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The Marcellus Shale: An Overview

September 22, 2011

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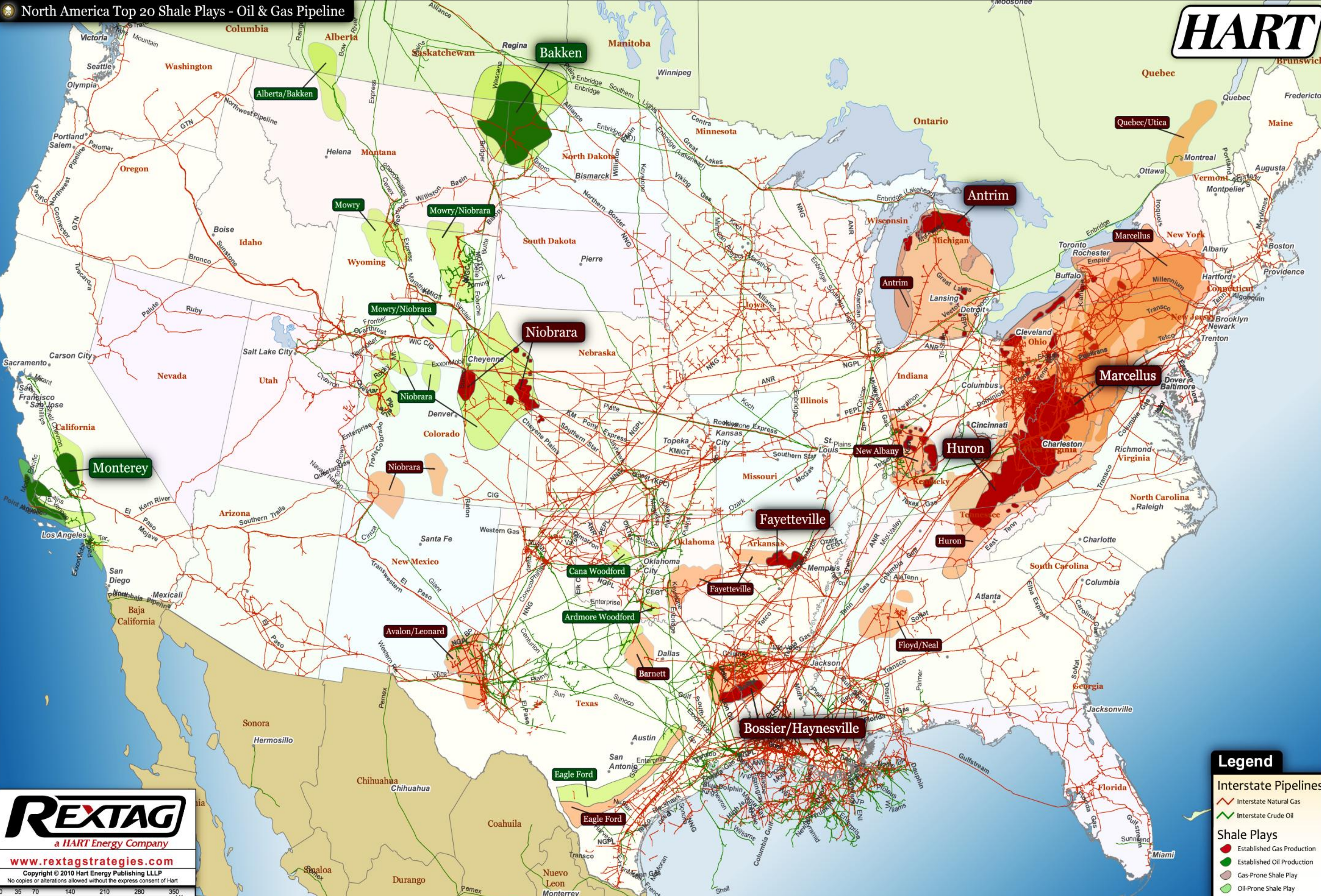
The Resource Triangle


North America Top 20 Shale Plays - Oil & Gas Pipeline
HART
Bakken
Alberta/Bakken
Mowry
Mowry/Niobrara
Mowry/Niobrara
Niobrara
Niobrara
Niobrara
Monterey
Antrim
Antrim
Marcellus
Marcellus
Quebec/Utica
Huron
Huron
New Albany
Fayetteville
Fayetteville
Cana Woodford
Ardmore Woodford
Avalon/Leonard
Barnett
Floyd/Neal
Bossier/Haynesville
Eagle Ford
Eagle Ford
Legend
Interstate Pipelines
Interstate Natural Gas
Interstate Crude Oil
Shale Plays
Established Gas Production
Established Oil Production
Gas-Prone Shale Play
Oil-Prone Shale Play
REXTAG
a HART Energy Company
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0 35 70 140 210 280 350 Miles

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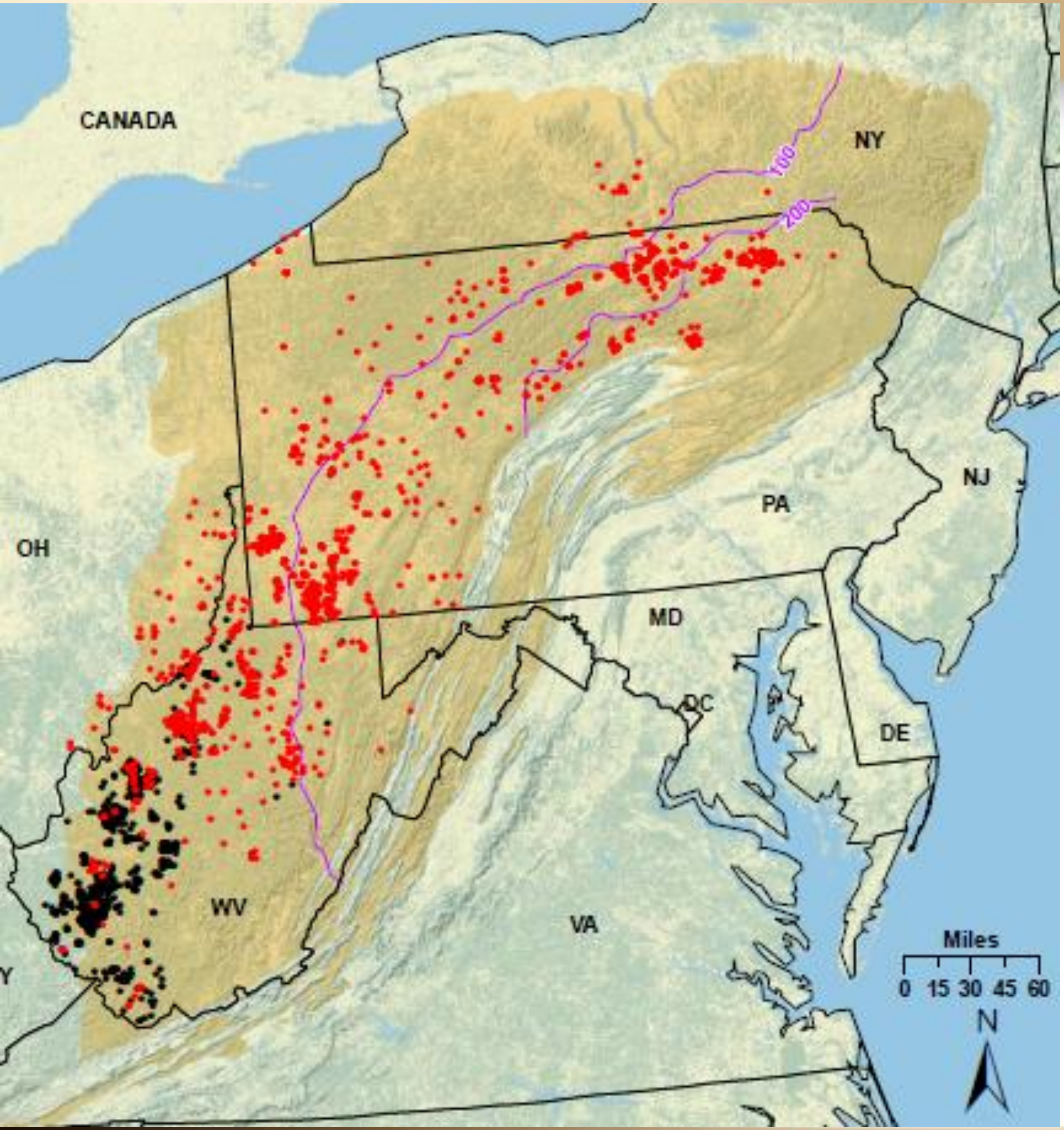
Marcellus Geology

