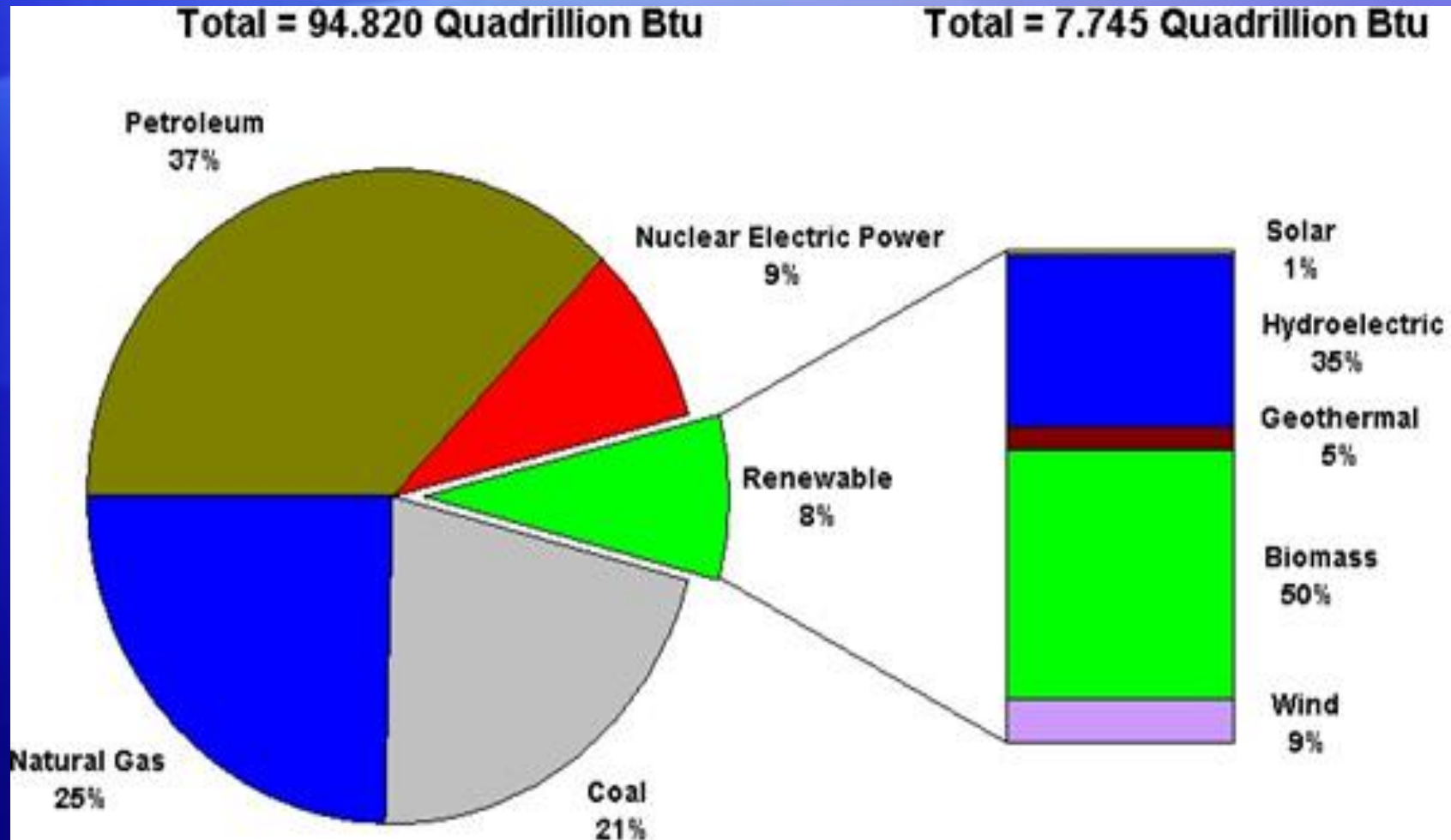


Pennsylvania's Marcellus Resource

Recent Trends, Future Impacts



U.S. Energy Consumption



Source: Energy Information Administration, 2009



73 MW
solar farm
in Thailand

Change in Our Energy Future



Energy consumer to producer/exporter. Value-added??



Emerging Trends

- NG for power generation increased 3% -2/yr
- Most gained from coal-fired plants
 - permitting?
 - New EPA rules?
- Estimates of 35% by 2030 vs. 22% in 2010
 - GHG emission reduction of 44% by 2030
 - climate legislation??
 - political implications –alternatives %??
 - possible nuclear policy changes



Utilization—A New Future??

- PA's public policy for energy?
 - Public initiatives
 - Private efforts
 - New funding?
- Power generation
 - conv. vs. fuel cell
- Feedstock
 - industrial use
 - plastics, paper, steel, glass all seeking options
 - new employment opportunities



Transportation

Transportation fuels

- \$8M in new alternative fuel usage
 - 21 new projects in PA
 - CNG for private/public use –ex. Towanda
 - refueling corridors East/West, North/South

Gas To Liquids technologies

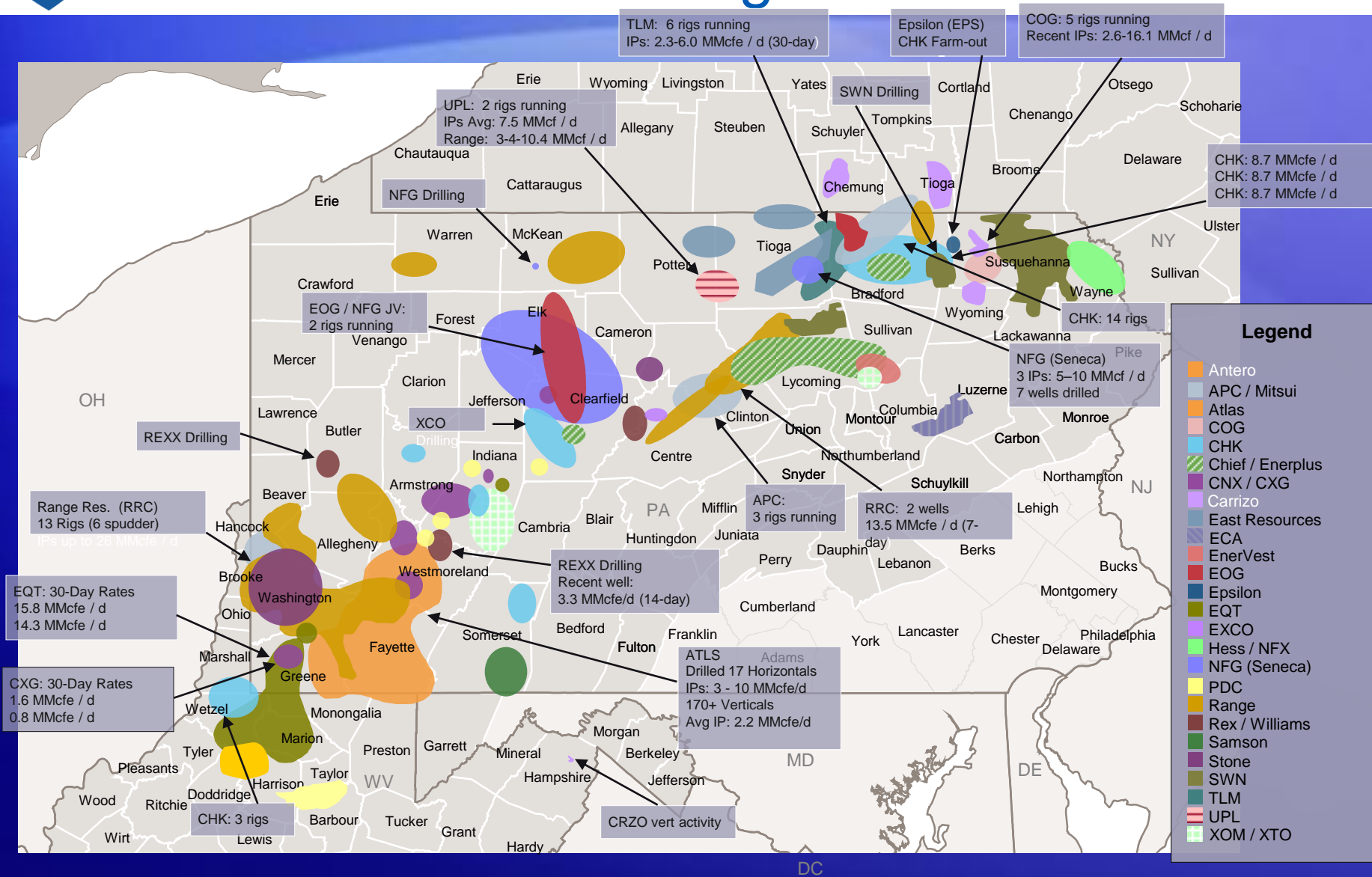
- diesel
- other more efficient fuel chemistry
- engine modification and/or redesign
- research initiatives -- Commercialize?



