



ATLANTIC COUNCIL

IDEAS. INFLUENCE. IMPACT.

# EUROPEAN UNCONVENTIONAL GAS DEVELOPMENTS THE SCIENCE, TECHNOLOGY AND BEST PRACTICES

*Session IV: Investments and Surface Impacts  
Associated with Infrastructure Requirements*

*“Infrastructure Investments and Economic Benefits”*

Michael E. Moore

Vice President External Affairs and Business Development Blue Source LLC

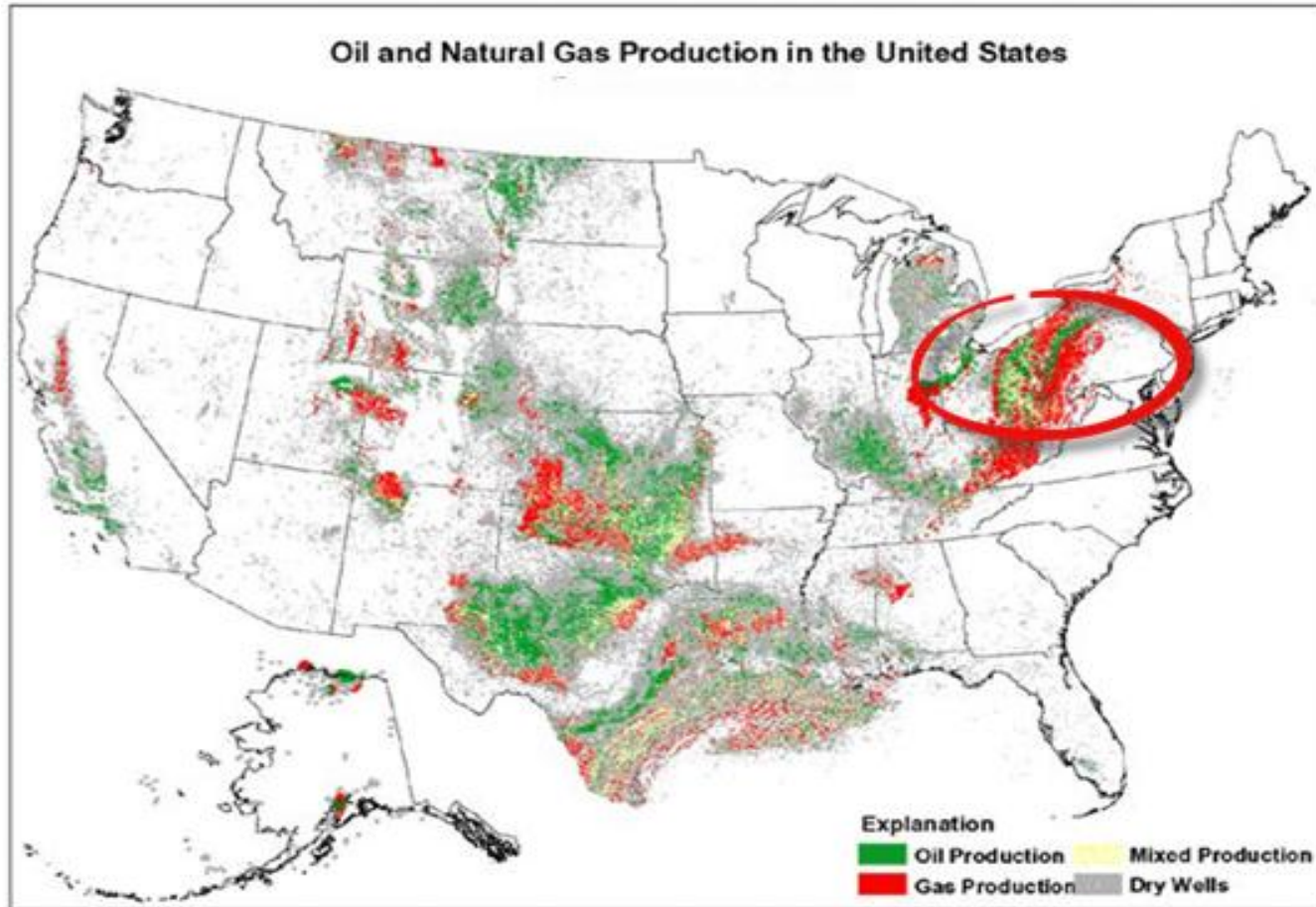
Executive Director – NACCSA

Bucharest, Romania March 11<sup>th</sup> 2013

# Shale Oil & Gas

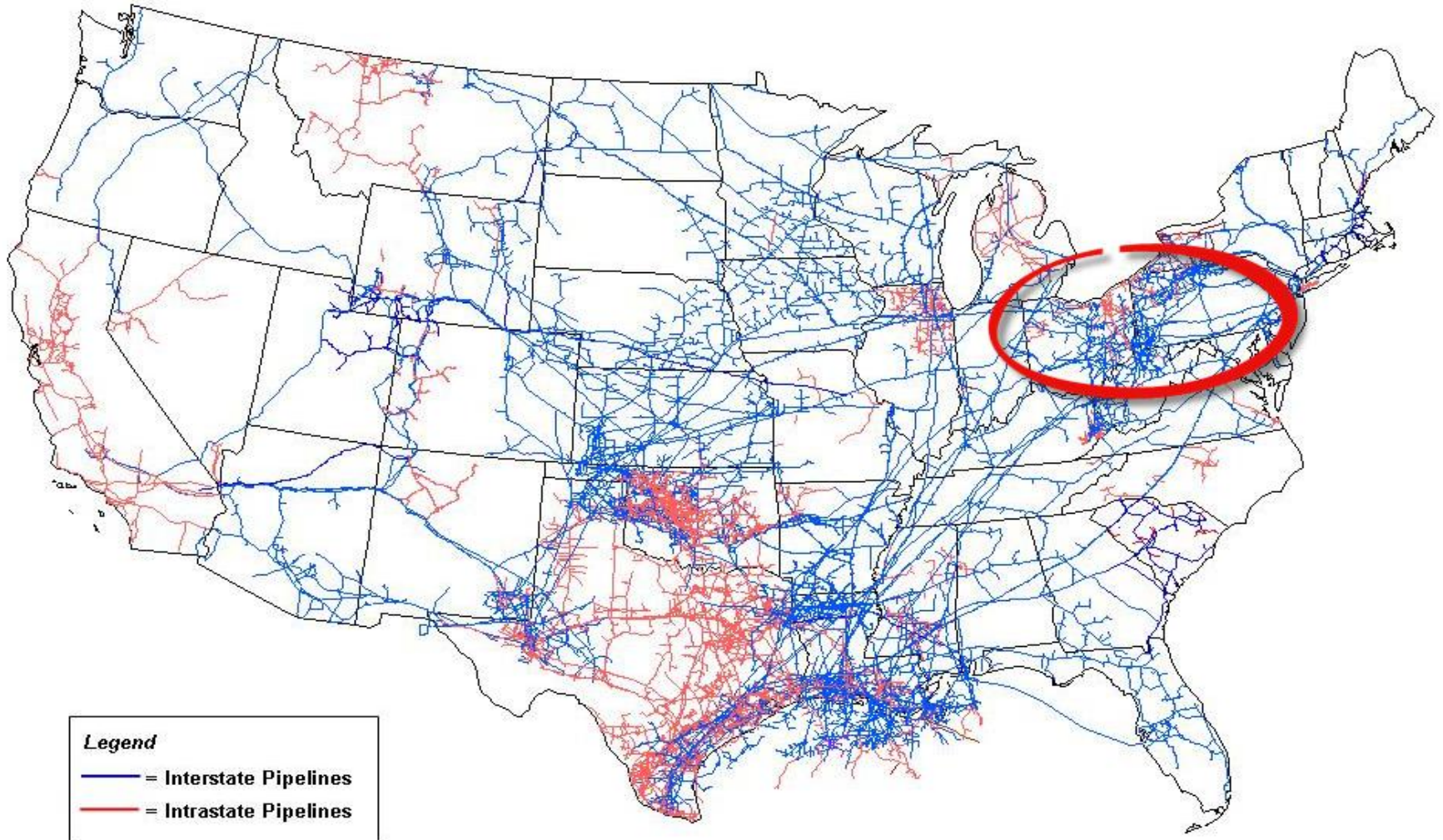
- US & Europe
- Impacts to the US
- Regional Ohio/(Pennsylvania) economic highlights

