



Marcellus Shale Exploration and Development

Understanding Community Impacts

Penn State Cooperative Extension
Penn State University
September 19, 2009

Outline

- What does development of the Marcellus shale look like?
- Possibilities here in Pennsylvania
- Implications for local governments, agencies, organizations

A Few Background Concepts

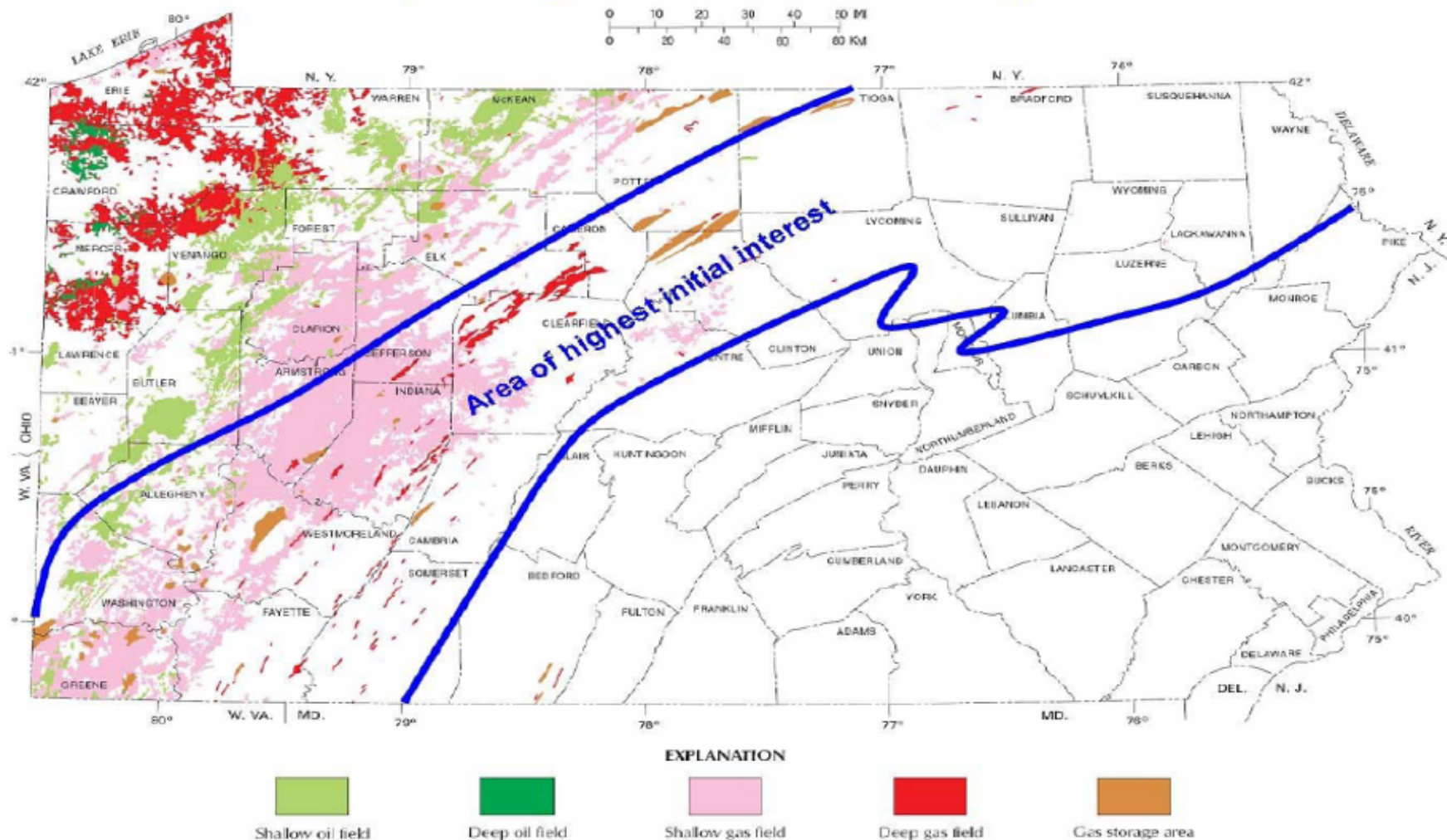
- Scale of this may be **BIG**
- Resource-based economic development; when it's gone, it's gone
- Local impact- multiplier effects if keep dollars local
- How ensure “winners” pay fair share of increased taxes & costs?