Marcellus Shale Economic Impact

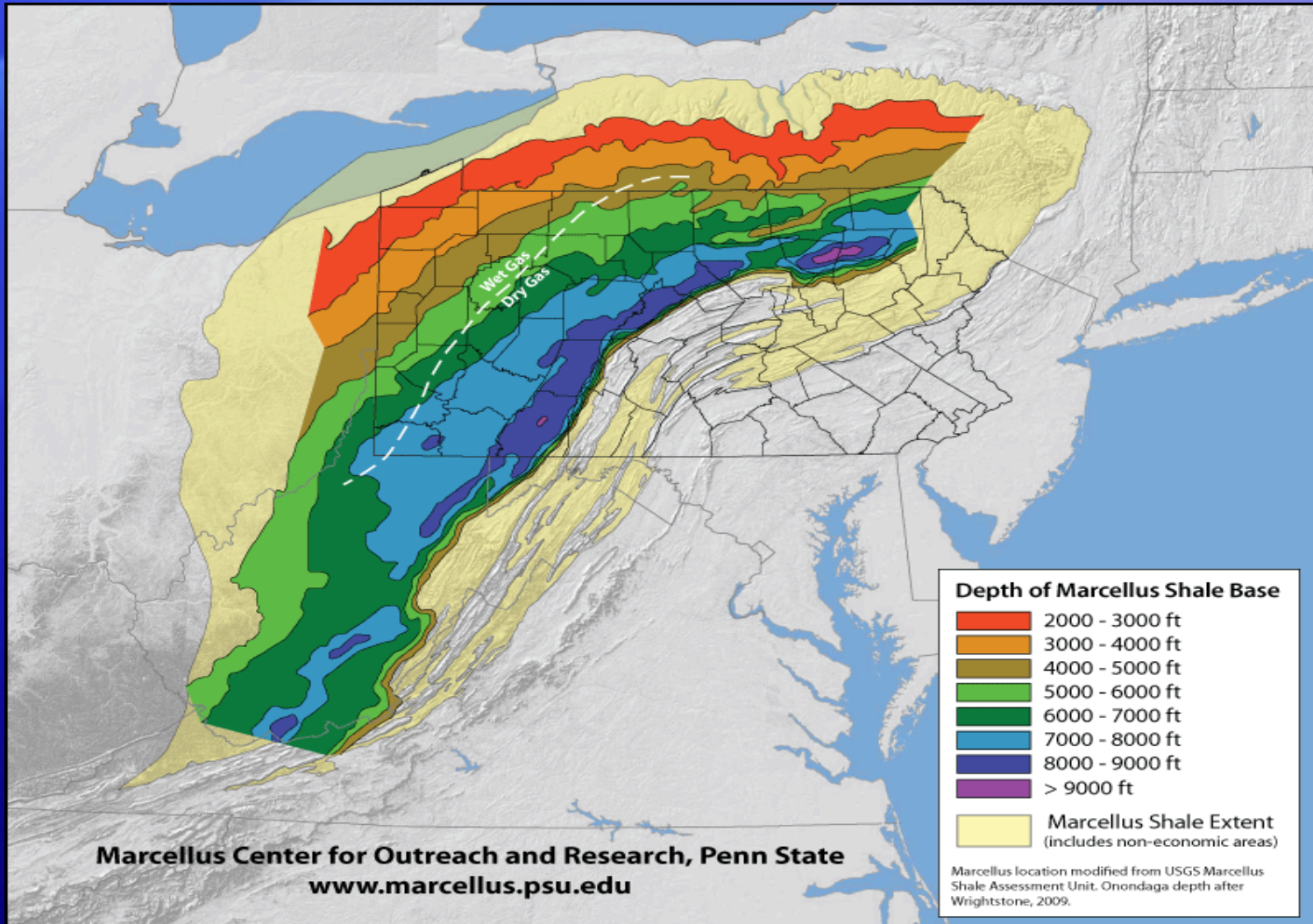
- ~60+ companies looking at Marcellus
 - est. \$8 B+ spent in '10
 - est. value of Marcellus -\$1.5T
 - Royalties to PA landowners – \$250 billion?
 - 1.2 bcf/d in Aug '10 to 5 bcf/d+ (est) in 2015
 - International interest.
 - Lowest cost shale?? Other shales??
 - New trend?? --movement towards NG liquids

