The Economic Impact of Investment in Gas Infrastructure in the Marcellus Shale Region

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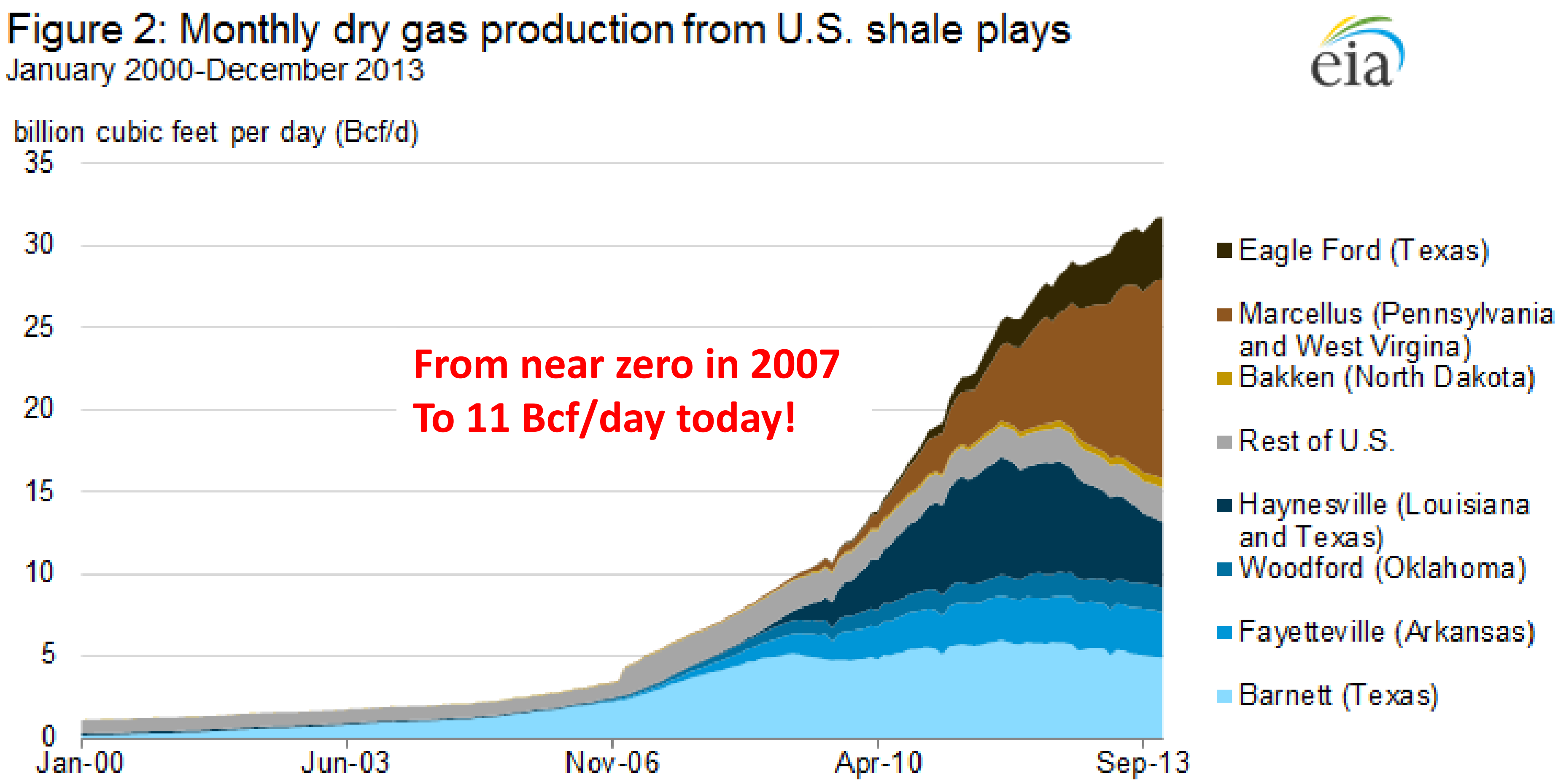
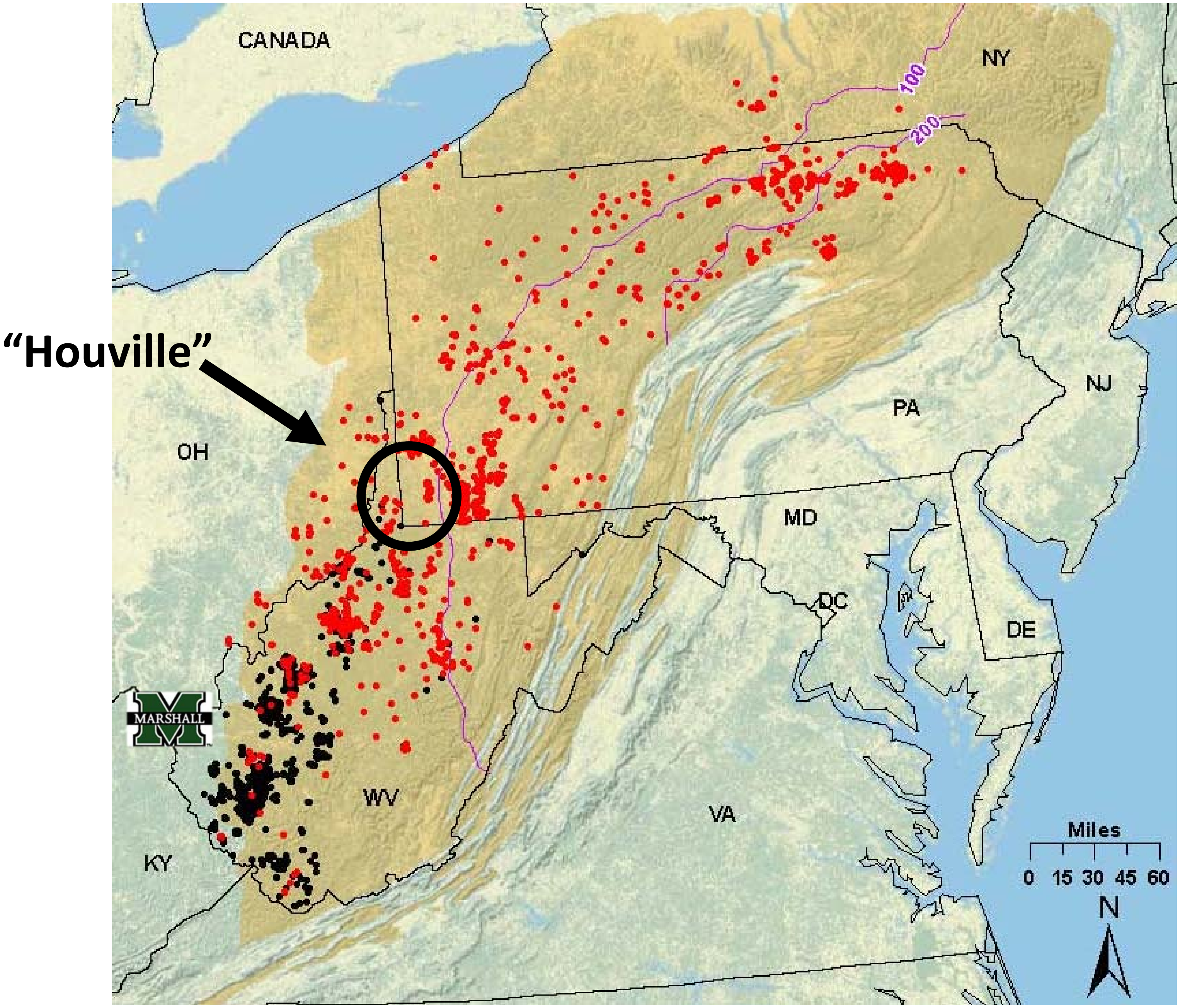
US Shale Plays

