Marcellus Shale Workforce Needs Assessment Review

Marcellus Shale Education & Training Center

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Presentation Outline

- Background (Review)
- Model Results
- Educational Capacity
- Analysis
- Summary
- Discussion
Brief Background

- Marcellus Shale Education & Training Center (MSETC) formed in November 2008
- Funding for This Assessment Was Provided by:
  - Pennsylvania College of Technology
  - Pennsylvania Department of Labor and Industry
    - Central Pennsylvania Workforce Development Corporation
    - Northern Tier Regional Planning and Development Commission
  - Penn State Cooperative Extension
Specific Geography

Pennsylvania Workforce Investment Board Regions

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Where It All Started

Natural Gas Extraction
Education / Job Matrix

Extraction Timeline

Pre-Drilling
- Geology Studies
- Lease Analysis

Drilling & Completion
- Drilling the Well
- Fracturing and Completion

Post-Drilling

Pipeline Construction
- Construction begins after extraction of natural gas

Natural Gas Production
- Wells produce natural gas

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## Drilling Down (The Matrix)

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<td>Operational Landmen for pipelines</td>
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<td>Local Government</td>
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<td></td>
<td></td>
<td>Instrument Chief</td>
<td>x</td>
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<td></td>
<td></td>
<td></td>
<td>Roadman</td>
<td>x</td>
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</table>
Model Methodology

• Per well and per mile
  - Allows for re-adjustment based on activity level
• Conducted interviews with industry representatives
• Confirmed those numbers with other sources with similar capabilities
• Confirmed some occupations with other research or legacy knowledge of the industry
• Further confirmed with survey data
Where Did We Base the Initial Well Predictions?

1. Personal contact with industry representatives
2. Investor reports for active Marcellus companies and the areas that they hold acreage and are actively drilling
3. Public meetings and newspaper accounts of public meetings
What We Discovered

• The direct job opportunities in northcentral Pennsylvania will likely increase dramatically
• Most job opportunities will be “blue collar”
• The direct workforce to drill a single well requires approximately 410 individuals working in 150 different occupations
• An average of 20-30 contract companies are utilized to drill a single well
• Each well requires 11.53 full-time equivalent workers and .17 full-time production jobs
Shale Play Comparison

<table>
<thead>
<tr>
<th></th>
<th>Gross EUR (Bcfe)</th>
<th>Well Costs (millions)</th>
<th>Royalty</th>
<th>F&amp;D Cost (per mcf)</th>
<th>ROR ($/NYMEX)</th>
</tr>
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<tbody>
<tr>
<td>Range Marcellus</td>
<td>4.4</td>
<td>$3.5</td>
<td>16%</td>
<td>$0.96</td>
<td>64%</td>
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<tr>
<td>Fayetteville Core</td>
<td>2.5</td>
<td>$2.7</td>
<td>16%</td>
<td>$1.29</td>
<td>52%</td>
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<tr>
<td>Barnett Core</td>
<td>2.5</td>
<td>$2.3</td>
<td>25%</td>
<td>$1.22</td>
<td>39%</td>
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<tr>
<td>Haynesville Core</td>
<td>7.5</td>
<td>$8.5</td>
<td>25%</td>
<td>$1.51</td>
<td>36%</td>
</tr>
</tbody>
</table>

- Type curves for Barnett, Fayetteville and Haynesville based on public production information
- Type curve for Marcellus based on production results from 24 Range wells only

Range Resources

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### Marcellus Shale Natural Gas Development Activity in Selected WIB Regions 2007 - 06/01/2009

**Sources:** PA-DEP; Baker-Hughes

<table>
<thead>
<tr>
<th>Region</th>
<th>Wells Drilled</th>
<th>Permits Issued</th>
<th>Peak Drilling Rigs</th>
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<tbody>
<tr>
<td>Northern Tier</td>
<td>4</td>
<td>54</td>
<td>36</td>
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<tr>
<td>Central</td>
<td>6</td>
<td>21</td>
<td>5</td>
</tr>
<tr>
<td>Rest of Pennsylvania</td>
<td>1,21</td>
<td>95</td>
<td></td>
</tr>
</tbody>
</table>

Website: [www.msetc.org](http://www.msetc.org)
Department of Environmental Protection
Bureau of Oil and Gas Management
Well Permits Issued
Total Permits Issued January thru September 2009 - 4,940
Non Marcellus Shale - 3,600 Permits Issued
Marcellus Shale - 1,340 Permits Issued

Updated 10/07/2009

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What Does This Mean in Terms of Wells?

Projected Northern Tier WIB Scenarios - Wells Drilled Per Year
What Does This Mean in Terms of Wells?

Projected Central WIB Scenarios - Wells Drilled Per Year

- High
- Likely or Medium
- Low

Wells Drilled Per Year

- 2008
- 2009
- 2010
- 2011
- 2012
- 2013

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What Does This Mean in Terms of Jobs?

"Likely" Scenario Northern Tier WIB Region
Marcellus Shale Workforce Requirements By Phase

- Pre-Drilling (Short-term)
- Drilling (Short-term)
- Production (Long-term)

Number of Workers

Year

2009
2010
2011
2012
2013

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What Does This Mean in Terms of Jobs?

