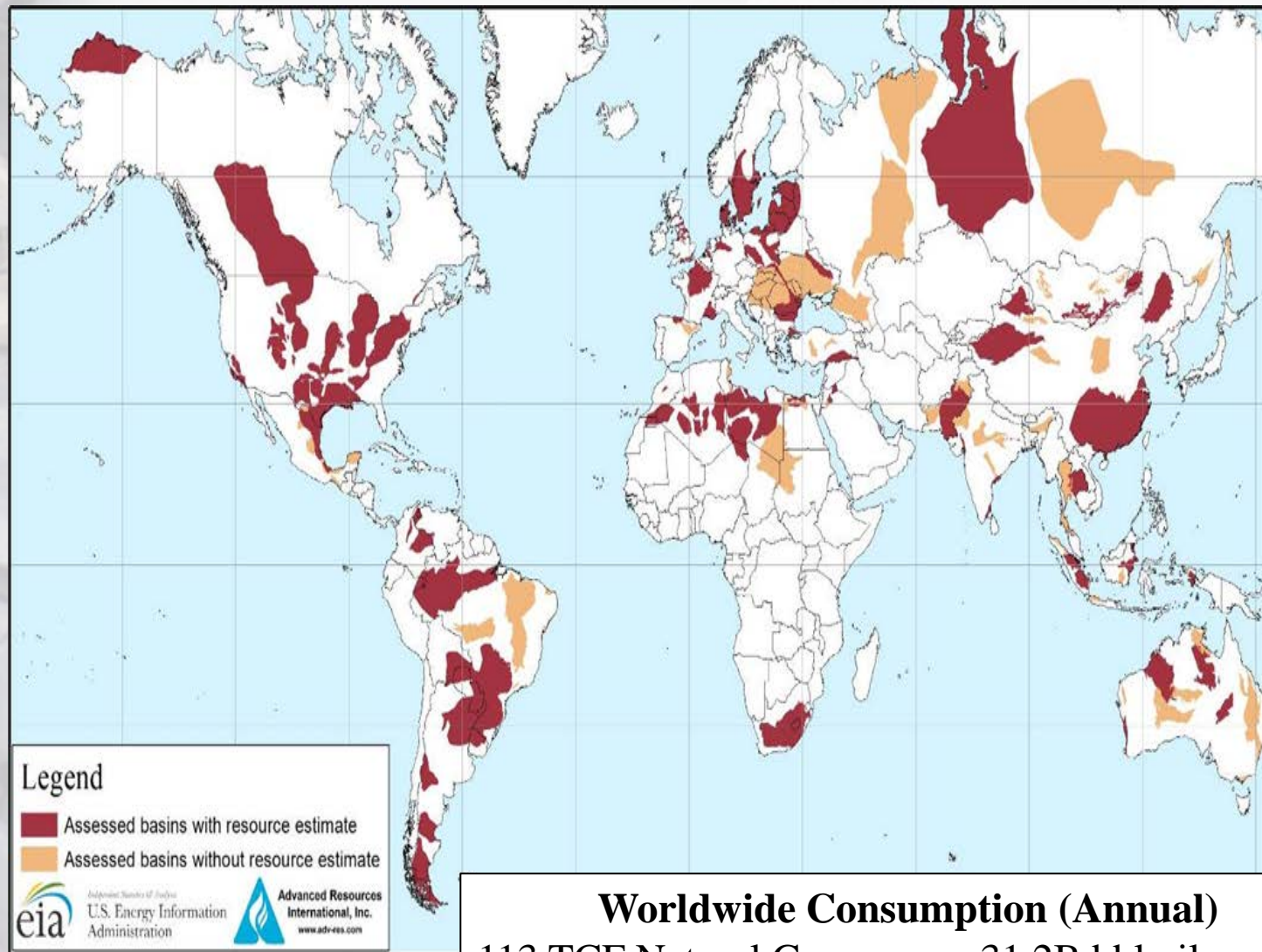




Business Considerations in the Shale Supply Chain



Global Shale Resources



22.9 QCF NG

3,352 bbl oil

United States

- 2,431 TCF
 - 665 TCF (27% shale)
- 223B bbl oil
 - 58B bbl oil

Worldwide Consumption (Annual)
113 TCF Natural Gas 31.2B bbl oil

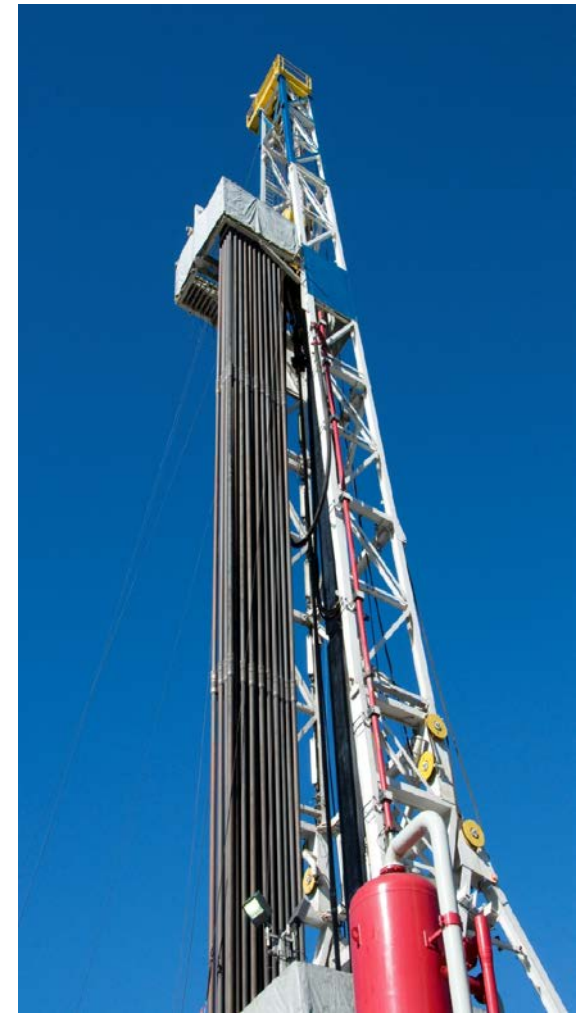
200 & 100 year supply respectively

How Long?

- “Multi-generational play”
- “Careers not jobs”

Marcellus / Utica / Upper Devonian

- 95,000 sq. mile aerial extent
- 10,000 – 20,000 to be developed
- 10 wells per square mile?
- 100,000 – 200,000 total wells
- 2,500 wells per year (currently)





Evolving Shale Issues

- Economics of development
- Constraints in transmission/storage
 - Wells on pipeline
- Growing International Interest
- Predictability by public & industry is critical
- Public understanding of regulatory process





Potential Permits Required for Gas Well

Evolving Shale Issues

- Well drilling permit (w/ well location plat, casing and cementing plan, FNDC for threatened or endangered species, landowner/water well owner notification, coal owner or operator notification, storage field owner notification)
 - Water management plan for Marcellus Shale wells
 - Proposed alternate method of casing plugging, venting or equipping a well
 - Bond for Oil and Gas Well(s) (individual or blanket, various bond types allowed)
 - Waiver of distance requirements from spring, stream, body of water, or wetland (to put the well closer than 200 feet)
 - Variance from distance restriction from existing building or water supply (to put the well closer than 100 feet)
 - Proposed alternate method of casing plugging, venting or equipping a well
