Association of Union Constructors
Industry Leaders Forum
Natural Gas Industry Update

December 14, 2017

David J. Spigelmyer
President
Marcellus Shale Coalition
Our Membership

- 200+ diverse members
- Producers, midstream and suppliers

Our Focus

- Long-term development
- End use opportunities
- Addressing landowner and public issues
- Maximizing benefits to secure our region’s energy future

Associate Members are an integral part of the MSC and the industry’s robust supply chain.

More than 95% of the natural gas in Pennsylvania is produced by MSC member companies.

The MSC Board of Directors consists of 34 major producer and midstream companies in the Appalachian Basin.
STATE OF THE INDUSTRY

December 2017
Pennsylvania: A World-Class Player in Shale Gas Production

- 2nd largest natural gas producer in U.S.
- 9,923 unconventional wells*
  - 564 shut in
  - 792 drilling not completed
  - 638 inactive
- Nearly 7,880 producing wells
- 5.1 Trillion Cubic Feet (2016)
- 19.2% of total U.S. natural gas production
- 33 of 67 counties with at least 1 producing well
Feedstock: “Wet Gas” Region

Legend
- Marcellus /Utica Formation
- Wet Gas Region

Feedstock: "Wet Gas" Region

Wet Gas
>1.2 MMBtu+ per Mcf

Dry Gas
<1.2 MMBtu per Mcf
Drilling Activity in PA

PA Rig Count 2011-2017

Source: Baker Hughes
Drilling Activity in PA

Unconventional Well Activity
2008-2017

Source: PA DEP Well Permit & Spud Data Report

Spud  Permitted

Marcellus Shale Coalition
Challenges

Vital need for Infrastructure
• 24 FERC projects (Tri-State Area)
• $12.9 Billion (PA)

Climate Certainty
• Chapter 78a
• GP-5 and GP-5A
• Permit delays
• Severance tax
• Post-production costs
• Local zoning
### December Bid Week Pricing (Inside FERC's Gas Market Report)

<table>
<thead>
<tr>
<th>Primary PA Interconnect Points</th>
<th>Pricing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tennessee Zone 4</td>
<td>$2.29/MMBTU</td>
</tr>
<tr>
<td>Leidy Receipts</td>
<td>$2.39 MMBTU</td>
</tr>
<tr>
<td>Dominion Appalachia</td>
<td>$2.50/MMBTU</td>
</tr>
<tr>
<td>Average Gas Sales $</td>
<td>$2.39/MMBTU</td>
</tr>
</tbody>
</table>

**Average Gathering of $0.80/ MMBTU (Independent Fiscal Office)**
Proposed Pipeline Projects

Legend

<table>
<thead>
<tr>
<th>Name</th>
<th>Company</th>
<th>Capacity</th>
<th>Miles</th>
<th>Planned In Service</th>
</tr>
</thead>
<tbody>
<tr>
<td>Atlantic Coast</td>
<td>Duke Energy, Piedmont Natural Gas, MLP, Resources, Dominion</td>
<td>1.5 BCF/d</td>
<td>556</td>
<td>Late 2018</td>
</tr>
<tr>
<td>Atlantic Sunrise</td>
<td>Williams</td>
<td>1.7 BCF/d</td>
<td>178</td>
<td>2017</td>
</tr>
<tr>
<td>Constitution</td>
<td>Williams, Cabot Oil &amp; Gas, WGL Holdings, Piedmont Natural Gas</td>
<td>0.65 BCF/d</td>
<td>124</td>
<td>2017</td>
</tr>
<tr>
<td>ET Rover</td>
<td>Energy Transfer Partners</td>
<td>1.25 BCF/d</td>
<td>590</td>
<td>Mid 2017</td>
</tr>
<tr>
<td>Leach Express</td>
<td>Columbia Pipeline Group</td>
<td>1.5 BCF/d</td>
<td>166</td>
<td>Fall 2017</td>
</tr>
<tr>
<td>Mar II</td>
<td>Crestwood Midstream Partners</td>
<td>1.0 BCF/d</td>
<td>50</td>
<td>Fall 2017</td>
</tr>
<tr>
<td>Mariner East, Phase II</td>
<td>Sunoco</td>
<td>50/600+</td>
<td>300</td>
<td>Late 2016</td>
</tr>
<tr>
<td>Mountain Valley</td>
<td>PCLI and Next EVA</td>
<td>2.0 BCF/d</td>
<td>530</td>
<td>Late 2018</td>
</tr>
<tr>
<td>Northeast EnergyDirect</td>
<td>Kinder Morgan</td>
<td>0.8-2.2 BCF/d</td>
<td>2000-44 Loop</td>
<td>Late 2018</td>
</tr>
<tr>
<td>Penn East</td>
<td>ALG Resources, NRU Pipeline, PSEG, South Jersey Industrial, UGI Energy Services</td>
<td>1.0 BCF/d</td>
<td>105</td>
<td>Late 2017</td>
</tr>
<tr>
<td>Sunbury</td>
<td>UGI</td>
<td>NA</td>
<td>35</td>
<td>2017</td>
</tr>
<tr>
<td>Utica East &amp; West</td>
<td>Kinder Morgan</td>
<td>50/100+</td>
<td>240</td>
<td>Late 2018</td>
</tr>
<tr>
<td>Western Marcellus</td>
<td>Williams</td>
<td>1.0-2.0 BCF/d</td>
<td>25+</td>
<td>Late 2018</td>
</tr>
</tbody>
</table>

