-WV
- To provide factual information
- To debunk false information
- To explain the drilling process and the economic benefits of natural gas development



Can hydraulic fracturing impact freshwater resources?

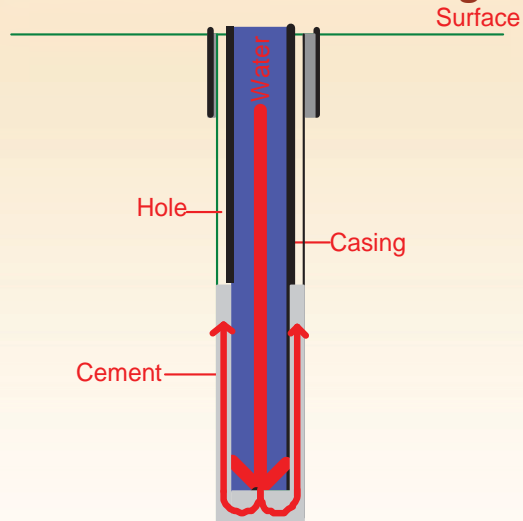
- There are three strings of steel casing set at strategic locations that protect water strata.
- All cement strings are cemented in place.
- If the casing OR the cement failed, the well could not be fractured.

EXHIBIT 30: CASING ZONES AND CEMENT PROGRAMS



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Displacement of Cement Through Casing



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Cementing Casing



Cementing Production Casing

- Production casing is cemented to “bond” it to the formation.
- **Cementing most important!**
- **Well cannot be fractured if cement fails.**
- **Fresh water cannot be impacted if cement holds.**
- There are generally THREE strings of casing, all cemented, between Marcellus frack job and fresh water zones.

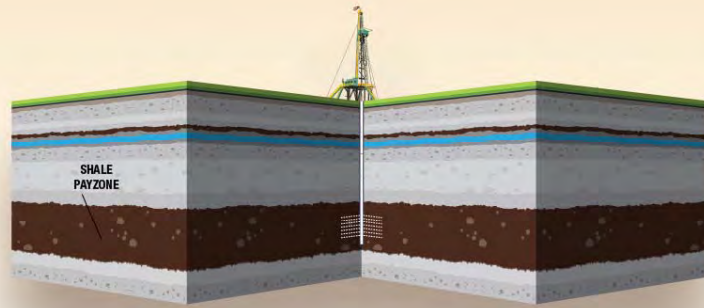


Horizontal Drilling: Good or bad for the surface owner?

- One well pad can host multiple wells
- Each HZ well can drain 5 to 10 times as much as a conventional vertical well.
- Each HZ pad is served by only one road and one pipeline. Vertical wells each require a road and pipeline.
- Areas that cannot be accessed with vertical wells can be drained using directional drilling.

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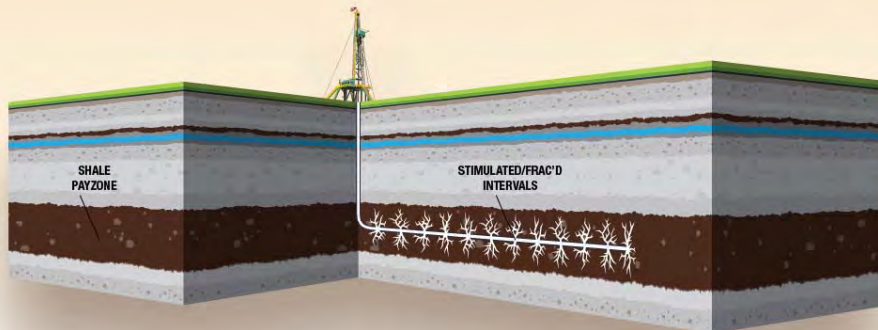
Vertical Drilling



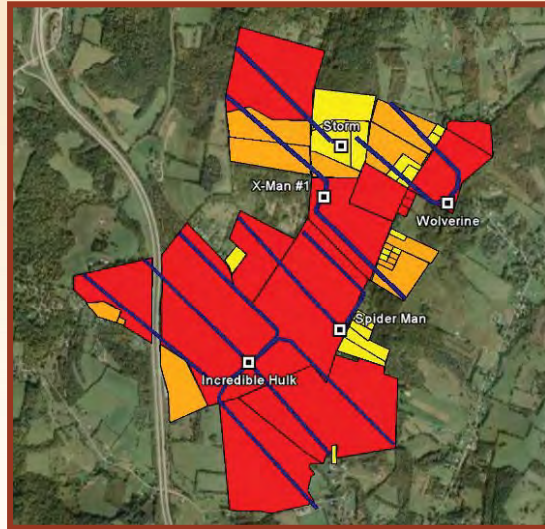
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Horizontal Drilling