Marcellus Shale

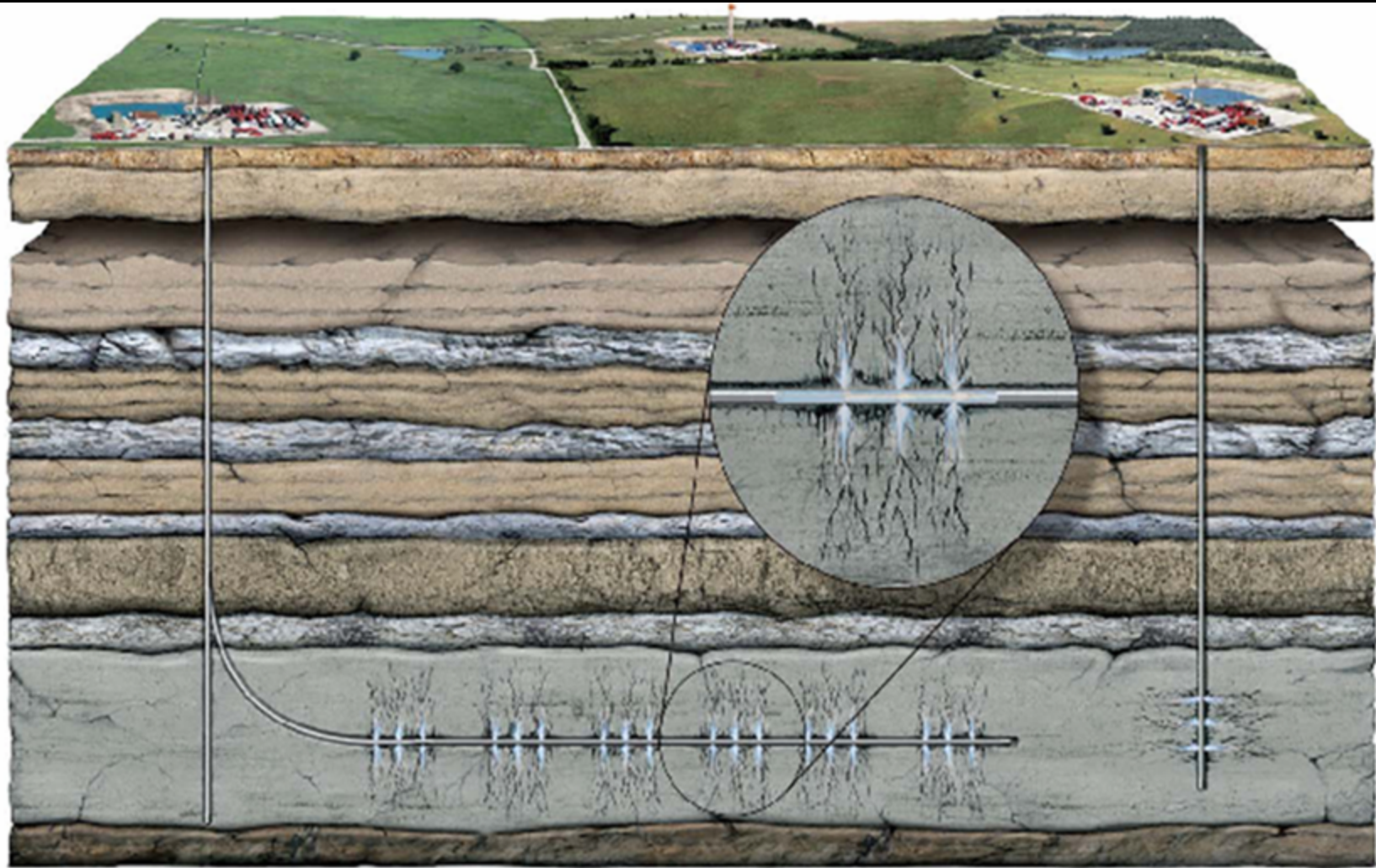
- 34 million acres in size, multi-state
- Several million acres leased
- Multiple companies drilling in region, more planned
- \$2 Billion invested in Appalachian basin in 2008

Where is the Interest?