Marcellus Now Largest Shale Producer

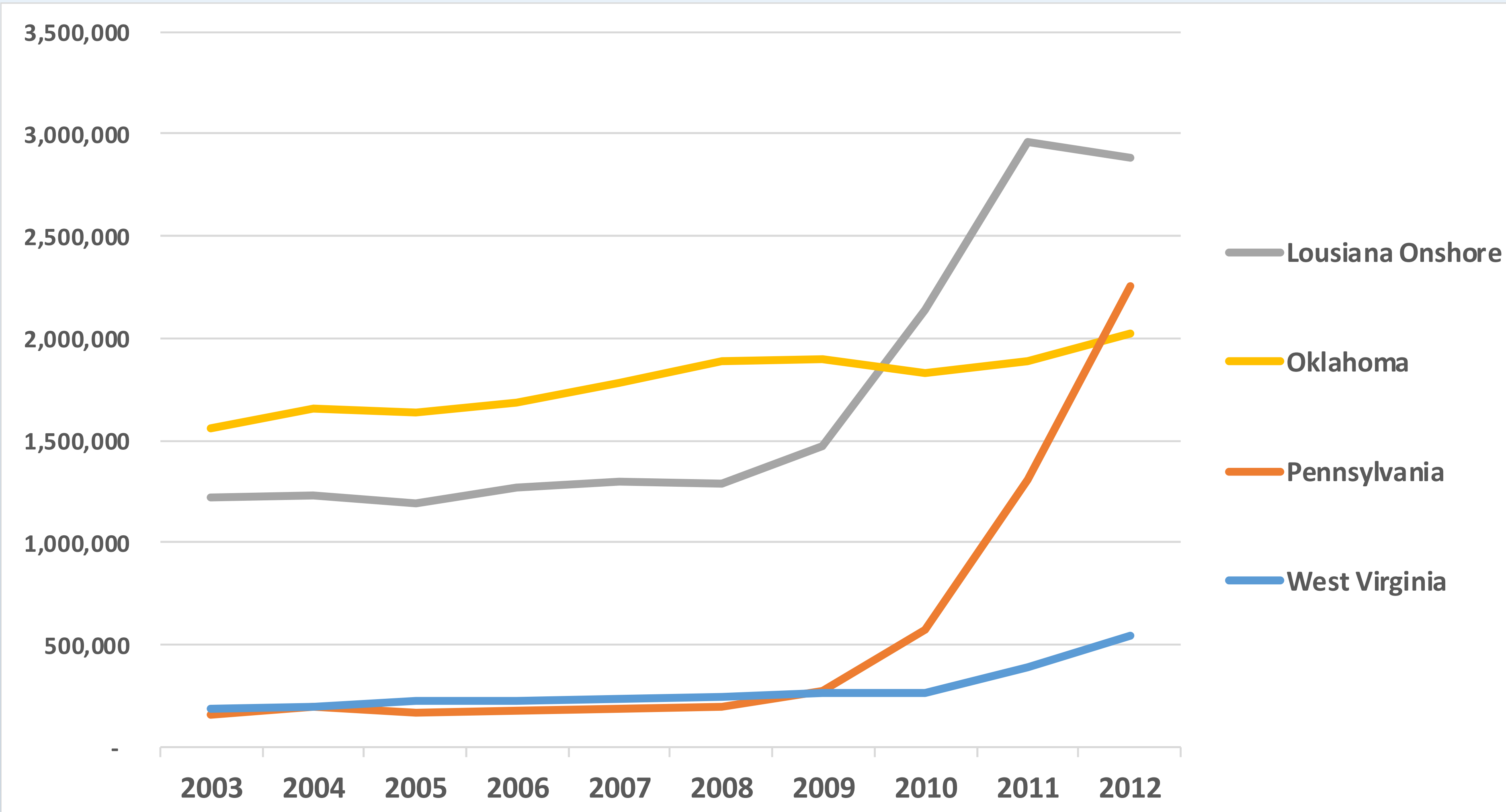


Source: Calculations based on data from Drillinginfo and EIA's Drilling Productivity Report.
Note: EIA calculations from Drillinginfo from wells within a geological shale formation are available through November 2013. December 2013 is estimated by multiplying the November 2013 number by the change from November 2013 to December 2013 in each shale play's aggregated county totals contained in the Drilling Productivity Report.