+/- 3,000–4,000 ft of horizontal drilling length



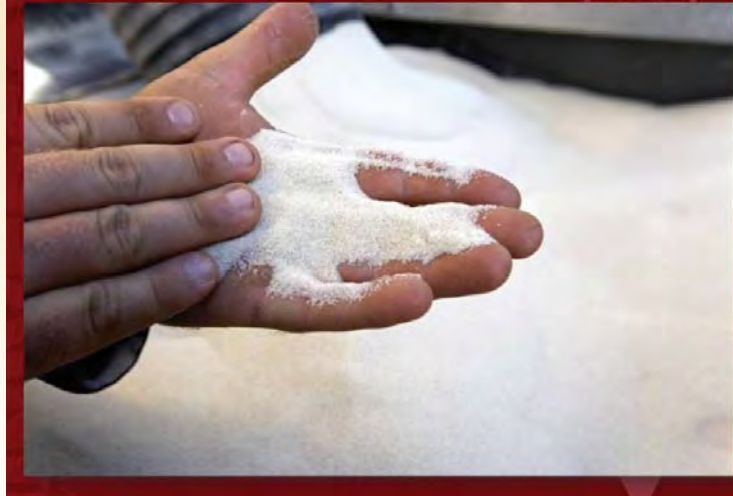
Typical Horizontal Marcellus Development



Horizontal Drilling: Good or bad for the surface owner?

	Hz	Vert
Drainage Area (Acres)	1,100	1,100
Well Pads	1	55
Acres/Pad	<u>5</u>	<u>1</u>
Disturbed Acreage	5	55
Pipelines	1	55
Roads	1	55

Hydraulic Fracturing



Hydraulic Fracturing

- Technology used to stimulate the flow of energy from new and existing oil and gas wells.
- First commercially employed in 1942.
- The well is lined with cemented steel casing.
- Pure water makes up 99.5 percent of the fluid mixture.
- There has never been a documented instance of water contamination caused by hydraulic fracturing.

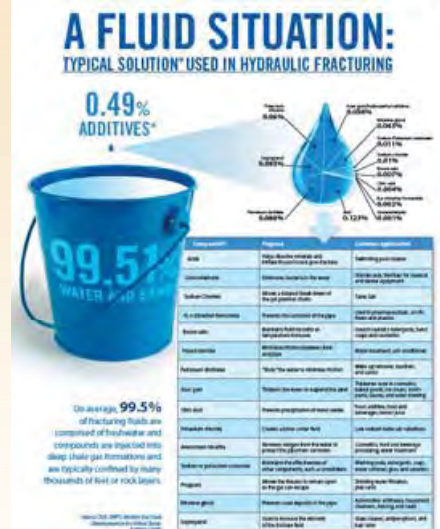
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Adding Sand to Frac Water

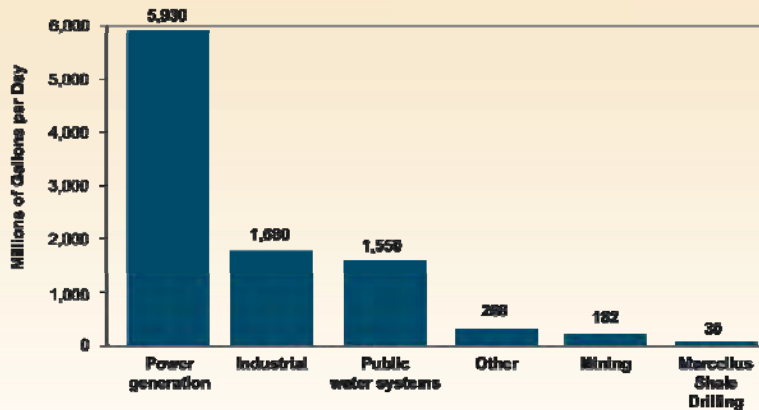


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What is in Frac Water?



Water Usage By Industry



Source: USGS, Pennsylvania Water Consumption

How Much Water is Being Used??

Susan Obleski, with the Susquehanna River Basin Commission says:

“The Susquehanna River provides the Chesapeake Bay with 18 million gallons of fresh water every minute, and there are 1,440 minutes in a day. The SRBC estimates that if the natural gas industry was at its peak, with all the companies active, they would use up *two minutes' worth of water* that day.”

**NO PROOF THAT FRACTURING HAS EVER CAUSED
GROUND WATER CONTAMINATION!**

After a “million experiments across the country, I’ve yet to see a single impact of fracking actually directly communicating with freshwater resources. Again and again and again, I never see a single incidence of fracking causing this direct communication that we keep hearing about” – Scott Perry Director of the Pennsylvania Department of Environmental Protection’s Bureau of Oil and Gas Management

“I’m not aware of any proven case where the fracking process itself has affected water.” - Lisa Jackson, EPA Administrator – May 25, 2011

What is this stuff, anyway?!?