- Areal extent: 34 million acres (53,125 sq. mi.)
- Depth: 4,000 to 8,500 feet
- Thickness: 50 to 250 feet
- Total Organic Carbon: 2% to 10%
- Kerogen: Type II to Type III

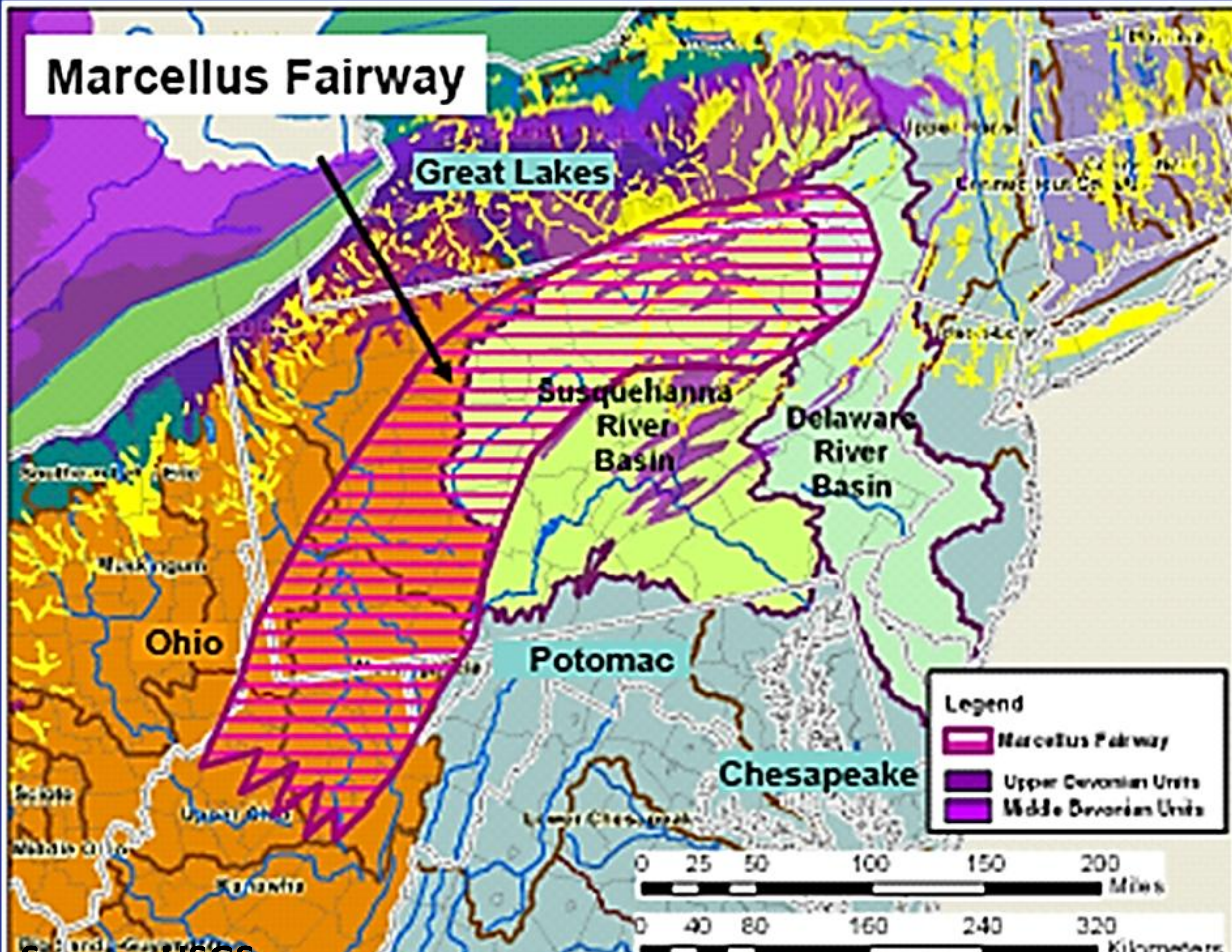


Producing Marcellus Wells

Red: Marcellus wells

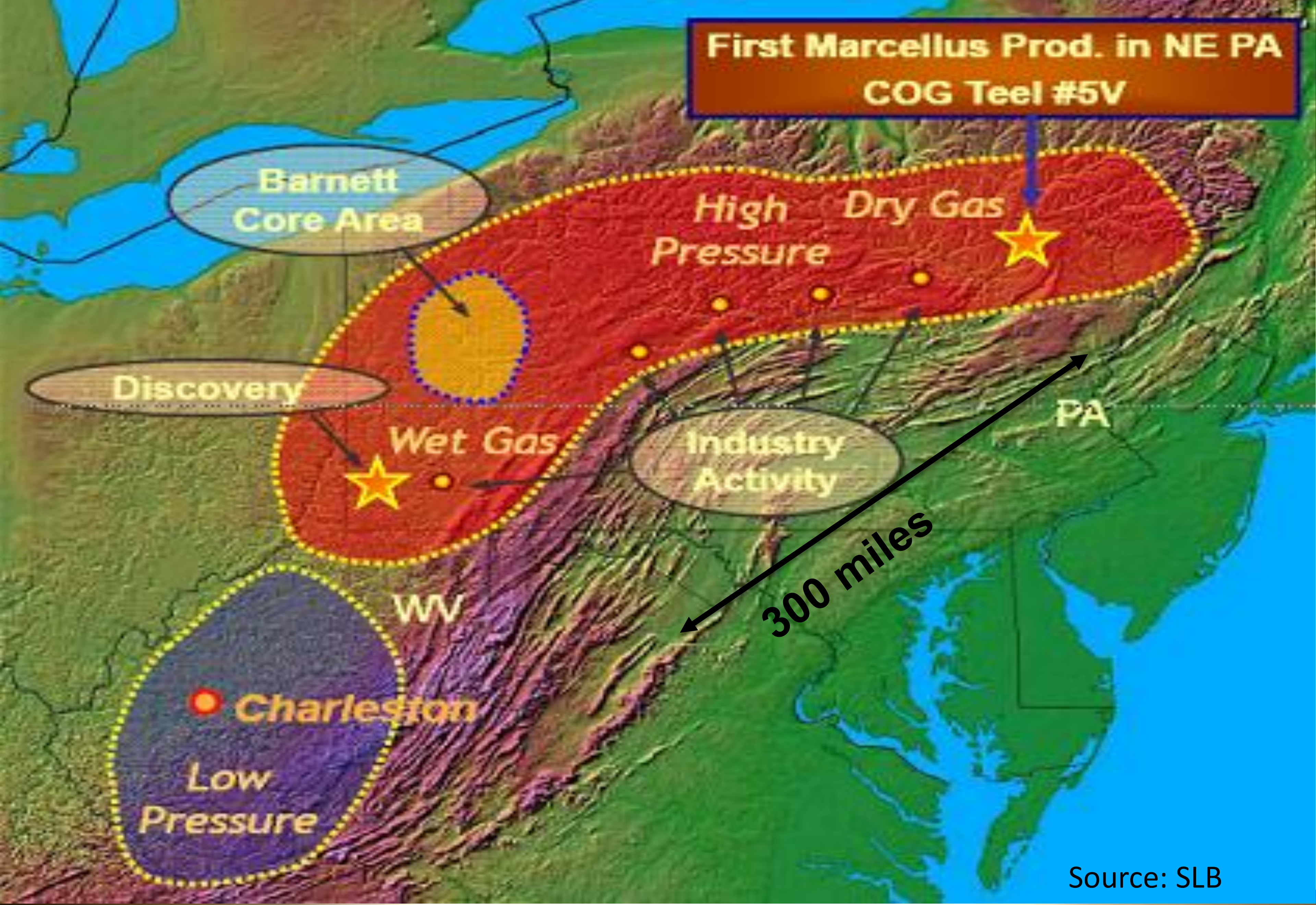
Black: Marcellus commingled with other zones.

Source: EIA
As of July 2011


Marcellus Fairway
Great Lakes
Susquehanna River Basin
Delaware River Basin
Ohio
Potomac
Chesapeake
Legend
Marcellus Fairway
Upper Devonian Units
Middle Devonian Units
0 25 50 100 150 200
Miles