# US Conventional Oil and Gas Reservoirs

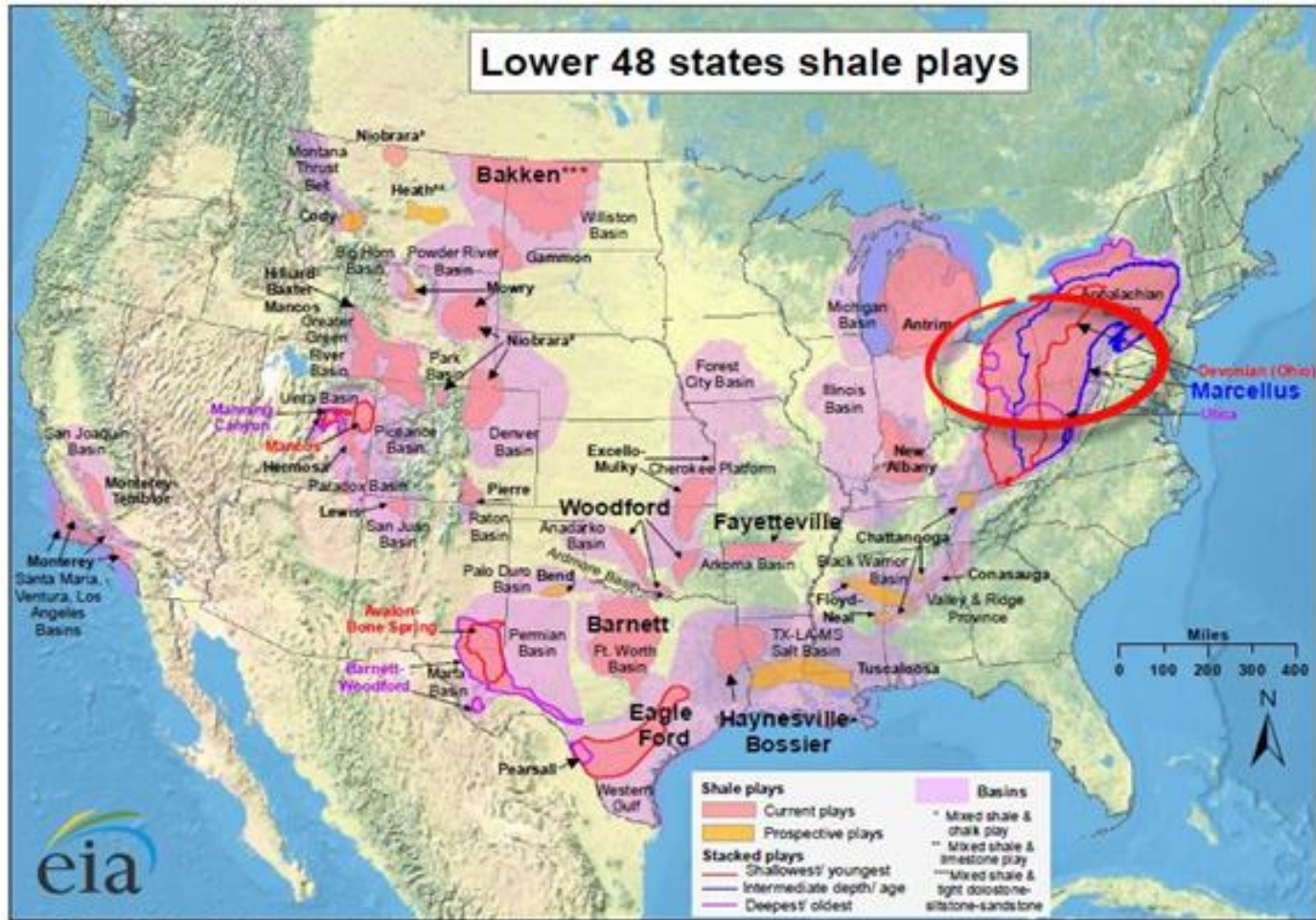


# US Gas Pipeline System

[http://www.eia.gov/pub/oil\\_gas/natural\\_gas/analysis\\_publications/ngpipeline/ngpipelines\\_map.html](http://www.eia.gov/pub/oil_gas/natural_gas/analysis_publications/ngpipeline/ngpipelines_map.html)