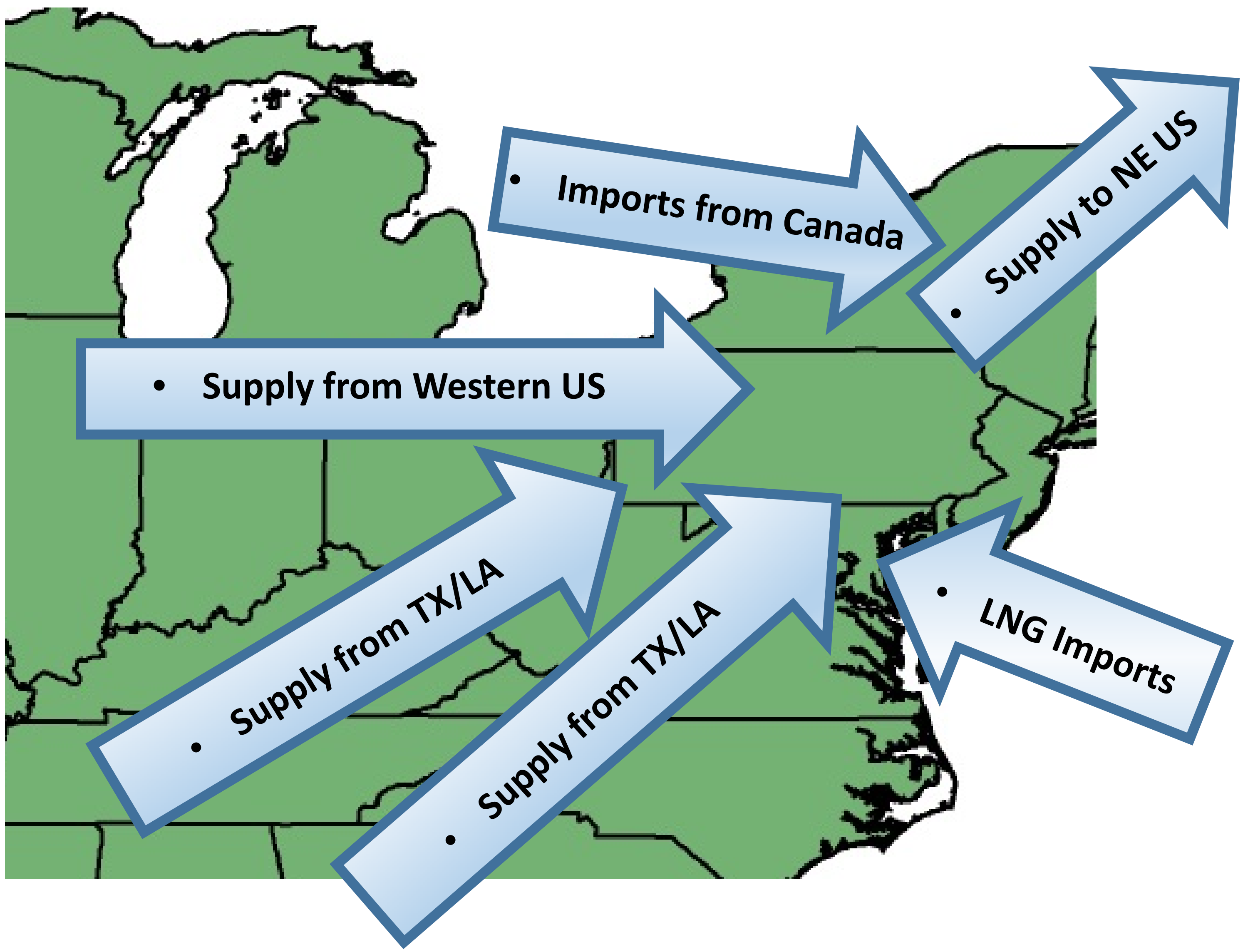
Marcellus Shale Wells in 2011 (black = commingled)