0 40 80 160 240 320

Key Characteristics

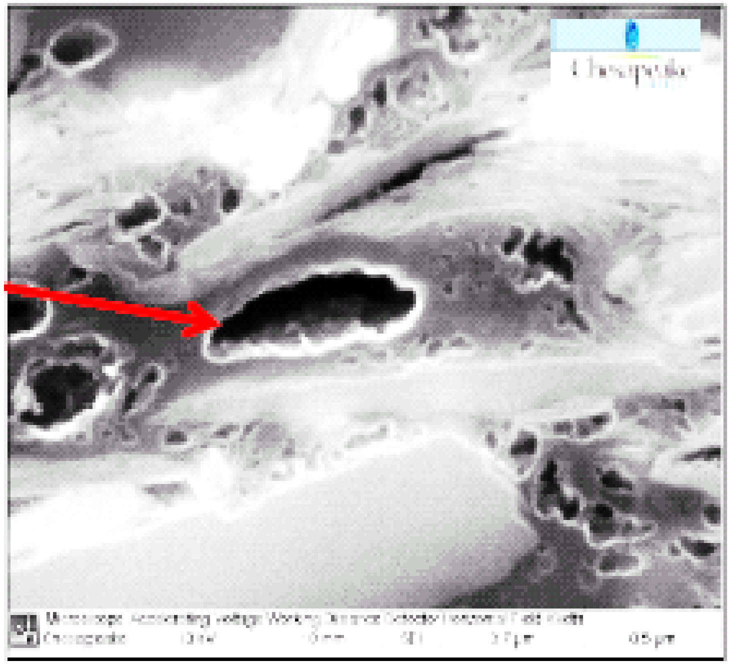
- The Marcellus shale is naturally fractured throughout the Appalachian Basin.
- It carries two vertical joint sets, and hydraulic fracturing works well to exploit these joint sets.
- It carries both organic and inorganic porosity.
- Pressure regimes vary from high to transitional to low.
- The play's west side has high-BTU gas.


First Marcellus Prod. in NE PA
COG Teel #5V
Barnett
Core Area
High
Pressure
Dry Gas
Discovery
Wet Gas
Industry
Activity
PA
300 miles
WV
Charleston
Low
Pressure
Source: SLB