Marcellus – acreage locations





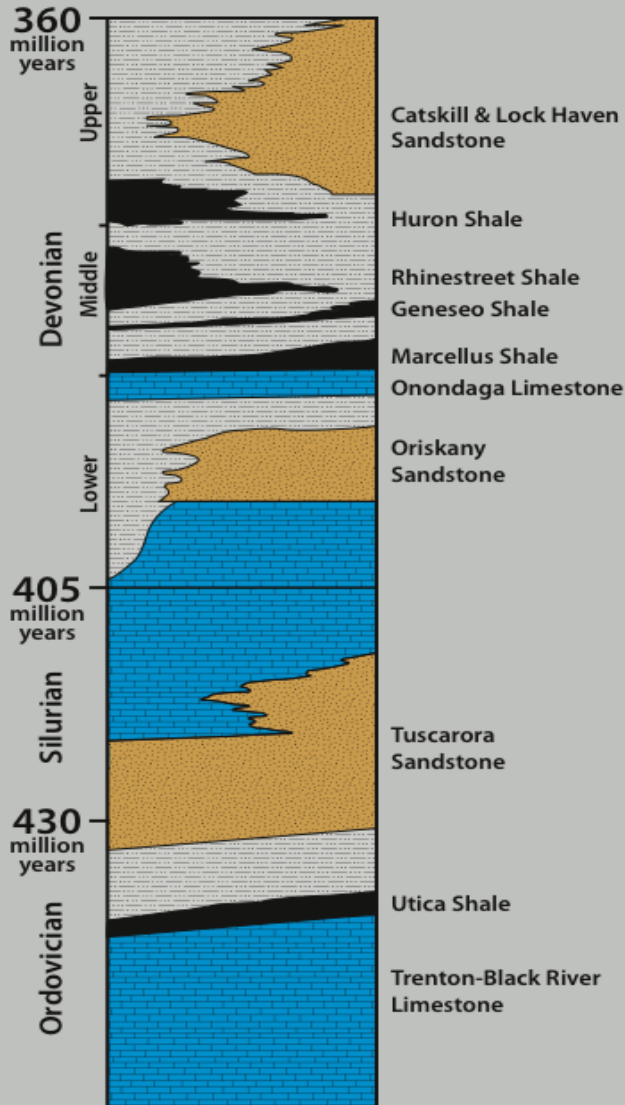
Wet/Dry Gas in PA



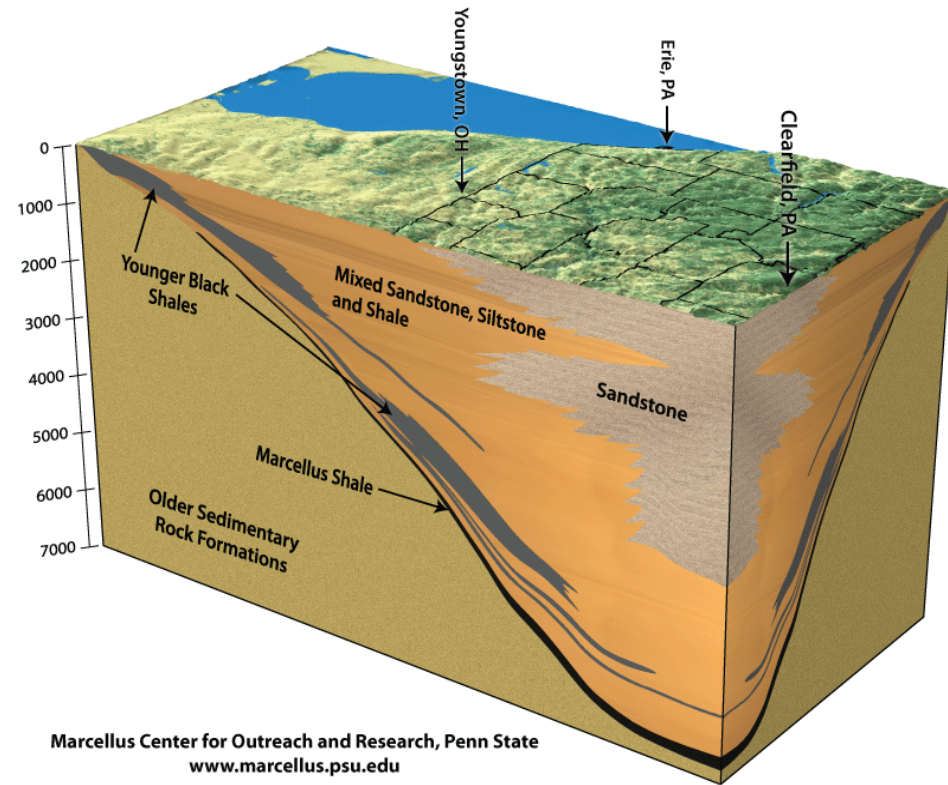


Other Shale Targets

Key Gas-Producing Formations in Pennsylvania

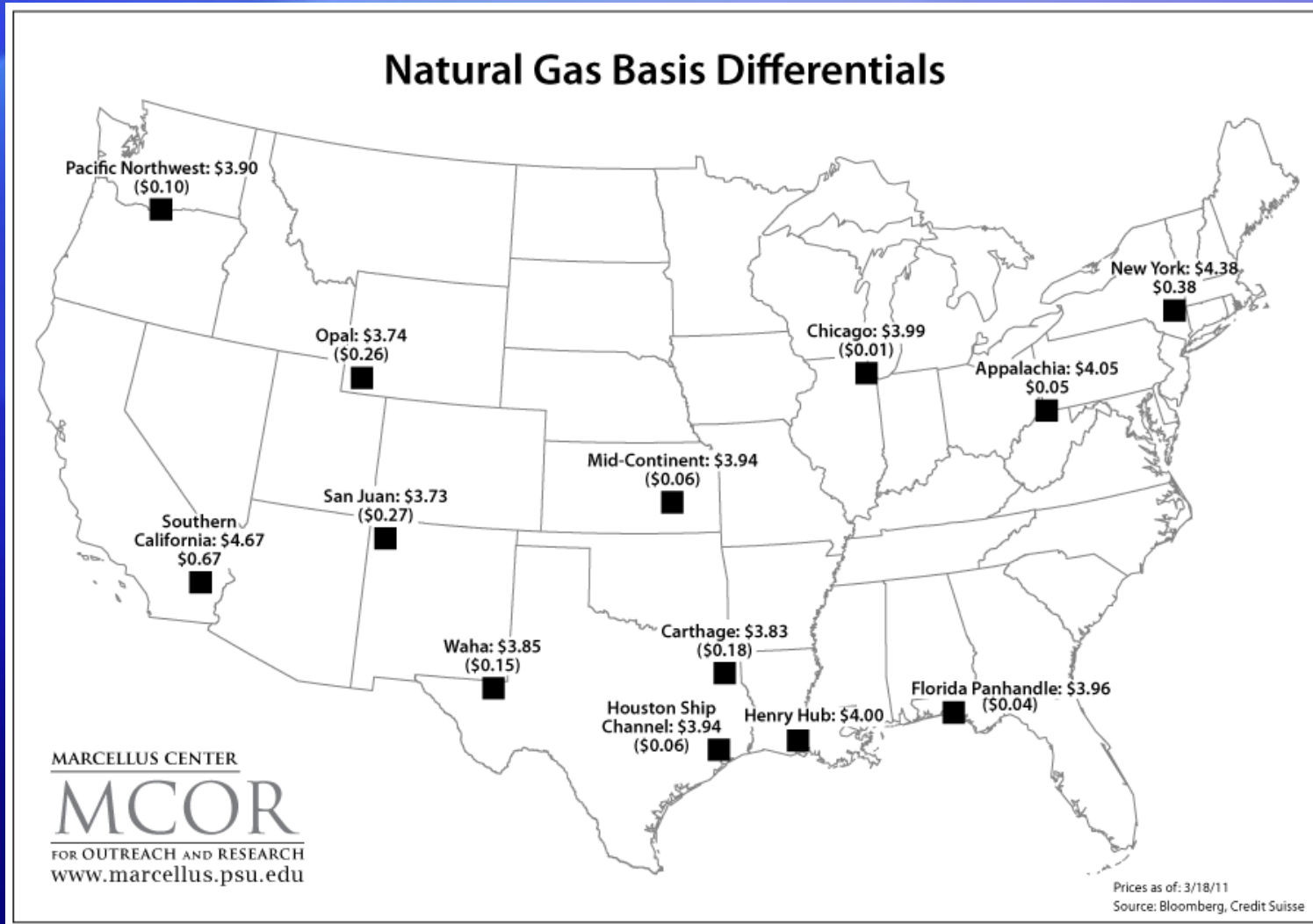


Generalized Geologic Cross Section Showing Marcellus Shale in Western Pennsylvania



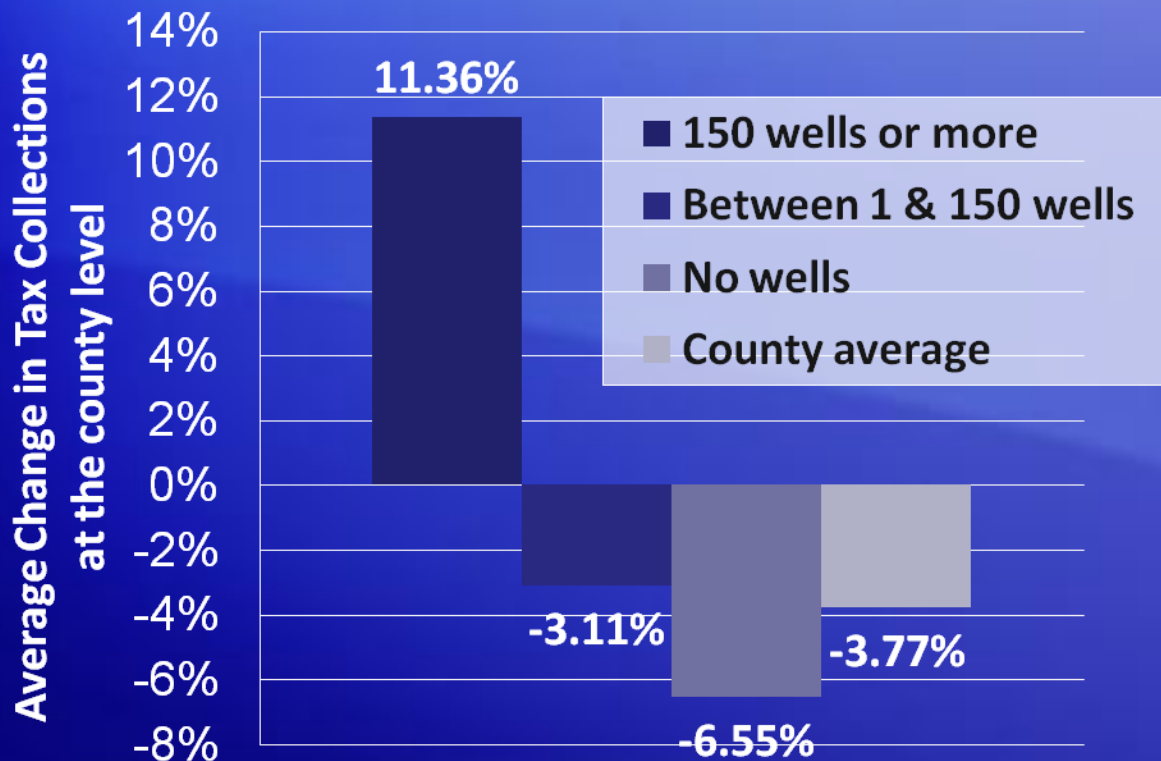


Pricing Differences



Change in State Sales Tax Collections, by County Level Marcellus Drilling Activity

July, 2007- June, 2010



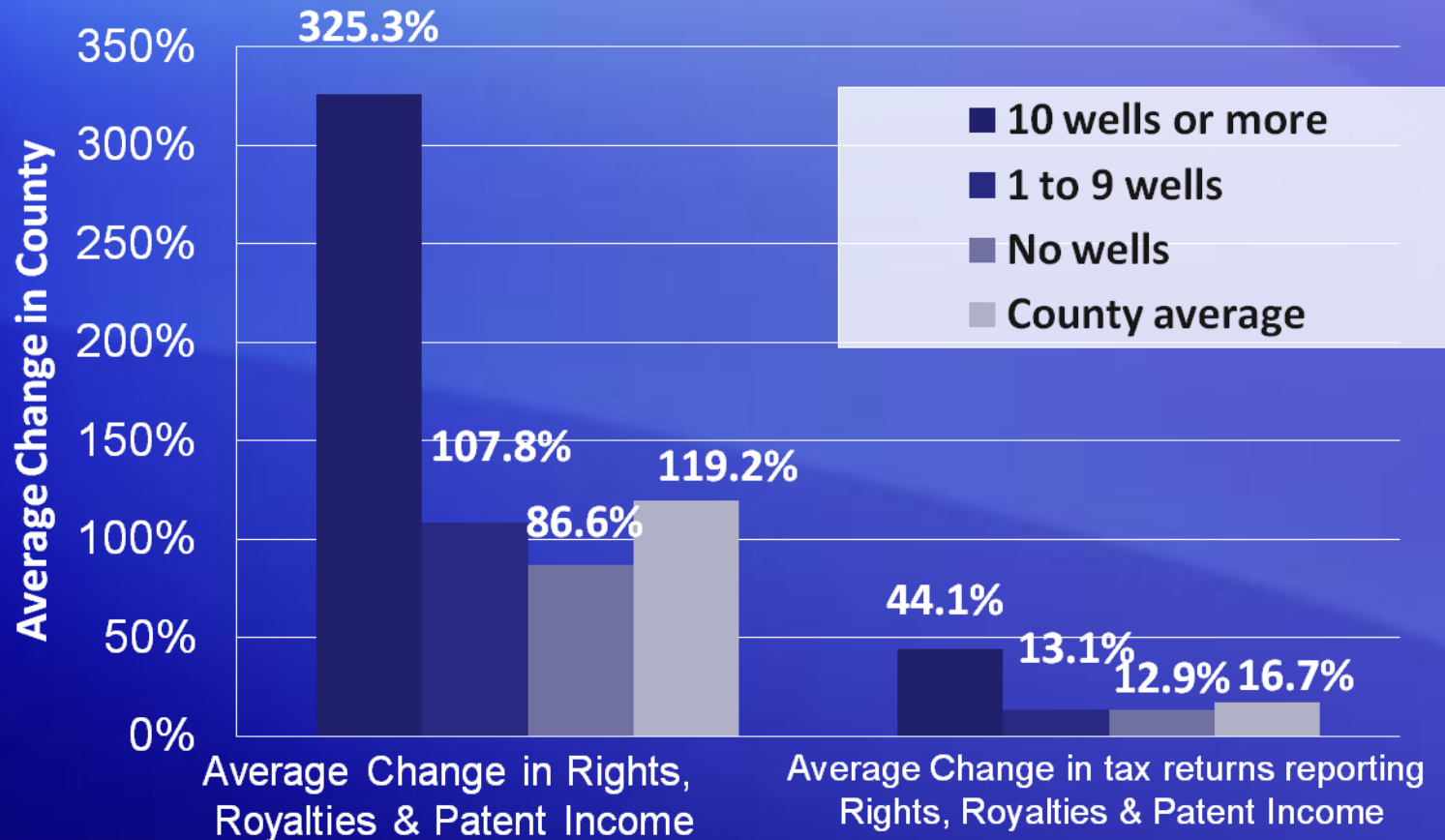
Sales tax dollars go to the state - none remains at the local level (except in a few urban counties)

