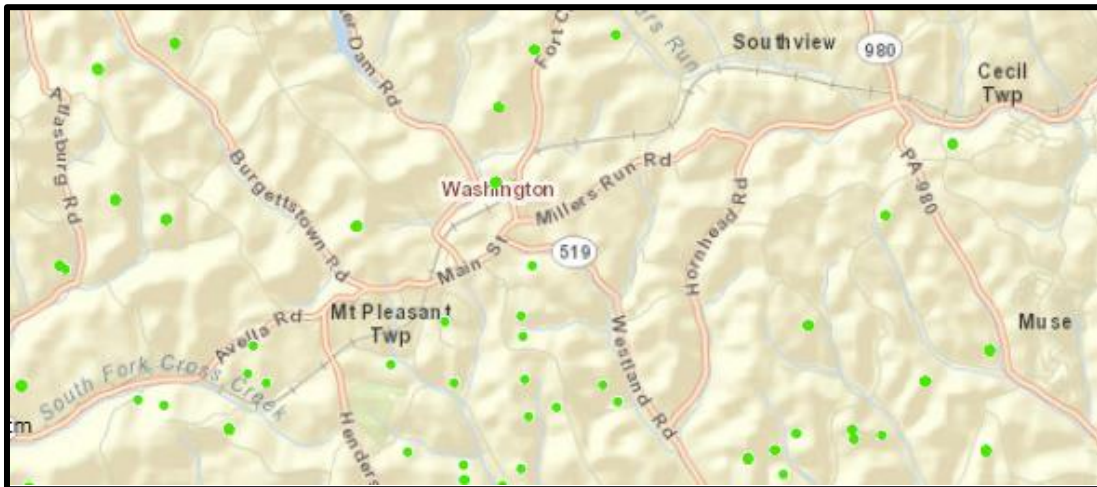


Navigating Shale Gas Development

**A Guidebook for Local Government Officials in
Pennsylvania**

A Working Paper



**Washington & Jefferson College
Center for Energy Policy and Management
&
Environmental Law Institute**

2014

Navigating Shale Gas Development
A Guidebook for Local Government Officials in Pennsylvania
(A Working Paper)

This Guidebook for Pennsylvania's local government officials was created by the Environmental Law Institute and the Center for Energy and Policy and Management at Washington & Jefferson College as part of a project to educate the public about shale gas development in Pennsylvania, and to help local governments understand what they can do to assure their communities receive long-term benefits from the development.

The Guidebook is being presented at this time as a working paper, in that we are soliciting input on its content and plan to produce a final version of the Guidebook by the end of 2014. The final Guidebook will be published electronically thereafter and will be accessible through the W&J College website.

ELI and W&J College will be releasing a detailed white paper that examines the likely effects of the shale gas boom in southwestern Pennsylvania and approaches for dealing with jobs, community development, and financial impacts.

The Environmental Law Institute and W&J College thank The Heinz Endowments for their generous support of this project.

Navigating Shale Gas Development

A Guidebook for Local Government Officials in Pennsylvania

Over the past ten years, shale gas development has revolutionized the country's energy landscape. The development of new technologies has made it more economical to access the natural gas from shale plays such as the Marcellus and Utica shales in Pennsylvania. Natural gas is expected to replace coal as the greatest source of energy for electricity generation in the U.S. by 2035. Also, low prices and increased availability of natural gas is expected to promote growth in industrial production, particularly in bulk chemicals.

Approximately 60% of Pennsylvania lies atop the Marcellus Shale formation, which spans a 95,000 square mile area extending across most of Pennsylvania, and West Virginia, southern New York, eastern Ohio, western Virginia, and western Maryland. The formation is located between 5,000 to 8,000 feet below the land surface. Pennsylvania has the largest share (35%) of the area of the formation.

Because of the size of these resources, natural gas operators have made substantial investments in drilling and production activities and in infrastructure and pipelines in Pennsylvania. They also have made investments in Pennsylvania's local economies, by purchasing oil and gas rights and encouraging the development of local businesses. At the same time, these activities have impacts on communities and the economy, with many changes yet to come.