 - Approval for alternative water management practices
 - Approval of a pit for control, handling or storage of production fluids
 - Use of alternate pit liner
 - NFDES GP-1 for discharges from stripper oil wells
 - Water Quality Management Plan for treatment facilities
 - Alternative pit liner
 - Inactive status
- Road spreading plan approval
 - Transfer of well permit or registration
 - Orphan well classification
 - Residual waste transfer stations and transportation of residual waste
 - Road use permit - construction of access to state roadway
 - Road use bond (PennDOT or municipality)
 - Surface use permit (if in the Allegheny National Forest)
 - Water Obstruction - Encroachment - US Army Corps of Engineers Section 404 Joint Permit
 - Dam permit for a centralized impoundment dam for Marcellus Shale gas wells
 - GP-11 for non-road engine air emissions
 - GP-05 for natural gas compression facilities emissions
 - Erosion & Sedimentation Plan (5,000 square feet-Five acres)
 - Erosion & Sedimentation Control General Permit for Oil and Gas Activities
 - NFDES storm water for construction activities
 - Water allocation (SRBC, DRBC or DEP for Ohio River basin)
- Ohio River basin)
 - GP-3 for bank rehabilitation, bank protection, and gravel bar removal
 - GP-4 for intake and outfall structures
 - GP-5 for utility line stream crossings
 - GP-7 for minor road crossings
 - GP-8 for temporary road crossings
 - GP-11 Maintenance, Testing, Repair, Rehabilitation or Replacement of Water Obstructions and Encroachments

• Evolving Technology

– Closed loop vs. tanks

– Move to “green completions”

– Greening of products (food grade products)