Counties with more than 150 wells since 2007 include:

- Bradford (482 wells)
- Tioga (387 wells)
- Washington (305 wells)
- Greene (179 wells)
- Susquehanna (174 wells)

Counties by Number of Marcellus Wells Between 2007 and December, 2010

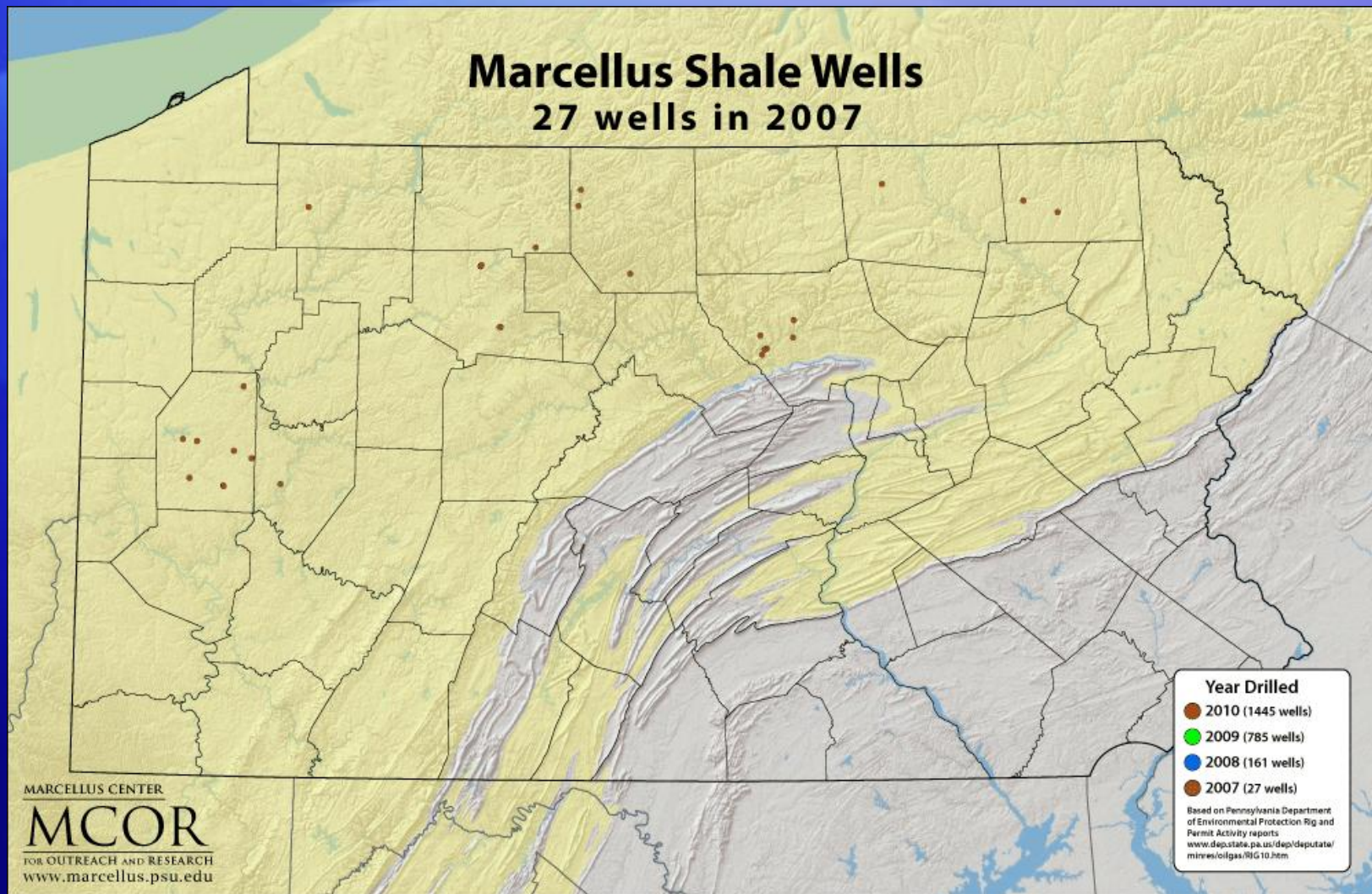
Change in Rights, Royalties & Patents- State Personal Income Tax Collections, by County Level Marcellus Drilling Activity, 2007-08



