The Marcellus Play:
Pennsylvania’s experience

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Marcellus (and other shales):

- Vast source of domestically-produced energy
- Landowner wealth
- New jobs
- Replace gasoline, diesel in our vehicles
- Replace coal in our power plants (and reduce water consumption for electricity generation)
- Reduce soot, mercury, NOX, SOX pollution; no ash disposal
- Improve public health
- Enhance national energy security
- Reduce global warming emissions *
* About that Asterisk

- Weather records shattered- 3K in 2011
- 2011: 13 $1Billion weather disasters
  - $14B in weather disasters in last decade
- Global water cycles intensifying (@ 3°C 24%)
  - IEA: 6°C warming by 2100
- Artic Monitoring and Assessment Program:
  - Arctic temps – highest in 2,000 years – projected to raise global sea levels by 3 to 5 FEET by 2100.
  - That's up from a 2007 projection of 7 to 23 inches by the U.N.'s scientific panel on climate change.
* About that Asterisk

- Natural gas: Electricity: 50% lower lifecycle GHG emissions v. coal
  - NETL, 2011
  - CMU, 2011
  - Worldwatch Institute/Deutsche Bank Climate Change Advisors, 2011
  - UMD, 2011
  - Cornell, 2011
  - Others…http://energy.wilkes.edu/PDFFiles/Reports/IEER.GHG.V3.pdf

- Bridge to renewable future
  - Facilitate renewable energy deployment (Worldwatch Institute)

- BUT methane emissions **MUST** be minimized in production, transmission, storage, distribution
  - Methane = 25X CO₂
Getting it Right

- The right regulations (planning to drilling to transport)
- The right enforcement
- The right monitoring
- The right taxation
- The right energy policies
- Protecting the commons
- The right vision
PA...A cautionary tale
PA’s History

- Punctuated by waves of natural resource extraction...
PA’s History

- Drake’s first oil well, early shallow gas
PA’s History

- Timbering over of millions of acres of forests to fuel the early days of the Industrial Revolution
PA’s History

- King Coal
In Each Case

- PA got it wrong
- Privatized profits, socialized costs
  - Blighted environment
    - Uncounted unplugged wells
    - 180K acres of abandoned mine lands
    - 5,000 miles of polluted streams
    - Multi-billion dollar/perpetual clean up bill
  - Blighted communities (during/ghost towns after)
My home town

Hazleton, Pennsylvania
Hazleton, PA

- **Boom**
  - 3rd city in world to have electric street lights (Edison)
  - 1940: Pop. 38,000
  - Stop on Vaudeville circuit

- **Bust**
  - 1990: < 25000 (-35%)
  - Physical blight (almost all buildings pre-WW2)
  - 1/3 >60 yrs old – Oldest city outside FL
  - Perpetually high unemployment
  - Stagnant tax base
  - Streams – turquoise, orange, “forest” scrub birch, black dirt
  - Most prominent features culm piles, stripping pits
Now Consider...

- Marcellus underlays 2/3 of PA
Now Consider…

- 7M–10M acres – 25%-36% of PA land area – leased for drilling
- 200K? wells drilled in PA in next 20 (70?) years
  - 10K permitted, 6K drilled - early May
- Each well = millions of gallons of water; refrac?
- 1000’s mi. of roads
- @ 60K wells: 27K mi. gathering lines, 1700 mi. pipelines, industrial infrastructure (TNC, 2011)
- Air, water, soils, habitat, other impacts…
Now Consider…

- Utica? (and Upper Devonian…Trenton Black River…)

John Quigley
The wave of natural gas development that is just beginning to sweep over PA will have profound environmental impacts.

Change the face of Penn’s Woods

- @ 60K wells, as much as 1.6 M acres - >9% of PA forest – damaged (TNC 2010-11)
Well site where lubricant leaked into Big Pine Creek, an EV Stream
Pond is 8 acres

@75 trailers
Multiply these images by tens of thousands
Fracking Technology

- Industrial activity – not your “Mom & Pop” shallow gas
- Developed in states with different land forms
- Applied to eastern forests for the first time in PA
- Much to learn
- Ample reasons for caution
PA Problems

- Gas migration
- Contamination of drinking water wells
  - caused by improper well construction, surface spills
- Leaks of wastewater pits
- Fracking fluid, diesel, other spills at surface
- Well blowouts, explosions, fires
- Gas bubbling in middle of Susquehanna River
- Thousands of recorded violations of enviro regs
- Infrastructure damage
- Social impacts
- Rush to drill to secure leases (most wells not connected)
The Odds…