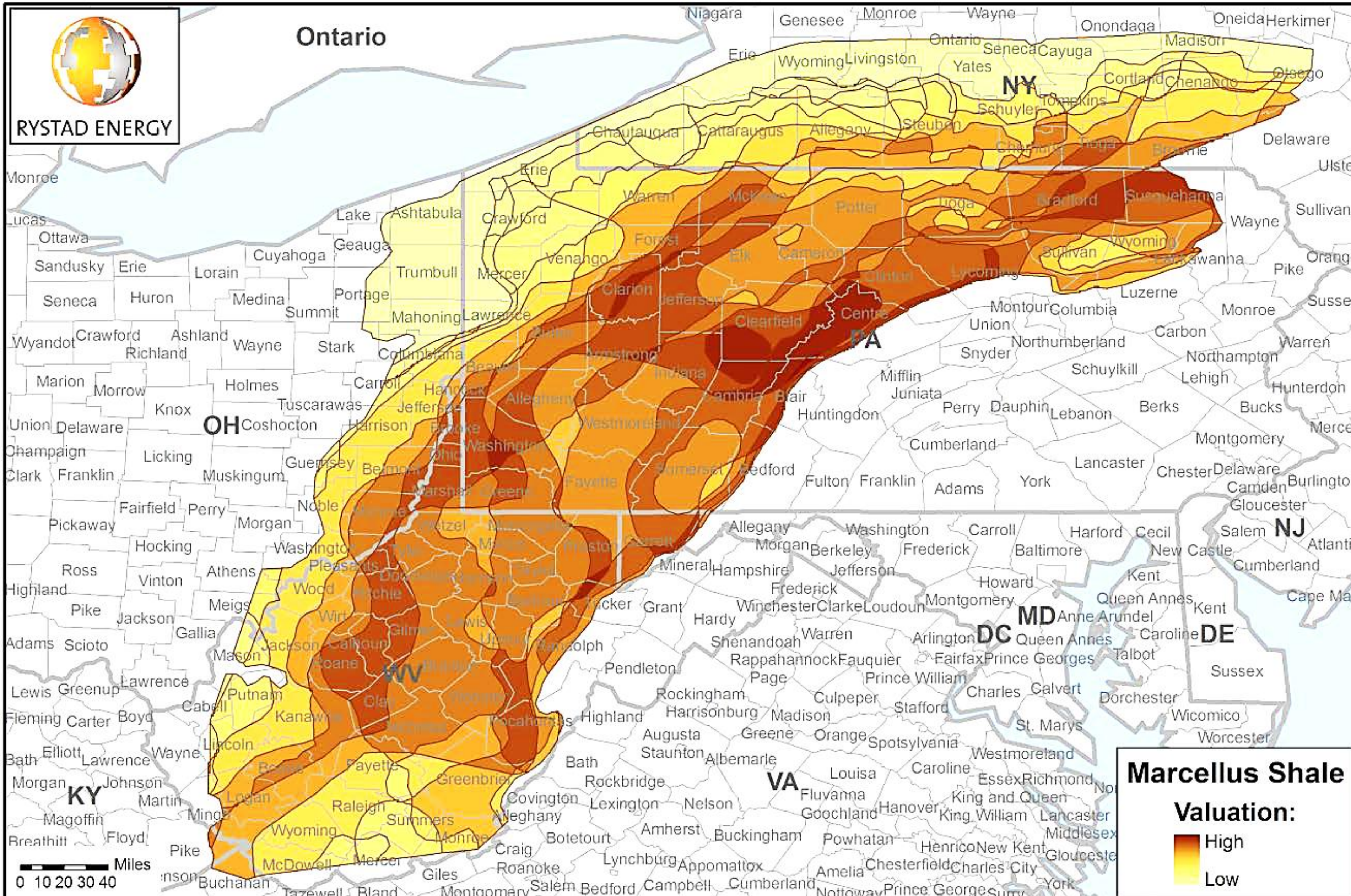
Marcellus Pore Types

- **Matrix Intergranular**
- **Kerogen Intraparticle**

Organic porosity is developed within diagenetically altered kerogen.



Source: Dr. John Ward: Marcellus Porosity Regional Viewpoint, DUG East


RYSTAD ENERGY
Ontario
NY
PA
OH
WV
MD
DC
DE
NJ
VA
KY
Miles
0 10 20 30 40
Marcellus Shale Valuation:
High
Low

Recoverable Resources

- OGIP: 20 to 150 Bcf/sq. mile.
- U.S.G.S. recently assessed mean undiscovered natural gas resource of 84 Tcf and mean NGL resource of 3,379 million barrels. That equates to 102.5 Tcfe. Last estimate of proved reserves in 2009 was 4.5 Tcfe, for a total of 107 Tcfe.
- Hart Energy's North American Shale Quarterly service estimates 130 Tcfe of economically viable resources.

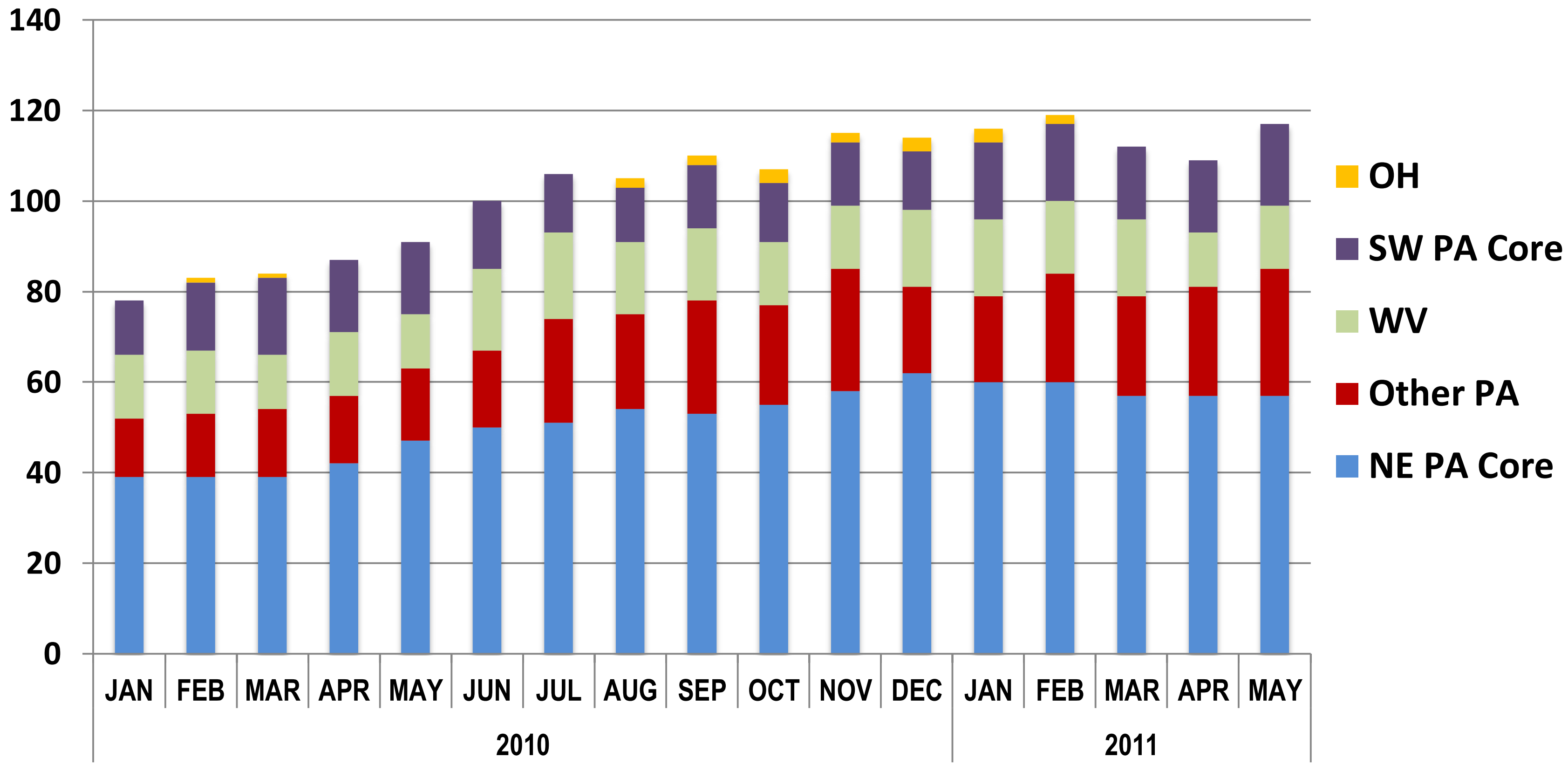
Marcellus Well Specifics

- Well Cost: $3.5- to $6.5 million.
- Laterals: ~ 3,500 to 4,500 ft.
- Average well design: 10-12 frac stages, pumping 400,000 gallons of water and 400,000 lbs of sand per stage.
- Total per-well requirements: 115,000 barrels of water and 2,400 tons of sand.