# US Shale Plays - Unconventional Oil & Gas

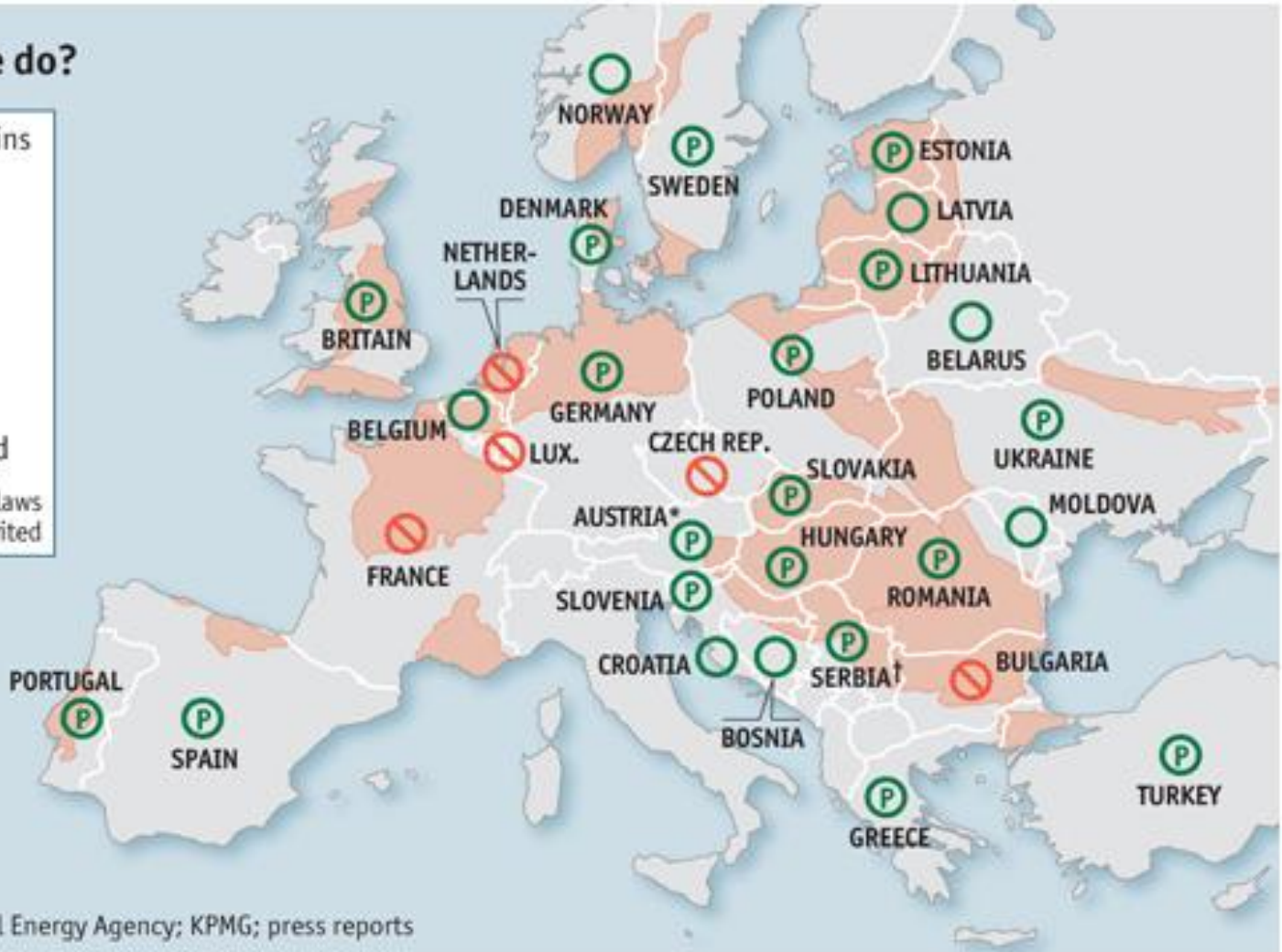


Source: Energy Information Administration based on data from various published studies.  
Updated: May 9, 2011

# Shale Advances in Europe

Economist Feb 2, 2013 <http://www.economist.com/news/business/21571171-extracting-europes-shale-gas-and-oil-will-be-slow-and-difficult-business-frack-future>

## What shale we do?



# Shale Impacts on US

- Coal exports-natgas generation favored
- LNG/Natgas exports-abundance
- CCS on natgas power generation-GHG emissions
- Reshaping natgas/oil infrastructure
- Reshaping petrochemical industry

# Coal Export Terminals

<http://www.platts.com/newsfeature/2012/coaltransport/map>

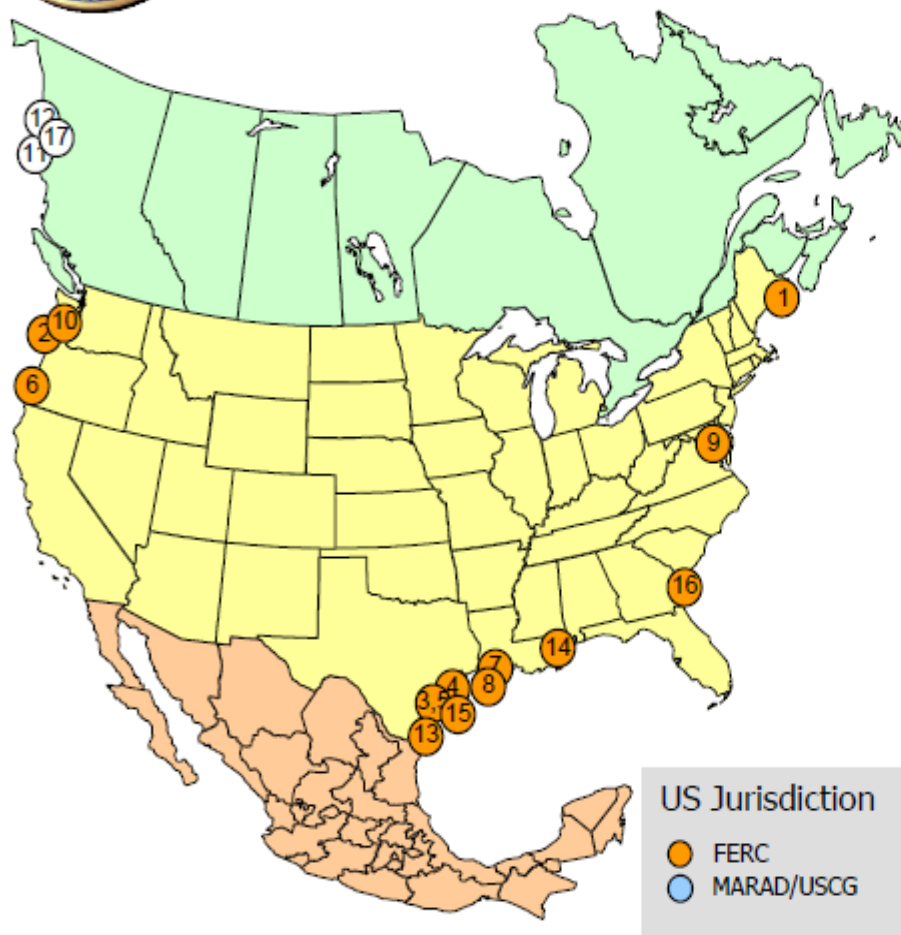






# North American LNG Import/Export Terminals

## *Proposed/Potential*



### Import Terminal

#### PROPOSED TO FERC

1. Robbinston, ME: 0.5 Bcfd (Kestrel Energy - Downeast LNG)
2. Astoria, OR: 1.5 Bcfd (Oregon LNG)
3. Corpus Christi, TX: 0.4 Bcfd (Cheniere – Corpus Christi LNG)

### Export Terminal

#### PROPOSED TO FERC

4. Freeport, TX: 1.8 Bcfd (Freeport LNG Dev/Freeport LNG Expansion/FLNG Liquefaction)
5. Corpus Christi, TX: 1.8 Bcfd (Cheniere – Corpus Christi LNG)
6. Coos Bay, OR: 0.9 Bcfd (Jordan Cove Energy Project)
7. Lake Charles, LA: 2.4 Bcfd (Southern Union - Trunkline LNG)
8. Hackberry, LA: 1.7 Bcfd (Sempra – Cameron LNG)
9. Cove Point, MD: 0.75 Bcfd (Dominion – Cove Point LNG)
10. Astoria, OR: 1.30 Bcfd (Oregon LNG)