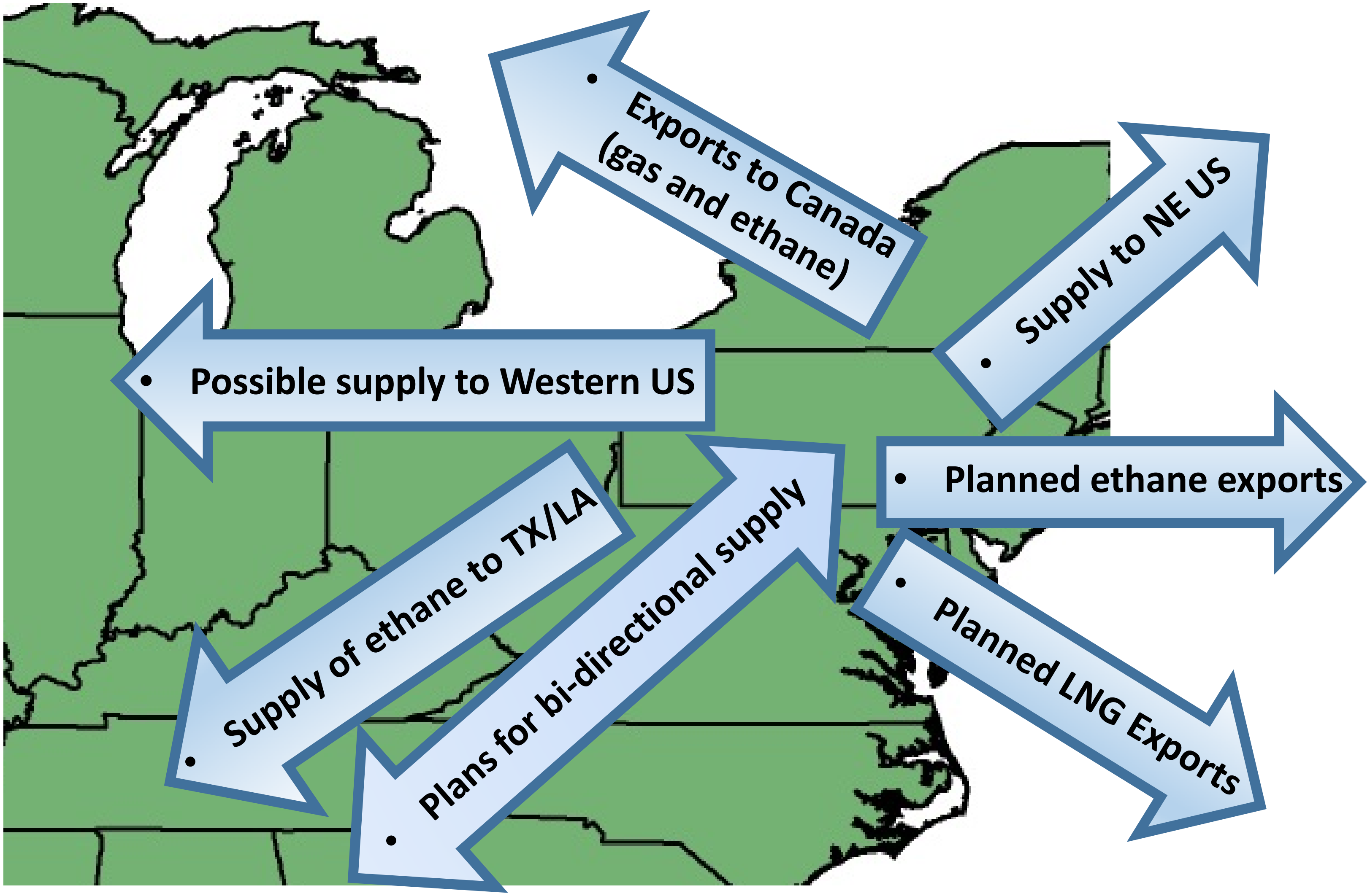
Recent Gas Production Trends by State (mmcf)



