Marcellus Shale Workforce

ECONOMIC & WORKFORCE DEVELOPMENT WORK GROUP

GOVERNOR’S MARCELLUS SHALE ADVISORY COMMISSION

April 14, 2011

Marcellus Shale Education and Training Center

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(570) 327-4775

www.msetc.org
Workforce Development
<table>
<thead>
<tr>
<th>Field Name</th>
<th>Country</th>
<th>Recoverable Reserves, Tcf</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 South Pars/North Dome</td>
<td>Iran and Qatar</td>
<td>1,235</td>
</tr>
<tr>
<td>MARCELLUS</td>
<td>UNITED STATES OF AMERICA</td>
<td>489 (2)</td>
</tr>
<tr>
<td>2 Urengoy</td>
<td>Russia</td>
<td>222</td>
</tr>
<tr>
<td>3 Yamburg</td>
<td>Russia</td>
<td>138</td>
</tr>
<tr>
<td>4 Hassi R’Mel</td>
<td>Algeria</td>
<td>123</td>
</tr>
<tr>
<td>5 Shtokman</td>
<td>Russia</td>
<td>110</td>
</tr>
<tr>
<td>6 South Iloitan-Osman</td>
<td>Turkmenistan</td>
<td>98</td>
</tr>
<tr>
<td>7 Zapolyarnoye</td>
<td>Russia</td>
<td>95</td>
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<tr>
<td>8 Hugoton</td>
<td>Unites States of America</td>
<td>81</td>
</tr>
<tr>
<td>9 Groningen</td>
<td>Netherlands</td>
<td>73</td>
</tr>
<tr>
<td>10 Bovanenko</td>
<td>Russia</td>
<td>70</td>
</tr>
</tbody>
</table>

(1) Rafael Sandres, Global Natural Gas Reserves – A Heuristic Viewpoint, March 2006
(2) Dr. Terry Engelder, Penn State University – from August 2009 issue of Fort Worth Basin Oil & Gas Magazine
- Texas – 335 Land-based Natural Gas Rigs
- United States – 870 Land-based Natural Gas Rigs

Sources: [Baker-Hughes Investor Relations](http://www.baker Hughes.com) (April 1, 2011)
Department of Environmental Protection
Bureau of Oil and Gas Management
Well Permits Issued

Total Permits Issued January thru December 2010 - 6,598
Non Marcellus Shale - 3,284 Permits Issued
Marcellus Shale - 3,314 Permits Issued

Updated 1/05/2011
Department of Environmental Protection
Bureau of Oil and Gas Management
Wells Drilled
2010 January-December Wells Drilled - 2,755
Non Marcellus Shale - 1,369 Wells Drilled
Marcellus Shale - 1,386 Wells Drilled

As Reported by Operators

Updated 01/05/2011

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Bureau of Oil and Gas Management
Well Permits Issued

Total Permits Issued January-March - 2011 - 1,554
Non Marcellus Shale - 677 Permits Issued
Marcellus Shale - 877 Permits Issued

Updated 04/07/2011
2011 January-March Wells Drilled - 627
Non Marcellus Shale - 228  Marcellus Shale - 399

As Reported by Operators  Updated 04/06/2011
Marcellus Permits 2007-2010

- Bradford: 818
- Centre: 97
- Clinton: 44
- Greene: 163
- Lycoming: 247
- Susquehanna: 229
- Tioga: 557
- Washington: 249

Source: Pennsylvania DEP

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Where is all started for PCT

• Marcellus Shale Education and Training Center (MSETC) formed in November 2008

• Collaboration between:
  • Pennsylvania College of Technology - WDCE
  • Penn State Cooperative Extension
Education/Job Matrix

Natural Gas Extraction
Education / Job Matrix

Extraction Timeline

- Pre-Drilling
  - Geology Studies
    - Up to six months
- Drilling & Completion
  - Staking the Well
    - 40 to 180 days
  - Fracing and Completion
    - 12 weeks
- Post-Drilling
  - Pipeline Construction
    - Construction time depends on length of pipeline
  - Natural Gas Production
    - Wells can be productive over a 20 to 30 year period
  - Maintenance
    - Up to seven years

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## Drilling Down (The Matrix)