Local governments have many issues to address in dealing with the Marcellus Shale development, and in assuring that their communities receive long-standing benefits along with the impacts. This Guidebook, which is presented largely in question and answer format organized under various topics, is designed to provide guidance on these issues.

Background Information

What is shale gas and why is it being developed now?

Shale gas is natural gas that is recovered from very deep rock formations. Geologists have always known about these rock formations and the reservoirs of gas that they hold, but until recently there was no technology that could be used to extract this gas economically. Now, two technologies, horizontal drilling and hydraulic fracturing, make it less expensive to extract the natural gas from these deep rock formations. Hydraulic fracturing involves the injection of large volumes of water, additives, and proppants into natural gas wells to fracture underground

gas-bearing shale formations and release the natural gas. This combination of technologies is referred to as unconventional gas development or shale gas development.

How much development is occurring in Pennsylvania?

The first hydraulically fractured gas well in Pennsylvania was drilled in Washington County in 2003 and completed in 2004. Soon the number of wells began to grow dramatically. The table below shows the number of permits issued for Marcellus Shale wells in Pennsylvania and the number of wells drilled in Pennsylvania between 2004 and 2013.

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Permitted	6	19	58	185	576	2,004	3,364	3,562	2,648	2,966
Drilled	2	8	37	115	332	816	1,603	1,962	1,348	1,207

Source: DEP database

As of December 2013, there were 6,649 active unconventional gas wells in the Commonwealth. Marcellus Shale wells in Pennsylvania produced about 3.103 trillion cubic feet of natural gas in 2013 alone. That is nearly as much as had been produced since the beginning of the Marcellus Shale play in Pennsylvania.

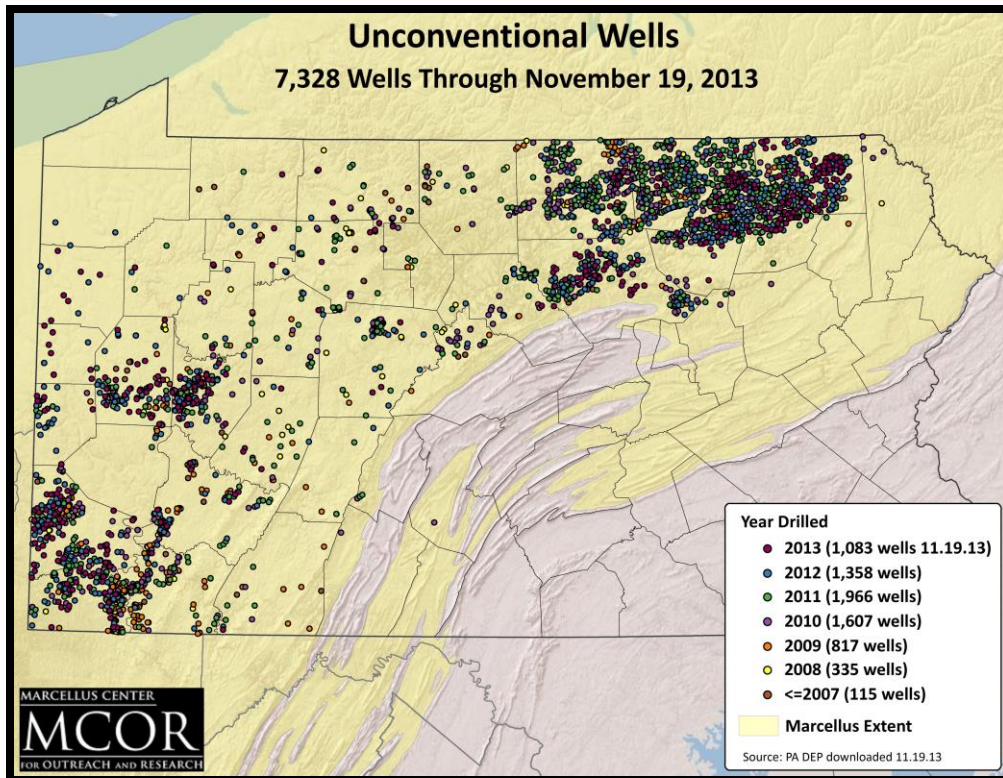
How can I find out where Marcellus Shale wells are located?