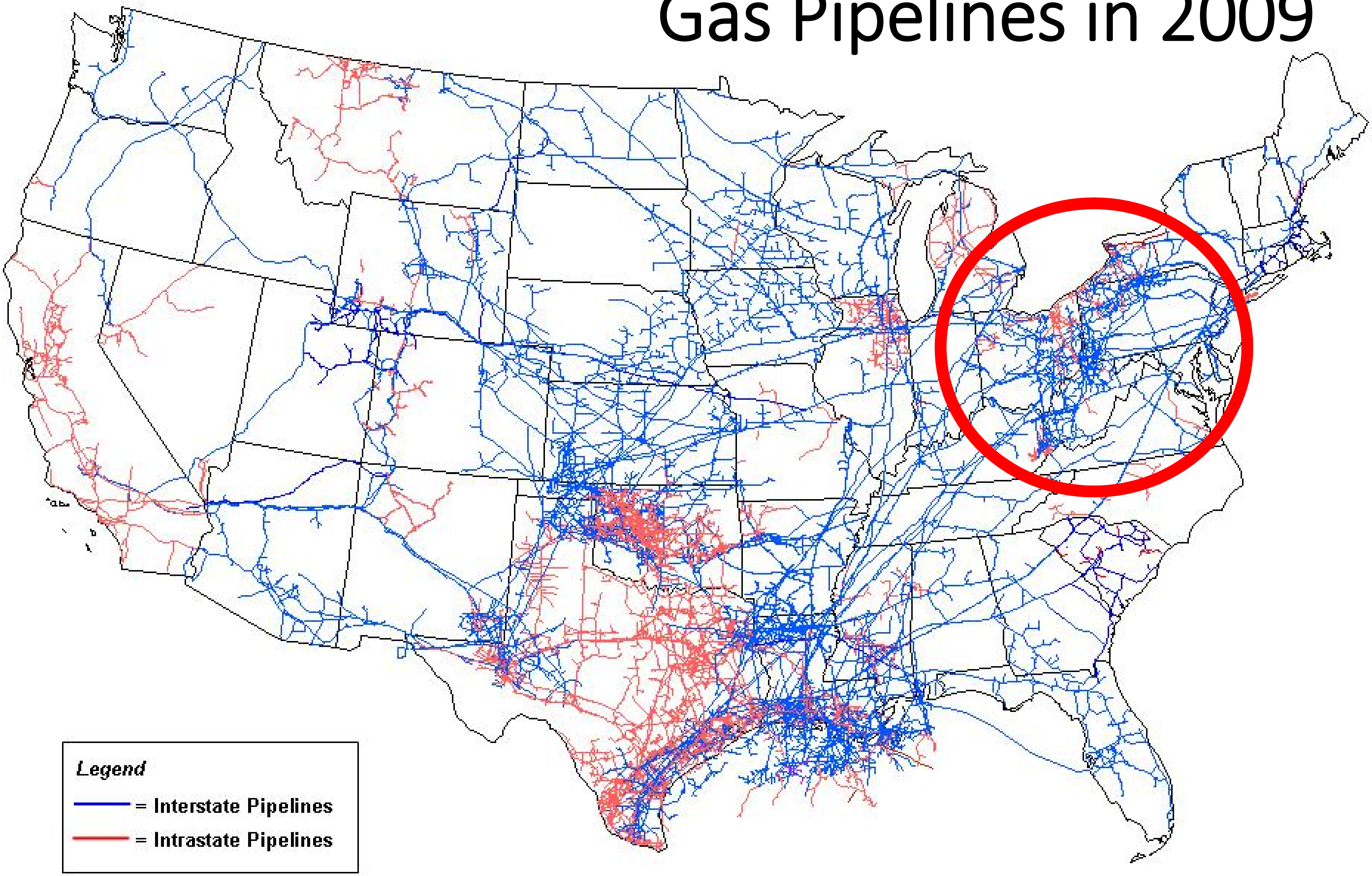
Before Marcellus….



What is happening or about to happen….