Counties by Number of Marcellus Wells Between 2007 and 2008

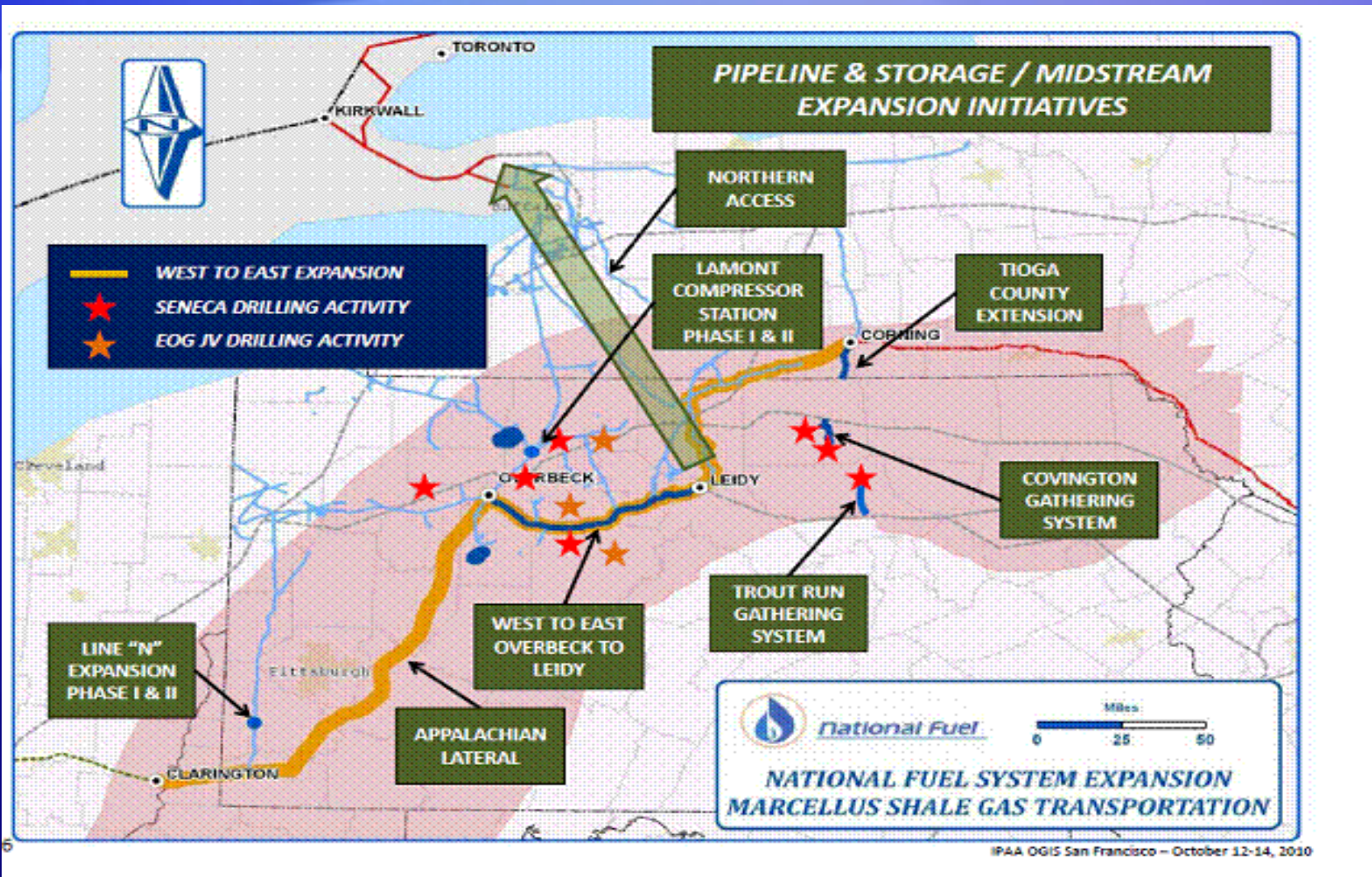


Wells Drilled



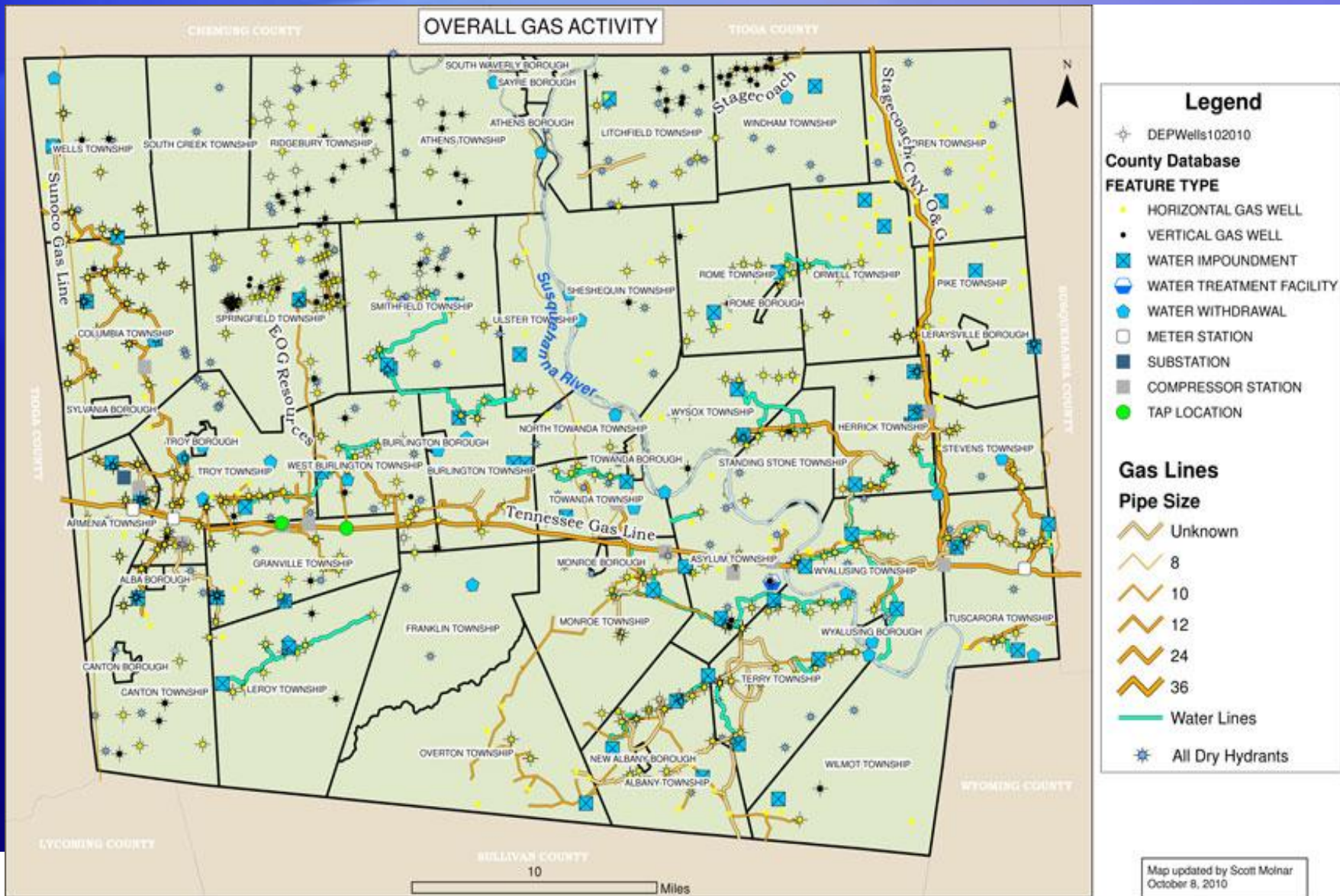


Major Pipeline/Storage Expansion





Bradford Co Pipeline Development





Impacts on Business/Communities

Local businesses

- New business ventures
 - ex: 75 to 100 new in Wmspt area
- New business models
- Satellite offices
- Brownfields development
- Hotels/airports
- Job migration

Local Communities

- Road and traffic impacts
 - costs/agreements
 - reconstruction
 - industry spent est. \$200M in '10
- emergency response
- human services
- water and sewer infrastructure
- landfill utilization
- workforce
- current research to determine impacts



2010 Survey of Businesses Bradford and Washington Counties

Bradford County

Most active Marcellus drilling county

60,384 residents in 2009

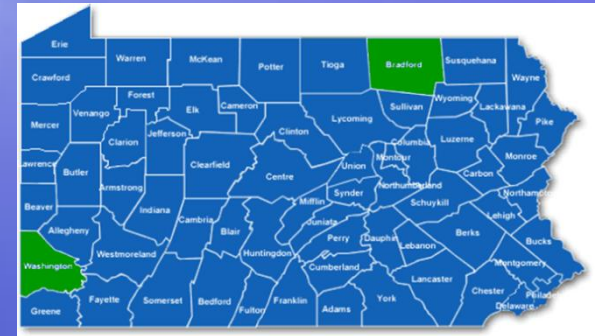
1,345 businesses

Washington County

Third most active Marcellus drilling county

200,505 residents in 2009

5,082 businesses





2010 Survey of Businesses Bradford and Washington Counties

Survey to 1,000 businesses in each county

All tourist-related businesses

Plus random selection

Responses from 619 (response rate of 31%)

Conducted by Marcellus Shale Education & Training Center (Penn
State Cooperative Extension & Penn College)

Funded by PA Dept of Community & Economic Development



Impacts on Businesses, 2010

Bradford & Washington Counties

	Percent responding 'Yes'		
	All Responses	Bradford County	Washington County
Because of natural gas drilling...			
Have your business activities changed?	17%	22%	9%
Have your annual sales <u>increased</u> ?	28%	32%	23%
Have your annual sales <u>decreased</u> ?	3%	3%	2%
Has the number of regular non-gas customers <u>increased</u> ?	7%	10%	3%
Has the number of regular non-gas customers <u>decreased</u> ?	3%	3%	2%



Effects on Worker Retention & Hiring Bradford & Washington Counties

Has Natural Gas Drilling...	Percent responding 'Yes'		
	All Responses	Bradford County	Washington County
Affected the ability of your business to find and hire qualified employees?			
Somewhat easier to find	0.4%	1%	-
Somewhat more difficult to find	5%	7%	1%
Much more difficult to find	4%	6%	1%
Affected your ability to retain your workforce?			
Turnover has increased	5%	9%	1%
Turnover has decreased	0.4%	0.3%	0.5%



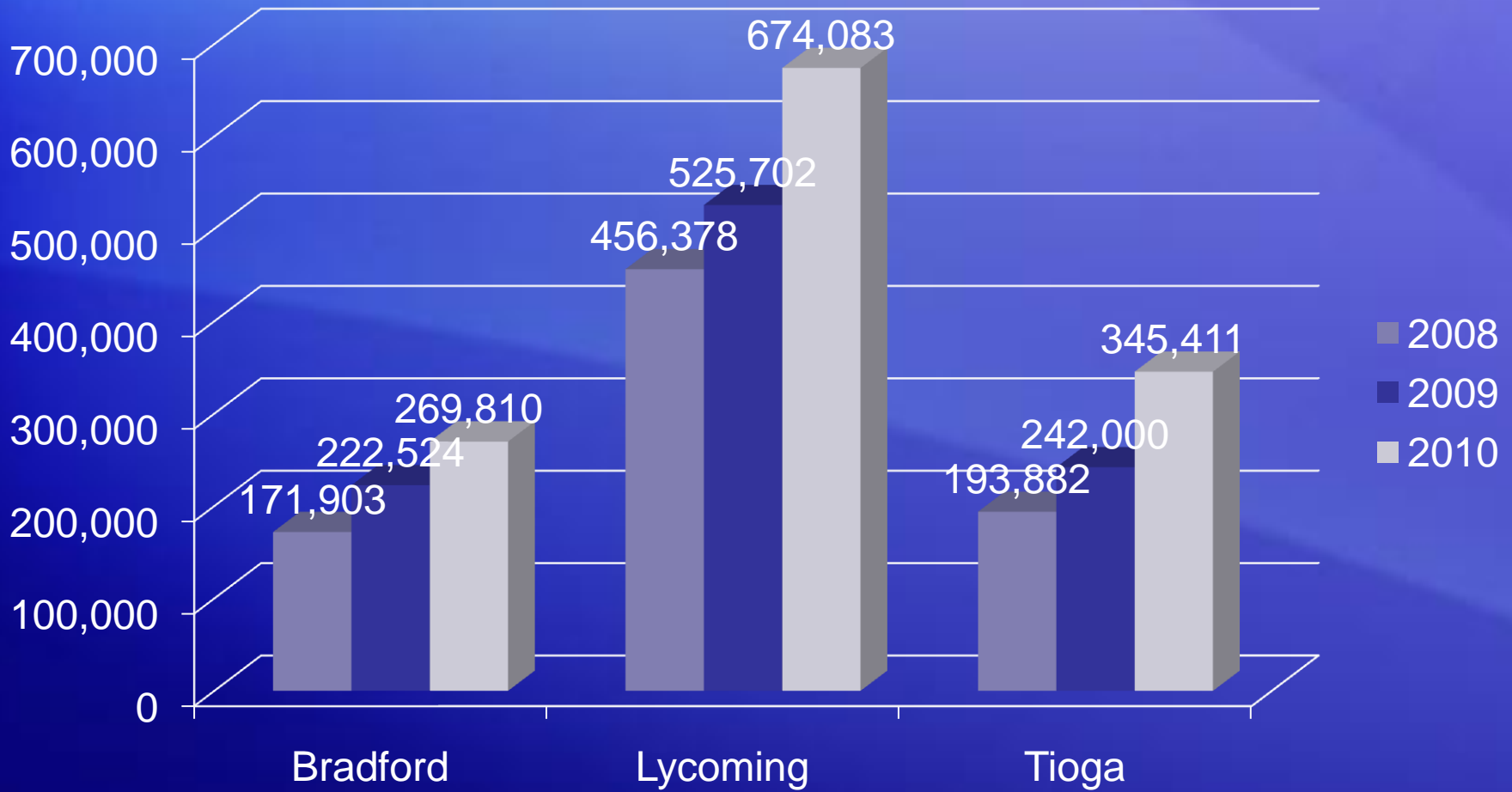
Impacts by Type of Businesses, 2010

Bradford & Washington Counties

	Percent responding 'Yes'			
	Business Activities Changed?		Annual Sales Increased?	
	Bradford	Wash.	Bradford	Wash.
Construction	35%	16%	27%	15%
Wholesale Trade	28%	20%	33%	50%
Retail Trade	25%	8%	44%	28%
Financial, Insurance, Real Estate	28%	10%	50%	40%
Business Services	20%	6%	33%	16%
Eating & Drinking Places	29%	0%	38%	33%
Hotels & Campgrounds	80%	50%	100%	50%