The Pennsylvania Department of Environmental Protection’s interactive oil and gas mapping website allows users to identify different types of wells by operator, location, status, and to adjust the views to show particular municipalities, counties and other information.

<http://www.depgis.state.pa.us/PaOilAndGasMapping/>

Is the development occurring all throughout Pennsylvania?

Although the Marcellus Shale lies beneath much of Pennsylvania, development so far has been concentrated in two areas in the Commonwealth – the northeastern counties of Bradford, Susquehanna and Lycoming, near the New York state border, and the southwestern counties of Washington and Greene. These two areas are referred to as the “sweet spots” of the Marcellus Shale in Pennsylvania, the places where gas can be extracted at a low enough price to make it commercially viable to develop. The following map shows the location of all of the unconventional wells drilled in Pennsylvania based on DEP drill reports.



Is the gas the same at all locations?

Most gas in northeastern Pennsylvania is “dry” gas, meaning it is almost exclusively made up of methane. Most of the gas in the sweet spots in southwestern Pennsylvania is “wet” gas meaning it contains natural gas liquids in addition to methane. The liquids include ethane, propane, butane, isobutene, and pentane. They can be separated and sold for a variety of uses.

Who owns the natural gas that is extracted from the ground?

The natural gas is sometimes owned by the person whose property overlies where the gas is being extracted, but not always. The reason for this is that the law in Pennsylvania allows the oil and gas interest to be severed (sold or leased separately) from the surface interest. If the mineral interest has been severed from the surface interest, one party owns the surface and another party owns the gas. The owner of the gas decides whether to allow the extraction of the natural gas and generally receives payment for the gas that is removed. If the gas owner wants to have the gas extracted the surface owner generally is not able to prevent extraction.

Are there any state requirements concerning how much royalties a natural gas owner must be paid?

A Pennsylvania statute, the Oil and Gas Lease Act, makes invalid any lease for natural gas that pays less than a 12.5% royalty on all gas removed from the real property. There have been

some controversies recently concerning when in the process of removal the royalty is calculated.

Regulating Shale Gas Development

Who is responsible for regulating the shale gas development activities?

Several state agencies are involved in the regulation of shale gas development and its impacts, including the Department of Environmental Protection, the State Conservation Commission, and the Pennsylvania Public Utility Commission. Act 13, a Pennsylvania statute which was enacted in February of 2012 in response to the new shale gas development, identifies the roles of the various agencies. The Department of Environmental Protection (DEP) is responsible for regulating the impacts of the activities on the environment and the public health and safety.

Is a well operator required to have a permit to drill and develop a gas well?

Yes. In order to drill an unconventional gas well, an operator must first obtain a well permit under Act 13 and comply with other environmental requirements of Pennsylvania law. The permit application is accompanied by a plat showing the municipality and county where the well is to be located, the name of the surface owner and lessor, owners of underlying workable coal seams, and the names of all surface owners and water purveyors whose water supplies are within 3000 feet of the vertical well bore of the gas well. The DEP will approve the permit promptly, within 45 days of submission of a complete application.

Who is notified about the filing of the well permit application?

Surface owners and municipalities and water suppliers and coal owners and operators must be notified by certified mail of the submission of the permit application.

Do persons have a right to object to the issuance of the well permit?

The same parties who received notification of the permit issuance, which includes municipalities, have the right to file objections to the permit. The objections must be filed within 15 days of receipt of notice. However, objections can be based only on very limited grounds – such as that the well location violates setback requirements in Act 13 or that information in the application is untrue. Coal operators have additional grounds for objections, which may lead to a conference and order by the DEP. DEP has the discretion, but is not required, to consider comments by municipalities.

Are there any restrictions on the location of the gas well?