- Scale, pace, volumes…
- The sheer number of wells that are/will be drilled in coming decades makes incidents inevitable
  - A daily occurrence across PA
- State government must plan accordingly
  - Full regulatory program (PA has a strong one; not strong enough)
  - Monitoring program
  - Robust enforcement
  - Conserve the commons
PA’s Public Lands: Under the drill
PA’s State Forest

- 2.2 million acres
- First, longest-certified sustainable public forest in US
- 12% of PA forested land, 88% of certified forest
- A working forest, managed in balance
- Critical to PA’s:
  - Environment – air, water…
  - Forest products industry
    - 90K jobs, 3000 businesses, 10% of manufacturing workforce
    - Entrée to $5B “green” wood market
  - Tourism economy
    - PA’s 2nd largest industry - $33B impact
  - Quality of life
The Numbers… The Impacts…

- 1.5 million acres SFL in Marcellus fairway
  - 700,000 acres available for exploration
    - 1/3 total state forest
    - 40% SFL in PA Wilds

- Next 15-20 years - 6K-12K wells?
  - @6K wells, 25K acres “converted” (39 sq. mi.)

- Plus infrastructure

- Cumulative impacts?
The Limits

- All unleased SFL is environmentally sensitive
- 2009-2010 – DCNR analysis - no additional leasing w/surface disturbance without threatening ecological integrity, wild character of state forest
- 2010 - Governor Rendell signed an executive order prohibiting additional leasing
- DCNR – monitoring program
- 72% of Pennsylvanians oppose further SF leasing – 54% “strongly” (F&M, 9/11)
- 57% oppose ANY drilling in state forests, 67% oppose drilling within state parks (MCAP, Oct. 2011)
- WWCD?
Collaborative Model

Commonwealth of Pennsylvania
Department of Conservation and Natural Resources
Bureau of Forestry

Guidelines for Administering Oil and Gas Activity on State Forest Lands

VERSION 2011-1
April 26, 2011


John Quigley
Shale Gas Monitoring Program

Objectives:

1. Annual Comprehensive Assessment of Shale Gas Activities on State Forest Land
2. Conditions Analysis of Shale Gas Activities on State Forest Land
3. External Partner Collaboration

Outcomes:

- Provide objective information
- Integrate monitoring information in an adaptive management context

Shale Gas Monitoring Program

- Bureau wide interdisciplinary team
- Integrating information from multiple program areas and forest districts
  - Sproul, Tiadaghton, Tioga, Loyalsock, Susquehannock, Elk, and Moshannon Forest Districts
Shale Gas Monitoring Program

Bureau wide interdisciplinary team

– Specialists
  • Water quality, wildlife biologist, botanist, infrastructure, policy/social, plant specialist, biometrician, GIS
– Field staff – stationed at Tiadaghton RMC
  • Assistant forest program manager
    – 3 foresters
    – 3 seasonal forest technicians
– Forest District Gas Management Staff
  – DF, ADF, Gas Forester
Shale Gas Monitoring Program

1. Annual Comprehensive Assessment of Shale Gas Activities on State Forest Land
   - Cumulative summary of on-going activities
     - Wells/Pads/ROW developed
       - Wells producing, revenue generation
     - Water quality/quantity conditions
       - Wetlands, EV/HQ water ways
     - Infrastructure changes/long term maintenance requirements
     - Invasive plants presence/absence
     - Recreational implications
     - Public Safety Incidents
     - Pollution events/spills
Shale Gas Monitoring Program

2. Conditions Analysis of Shale Gas Activities on State Forest Land
   - Paired landscape analysis approach
     - Establish baseline/reference conditions of non-developed areas of the state forest system in representative/comparable units of analysis
     - HUC 12 watersheds are currently being evaluated
     - Measure/investigate a suite of parameters to understand changes/effects among the landscapes
Shale Gas Monitoring Program

3. External Partner Collaboration
   – Department of Environmental Protection
   – Susquehanna River Basin Commission
   – State Conservancies – TNC, WPC
   – Research Community
     • Rattlesnake Study – Moshannon State Forest
     • Visitor Use Monitoring – multiple forest districts
     • ROW effects on wildlife
     • Erosion/Sedimentation modeling
     • Soil wetness/probability modeling
     • Many others…
Monitoring Values

Current List
1. Water
2. Plants
3. Animals
4. Invasives
5. Soil
6. Recreation
7. Infrastructure
8. Local communities
9. Air
10. Revenue
11. Incidents
12. Land-use
13. Forest health
14. Timber products
15. Energy
PA State Parks

- 120 state parks
- 2009 *National Gold Medal Award for Excellence in Park and Recreation Management* by American Academy for Park and Recreation Administration, National Recreation and Park Association
- 38 million visitors annually
- Return $12 to local economies for every $1 invested by PA ([PSU, 2012](#))
  - $1 billion in local economic activity
  - Almost 13K local jobs
61 state parks lie atop Marcellus

PA owns 15% -20% of state park mineral rights
Coming to a State Park Near You...
The Marcellus/Utica Era

- Industrialization of landscape
- **Cumulative impacts** will dwarf all of PA’s previous waves of resource extraction combined.
What to Do?