• Predictability by public & industry is critical

• Public understanding of regulatory process

• Greater Transparency Push

– Industry and Government

– Fracfocus.org

Potential Permits Required for Gas Well

Well drilling permit (w/ well location plat, casing and cementing plan, FNDC for threatened or endangered species, landowner/water well owner notification, coal owner or operator notification, and gas storage field owner notification)	Road spreading plan approval	Ohio River basin)
Water management plan for Marcellus Shale wells	Transfer of well permit or registration	GP-3 for bank rehabilitation, bank protection, and gravel bar removal
Proposed alternate method of casing plugging, venting or equipping a well	Orphan well classification	GP-4 for intake and outfall structures
Bond for Oil and Gas Well(s) (individual or blanket, various bond types allowed)	Off-site solids disposal	GP-5 for utility line stream crossings
Waiver of distance requirements from spring, stream, body of water, or wetland (to put the well closer than 200 feet)	Residual waste transfer stations and processing facilities	GP-7 for minor road crossings
Variance from distance restriction from existing building or water supply (to put the well closer than 100 feet)	Transportation of residual waste	GP-8 for temporary road crossings
Proposed alternate method of casing plugging, venting or equipping a well	Road use permit - construction of access to state roadway	GP-11 Maintenance, Testing, Repair, Rehabilitation or Replacement of Water Obstructions and Encroachments
Approval for alternative water management practices	Road use bond (PennDOT or municipality)	
Approval of a pit for control, handling or storage of production fluids	Surface use permit (if in the Allegheny National Forest)	
Use of alternate pit liner	Water Obstruction - Encroachment - US Army Corps of Engineers Section 404 Joint Permit	
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Alternative pit liner	GP-05 for natural gas compression facilities emissions	
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	GP-5 for utility line stream crossings	
	GP-7 for minor road crossings	
	GP-8 for temporary road crossings	
	GP-11 Maintenance, Testing, Repair, Rehabilitation or Replacement of Water Obstructions and Encroachments	

Industry Supporter?



Social Media Impacts



Civil disobedience



Industry Drivers: Technology & Innovation





Industry Drivers: Technology & *Innovation*



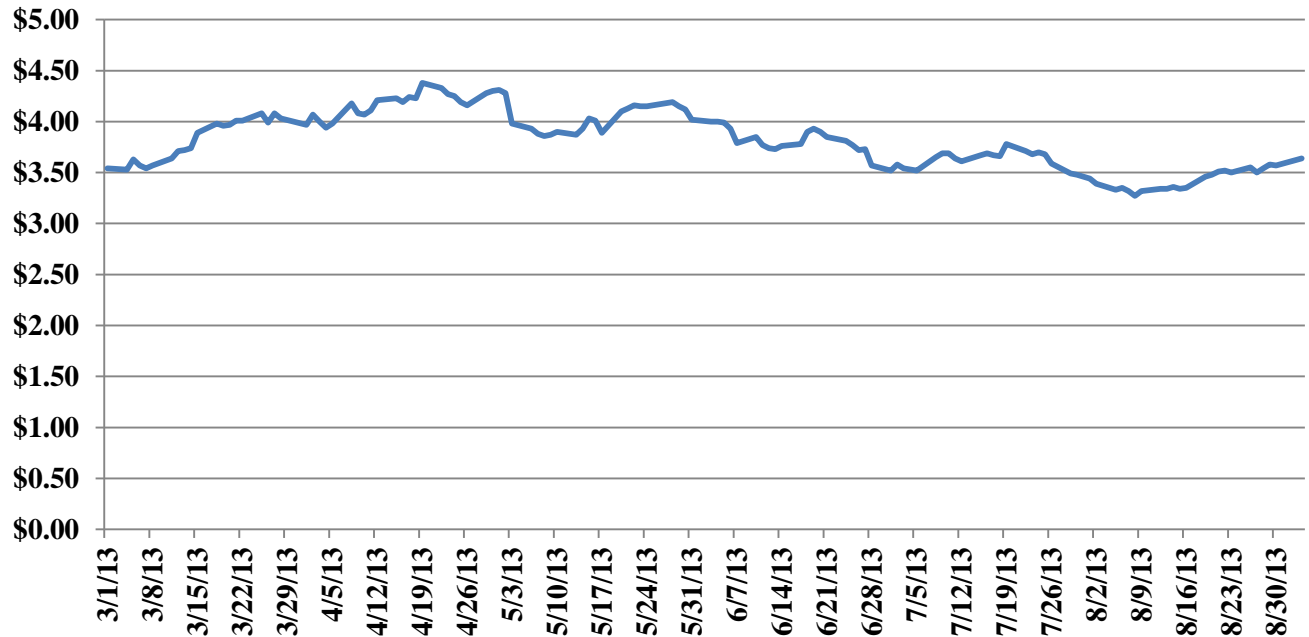
Key Drivers of Development: Rigs & Price