<table>
<thead>
<tr>
<th>Field</th>
<th>Associated Jobs</th>
<th>Secondary/ Career and Technical Centers</th>
<th>Work Experience/ Certification</th>
<th>Post Secondary/ Higher Education</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-Drilling</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mineral Rights</td>
<td>Landmen-for drilling/leasing</td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Lawyers</td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Legal Professionals</td>
<td>x</td>
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<tr>
<td></td>
<td>Para-legal</td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Title-Abstract</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td></td>
<td>Operational Landmen for pipelines</td>
<td>x</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Title Attorney</td>
<td></td>
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<tr>
<td>Permitting Process</td>
<td>Environmental Engineers</td>
<td></td>
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<td></td>
<td>Environmental Technicians</td>
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<td></td>
<td>Office operation</td>
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<td>x</td>
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<td></td>
<td>Water Sampling</td>
<td>x</td>
<td></td>
<td>x</td>
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<tr>
<td></td>
<td>Civil Engineers</td>
<td>x</td>
<td></td>
<td>x</td>
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<tr>
<td></td>
<td>Local Government</td>
<td>x</td>
<td></td>
<td>x</td>
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<tr>
<td></td>
<td>Instrument Chief</td>
<td>x</td>
<td></td>
<td>x</td>
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<tr>
<td></td>
<td>Roadman</td>
<td></td>
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<td>x</td>
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<tr>
<td></td>
<td>Surveyor</td>
<td></td>
<td></td>
<td>x</td>
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<tr>
<td>Geological Studies</td>
<td>Geologists</td>
<td></td>
<td></td>
<td>x</td>
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<tr>
<td></td>
<td>Petroleum Engineers</td>
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<tr>
<td></td>
<td>Computer tech</td>
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<td></td>
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<tr>
<td></td>
<td>Project Management</td>
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<td></td>
<td>CDL Drivers</td>
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<td>Seismio</td>
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<td></td>
<td>Hydro Geologist</td>
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<tr>
<td></td>
<td>Helicopter Pilot/Crew</td>
<td></td>
<td>x</td>
<td>x</td>
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<tr>
<td></td>
<td>Cartographer</td>
<td></td>
<td></td>
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<td></td>
<td>GIS Technicians</td>
<td></td>
<td>x</td>
<td>x</td>
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<tr>
<td></td>
<td>Archaeology</td>
<td></td>
<td>x</td>
<td>x</td>
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<tr>
<td></td>
<td>Petroleum Chemists</td>
<td></td>
<td>x</td>
<td>x</td>
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<td></td>
<td>Water Management</td>
<td></td>
<td>x</td>
<td>x</td>
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<tr>
<td></td>
<td>Biologist</td>
<td></td>
<td>x</td>
<td>x</td>
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<tr>
<td></td>
<td>Geophysicists</td>
<td></td>
<td>x</td>
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</tr>
</tbody>
</table>

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What Does This Mean in Terms of Wells?

Projected Northern Tier WIB Scenarios - Wells Drilled Per Year

- High
- Likely or Medium
- Low

Year:
- 2008
- 2009
- 2010
- 2011
- 2012
- 2013

Wells Drilled Per Year:
- 0
- 50
- 100
- 150
- 200
- 250
- 300
- 350
- 400
- 450

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What Does This Mean in Terms of Jobs?

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

<table>
<thead>
<tr>
<th>Year</th>
<th>Pre-Drilling (Short-term)</th>
<th>Drilling (Short-term)</th>
<th>Production (Long-term)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009</td>
<td>1000</td>
<td>1750</td>
<td>250</td>
</tr>
<tr>
<td>2010</td>
<td>1750</td>
<td>2750</td>
<td>500</td>
</tr>
<tr>
<td>2011</td>
<td>2500</td>
<td>3500</td>
<td>500</td>
</tr>
<tr>
<td>2012</td>
<td>3500</td>
<td>4500</td>
<td>500</td>
</tr>
<tr>
<td>2013</td>
<td>4500</td>
<td>5500</td>
<td>500</td>
</tr>
</tbody>
</table>
Direct Workforce Requirements of Marcellus Shale development in the Central and Northern Tier

Size of workforce will depend on number of wells drilled each year.
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
Jobs

- Transient workers will decrease over time
- White collar jobs created
- Blue collar jobs created
- Local education and training programs will help to increase the number of local workers
What specific jobs are required?

Natural Gas Workforce Requirements
By Category

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

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Each Direct Job Is Estimated to Create 1.53 Indirect And Induced Jobs

Source: The Economic Impact of the Oil and Gas Industry in Pennsylvania, November 2008, PA Economy League of SW PA
INDIRECT JOBS
Related to the Natural Gas Industry

• Surveyors
• Business Managers
• Retail Sales
• Bankers/Accountants
• Hotel Management
• Realtors

• Restaurant Owners
• Chefs & Food Service Workers
• Forestry
• Mechanics
• Many more……..
How Long will Unconventional Shale Last?