#### PROPOSED CANADIAN SITES IDENTIFIED BY PROJECT

##### SPONSORS

11. Kitimat, BC: 0.7 Bcfd (Apache Canada Ltd.)
12. Douglas Island, BC: 0.25 Bcfd (BC LNG Export Cooperative)

#### POTENTIAL U.S. SITES IDENTIFIED BY PROJECT SPONSORS

13. Brownsville, TX: 2.8 Bcfd (Gulf Coast LNG Export)
14. Pascagoula, MS: 1.5 Bcfd (Gulf LNG Liquefaction)
15. Lavaca Bay, TX: 1.38 Bcfd (Excelerate Liquefaction)
16. Elba Island, GA: 0.5 Bcfd (Southern LNG Company)

#### POTENTIAL CANADIAN SITES IDENTIFIED BY PROJECT SPONSORS

17. Prince Rupert Island, BC: 1.0 Bcfd (Shell Canada)

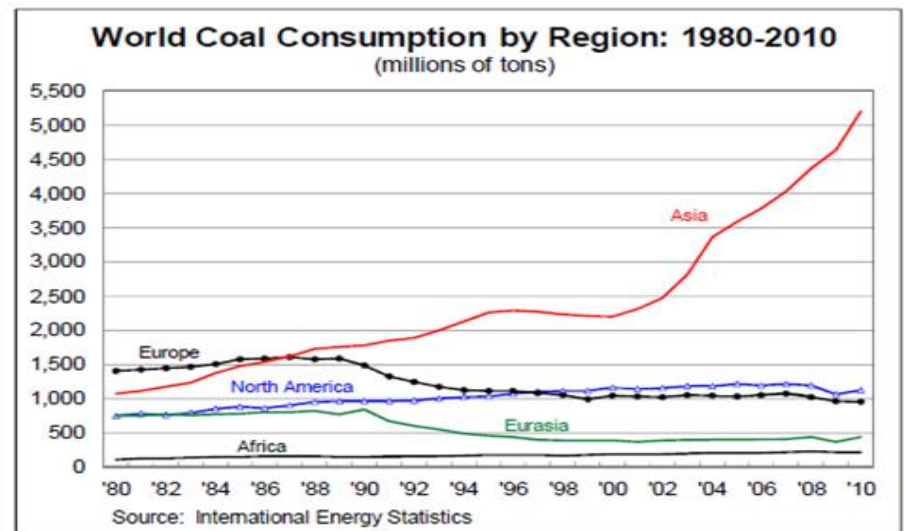
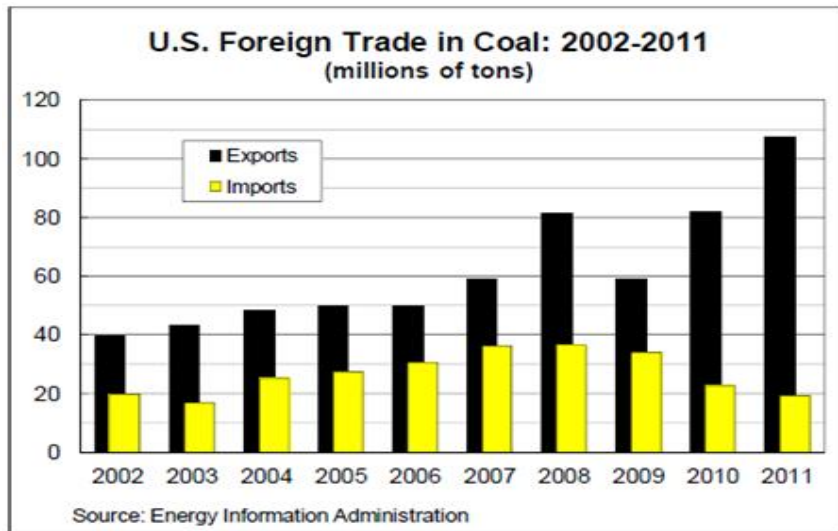
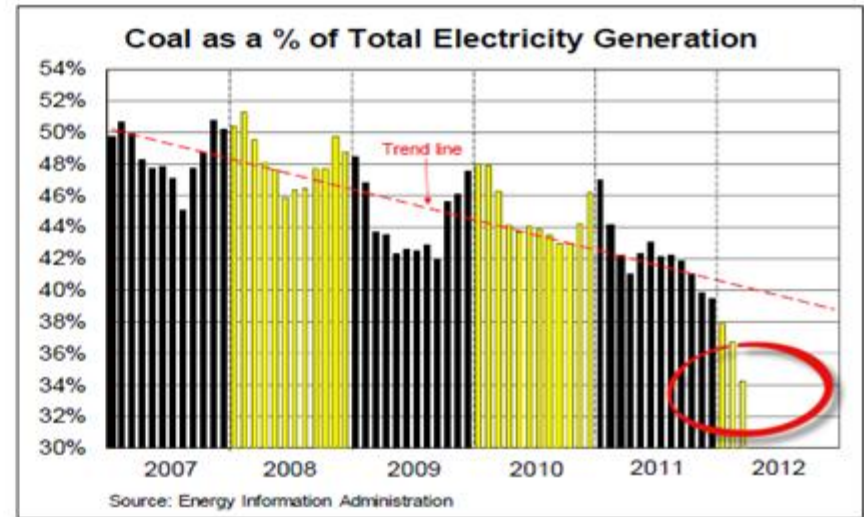
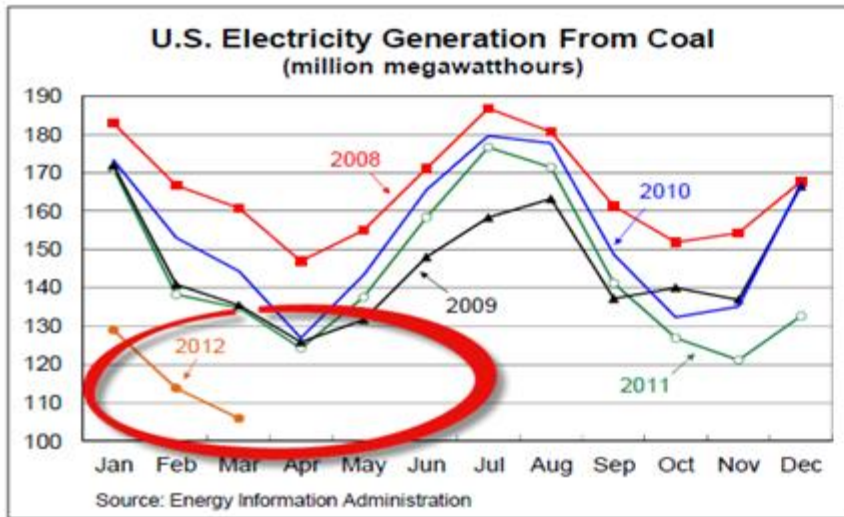
As of July 17, 2012