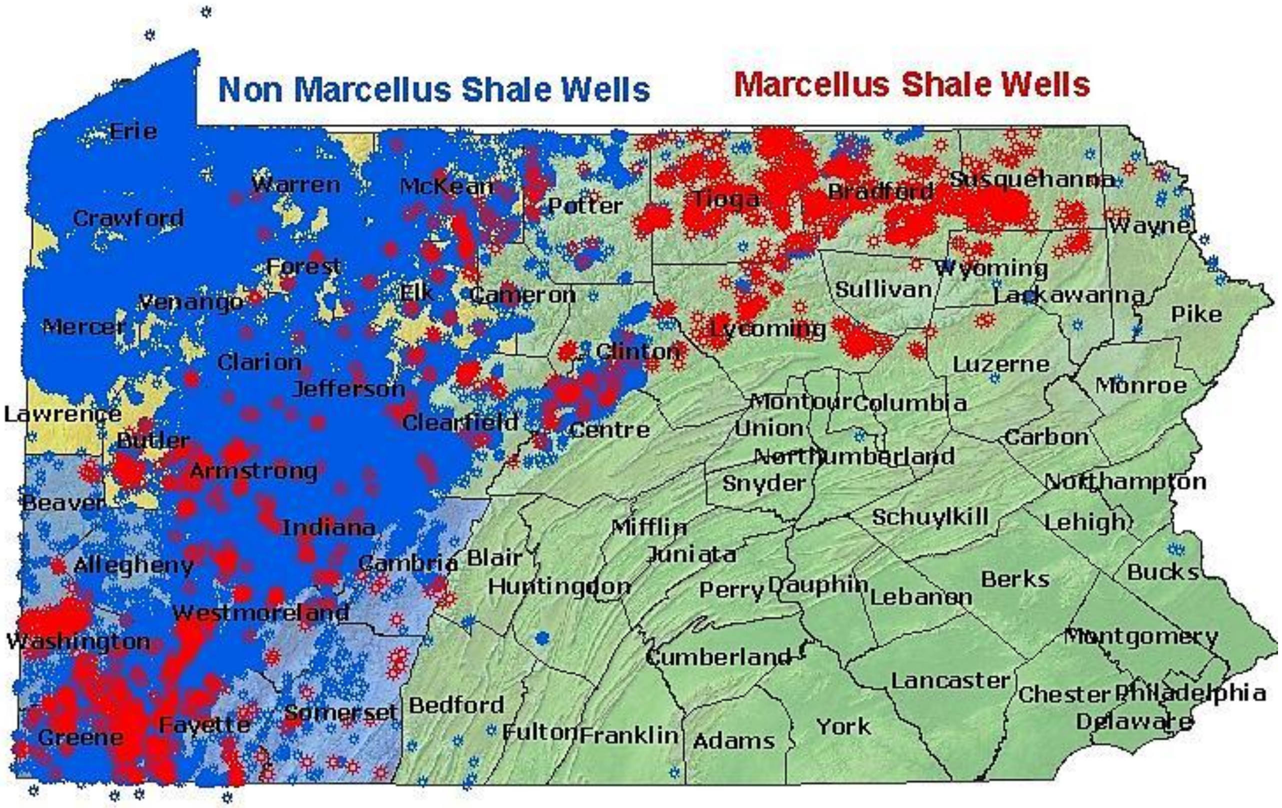
Marcellus Economics

- Average well makes 4.7 Mmcfe per day for its first 30 days; average EUR is 5.2 Bcfe.
- $5-million per-well cost.
- NPV = $3.83 million per-well average.
- Average breakeven costs for the Marcellus for the top operators is $3.85 per Mcf.

Rig Count By Area



Pennsylvania Activity



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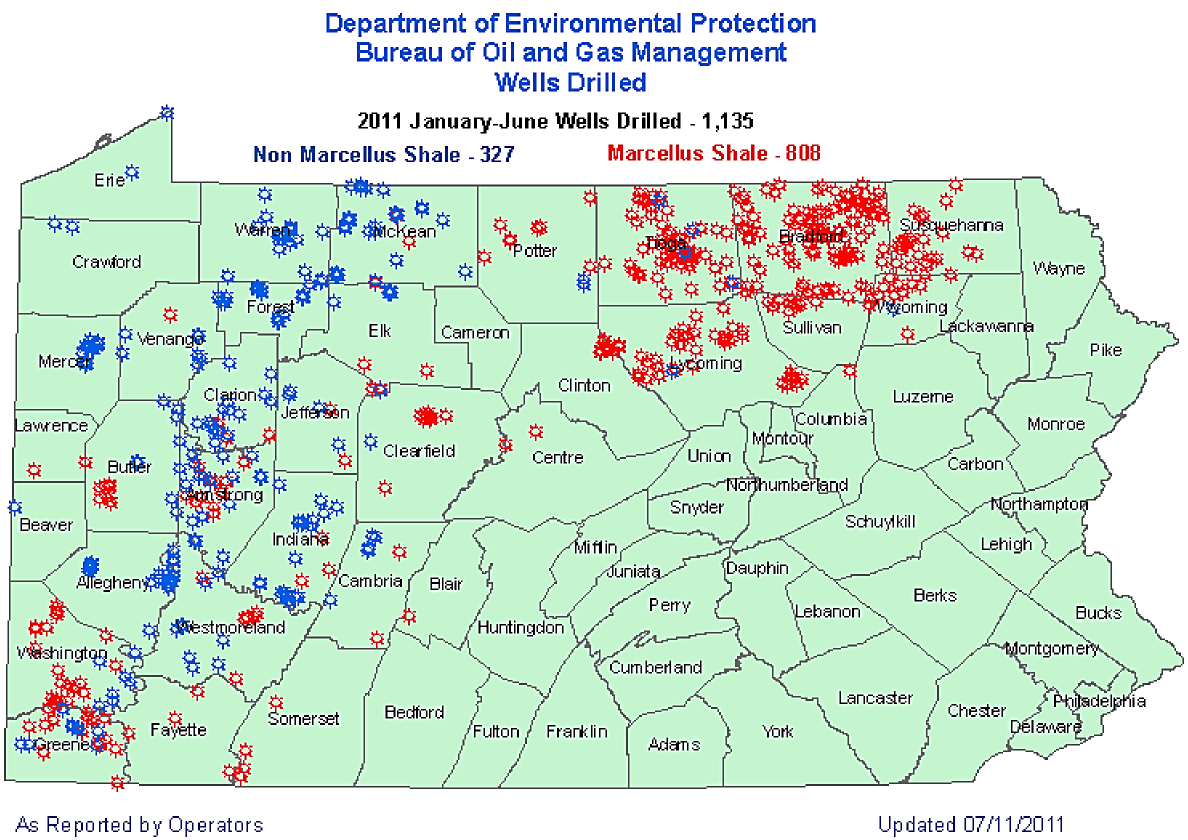
2011 1H Wells Drilled, Pennsylvania