		Oil	Gas	PA	TX	OH	WV
Sept	2012	1409	452	63	877	20	27
Sept	2013	1365	394	52	830	35	35

Leading PA Counties

Susquehanna	11
Washington	9
Lycoming	8
Wyoming	8
Greene	7

Natural Gas Spot Price (\$/MMBTU)



* *Bakers-Hughes*

Key Drivers of Development: Policy

- New York
- Federal
 - Coal Fired Power Plants
 - Hydraulic Fracturing
 - Pipeline Development
 - Exporting
 - Economically Driven (4-6x premium)
 - Contract vs spot pricing
 - Political/Patriotic
 - DOE
- State
 - Impact Fee / Taxes
 - Pipeline Regulation
 - Public Input

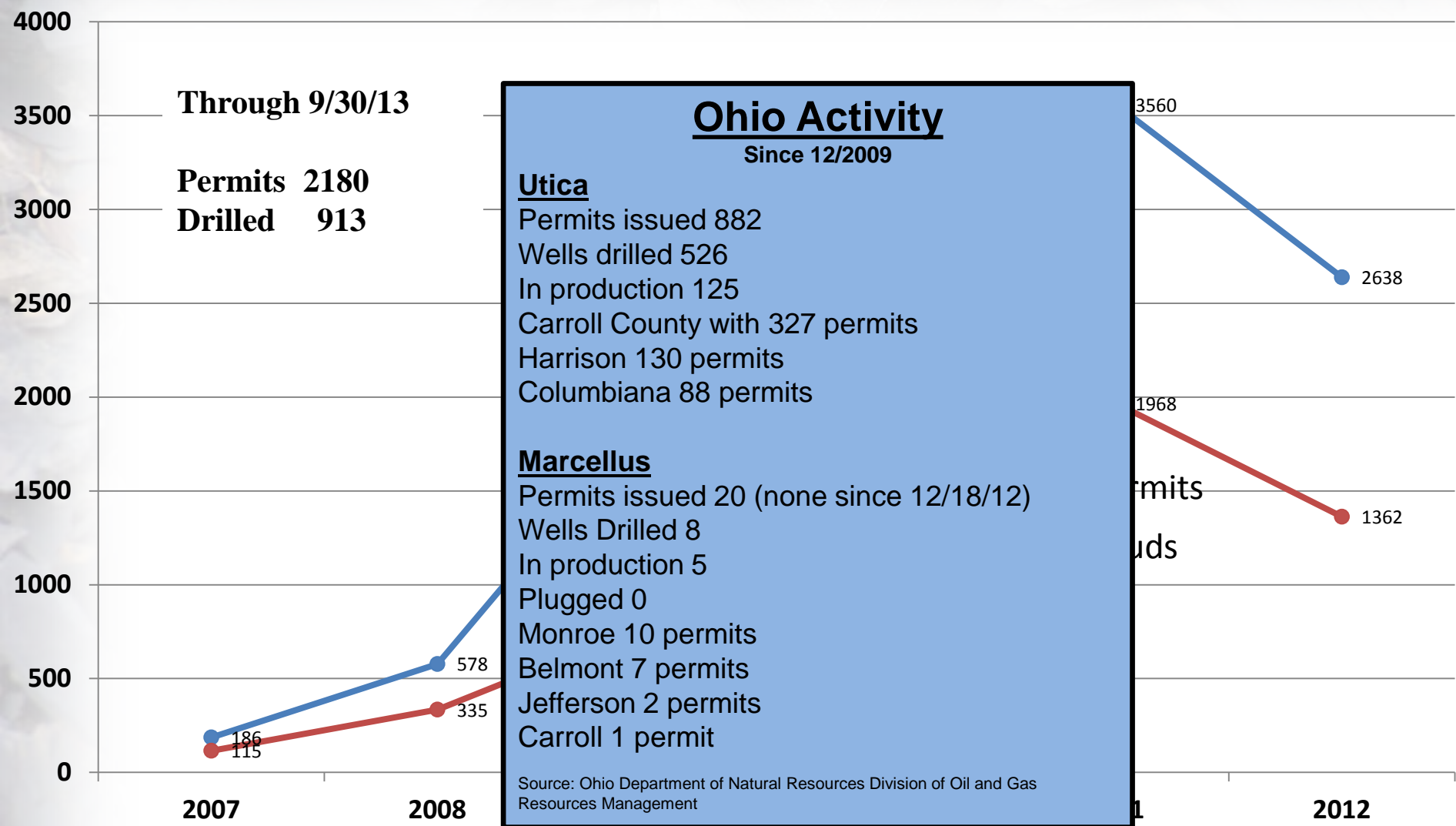


Applications Received by DOE/FE to Export Domestically Produced LNG from the Lower-48 States (as of January 11, 2013)
All Changes Since January 4, 2013 Update Are In Red