Aluminum Chlorohydrate	Hectorite
Butane	Isobutane
Hydrofluorocarbon 152a	Propylene
Cyclopentasiloxane	Carbonate
Isopropyl Palmitate	Propane
Disteardimonium	Octenylsuccinate

Deodorant

What is this stuff, anyway?!?

Cetyl Alcohol	Benzophenone-4
Diisopropyl Adipate	Cyclomethicone
Glyceryl Stearate SE	Dimethicone
Stearic Acid	Dimethicone Copolyol
Wakame	Triethanolamine
Panthenol	Propylene Glycol
Tocopheryl Acetate	Diazolidinyl Urea
Isostearyl Behenate	Methylparaben
Octyl Methoxycinnamate	Propylparaben
Glycol Stearate	Butylparaben

Hand Lotion

What is this stuff, anyway?!?

Sodium Laureth Sulfate	Benzophenone-4
Cocamidopropyl Betaine	Methychloroisothazoline
Sodium Methyl Cocoyl Taurate	Methylparaben
Tocopheryl Acetate	Methylisothiazoline
Potassium Dimethicone Copolyol Panthenyl Phosphate	

Hand Soap

What is this stuff, anyway?!?

Avobenzone
Homosalate
Octinoxate
Octisalate
Oxybenzone
Alkyl Benzoate
Diethylexyl 2
Naphthalate
Acrylates/Octylacrylamide Copolymer

Sunscreen

What is this stuff, anyway?!?

Glutaraldehyde	Citric Acid
Sodium Chloride	Potassium chloride
Non-Dimethyl formamide	Ammonium bisulfite
Borate salts	Sodium or potassium carbonate
Polyacrylamide	Ethylene glycol
Petroleum distillates	Isopropanol
Guar gum	

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Chemicals added to Frac Water (0.5%)

**JUST BENEATH
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Marcellus Shale

Economic Impact in WV

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Overview of Current US Shale Plays

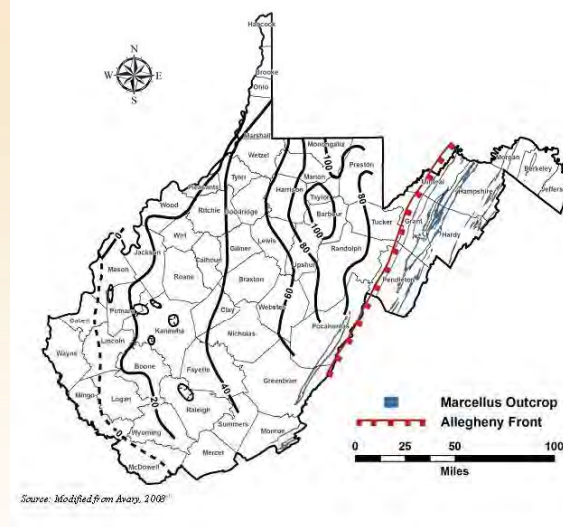


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Marcellus Shale in West Virginia



Marcellus Shale Thickness in West Virginia



Natural Gas in West Virginia

- 53 of West Virginia's 55 counties have natural gas operations.
- Industry paid severance taxes of more than \$71million last year.
- Industry paid property taxes of nearly \$106 million last year.
- All 55 West Virginia counties benefit from industry taxes.

Natural Gas in West Virginia

- \$771 million in new capital investment last year.
- 35,000 West Virginia jobs are made possible by the industry.
- \$757 million in yearly salaries paid.
- Average industry wage is nearly \$60,000.
- Estimated 7,000 new jobs due to Marcellus Shale development.

Homegrown Energy Source

- Natural gas serves 65 million homes, 5 million businesses, 207,000 factories and 1,800 electric generating units.
- Estimated to be over 2,000 trillion cubic feet nationally.
- This will meet current U.S. consumption for another 100 years.
- West Virginia has over 100 trillion cubic feet of available natural gas.

“Cracking” Opportunity

- Natural gas is comprised of several gases, including **ethane**.
- Ethane can be fractionated from natural gas.
- Ethane can be “Cracked” into **Ethylene**.
- Ethylene is a primary feedstock of the plastics industry.
- A cheap, abundant supply of Ethylene in WV could revolutionize WV’s economy.

“Cracking” Opportunity

“According to the American Chemical Council, a **25 percent increase in the supply of ethane** - the predicted growth in supply given the Marcellus Shale boom - could result in **17,000 new chemical industry jobs**, **395,000 jobs outside the chemical industry**, **\$16 billion in chemical industry capital investment** and **\$4 billion in federal, state and local tax revenue.**” *WV Senator Karen Facemyer, President of the West Virginia Polymer Alliance Zone – Charleston Daily Mail – August 11, 2011*

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