*Office of Energy Projects*

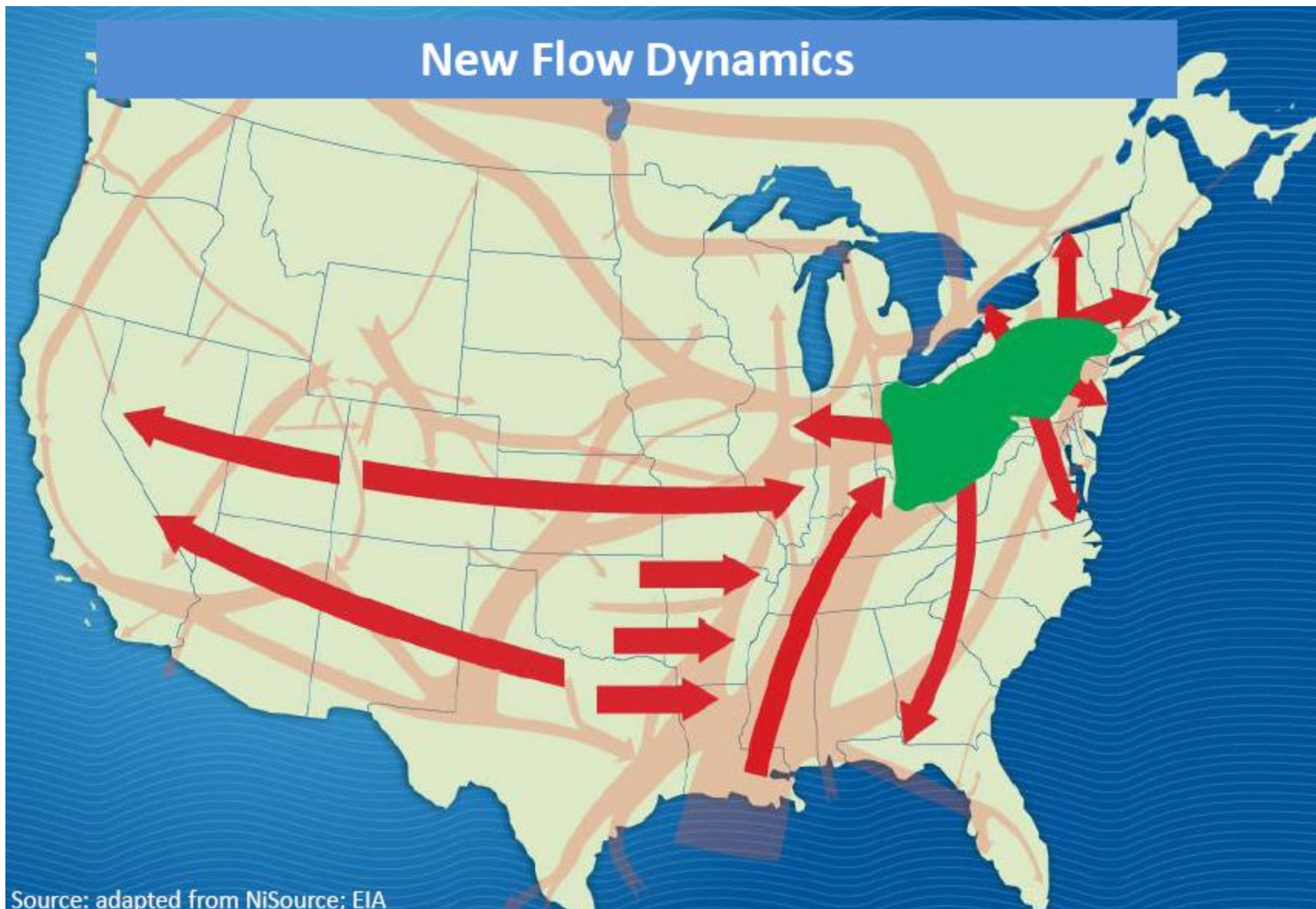
<http://ferc.gov/industries/gas/indus-act/lng/LNG-proposed-potential.pdf>

# Fuel Switching Impacts and Coal Exports

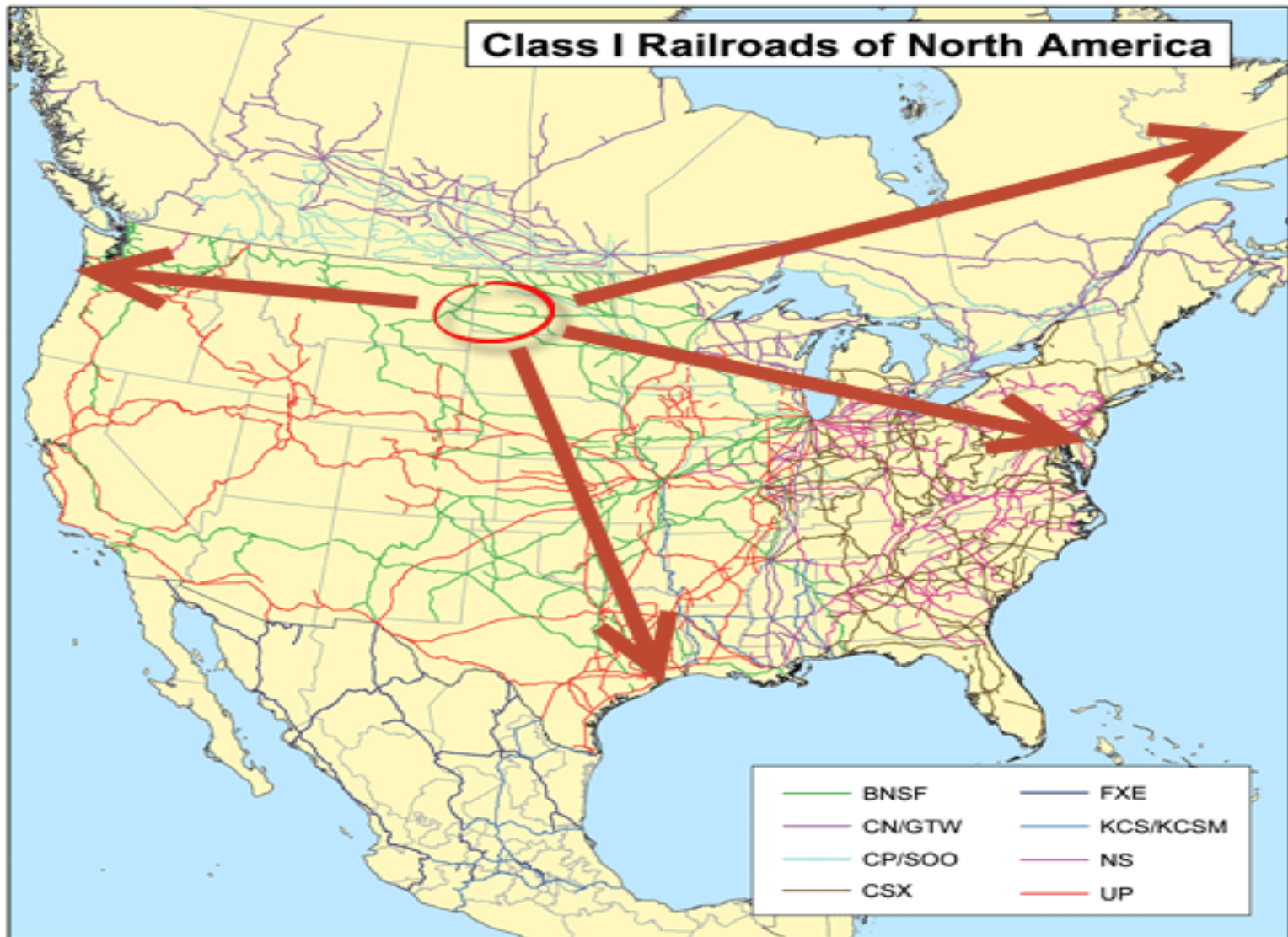
<http://www.aar.org/~/media/aar/Background-Papers/Railroads-and-Coal.ashx>