Company	Quantity ^(a)	FTA Applications ^(b) (Docket Number)	Non-FTA Applications ^(c) (Docket Number)
Sabine Pass Liquefaction, LLC	2.2 billion cubic feet per day (Bcf/d) ^(a)	Approved (10-85-LNG)	Approved (10-111-LNG)
Freeport LNG Expansion, L.P. and FLNG Liquefaction, LLC	1.4 Bcf/d ^(a)	Approved (10-160-LNG)	Under DOE Review (10-161-LNG)
Lake Charles Exports, LLC	2.0 Bcf/d ^(a)	Approved (11-59-LNG)	Under DOE Review (11-59-LNG)
Carib Energy (USA) LLC	0.03 Bcf/d: FTA 0.01 Bcf/d: non-FTA ^(d)	Approved (11-71-LNG)	Under DOE Review (11-141-LNG)
Dominion Cove Point LNG, LP	1.0 Bcf/d ^(a)	Approved (11-115-LNG)	Under DOE Review (11-128-LNG)
Jordan Cove Energy Project, L.P.	1.2 Bcf/d: FTA 0.8 Bcf/d: non-FTA ^(a)	Approved (11-127-LNG)	Under DOE Review (12-32-LNG)
Cameron LNG, LLC	1.7 Bcf/d ^(a)	Approved (11-145-LNG)	Under DOE Review (11-162-LNG)
Freeport LNG Expansion, L.P. and FLNG Liquefaction, LLC ^(a)	1.4 Bcf/d ^(a)	Approved (12-06-LNG)	Under DOE Review (11-161-LNG)
Gulf Coast LNG Export, LLC ^(d)	2.8 Bcf/d ^(d)	Approved (12-05-LNG)	Under DOE Review (12-05-LNG)
Gulf LNG Liquefaction Company, LLC	1.5 Bcf/d ^(d)	Approved (12-47-LNG)	Under DOE Review (12-101-LNG)
LNG Development Company, LLC (d/b/a Oregon LNG)	1.25 Bcf/d ^(d)	Approved (12-48-LNG)	Under DOE Review (12-77-LNG)
SB Power Solutions Inc.	0.07 Bcf/d	Approved (12-50-LNG)	n/a
Southern LNG Company, L.L.C.	0.5 Bcf/d ^(d)	Approved (12-54-LNG)	Under DOE Review (12-100-LNG)
Excelerate Liquefaction Solutions I, LLC	1.38 Bcf/d ^(d)	Approved (12-61-LNG)	Under DOE Review (12-146-LNG)
Golden Pass Products LLC	2.6 Bcf/d ^(d)	Approved (12-88-LNG)	Under DOE Review (12-156-LNG)
Cheniere Marketing, LLC	2.1 Bcf/d ^(d)	Approved (12-99-LNG)	Under DOE Review (12-97-LNG)
Main Pass Energy Hub, LLC	3.22 Bcf/d	Approved (12-114-LNG)	n/a
CE FLNG, LLC	1.07 Bcf/d ^(d)	Approved (12-123-LNG)	Under DOE Review (12-123-LNG)
Waller LNG Services, LLC	0.16 Bcf/d	Approved (12-152-LNG)	n/a
Pangea LNG (North America) Holdings, LLC	1.09 Bcf/d ^d	Pending Approval (12-174-LNG)	Under DOE Review (12-184-LNG)
Magnolia LNG, LLC	0.54 Bcf/d	Pending Approval (12-183-LNG)	n/a