Marcellus Top Operators, Pennsylvania

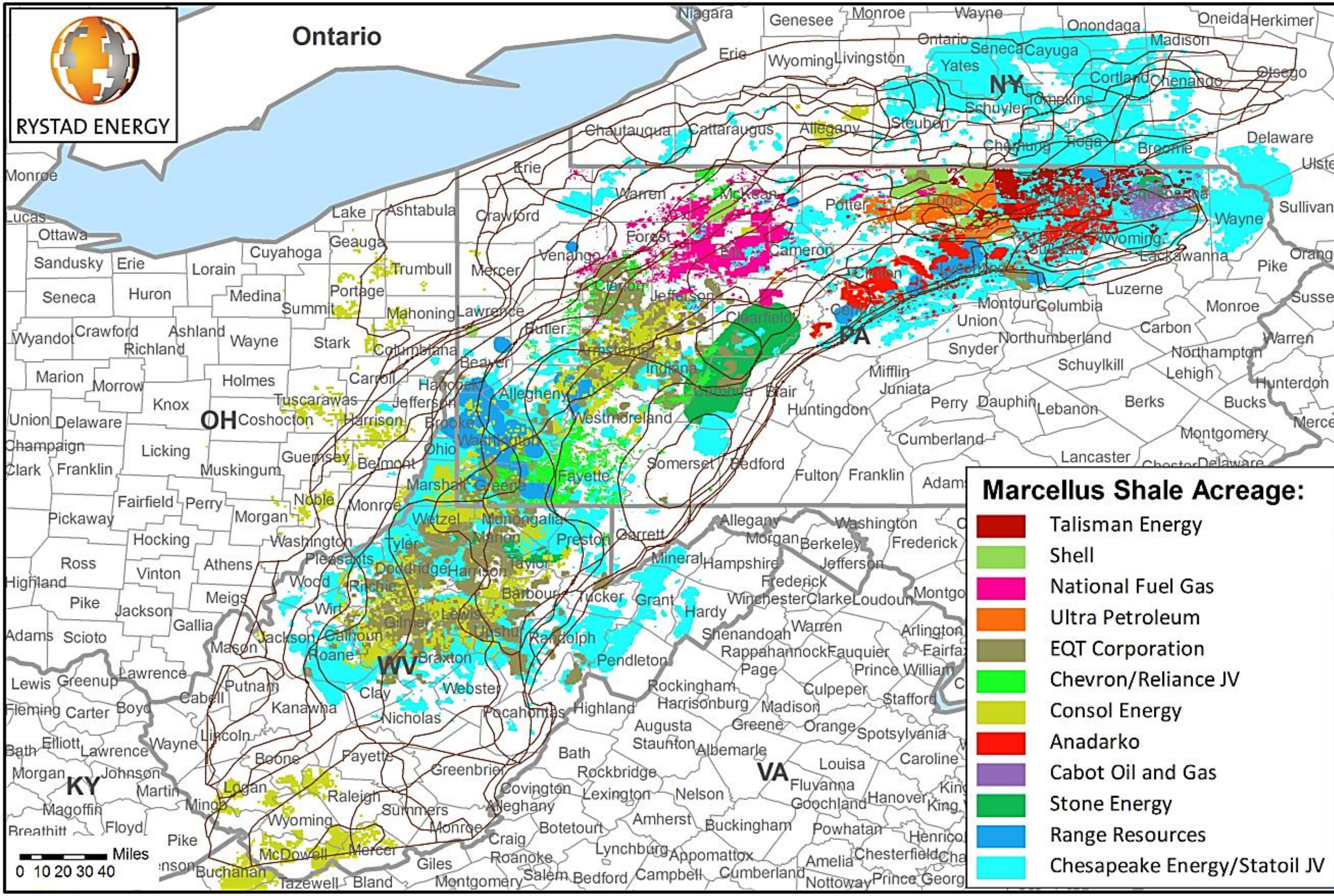
Top 5 Operators Represent 54% of Rig Count

E&P	1Q 10	2Q 10	3Q 10	4Q 10	1Q 11	2Q 11
Chesapeake	13	15	21	22	25	23
Range	11	11	10	11	12	12
Talisman	9	12	10	12	11	10
Anadarko	3	4	6	6	7	7
Chief	3	4	5	5	5	6
All Others	47	47	47	59	58	50
Marcellus	86	93	99	116	118	108

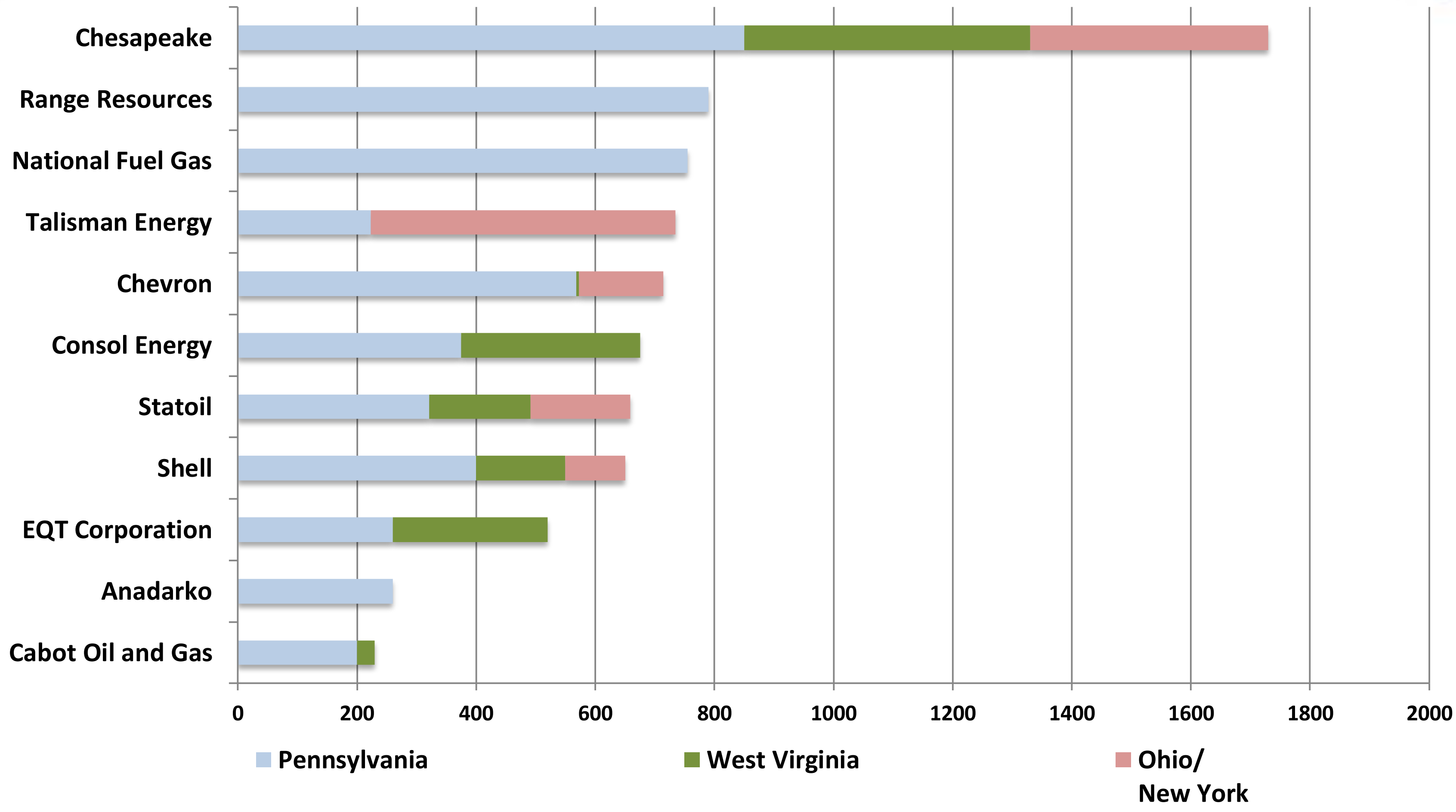
Smith International, Hart Energy

West Virginia Activity

- The new-generation Marcellus play covers ~3 million acres in northern WVa.
- The Marcellus is thinner and has less pressure in WVa, as compared to Pa.
- About 30 rigs are active in WVa.
- Most active operators in WVa are Chesapeake and Antero.