“Potential” Marcellus Shale County-based Timeline Example

<table>
<thead>
<tr>
<th>70% Drillable</th>
<th>6-Wells</th>
<th>10-wells</th>
</tr>
</thead>
<tbody>
<tr>
<td>Square Miles</td>
<td>700</td>
<td>700</td>
</tr>
<tr>
<td>Drillable Area/Well Pads</td>
<td>490</td>
<td>490</td>
</tr>
<tr>
<td>Total Wells</td>
<td>2,940</td>
<td>4,900</td>
</tr>
<tr>
<td>Years @ 15 Rig Average</td>
<td>16.3</td>
<td>27.2</td>
</tr>
</tbody>
</table>

Provided as an illustration for discussion, not a forecast of future activity.

Don’t forget Utica, Huron, Upper Devonian, others?

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Academic Programs

• Degree Programs & Certifications
PCT Degrees - Directly Related

Automated Manufacturing Technology - A.A.S.
Civil Engineering Technology – A.A.S. and B.S.
Computer Aided Drafting Technology – A.A.S.
Computer Aided Product Design – B.S.
Construction Management – B.S.
Diesel Technology- A.A.S.
Electric Power Generation – A.A.S.
Electrical Technology – A.A.S.
Electronics & Computer Engineering Technology – A.A.S.
Heavy Construction Equipment Technology – A.A.S.
Machine Tool Technology - A.A.S.
Welding - A.A.S.  Welding & Fabrication Engineering Technology – B.S.
PCT Degrees – Indirectly Related

Accounting – A.A.S. and B.S.

Business Administration – B.S.

Business Management – A.A.S.

Information Technology – A.A.S. and B.S.

Legal Assistant – Paralegal – A.A.S.

Culinary Arts – A.A.S. and B.S.

Hospitality Management – A.A.S.

Health Sciences, esp. Radiography – A.A.S.
MSETC Noncredit Training
MSETC Noncredit Programs

- “Fit 4 Natural Gas”
  - Roustabout Pre-emp. Training
- API 1104 welding training
  - Level 1
  - Level 2
- API 1104 certification and testing
- OSHA Rough Terrain Forklift Certification
- Commercial Driver Training (CDL Class A)

- PEC/ Premier SafeLand USA
- Certified Operations Technician
- OSHA 30 hour certifications (Online)
- OSHA 10 Hour Construction
- First Aid/ CPR

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MSETC Offerings – Future

• Emergency Responders
• Roughneck Training (Hands-on)
• OSHA Regulatory Training
• Well operator / tender
• Oilfield Heavy Equipment Safety
• Well Control
• Trenching/ Soils

• Instrumentation and Calibration
• DOT compliance training
• SCADA/ HMI
• Title Abstracting / Landman
• Welder’s Helper/ Pipe fitting
• Fall Protection
• Erosion and Sediment Control
Natural Gas Training Site

First class
October 2011

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High School Preparation

- Math is important!
- Low absenteeism
- On time
- Physically fit
- Able to work as a team
- Safety first

- No DUI
- No criminal offenses
- No drugs
- Clean driving record
Current MSETC Workforce Assessment Projects

- PA Statewide Workforce Assessment
- West Virginia Statewide Workforce Assessment
Current MSETC Economic Impact Analysis Projects

- Five-county Northern Tier PA
- Statewide Economic Impact Analysis
Grants

• National Science Foundation
  $900,000, 3-year, 20-county project with approx. 20 school districts

• PA Dept. of Labor & Industry
  - $250,000 training grant (pre-employment and incumbent)
  - Industry Partnership grants for two regions in PA (SW & NC)

• U.S. Dept. of Labor
  $4.9 million for Marcellus wide pre-employment training
• What is ShaleNET?
  – Collaboration among key stakeholders to address Workforce issues related to Oil and Gas
    • Industry
    • Education
    • Public Workforce System
What is ShaleNET?

- Standardizes curriculum for six natural gas industry high priority occupations in five programs:
  - Roustabouts
  - Floorhands
  - Production Technician
  - CDL
  - Welder Helpers
• Provides:
  – Central communication structure for all workforce development initiatives:
    • Quarterly regional hub meetings at:
      – Pennsylvania College of Technology
      – Westmoreland Co. Community College
    • Annual Workforce Forum
      – 2011 Conference – Altoona, Sept. 20-21
• What’s Next for ShaleNET?
  – Application for ShaleNET US
  – US DOL grant application for approx. $13 million
  – Adds credit certificates and two-year AAS degree
  – Expands training network across U. S. shale areas
Where can the Commonwealth help?

• Workforce training funding assistance:
  1. Low-skilled/unskilled workforce to reduce unemployment
     • Roustabouts
     • Floorhands
     • Production Technicians (Hydraulic Fracturing)
  2. First responder/Emergency responder training
  3. Community awareness programming
Questions???

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