Unconventional Wells and Permits in Pennsylvania



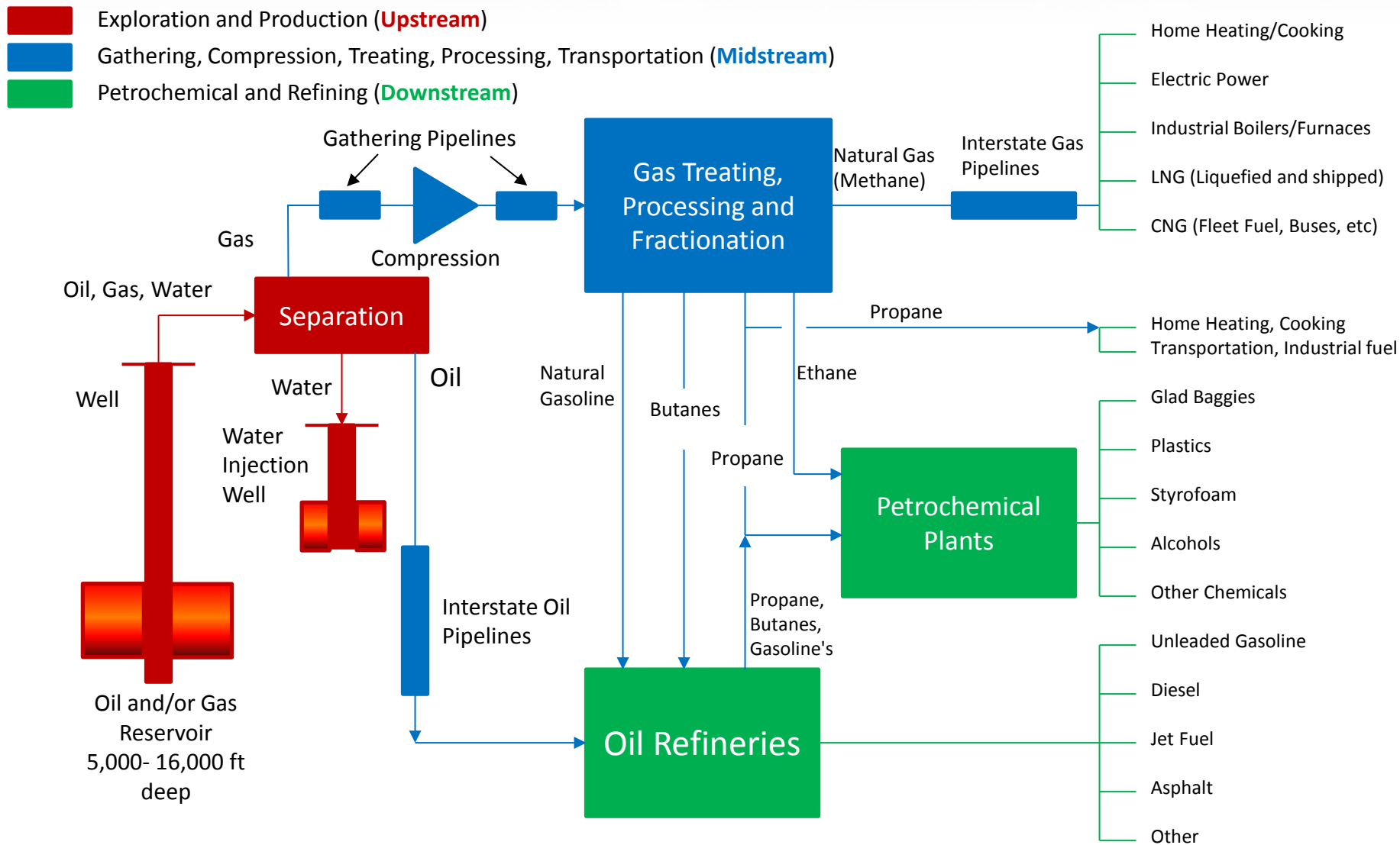


Supply Chain Opportunities: What & Where

- Hot spots versus overall development
- Development type/geography
 - Energy & Production versus sub-contractors
 - Basin headquarters
 - Regional offices/centers
 - Field offices
 - Field location
 - well site, compressor station, pipeline, etc...



Segments of the Oil and Gas Industry



Master Service Agreement

- Legal contract that includes most terms that govern future transactions
- Permits quick execution of work/purchase orders that incorporate MSA terms
- Process to evaluate risks and benefits
- Defines rates, payment terms, services
- Defines EHS and performance standards
- Safety audits & required vendor meetings
- Required for first tier suppliers
- Outline obligations and responsibilities of both parties



Master Service Agreement

What it's not....

- Guarantee of work
- Template for all contractors or companies
- Speedy process
 - Market changes during negotiation may extend time
- Required for all work in the oil gas industry



Payment - Terms and Process

- May not align with your set terms
- Unique process
 - Proper documentation
 - Electronic
 - Added cost?
- Plan accordingly





Industry Knowledge & Updates

Newsletters & Terminology

- NGI Daily – Daily News Accounts (\$\$)
- Ohio Energy Resource Alliance – Updates on Ohio Activity (Free)
- Schlumberger – Oil Field Glossary (Free)
- Shale Directories (Free)
- Marcellus Drilling News (\$\$)
- Shale Digest (\$\$)
- Energy in Depth (Free)



Websites

- Education
- Government (State & Federal)
- Non-profit

Linked In Groups

Google Alerts



Business Considerations

The Message

- Safety
- Experience
- Knowledge
- Commitment
- Owner Involvement
- High tech
- Be Direct

Forms of Operation

- Internal/Interwoven
- Separate Division
- Independent Entity

Adapt

- 24/7
- Mobile
- “Local” redefined
- Think global

Competition or not?