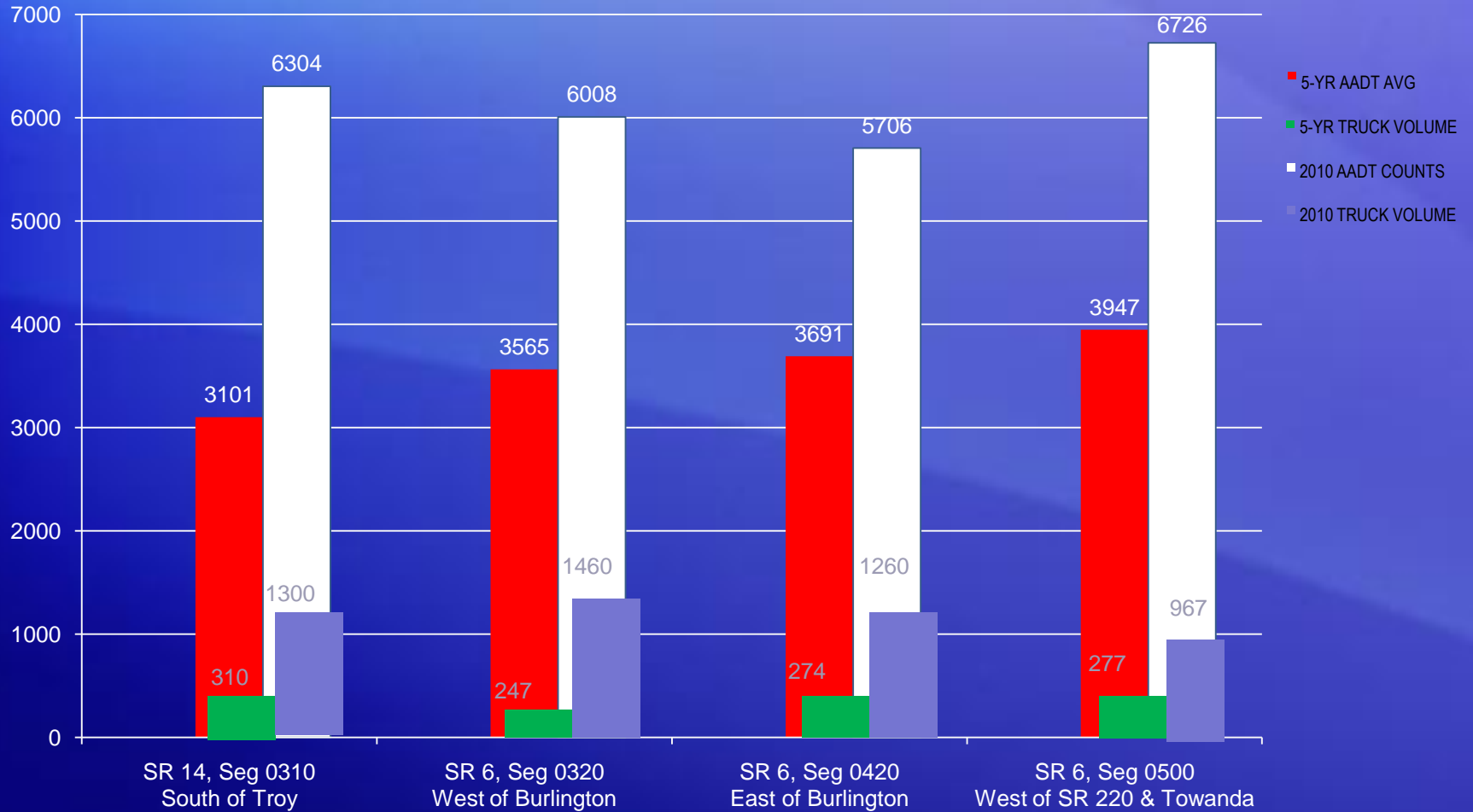
Hotel Taxes Collected





Traffic Increases

Bradford County Traffic 5-Year Average vs. 2010 Counts

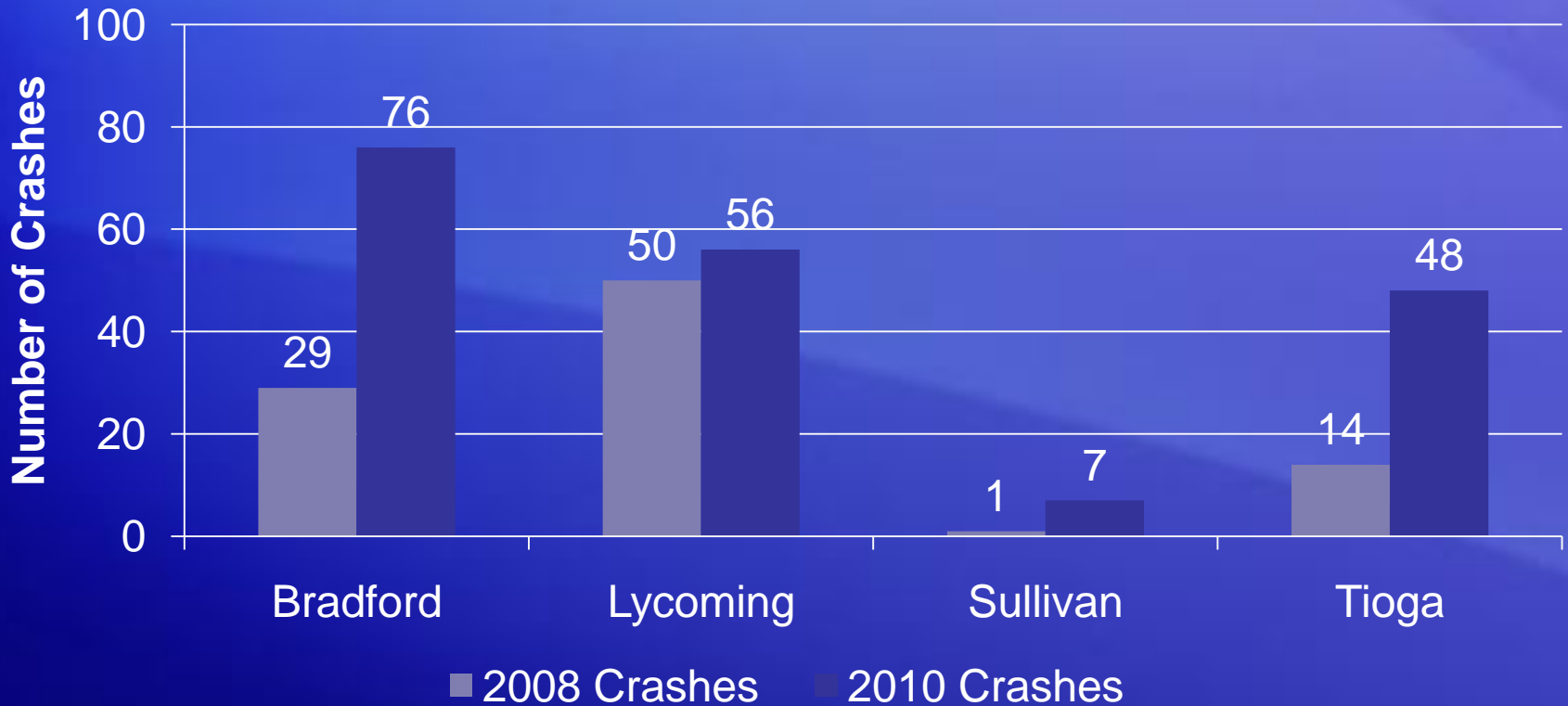


“AADT” is Average Annual Daily Traffic Source: PennDOT



Traffic Changes - Safety

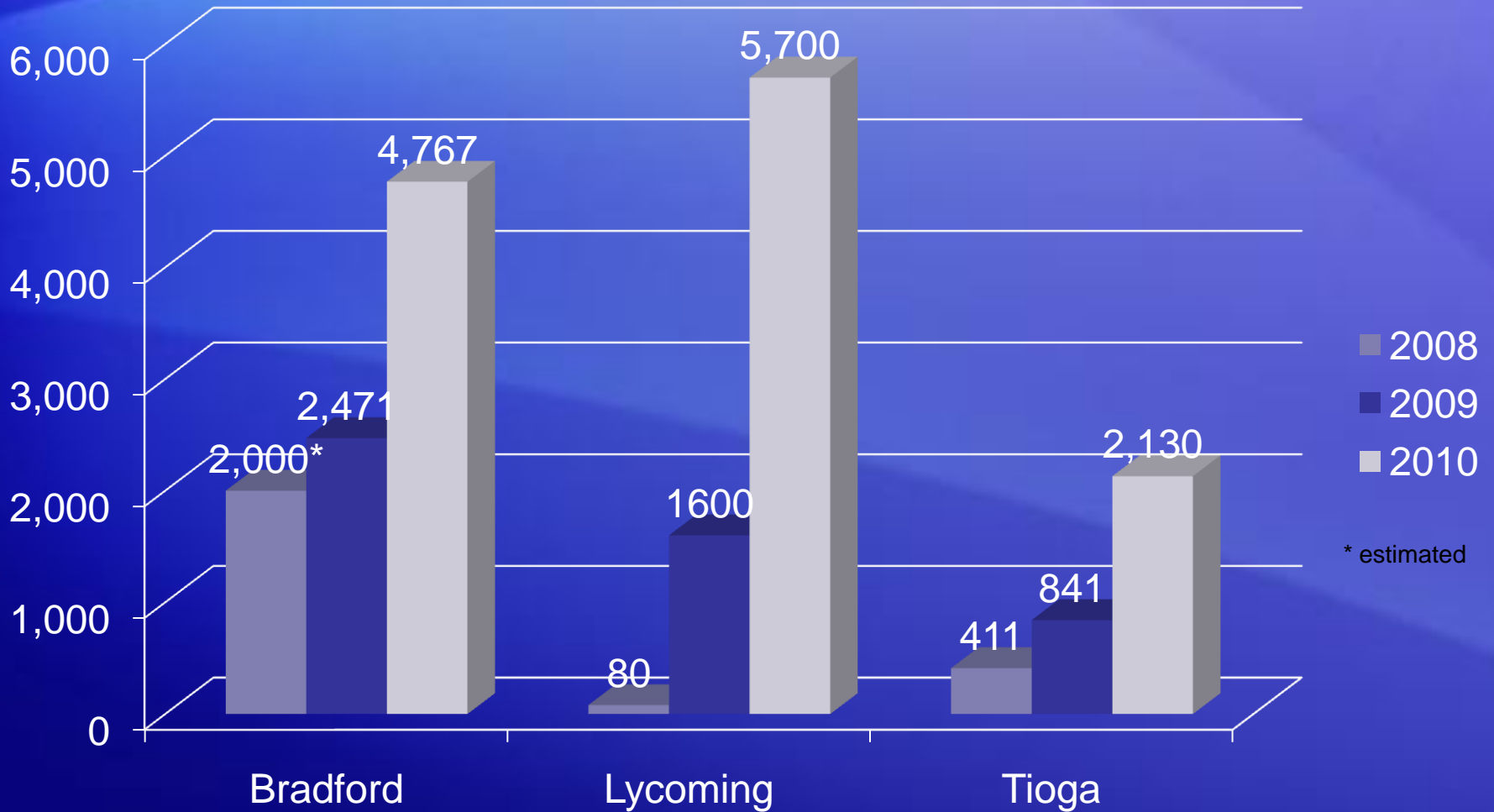
Heavy Truck Crash Statistics Comparing 2008 vs. 2010







Rail Car Traffic



One railcar equals 4 truck loads



Airport Traffic

Williamsport Regional Airport

--7% increase in passengers from 2008 to 2009

--14% increase in passengers from 2009 to 2010

--24 % increase in passengers in last 6 months of 2010

In first two months of 2011, a 27.7% increase in passengers vs. the same period of 2010

On the corporate side, saw a 60% increase in corporate traffic from 2009 to 2010

