

Broadening the Marcellus Discussion - Impacts and Opportunities



Thomas Murphy
Timothy Kalsey
James Ladlee
Penn State Cooperative Extension
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Penn State Cooperative Extension & Natural Gas

- Statewide Penn State presence
 - 67 county offices
- Strong expertise on issues impacted by Marcellus Shale
- Landowner leasing workshops since 2001

Penn State Cooperative Extension & Natural Gas

- Expanding to address fuller range of issues
 - Economic & community development impact
 - Workforce development
 - Water quality & drinking water
 - Financial management
 - Local government
 - Support for community task force committees

Penn State Cooperative Extension

- Natural Gas Program
 - College of Agricultural Sciences
 - Ag Law Center
 - College of Earth and Mineral Sciences
 - Penn State Public Broadcasting
- Partnering With Others:
 - Natural Gas Industry (MSC)
 - Pennsylvania Department of Environmental Protection
 - Pennsylvania Department of Agriculture
 - Pennsylvania Department of Community and Economic Development
 - Pennsylvania College of Technology (MSETC)
 - Pennsylvania Farm Bureau
 - Pennsylvania Planning Association
 - County Commissioners Association of Pennsylvania
 - Pennsylvania State Association of Township Supervisors

Education

- ▣ Wide variety of audiences
- ▣ Evolution of questions
- ▣ Environmental concerns
- ▣ Risk vs. value
- ▣ Educating the “non-participants”
- ▣ Value of honest discussion
 - Who controls the message?

Environmental Issues

- ▣ Groundwater
- ▣ Surface waters
- ▣ Headwater streams
- ▣ Sound
- ▣ Wildlife
- ▣ E&S
- ▣ Forest fragmentation
- ▣ Aesthetics –viewsheds
- ▣ NORM



Marcellus black shale in northern Appalachia could conservatively boost proven U.S. reserves by trillions of cubic feet

...now estimated that potential recoverable gas could be 363 trillion cu. ft.

Drilling Process -What it is and how it works...

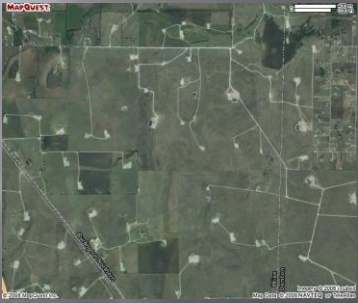


Photo courtesy pagaslease.com

New Marcellus Technology



Well Density



Multiple wells from one pad



XTO Energy

Gas Development -Community Impacts



Things are changing
More people, new companies,
new and unique jobs, more
trucks
Workforce changes, migration
Exploration and development
of gas nearest transmission
lines first
Movement to outlying areas

Infrastructure Development

What is it and why do we care?

- Pipeline --can't truck it out
- Compressors
- Gas Processing Plants
- Water Availability and Treatment
- Oil Field Service Companies
- Regulatory Agencies -monitoring the process

Pipelines



- ▣ Critical to development of well
 - \$500+ Million '09-'11
- ▣ Eminent domain??
- ▣ FERC for interstate transmission lines.
- ▣ ROW agreements
- ▣ Placement of lines
- ▣ Various impacts & considerations

Site Restoration



Water



- Thousands of gals. to drill, millions to frac
- 28 million/day peak?
- Comparisons
 - golf industry 51 million/day -irrigate
 - power plant 10 million/day
 - mainly large streams/rivers

Treatment

- Very expensive
- Weak link in process
 - Limited options
 - Limited final disposal
- Reuse/recycle
- PA "2 Year Plan"
- Specific regulations
- Reclaiming supplies
 - Wastewater
 - Acid Mine Drainage



Deep Well Injection

- Preferred option due to cost and env'tl reasons
- 8 wells already in PA
- Does PA geology support concept?
- Deeper formations
- Wells planned for '09?
- Strategic locations
 - highly profitable
 - truck traffic



Regulatory Agencies

- SRBC has new rules for water use -DRBC
- DEP has Marcellus Addendum
- Permitting fee increase
- 40 new DEP staff/inspectors
 - Williamsport Office
- More agencies regulating



Oil Field Services

- Most needed drilling services for Marcellus were not in PA
 - New regional centers in PA/Southern Tier NY
- Locations in various Marcellus counties
- Critical link in development
- Several new entries
- Many new high tech positions

Workforce Dev'l

- Educational opportunities
- Institutions finding niches
 - PSU, Penn College, Lackawanna College, Pitt/Brad.
- Partnership(s) with industry
- Ramp up timing
- Types of jobs
- Broaden the awareness
 - Students
 - Parents
 - Teachers

A Few Background Concepts

- ❑ Scale of this may be **BIG**
- ❑ Resource-based economic development; when it's gone, it's gone
- ❑ Local impact- multiplier effects if dollars kept local
- ❑ How to ensure "winners" pay fair share of increased taxes & costs?