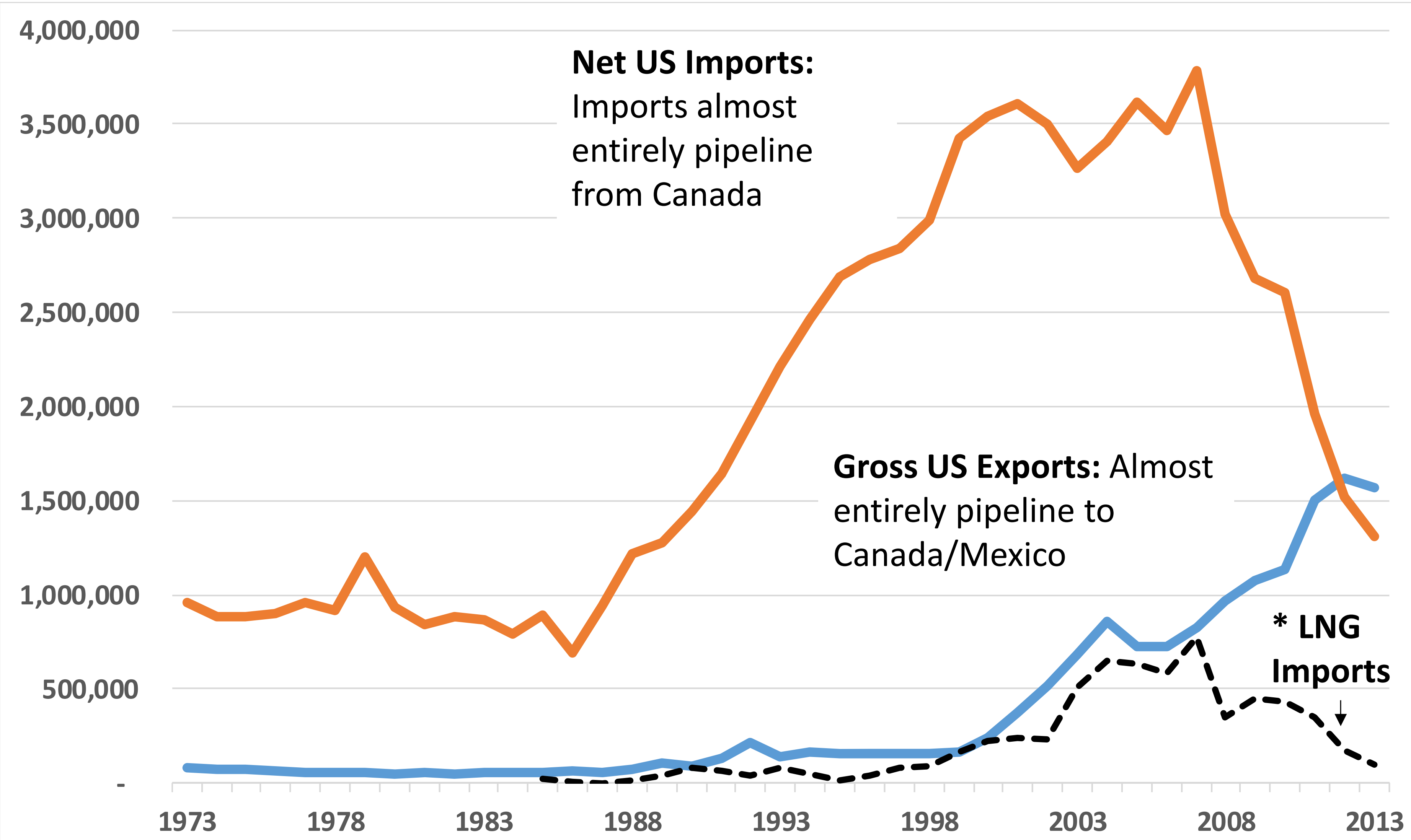


Gas Pipelines in 2009



Source: Energy Information Administration, Office of Oil & Gas, Natural Gas Division, Gas Transportation Information System

On the Export Front… (in MMcf)



* Algeria, Egypt, Qatar, Trinidad & Tobago, Yemen + others

Facts About the Marcellus Shale

- The world's second largest gas field – estimated at around 369 Tcf of gas in place and 141 Tcf technically recoverable

- Second to Qatar's North Dome field - estimated 900 Tcf of recoverable gas/Iran's South Pars portion of the same field is 360 Tcf but not geologically separate

- Currently about <u>20%</u> of US gas production and expected to grow to <u>25%</u> by 2015

- Much production is "wet" gas, with high % NGPLs – maybe up to 1,400 btu/cf vs. 1,027 btu/cf "dry".

Marcellus-Induced Investment Enables Production

- **Pre-Production:** geology, legal, land related
- **Drilling/Production:** <u>around</u> $50 billion invested
- **Gathering/Processing/Fractionation:** at least 20 new and expanded facilities, part of midstream services segment, ≥ $9 billion in capital since 2010
- **Transmission:** ≥ $9 billion in capital since 2010
  - expansion of major pipelines in region (TGP, Transco, TETCO)
  - Compression stations
  - Dedicated ethane lines (Mariner West, ATEX)