- Abundance of caution in protecting irreplaceable water resources is defensible
- More study – beyond EPA – is needed
  - Scientific research on impacts of fracking to groundwater (local and total)
  - Public health
  - Cumulative impacts (air, water, soils, habitat, etc.)
  - Baseline data needed
- Continual wastewater monitoring
- Long term ground/surface water monitoring
- BMPs – continuous improvement \((SGS, 2011)\)
- Regulation **must** follow where the science leads
PA’s Act 13
Act 13

- Process - Emerged from conference committee before the committee even met
- $ - Rate anemic – 1.5%? Lowest in nation
- Local zoning eviscerated
- Setbacks a sham- Waiver **SHALL** be granted if driller/mineral owner harmed/promises add’l protections
- Inadequate bonding – not full cost
- Health – MDs required to sign NDAs
- Hurdles to protect public lands
- $50M annual raid on conservation $ to pay for other programs
Act 13

- Legal challenge to local preemption
- Community compacts?
Community impacts:

- Immediate
  - Direct
  - Indirect

- Long Term
A long list

- Immediate impacts include:
  - Traffic
  - Infrastructure damage
If a road is showing signs of deterioration, it can be posted; i.e. weight-limited.

More immediate impacts:

- Local air quality
- Noise
- Crime/social
- Public health
- Community stress
- Public safety/emergency response capacity
- Housing (displace low-income persons)
- Zoning/planning (Act 13 eviscerates local zoning)
- Quality of life
And…

- **Tourism**
  - ($33B industry, PA’s 2\textsuperscript{nd} largest)
  - Outdoor rec = @ 1/6\textsuperscript{th}
  - 1.3M acres SFL in PA Wilds
  - 525K acres – 40% - leased
Let the good times roll...for awhile...

- Gas will flow for (70? 100?) Years
- Most jobs will last only as long as drilling does
  - Intensive period of well/pipeline infrastructure development, relatively little labor/resource use after
  - Drilling, pipeline-laying jobs will vanish
  - Small remnant workforce – monitor, truck water from wells, other duties
  - Economic activity will dry up
- 50% gas comes out in first 5 years
  - Royalty income will drop off
    - Royalty income exported or relocated (T. Kelsey, PSU)
The long term...

- The inevitable future when the drilling and associated jobs, business activity go away.
  - And they will....
Leaving communities with the inevitable question

Now what?...
Boom and Bust

- PA’s history – energy extraction boom towns typically emerge worse off
  - Lower employment
  - Higher poverty
  - Demographic challenges – aging pop
  - Vanishing – or vanished - tax base
  - Vacancies – residential, commercial, industrial
  - Blight – built environment and environmental
  - Caught in the “bust” part of the cycle
Local leaders must...

- Address the immediate direct/indirect impacts
  - Get a better deal than PA’s Act 13
- Also need to be proactive
  - Take steps during drilling phase that will harness some of the economic benefits of the gas boom for projects that will have long term benefits
  - Improve the attractiveness, sustainability, and liveability of the community over the long term
    - E.g. building roads, parks, and other infrastructure, improving the appearance of downtowns.
Local leaders…

- Work on economic restructuring NOW
  - Attract businesses/industries to the area that will remain in the community.
  - How?
Tool – a real severance tax...

Pay for local impacts, and...

States have created permanent funds to:

- Convert depleting natural resources into a source of sustainable wealth for communities today and into the future.
- Even out the fluctuations of the boom-bust natural resource-based economy.
- Diversify and expand local economies.

Existing funds include:

- Alaska Permanent Fund (1976)
- Montana Coal Severance Tax Trust Fund (1976)
- New Mexico Severance Tax Permanent Fund (1973)
- Utah Permanent Trust Fund (2008)
- Navajo Nation (est. 1985)

Severance tax could empower...

- Long term restructuring...

Sustainable uses:

- Economic development grants & loans including funds targeted to mining communities (MT, NM, UT)
- Remediation of impacts of mining (ND)

With a prudent, thoughtful public policy response, shale gas development can be an environmental victory that grows our economy and builds local communities.

Whether we achieve that victory is up to all of us.
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