- New Partnerships
- Backfill



Business Considerations

Financial Costs

- Soft costs
- Slower pay than typical operations
- Expansion (Hiring/Marketing, etc.)
- Equipment
- Employee
 - Safety Training
 - PPE
 - Screening
- Insurance



Marketing & Networking

- Local, State & National Trade Shows
 - Insight Conference
 - DUG East
 - Meeting
 - Networking, B2B Events
- Chamber of Commerce/Partnerships
 - Member only events
 - Direct marketing opportunities
- Public Meetings
- Print media
 - Hart Directory
 - Don's Directory
- Website
 - Must have
 - “Shale Energy Services”



Networking is Key

- Create & improve relationships
- Understand your market / decision makers
 - Maximize ROI
- Be seen and involved
 - Events, restaurants, trade shows, public meetings
 - Parking lots, bars, convenience stores
- **Follow up gets results**



Fitting the Oil/Gas Patch

- Be ready
 - Strong work ethic
 - Problem solver
 - Basic knowledge of natural gas production
 - Pass a drug test
- **Network Properly** (high contact)
- Patience and perseverance (polite persistence)
- Get ready
 - Follow/understand the industry
 - Take your safety training
 - Have a plan



Indirect Opportunities

Utilization

- Transportation
 - Infrastructure, mechanics, conversion, training
- Power Generation
 - Plant construction, industrial/commercial conversion
- Exporting
 - Terminal construction, pipeline, logistics, transportation

Workers

- Housing
 - Short term, long term apartments, home purchase
- Banking, legal, accounting
- Medical
- Food, retail
- Transportation
- Training, education