# New Gas Flow Dynamics-Shale Gas



# Crude Oil By Rail-Bakken Example



# Shale Gas Liquids Drive Petchem Growth

North American fractionator growth			
Company	Location	New capacity ('000 b/d)	Start-up
Chevron Phillips	Sweeny, TX	22	2013 (1Q)
Crosstex	Eunice, LA	40	2014
Dominion	Natrum, WV	36	2012 (4Q)
Enterprise	Mont Belvieu, TX	75	2012 (4Q)
Enterprise	Mont Belvieu, TX	75	2013 (4Q)
Enterprise	Mont Belvieu, TX	75	2013 (4Q)
Gulf Coast Fractionators	Mont Belvieu, TX	100	na
Lone Star	Mont Belvieu, TX	100	2013 (1Q)
Oneck	Mont Belvieu, TX	75	2013 (4Q)
Pembina	Redwater, Alberta	65	2014 (2Q)
Plains AA	Ross, ND	50-75	2013 (2Q)
Southcross	Refugio, TX	11-12	2012 (2Q)
Targa	Cedar Bayou, TX	100	2013 (2Q)
Targa	Cedar Bayou, TX	100	na

US petchem cracker growth				
Company	Location	Type	New capacity ('000 t/yr)	Start-up
Chevron Phillips	Baytown, TX	New	1,500	2016-17
Dow	US Gulf	New	na	2017
Dow	St Charles, LA	Restart	386	2012
Formosa	Pt Comfort, TX	New	800	2016
Ineos	Choc Bayou, TX	Expansion	115	2013
LyondellBasell	La Porte, TX	Expansion	386	2014
Shell	Pennsylvania	New	na	na
Westlake	Lake Charles, LA	Expansion	110	2014
Westlake	Lake Charles, LA	Expansion	110	2012
Williams	Geismar, LA	Expansion	270	2013

# Ohio as an Example

# Ohio/Pennsylvania-Romania

## Comparison

### Ohio

- **Area: 116,096 km<sup>2</sup>** or 44,825 sq mi
- **Population: 11,544,225** (2012)
- **Pop. Density: 109/km<sup>2</sup>**
- Mature oil/gas production since the mid 1800's
- Unconv permits issued:
- **Total to 2-23-13: 549**
- Unconv wells drilled:
- **Total to 2-16-13: 249**

### Pennsylvania

- **Area: 119,282 km<sup>2</sup>** or 46,055 sq mi
- **Population: 12,763,536** (2012)
- **Pop. Density: 110/km<sup>2</sup>**
- Mature oil/gas production since the mid 1800's
- Unconv permits issued:
- **2012 only: 2482**
- Unconv wells drilled:
- **2012 only: 1365**

### Romania

- **Area: 238,391 km<sup>2</sup>** or 92,043 sq mi
- **Population: 21,848,504** (July 2012 est.)
- **Pop. Density: 80/km<sup>2</sup>**
- Mature oil/gas production since the mid 1800's
- Unconv permits issued:
- **To date:**
- Unconv wells drilled:
- **To date:**

# IHS Ohio Utica Shale Report

[HTTP://UNCONVENTIONALENERGY.BLOGS.IHS.COM/2013/02/12/UTICA-SHALE-PROMISES-TO-MAKE-OHIO-AN-ENERGY-POWERHOUSE](http://unconventionalenergy.blogs.ihs.com/2013/02/12/utica-shale-promises-to-make-ohio-an-energy-powerhouse)

- 2012 unconventional oil/gas activity contributed value-added economic activity of \$4.1 billion
- IHS forecasts that this contribution will grow to \$35.2 billion by 2035.
  
- 2012 Utica shale new jobs - 39,000.
- 2020 will increase to 144,000
- 2035 to 275,000
  
- 2012 Ohio's operating shale/horizontal rig count was 9 rigs
- 2013 shale /horizontal operating rig count 25



# Ohio Economic Impact from Shale

Source: ODNR presentation 3/12 <http://www.dnr.state.oh.us/portals/10/energy/Utica/Utica-PointPleasantPlay.pdf>

## Recent Industrial Investments in Ohio as a Result of the Utica and Marcellus Shale Plays

V&M Star, Youngstown - \$650 million+

U.S. Steel, Lorain - \$240 million

Timken, Canton - \$225 million

Chesapeake, M3 Midstream, & EV Energy Partners, Columbiana County - \$900 million

Halliburton, Muskingum County - \$150 million & 300 jobs

MarkWest, Harrison & Monroe Counties - \$500 million & 700+ construction jobs

Exterran, Columbiana County - \$13 million & about 100 jobs

Baker Hughes, Stark County - \$64 million & 700 jobs

Select Energy Services, Carroll County - \$10 million & 185 jobs

**TOTAL INVESTMENT = \$2.75 BILLION**

**and counting, NOT including lease and royalty payments, operations, etc.!**

# Investments in Ohio Utica Shale

<https://www.mecseminars.com/sites/default/files/presentation-files/Manufacturing%20Renaissance%20in%20Ohio%20Powered%20by%20Oil%20and%20Gas%20from%20Shale.pdf>

Company	Location	Investment
Total	10 Eastern Ohio counties	\$2.3 Billion
Schlumberger	Tuscarawas County	\$150 Million and 236 jobs*
BP	Trumbull	\$331 Million and 85,000 leased acres
Weatherford	Mahoning	TBD*
Marathon Petroleum	Stark County	New Canton refinery truck rack, with ability to process 18,000 bpd at Catlettsburg, which supplies products to central and southern Ohio.