Map of Pennsylvania Oil and Gas Fields
Showing area of highest interest for Marcellus Shale exploration



Vertical vs. Horizontal Drilling



Larger Well Sites Needed for Bigger 'Fracs



Well Site



Heavy Truck Traffic

- Basic Drilling Equipment (70+ loads)
- Water
 - 364 water truck trips
 - 1 – 4 million gallons needed
 - Equivalent to 3,494,400 car trips
(Denton County Oil & Gas Task Force)
- After well completion, regular trips for brine water

Fracing – water trucks



Fracing – the wellhead



Pipeline Infrastructure



Compressor station used to increase gas pressure into pipeline



Picture courtesy Fortuna Energy

Start of Site Restoration



Four Weeks Later





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)

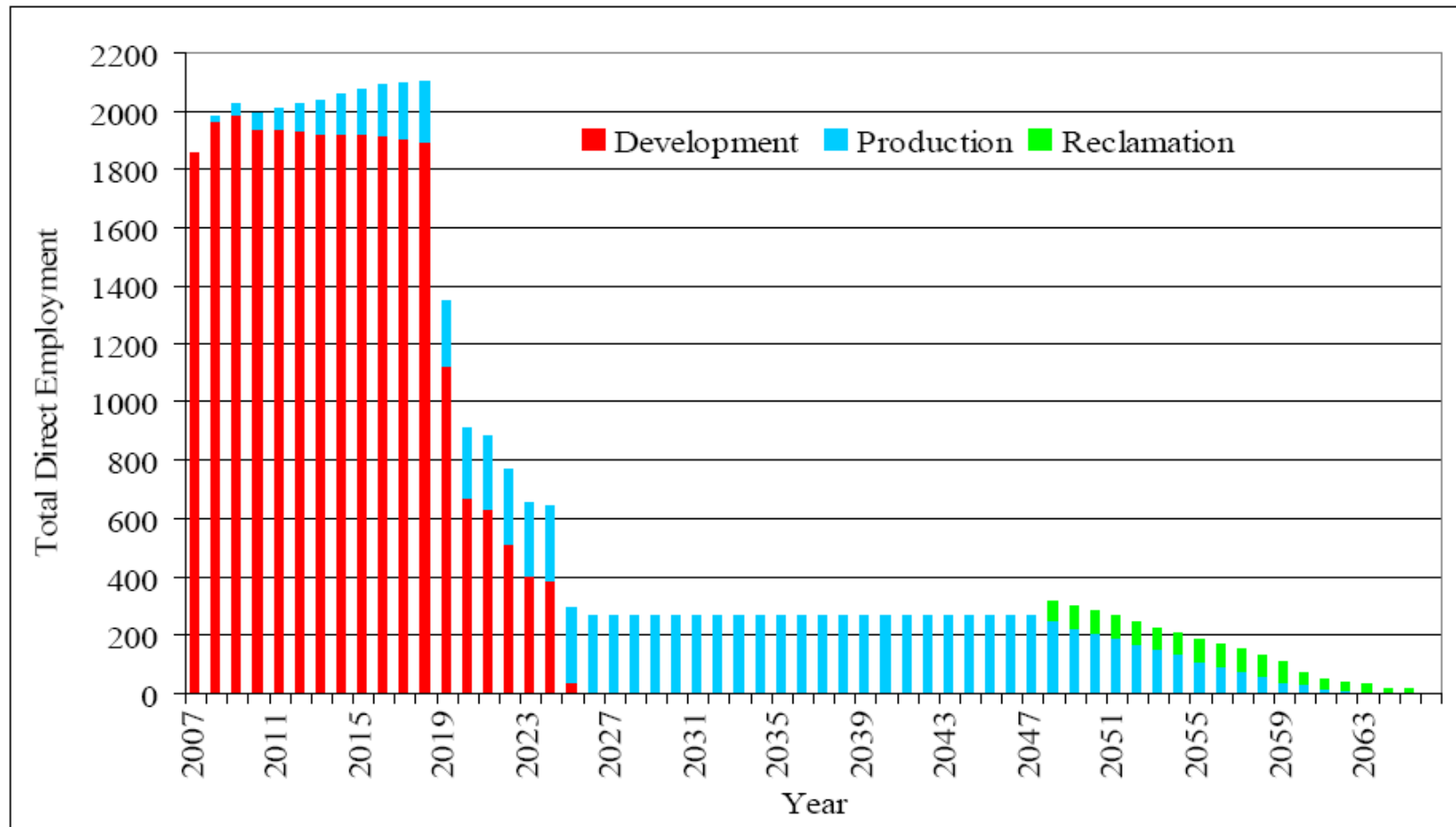
- Trucking Water and condensate from Well Site
- Monitoring Production
- Occasional Well Work-Overs (partially re-drill/re-frac)