Onsite

- Food
- Delivery service
- Clothing (FR), dry cleaning

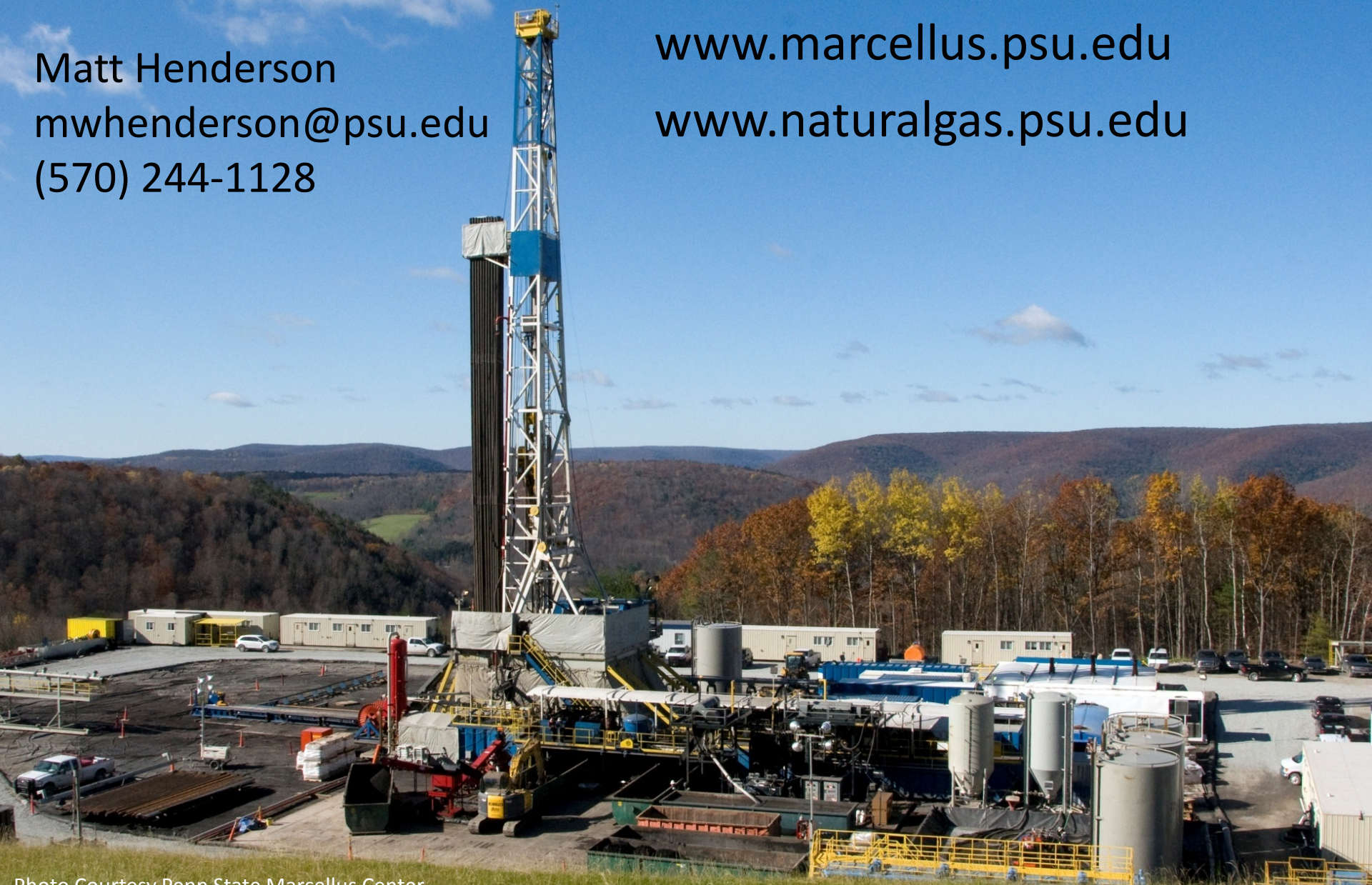
Summary

- Engage with industry
- Educate yourselves and organization
- Slow down – multi generational play
- Develop a plan

Thank You

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www.marcellus.psu.edu
www.naturalgas.psu.edu



Federal Regulatory & Education Resources

Environmental Protection Agency

www.epa.gov

Federal Energy Regulatory Commission

www.ferc.gov/industries/gas.asp

National Petroleum Council

www.npc.org

Geology

www.geology.com

Barnett Shale Energy Education Council

www.bseec.org

US Energy Information Administration

www.eia.gov



Education Resources

Go Marcellus Shale – Discussion Forum by County (Free)

www.gomarcellusshale.com

Frac Focus – Chemical Disclosure Registry (Free)

www.fracfocus.org

Shale Digest – Weekly Newsletter (\$\$)

www.shaledigest.com

Baker Hughes – Weekly Rig Count (Free)

www.bakerhughes.com

Penn State Marcellus Center for Outreach and Research (Free)

www.marcellus.psu.edu



Education Resources

NGI Daily – Daily News Accounts (\$\$)

www.intelligencepress.com

Schlumberger – Oil Field Glossary (Free)

www.glossary.oilfield.slb.com

Energy In Depth – Industry Updates (Free)

www.energyindepth.org

Linked-In Groups (Free)

<http://www.linkedin.com/in/matthewhenderson/>

Google Alerts – Custom to key words (Free)



State Trade Associations

Pennsylvania Independent Oil & Gas Association

www.pioga.org

Marcellus Shale Coalition

www.marcelluscoalition.org

Ohio Oil & Gas Association

www.ooga.org

WV Oil and Natural Gas Association

www.wvonga.com

Independent Oil and Gas Association of West Virginia

www.iogawv.com

Independent Oil and Gas Association of New York

www.iogany.org

Texas Oil & Gas Association

www.txoga.org

North Dakota Petroleum Council

www.ndoil.org

Louisiana Oil & Gas Association

www.loga.la

Louisiana Mid-Continent Oil and Gas Association

www.lmoga.com

California Independent Petroleum Association

www.cipa.org

Oklahoma Independent Petroleum Association

www.oipa.com

State Regulatory

Ohio Department of Natural Resources

www.dnr.state.oh.us

New York Department of Environmental Conservation

www.dec.ny.gov

West Virginia Department of Environmental Protection

www.dep.wv.gov

Railroad Commission of Texas

www.rrc.state.tx.us

North Dakota Industrial Commission, Oil and Gas Division

www.oilgas.nd.gov

California Department of Conservation

www.conservation.ca.gov/dog

Oklahoma Corporation Commission

www.occeweb.com

Louisiana Department of Natural Resources

www.dnr.louisiana.gov

Pennsylvania Department of Environmental Protection

www.depweb.state.pa.us



National Trade Associations

America's Natural Gas Alliance

www.anga.us

American Petroleum Institute

www.api.org

US Oil & Gas Association

www.usoga.org

Independent Petroleum Association of America

www.ipaa.org

American Gas Association

www.aga.org

Natural Gas Supply Association

www.ngsa.org

National Association of Royalty Owners

www.naro-us.org

Interstate Natural Gas Association of America

www.ingaa.org