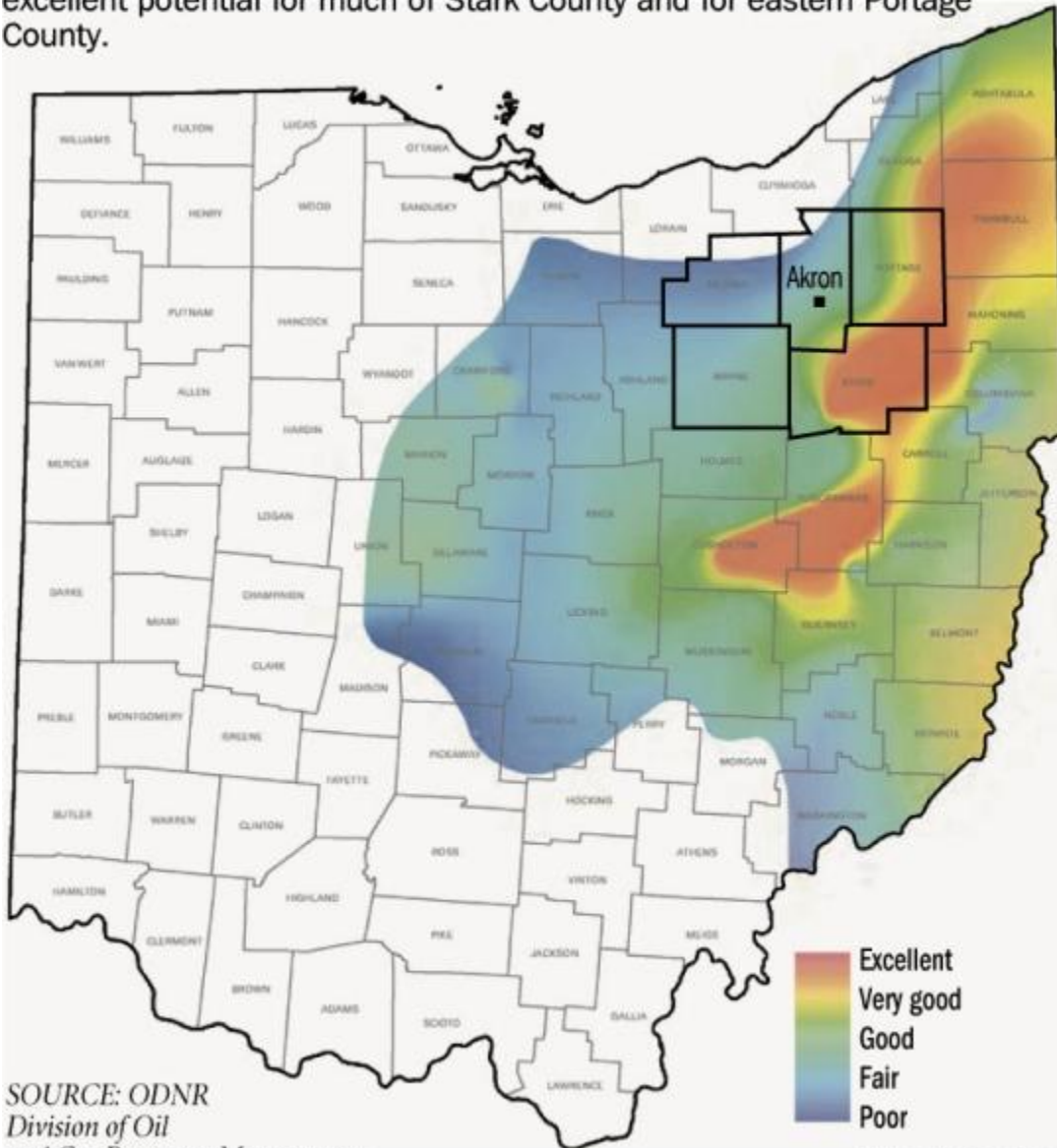
# Midstream Commitments in Ohio Utica Shale

<https://www.mecseminars.com/sites/default/files/presentation-files/Manufacturing%20Renaissance%20in%20Ohio%20Powered%20by%20Oil%20and%20Gas%20from%20Shale.pdf>

Company	Location	Investment
MarkWest	Harrison & Noble counties	\$1.5 Billion
M3 Midstream Partnership	Columbiana & Harrison counties	\$1.2 Billion
NiSource	Eastern Ohio	\$300 Million
Dominion/Caiman Energy	Eastern Ohio (plus portions of PA and WV)	\$800 Million

# Stark, Portage prospects improve

A map from state geologists of estimated gas/oil drilling yields shows excellent potential for much of Stark County and for eastern Portage County.