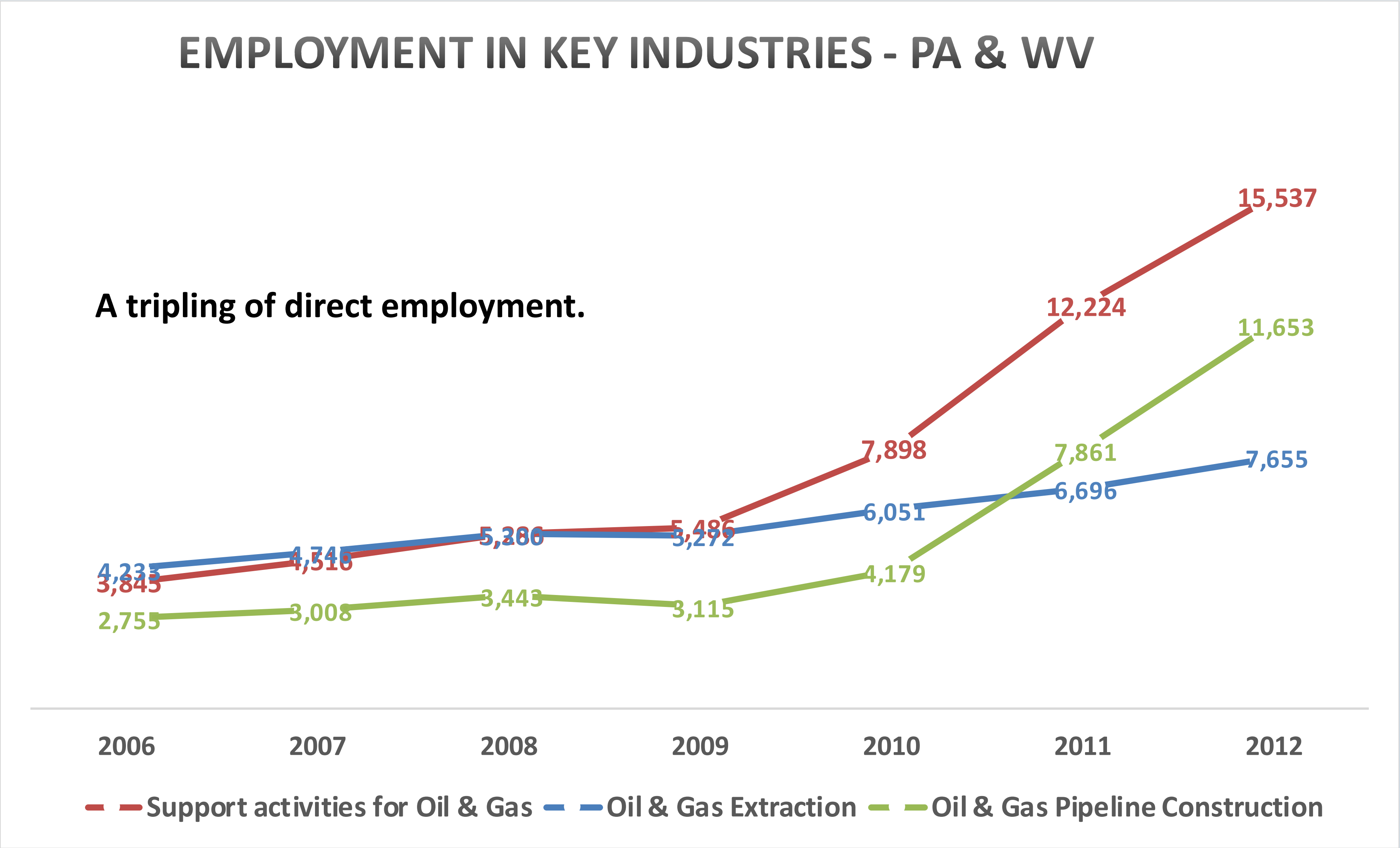
…AND MUCH MORE TO COME.

Economic Impact is Largely Not from Capital, and Extends Beyond the Region

- **Construction/Drilling** – labor and equipment
  - ❑Horizontal wells cost more than vertical wells (laterals, water supply, etc)
  - ❑Mid-stream capital larger for wet gas
- **Operations** – leasing, field services, utilities, etc.
  - ❑Mid-stream activity more significant for wet gas
- **Transportation** – mostly pipeline but some rail
- **Indirect impact of reduced natural gas prices**
  - Many electricity and gas customers benefit
  - Coal and nuclear plants do not benefit
  - Value Added impacts in manufacturing eventually

Marcellus prices were below the Henry Hub price for almost all of 2012, 2013 and into 2014.

Pre-Marcellus vs. the Developing Economy



Estimates of Total Jobs Impacts Vary

- West Virginia in 2009: PSU **(13,200)** vs. WVU **(7,600)**

- Pennsylvania in 2010: PA College of Technology and Penn State Extension **(44,000),** PSU - Considine et al **(140,000)**

- Pennsylvania in 2012: IHS Insight **(102,700)**

- WV & PA in 2012: IHS Insight **(114,500)**

- Differences depend on what spending is included and if the focus includes only permanent operations jobs or also includes construction.

Statements Made about the Marcellus Shale

- **“A Game-Changer”**
- **“The Bane of Forecasters” – Morningstar**
- **“The Marcellus Changes Everything” – RBN Energy**
- **“Appalachian Production Crying Out for Interstate Connections” – *Natural Gas Intelligence*, July 2013**