Additional 72% increase in aircraft that weigh 35,000 lb or more from 2009 to 2010 (includes planes like Gulfstream V's, regional jet type)

Airport surveys indicate 32 % of the people are gas related.

Current airline went from 35 seat to 50-seat aircraft recently.

Second airline with connection to TX currently proposed.



Airport Travel (cont'd)

Bradford County Airport

- Jet A fuel sales doubled in 2010 over 2009
- Air traffic has steadily increased over the past three years
- Since 2010, now have 4 helicopters based at the airport

Elmira Corning Regional Airport

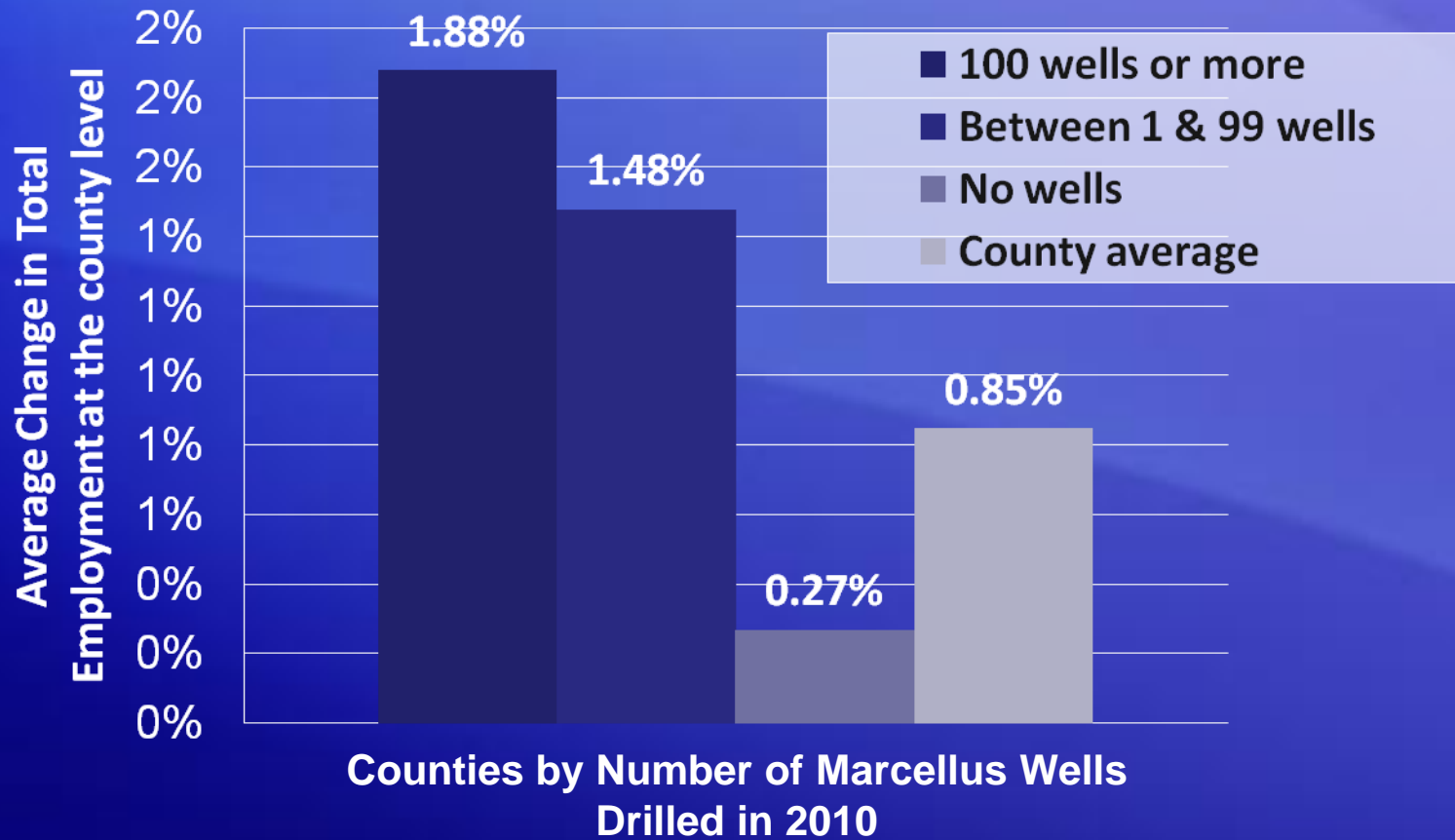
- Deplanements increased 14% in 2010 from 2009
- One gas company has a charter flight that lands about 2 times/month
- A new parking lot was added in 2009
 - Already need more space, parking revenue up.



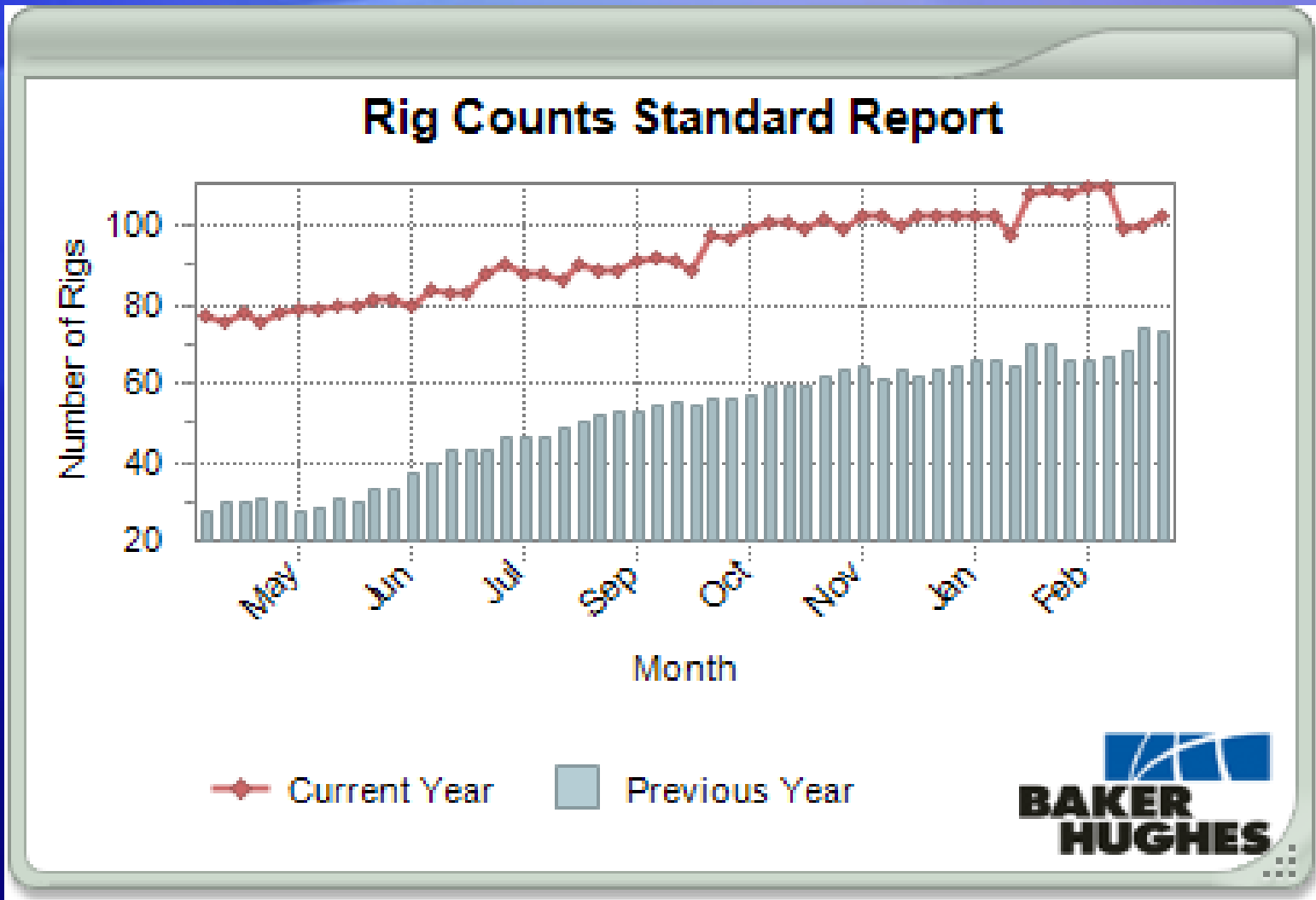
Employment trends?