RYSTAD ENERGY
Ontario
Marcellus Shale Acreage:
Talisman Energy
Shell
National Fuel Gas
Ultra Petroleum
EQT Corporation
Chevron/Reliance JV
Consol Energy
Anadarko
Cabot Oil and Gas
Stone Energy
Range Resources
Chesapeake Energy/Statoil JV
NY
PA
OH
WV
VA
KY
Miles
0 10 20 30 40

Company Acreage By State, 000s of Acres



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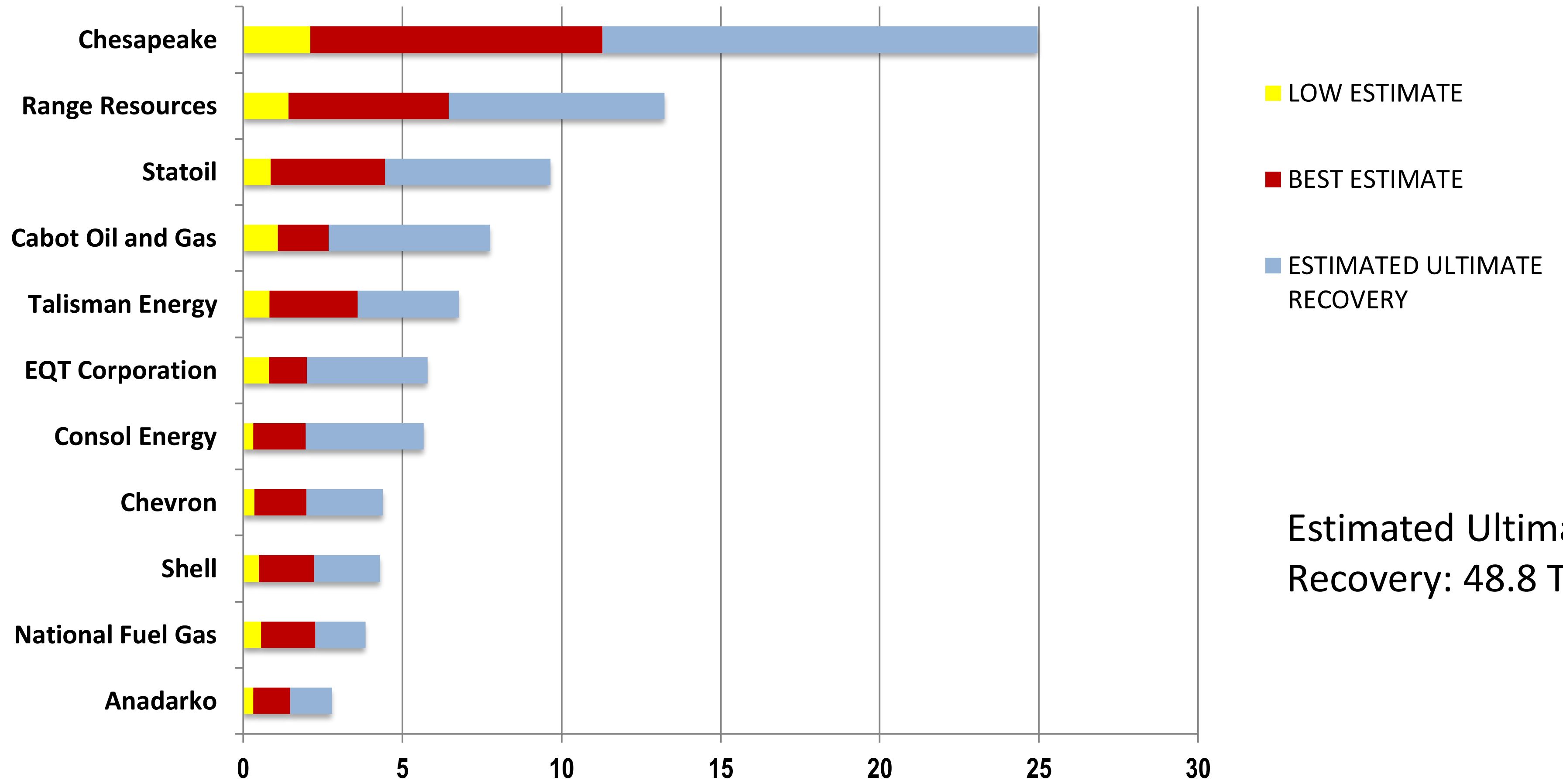
Additional Positions

These companies hold an additional 3.1 million acres:

Carrizo, Williams, Southwestern, ExxonMobil, EOG, Antero, Triana, Rex, Stone, Endeavour, Unit, Statoil, EVEnergy/Enervest, Reliance, Ultra, EXCO

Marcellus Resources by Company



Estimated Ultimate Recovery: 48.8 Tcfe

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Recent Marcellus Transactions

$21 Billion Since Jan. 1, 2010

Largest deals:

- Mitsui/Anadarko, $1.4 Billion
- Consol/Dominion, $3.5 Billion
- Reliance/Atlas, $1.7 Billion
- Shell/East, $4.7 Billion
- Chevron/Atlas, $4.3 Billion
- ExxonMobil/Phillips, $1.7 Billion

The Marcellus Narrative

- **The JV-Era of Finance:**
  Chesapeake/Statoil; Atlas/Reliance; EXCO/BG; Anadarko/Mitsui

- **The Majors Move In:**
  Shell, Chevron, ExxonMobil
  While everyone else gets oilier, majors go for Marcellus gas!