Three Phases of Natural Gas Development

Development Phase (Short Lived/Labor Intensive)

- Well-pad and access road construction
- Local collection pipeline construction
- Drilling of the well
- Fracturing of the well
- Reclaiming some disturbance

Production Phase (Long lived/Small & Steady Labor Force)

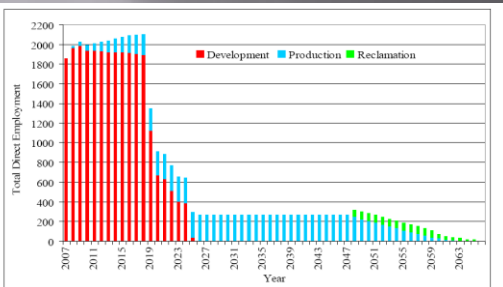
- Trucking water and condensate from well site
- Monitoring production
- Occasional well work-overs (partially re-drill/re-frac)

Reclamation Phase

- Dismantle and reclaim well-sites

Source: Jacquet

Jonah/Anticline Fields Direct Workforce Through The Three Phases:



Graph: Ecosystem Research Group/Jacquet

Economic Impact of Barnett

- \$8.2 billion in annual output
8.1% of total regional output
- 83,823 jobs (8.9% of total employment)
- Barnett Shale provides some resiliency to Fort Worth area's economy

Source: Perryman Group

Barnett - Which Industries Benefit?

Share of Annual Impact on Business Activity

Business Sector	Personal income	Employment
Crude Petroleum & Natural Gas	21%	7%
Retail Trade	16%	27%
New Construction	10%	9%
Maintenance & repair	7%	7%
Business services	6%	4%
Health services	6%	6%
Eating & drinking places	5%	15%
Transportation	4%	3%

Potential Economic Impact in PA

- ❑ Estimated \$500 billion+ in recoverable natural gas in Pennsylvania - *NOT uniformly distributed across the Commonwealth*
- ❑ Total Earnings across ALL Industries (2006)
 - Pennsylvania - \$339 billion

Opportunities/challenges in Pennsylvania:
Economic & Workforce

- ▣ **Businesses**
 - Existing local businesses benefit?
 - 'New' local businesses?
 - Attract outside businesses?
- ▣ **Workers & Residents**
 - Local residents/workers HAVE the skills?
 - Locals LEARN the skills?
 - Youth LEARN the skills & stay?
 - Newcomers to move into state?

Impacts on other sectors - tourism?

Community & Local Government

- ▣ *Little* local revenue impact
 - Natural gas is NOT subject to local taxes
 - Earned Income Tax paid where people live
- ▣ Service impacts may be large
- ▣ Little regulatory control over drilling
Balance of Oil & Gas Act; and Municipalities Planning Code

Could transform Pennsylvania communities
- but for the better or worse?

- Requires careful decision-making about:*
1. Thinking long term, not just short term gain
 - Monitoring, understanding & mitigating environmental impacts
 - How can this be used to improve Pennsylvania in long run? Other industries this could attract?
 - Value-added industry?
 2. Encouraging dollars to stay local
 - Workforce training
 - Business development
 - Housing

Could transform Pennsylvania communities
- but for the better or worse?

- 3. Manage the 'Boom' without having a 'Bust'?
 - "Short term" housing & worker needs?
 - Plan NOW for when the gas no longer flows
- 4. Need for monitoring, adapting regulations and recommended practices
 - Social and cultural change
 - Revenue sharing
 - Environmental remediation and use of conservation practices

Could transform Pennsylvania communities
- but for the better or worse?

- 5. Balancing private gain and public good
 - Local control & voice?
 - Quality of life impacts?
 - Effects on other businesses
 - Migration of labor?
 - Who pays for public service impacts (and how)

Summary

- ▣ Slowing economy
- ▣ Long term demand
- ▣ Proximity to market
- ▣ Infrastructure development issues
- ▣ Community impacts
- ▣ Environmental concerns
- ▣ Tax discussions
- ▣ ...Bridge to Future?



www.naturalgas.psu.edu

Timothy W. Kelsey, Ph.D.
State Program Leader, Economic and Community Development
Professor of Agricultural Economics
Penn State Cooperative Extension
105 Armsby Building
University Park, PA 16802
(814) 865-9542
tkelsey@psu.edu

Thomas B. Murphy
Marcellus Education Team/Energy Development/Agriculture
Penn State Cooperative Extension
542 County Farm Road, Suite 206
Montoursville, PA 17724-9621
(570) 433-3040
tbm1@psu.edu

James R. Ladlee
Economic and Community Development Educator/County Extension Director
Penn State Cooperative Extension
47 Cooperation Lane
Mill Hall, PA 17751
(570) 726-0022
jladlee@psu.edu



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