Gas Storage Area

Wells Drilled

Note: The "Proposed Pipeline Projects" map offers a guide to potential greenfield pipeline projects. Greenfield projects are subject to significant changes in size, timeline, regulatory review, land acquisition, etc. Shaded pipeline routes represent new construction lanes or existing pipeline routes. Information is subject to change. Actual locations may vary. Existing pipeline maintenance and upgrades, boosting systems and compressor changes are estimated.
Market Opportunities

Electricity generation, heating

Combined heat and power applications

Light and heavy duty transportation applications

Feedstock for industries and other liquids use
  - Rebirth of manufacturing

Exports
Opportunities in Power Generation
Benefiting Consumers

- Electric prices down 40% since 2008
- Natural gas prices for end-use customers down 57% - 81% since 2008
- Average annual savings > $1,200 per household
## Lower Prices = Customer Savings
2008 - 2016

<table>
<thead>
<tr>
<th>Utility</th>
<th>PGC Rate / mcf</th>
<th>% Change</th>
<th>Customer Savings</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2008*</td>
<td>2016*</td>
<td>2008-2016</td>
</tr>
<tr>
<td>PECO</td>
<td>$11.10</td>
<td>$3.41</td>
<td>- 69%</td>
</tr>
<tr>
<td>NFG</td>
<td>$10.34</td>
<td>$1.92</td>
<td>- 81%</td>
</tr>
<tr>
<td>PGW</td>
<td>$10.58</td>
<td>$3.22</td>
<td>- 70%</td>
</tr>
<tr>
<td>Columbia</td>
<td>$10.25</td>
<td>$3.64</td>
<td>- 64%</td>
</tr>
<tr>
<td>Equitable</td>
<td>$11.81</td>
<td>$2.72</td>
<td>- 77%</td>
</tr>
<tr>
<td>UGI</td>
<td>$11.79</td>
<td>$5.06</td>
<td>- 57%</td>
</tr>
<tr>
<td>UGI Penn</td>
<td>$10.66</td>
<td>$3.72</td>
<td>- 65%</td>
</tr>
<tr>
<td>Peoples</td>
<td>$9.53</td>
<td>$2.72</td>
<td>- 71%</td>
</tr>
</tbody>
</table>

* 1st Quarter 2008 & PUC-approved rate for 2016

* Residential heating customer using 15 mcf/month
The Ethane Factor

**ETHYLENE CHAIN**

![Diagram of ethylene chain with intermediate products and end products]

- **Intermediate Products**
  - PVC
  - Vinyl Chloride
  - Ethylene Glycol
  - Styrene
  - Polystyrene
  - Polyethylene

- **End Products**
  - Adhesives
  - Coatings
  - Films
  - Paper Coatings
  - Models
  - Instrument Lenses
  - Pool Liners
  - Window Siding
  - Trash Bags
  - Sealants
  - Carpet Backing
  - Insulation
  - Detergent
  - Flooring
  - Pipes
  - Food Packaging Bottles
  - Cups
  - Housewares
  - Crates
  - Footwear
  - Clothes
  - Diapers
  - Stockings
  - Toys
  - Textiles
  - Tires
  - Sealants
  - Paint
  - Antifreeze

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"Active Cracker Projects"

Map showing locations of Shell, PTT, and Braskem.
$6B+ Capital Investment

~3.5B Pounds of Polyethylene / Year

600 Full-time Employees

6000 During Construction Phase
Polyethylene Grades

- High Density
- Low Density
- Linear Low Density
Advantages to Local PE Supply

Reliability

Transportation Costs:
  • Potential Savings of ~2¢ / lb.*
  • ~1.5% COGS*

Reduced Delivery Time:
  • Reduced Inventory Carrying Costs

Transportation Options

*PRA estimates based on available industry data
Proximity to End Customers

Why Are Plastics Factories Here?

If Polyethylene Is Here
Use It Or Lose It

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Mariner East Pipeline Project

Sunoco Logistics

Proposed ME2 Pipeline
Existing Third Party Pipeline
ME1 Pipeline
SXL Terminal Facilities
Third Party Facilities
Propane Delivery Points
Truck Intake Point
Third Party Fractionation (for truck intake)
Marcellus Shale Formation
Grassroots Initiatives

- Take Action on public policy priorities
- Connect with shale supporters
- Get involved in advocacy events
- Access timely shale-related information

www.UnitedShaleAdvocates.com
Thank you!

Marcelluscoalition.org