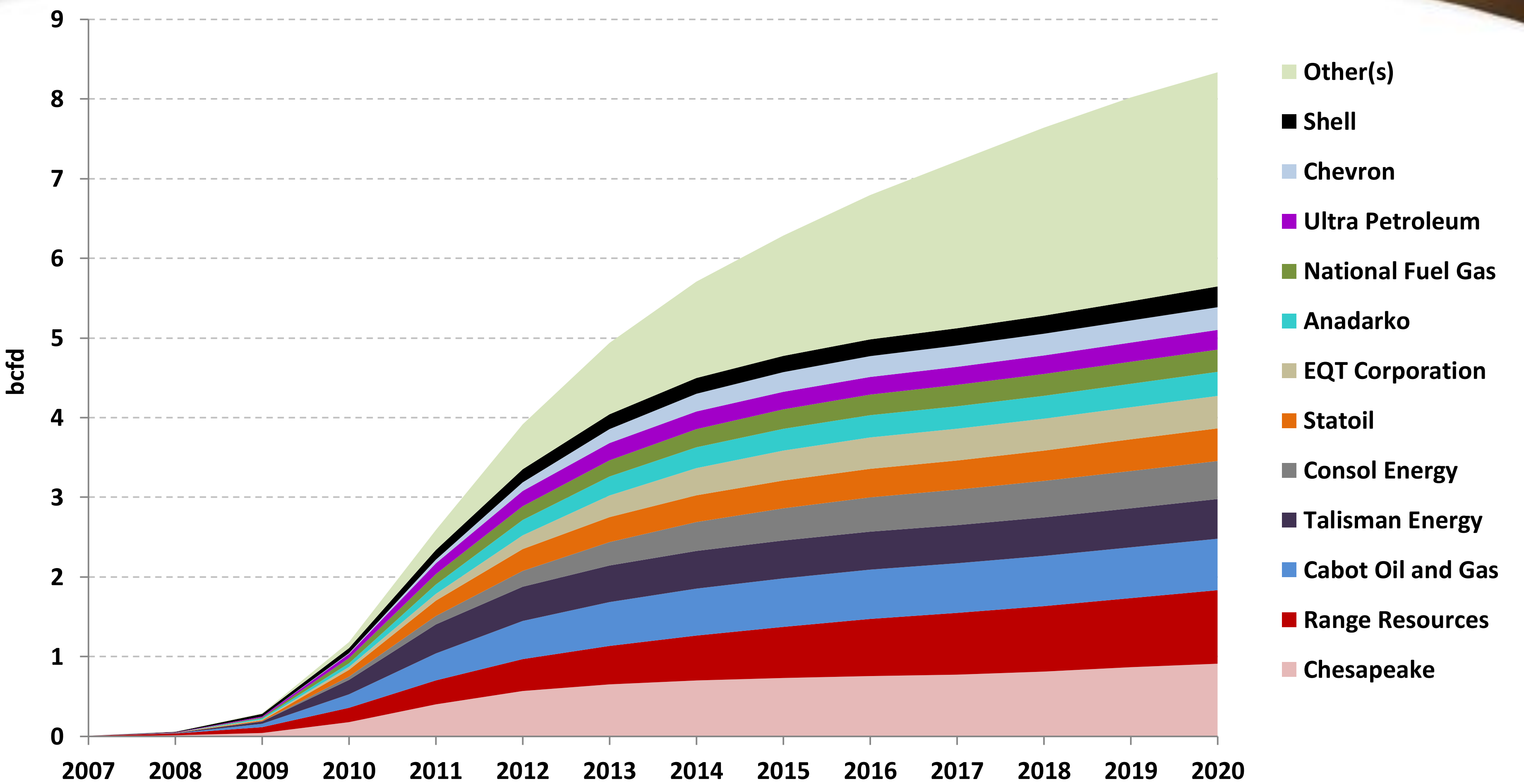
- **Play Is Becoming Concentrated.**

Marcellus Outlook

- Chevron, ExxonMobil and Shell are still early in their ramp phases.
- Another 20 rigs could be added by 2012.
- Regulatory and public relations issues could constrain activity, but will not stop it.

It's only just begun!

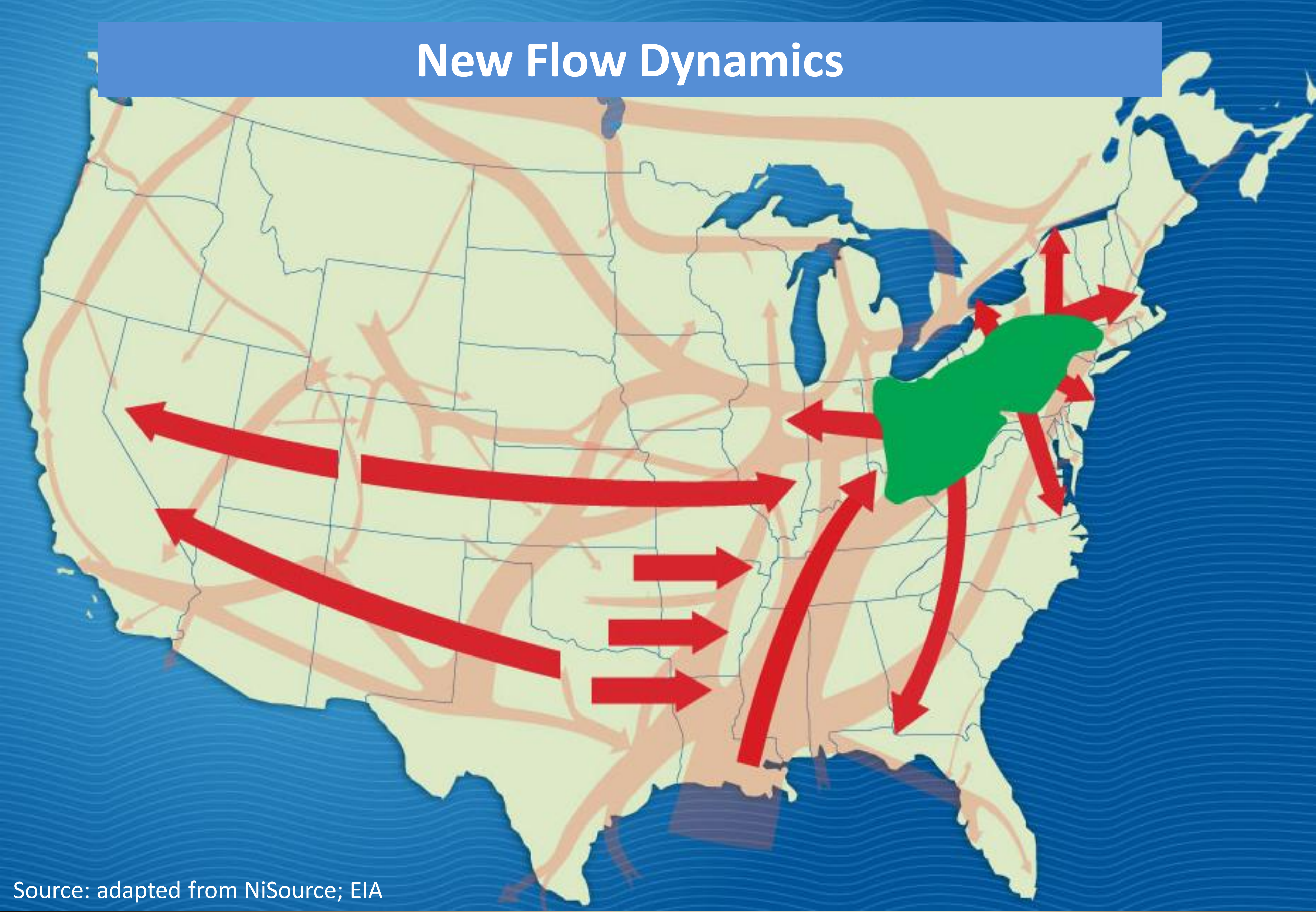
Marcellus Production Forecast



Traditional Flow of Natural Gas, Circa 2008

Source: adapted from NiSource; EIA

New Flow Dynamics



Source: adapted from NiSource; EIA

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For more information, please contact Peggy Williams
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Thank You!