'Likely' Scenario - Central WIB Region
Marcellus Shale Workforce Requirements By Phase

Number of Workers

Year

2009 2010 2011 2012 2013

Pre-Drilling (Short-term)
Drilling (Short-term)
Production (Long-term)
The direct workforce requirements of Marcellus Shale development in the Central and Northern Tier depends on the number of wells drilled each year. The chart shows:

- More wells drilled per year from 2012 onwards.
- No change in wells drilled per year until 2015.
- Less wells drilled per year from 2015 onwards.

The size of the workforce will depend on the number of wells drilled each year.
What Specific Jobs Are Required?

- General Office: 20%
- CDL: 10%
- General Labor: 20%
- Heavy Equipment: 17%
- Geologists: 3%
- Landmen: 5%
- Semi-Skilled Tech.: 6%
- Supervisors: 5%
- Engineers: 3%
- Inspectors: 1%
- X-Ray Tech: 0%
- X-Ray: 0%
- Welders- Helpers: 1%
- Welders: 1%
- Timber Logging: 1%
- Cartog/ GIS: 1%
- Paralegal: 1%
- Lawyers: 4%
- Geologists: 1%
- Semi-Skilled Tech.: 6%
- Landmen: 5%
- Supervisors: 5%
- Engineers: 3%
Post-Secondary Institutions:

• 3 institutions in Northern Tier WIB; 14 in Central WIB
• Few degrees directly target natural gas: Lackawanna College programs and pending Penn College programs
• There are many direct matches for “white collar” occupations; such as legal, geology, business administration, accounting, etc.
• Several close matches for “blue collar” occupations – similar skill sets and mechanical aptitude
Main Occupational Categories and available Post-Secondary Programs offering core skills in the Northern Tier and Central WIB Regions.

<table>
<thead>
<tr>
<th>Occupational Category</th>
<th>Percent of Workforce</th>
<th>Central WIB Region</th>
<th>Northern Tier WIB Region</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roughnecks</td>
<td>18.51%</td>
<td>3</td>
<td>0</td>
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<tr>
<td>Office support - admin assist.</td>
<td>8.27%</td>
<td>8</td>
<td>3</td>
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<tr>
<td>(Rig Move)</td>
<td>5.64%</td>
<td>0</td>
<td>0</td>
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<tr>
<td>Heavy Equipment Operators</td>
<td>4.86%</td>
<td>2</td>
<td>0</td>
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<tr>
<td>Land Clearing</td>
<td>4.44%</td>
<td>1</td>
<td>0</td>
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<tr>
<td>Frac Crew</td>
<td>4.41%</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Security</td>
<td>4.23%</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>Reality (lease admin/right-away)</td>
<td>4.07%</td>
<td>2</td>
<td>0</td>
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<tr>
<td>Roustabouts</td>
<td>3.29%</td>
<td>2</td>
<td>0</td>
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<tr>
<td>Lawyers</td>
<td>3.05%</td>
<td>11</td>
<td>0</td>
</tr>
<tr>
<td>Petroleum Engineers</td>
<td>2.98%</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Accountants</td>
<td>2.55%</td>
<td>11</td>
<td>3</td>
</tr>
<tr>
<td>IT/Computer</td>
<td>2.55%</td>
<td>12</td>
<td>3</td>
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<tr>
<td>Completion Activities</td>
<td>2.39%</td>
<td>0</td>
<td>0</td>
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<tr>
<td>General Labor (Pipeline)</td>
<td>2.33%</td>
<td>2</td>
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<tr>
<td>Financial/Business Management</td>
<td>2.16%</td>
<td>11</td>
<td>3</td>
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</tbody>
</table>
Educational Capacity

- Transient workers
- White collar jobs
- Blue collar jobs
- Local education and training programs
Educational Capacity

- Production phase jobs
- The time is now
- Basic employability skills
- Safety

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What MSETC Is Working On

• CDL training w/offroad emphasis
• API 1104 welding training
  – Level 1
  – Level 2
• API 1104 certification and testing
• OSHA forklift certification
• Oilfield-specific PLCs
  – Allen Bradley emphasis
• Well operator / tender and metering
• Basic electronics for non-technical oilfield workers
• SCADA
• OSHA oilfield-specific 10 and 30 hour certifications
• 120-150 hour roustabout (pre-employment training program)
• Natural gas instrumentation

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In Summary

- The direct job opportunities will likely increase dramatically
  - Most job opportunities will be “blue collar”
  - The direct workforce to drill a single well requires approx. 410 individuals working in 150 different occupations
  - Each well requires 11.53 full-time equivalent workers, and .17 full-time production jobs
  - Approximately 8,000 full-time equivalent “direct” jobs in both regions in the next 5 years (higher concentration in northern tier)
In Summary

• Educational Capacity
  – Local education and training providers will need to address natural gas specific skills for “blue collar” jobs
  – Local education and training providers have existing programming in place for “white collar” occupations found in the industry, but may need to expand current capacity
  – Career and technical education program are currently teaching some related skills, but lack natural gas industry specific programming
Marcellus Shale Workforce Needs Assessment Review

Marcellus Shale Education and Training Center