SOURCE: ODNR  
Division of Oil  
and Gas Resources Management

Akron Beacon Journal

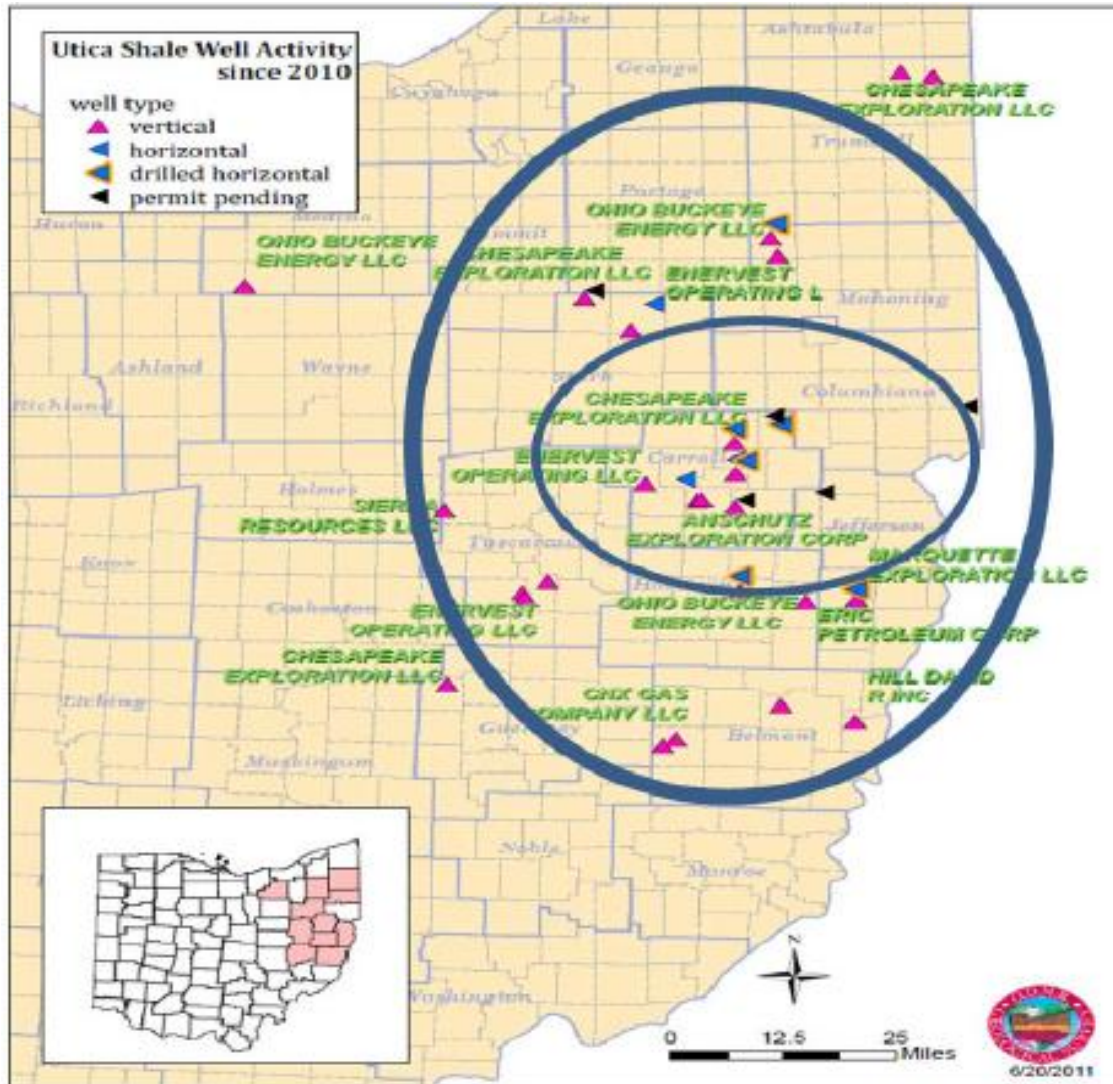
# Shale Oil/Gas Plays in Ohio

<http://www.ohio.com/business/shale25map-302677?ot=akron.PhotoGalleryLayout.ot&s=1.302678&pt=1>

As of April 24<sup>th</sup>, 2012

# Ohio Utica Wells by end of 2010

<http://208.68.184.222/wp-content/uploads/2011/12/Ohio-Natural-Gas-and-Crude-Oil-Industry-Economic-Impact-Study-September-2011.pdf>



**Only 6  
horizontal  
wells drilled  
by the end of  
2010**

# Marcellus and Utica Shale Play in Ohio

Horizontal Permits - 549  
Drilled Wells - 249

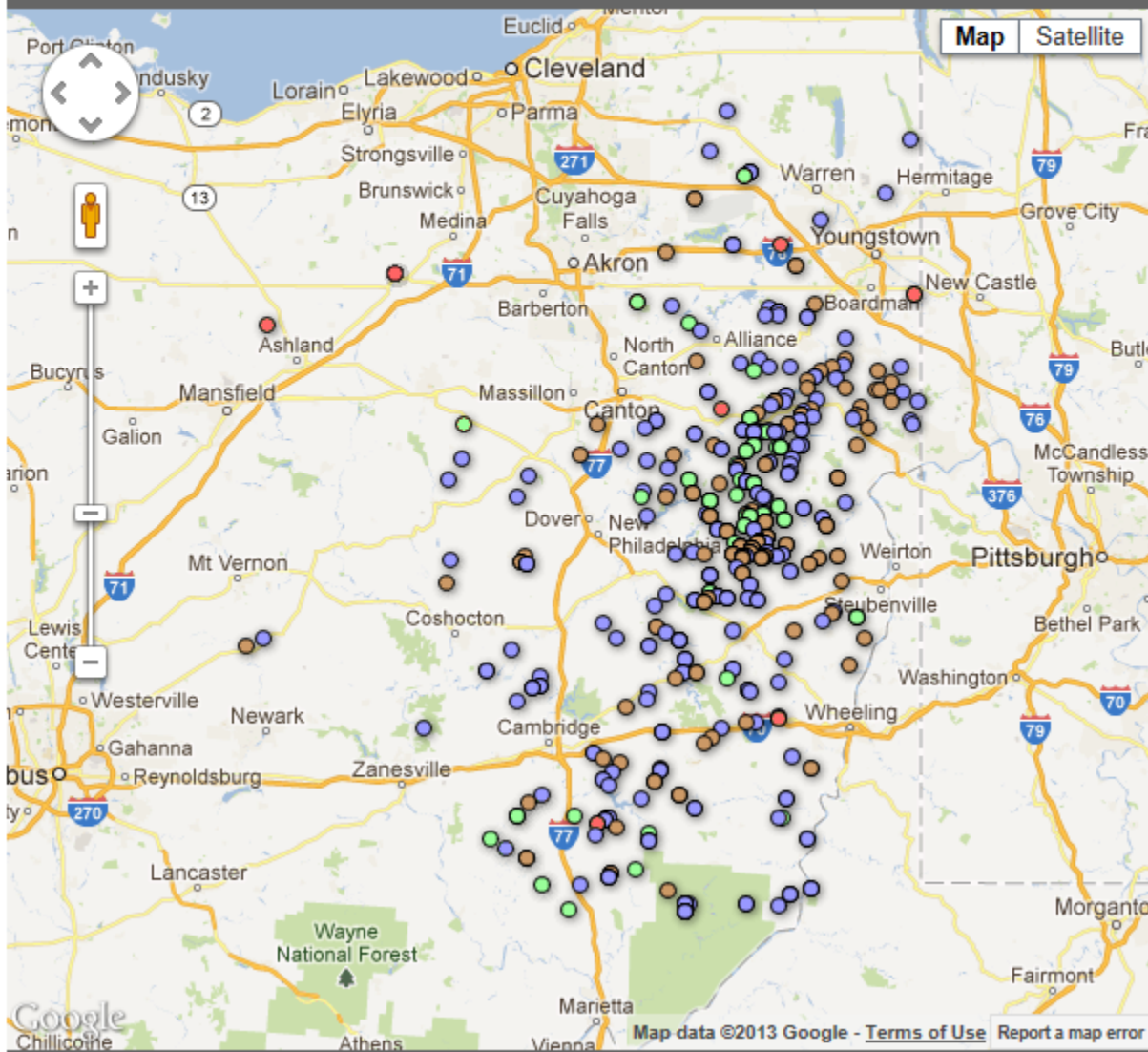
Search by address or city and state

Search

Reset

Drilling activity for the week of 02/16/2013

Well Type Legend: ● Permit or Not Drilled ● Drilling or Drilled ● Producing ● Inactive or Plugged



# Ohio

## By Feb 16<sup>th</sup> 2013

## 249 drilled 549 permitted

<http://www.ohio.com/blogs/drilling/maps>

<http://oilandgas.ohiodnr.gov/Industry/Shale-Well-Drilling.aspx/>

- **Pennsylvania learned from lessons in Texas Barnett Shale**
- **Ohio has been watching and learning from the Marcellus experiences in Pennsylvania**
- ***Romania can build from the all the above experiences!***

# Questions & Thank You!

**Michael E. Moore**

- **VP External Affairs and Business Development**
- **Blue Source/Blue Strategies LLC**
- **[www.bluesource.com](http://www.bluesource.com)**
  
- **Executive Director and Founding Board of Directors Member**
- **North American Carbon Capture Storage Association**
- **[www.naccca.org](http://www.naccca.org)**
  
- **mmoore@bluesource.com**
  
- **Tel: 281-668-8475**