Reclamation Phase

- Dismantle and Reclaim well-sites



Jonah/Anticline Fields Direct Workforce Through The Three Phases:



Graph: Ecosystem Research Group/Jacquet

Opportunities and Challenges for Pennsylvania
Economic and Workforce Issues

Overall Economic Impact

- 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 county?

Impacts on other sectors – tourism?

Business Opportunities



- Local contractors for site work
- Frac services, water hauling, brine water remediation
- Local fuel, stone, and site prep materials
- Equipment rentals
- Area surveyors, attorneys, abstractors, and other professional services

Opportunities and Challenges for Pennsylvania **Environmental Impacts**

Sources: Bryan Swistock, Margaret Brittingham

Environmental Issues

- Water
 - Sources of water for drilling
 - Disposal/treatment of drilling fluids
 - Chemicals used in drilling and fracing
 - Impacts on groundwater & private wells
- Wildlife and ecosystem impacts
 - Pipelines
 - Aesthetics
- Noise from drilling, construction, traffic, and compressors



Frac Wastewater Handling

- Collection in pits or tanks
- Transported to treatment via tanker trucks
- Treatment facilities
 - Dedicated or municipal
 - Current capacity limited
- Diluted discharge into streams must not affect existing uses
- Road application of treated fluids
- Deep disposal wells being tested, but not likely to be solution in PA

Effects on Forests and Wildlife

- Effects on timber resources
 - Damage to standing trees
 - Soil compaction and root damage
 - Reduced forest productivity
- Habitat disturbance and fragmentation



Allegheny National Forest

Source: <http://www.alleghenydefense.org>

Opportunities and Challenges for Pennsylvania

Community & Cultural Impacts



Community and Local Government Issues

- Roads & Bonding
- Water
- Population growth and change
- Infrastructure
 - emergency preparedness
 - human service, education
- Housing needs
- Cultural change (conflicts?)
- Economic development
- Environmental impacts
- Workforce development opportunities

Community & Local Government

- *Little* local revenue impact
 - Natural gas is NOT subject to local taxes
 - Earned Income Tax paid where people live
 - Potential Severance Tax dollars would go to the state unless there is a local sharing formula
- Service impacts may be large
- Little regulatory control over drilling

Much is preempted by Oil & Gas Act

Opportunities and Challenges for Pennsylvania

Taking Action Locally to Shape Impacts

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?
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

Resources

- www.naturalgas.psu.edu

- Written Materials

Landowner Guide

Local Government Primer

Financial Management Primer

Natural Resource Primer (summer)

Fact Sheet series

Organizing a Community Task Force

*Water Withdrawals for Development of Marcellus Shale Gas
in PA*