Change in Total Employment, by County Level Marcellus Drilling Activity

September, 2009- September, 2010



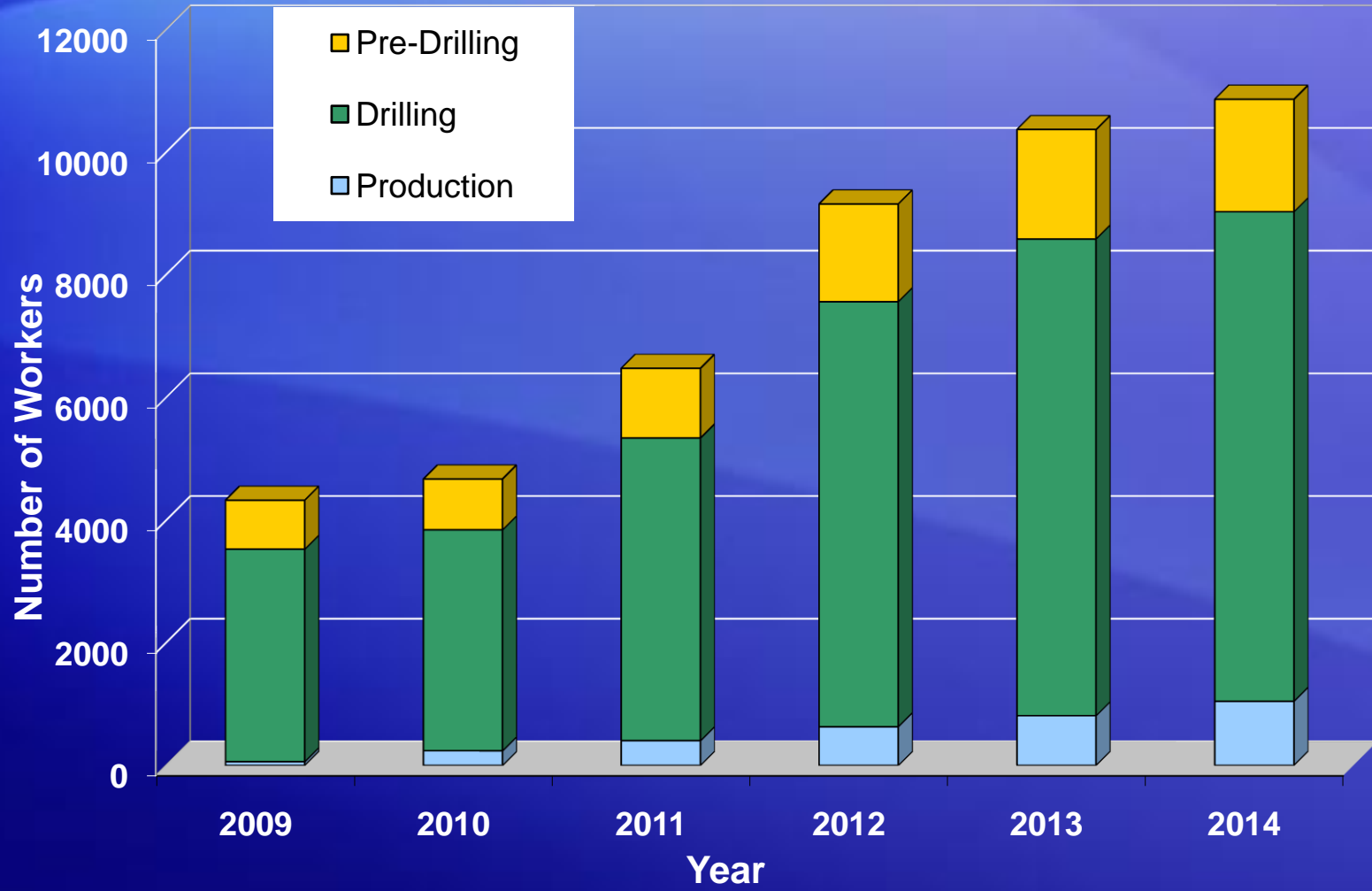
Pennsylvania Rig Count



103 on March 18, 2011 vs. 73 one year ago

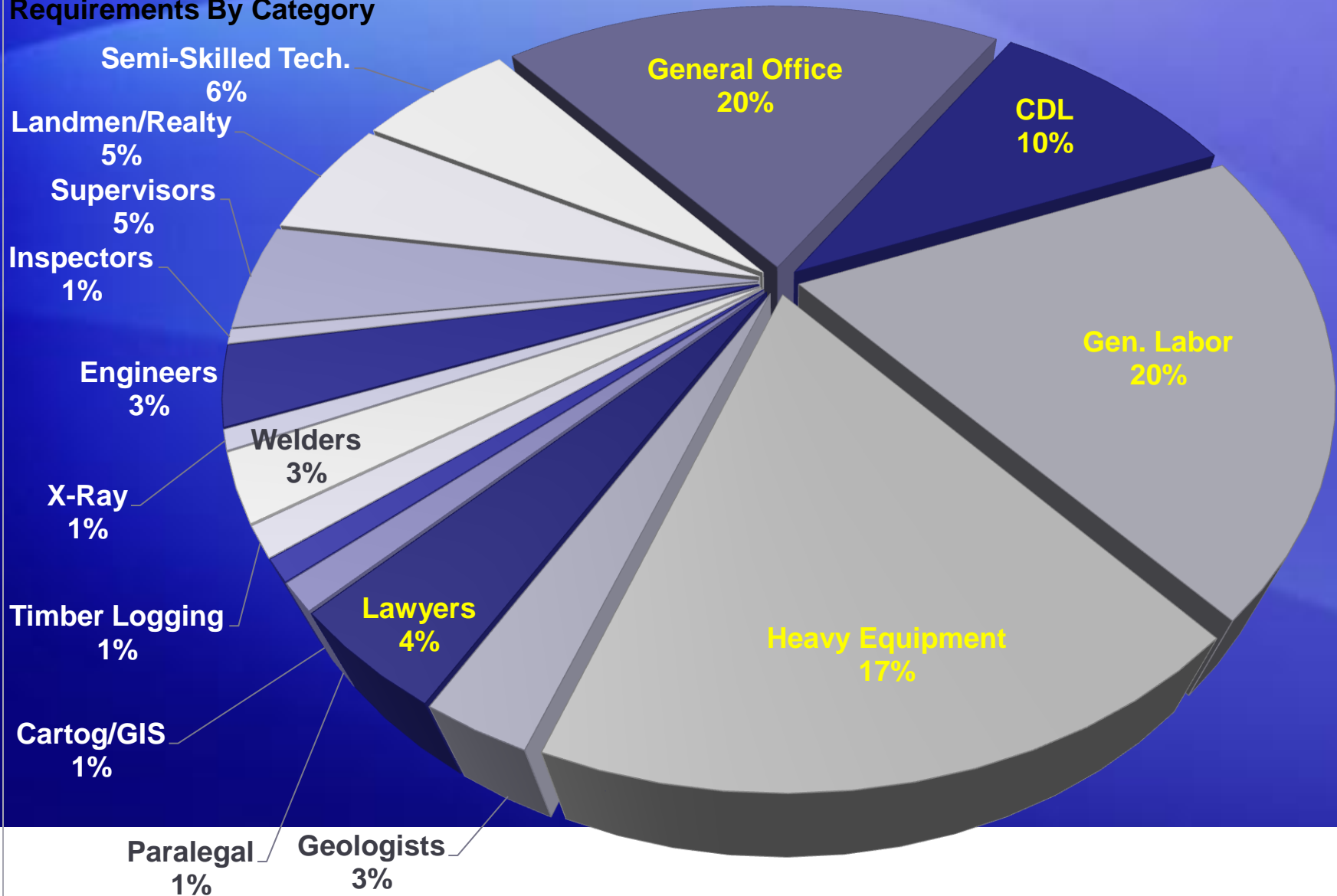
What does this mean in terms of direct jobs?

Medium or 'Likely' Scenario: Estimated SW PA
Marcellus Shale Workforce Requirements By Phase



What specific direct jobs are required?

Natural Gas Workforce Requirements By Category



Web Resources:

www.marcellus.psu.edu

www.msetc.org

www.naturalgas.psu.edu