There are a number of "setback provisions" in Act 13, which prohibit gas wells from being located within specified distances of certain structures or facilities. Unconventional gas wells cannot be drilled within 500 feet of an existing building or water well without written consent of the owner, nor can they be drilled within 1000 feet of water wells, water intakes, reservoirs or other water supply extraction point used by a water purveyor without consent of the purveyor.

Is a well operator required to post any financial assurance to guarantee how it will operate its well?

A well operator must post a bond prior to drilling to ensure compliance with the law. Act 13 bonds are \$4,000 per well for wells under 6,000 feet in depth and \$10,000 per well for deeper wells, but total bonds are capped based on the number of wells. Operators may also post "blanket bonds" for all of their wells in the Commonwealth. Bonds cannot be released until all water supply impacts have been addressed, the well is plugged and the well site reclaimed after operations are finished or abandoned.

Protecting Water Sources and Water Supplies

Are there special provision for the protection of water sources and water supplies?

A number of provisions of Act 13 and the Clean Streams Law are intended to protect waters of the Commonwealth and water supplies. Most of the protections require that the vertical well bore be set back at least 300 feet from streams, springs, wetlands and water bodies, with the edge of the disturbed area being at least 100 feet from these features. But these setback provisions are among those called into question by the Pennsylvania Supreme Court's December 2013 decision in *Robinson Township v. Commonwealth*, which found them too closely entangled with an unconstitutional provision that allowed DEP to waive these setbacks upon petition from an operator.

Does the operator have to test nearby water supplies before it drills a well?

Unlike many other states, Pennsylvania law does not require a natural gas driller to test wells and other water supplies in advance of drilling. However, it provides an incentive to do so by making operators presumptively liable for pollution of water supplies within 2500 feet of the unconventional gas well *unless* the driller can show by test results that the contamination pre-existed the gas well activity or that the landowner refused to allow access for pre-drilling tests.

Does a well operator have to disclose chemicals used in the hydraulic fracturing process?

During the drilling process, the operator must disclose chemicals used in the hydraulic fracturing process, including their concentrations, for publication on the FracFocus website (<http://fracfocus.org/>); however, the precise identity of the chemicals can be withheld if the operator claims that the identity or the concentration of the chemical is a trade secret. The DEP, however, does receive the actual chemical identities in the pollution prevention and contingency plan filed by the operator, and the information is also on material safety data sheets maintained by operators to assist emergency responders.

Does an operator of a gas well have to replace a water supply that it impacts?

Act 13 does require a well operator to replace a water supply that it adversely affects, either in quantity or quality. A decision as to whether a water supply has been adversely affected will turn in large part on the pre-drilling quality and quantity of the water supply. It is important to have reliable samples that establish these characteristics.

Are there any restrictions as to how an operator manages fluids on its well site?

Because so much water is required to hydraulically fracture a single well (approximately 4.4 million gallons of water per well) there are a lot of fluids handled on the site of a well and it is important that they be managed well. As a general matter, the Clean Streams Law prohibits anyone from polluting the surface or ground waters of the Commonwealth.

How do most operators manage waste water generated on-site?

Most operators recycle and reuse the largest volume of water used in hydraulic fracturing, as a less costly way to deal with fluids management. Water that is not reused is generally transported offsite for treatment and discharge, or for deep-well disposal regulated under the federal Safe Drinking Water Act. There are only 7 licensed deep disposal wells in Pennsylvania and so much of the wastewater disposed of by this means goes to Ohio disposal wells.

What does a well operator have to do after completing a well? After gas production has ended?

After drilling and completion, operators must within 9 months restore the well site in accordance with the Clean Streams Law and erosion and sediment control permit. Wells that have ceased production must be plugged and the site further restored to support bond release.

What about air pollution from the natural gas development?

Unlike water pollution associated with shale gas development, which tends to be the result of accidents such as spills or leaks, air emissions occur both in connection with regular operations and as a result of equipment malfunction. Generally air emissions from shale gas development

result from “diesel exhaust, natural gas flaring, venting, compressor stations, natural gas pipelines, storage tanks, wastewater storage” and a variety of fugitive sources such as pipes and valves. Air emissions include common pollutants such as nitrogen dioxide, carbon monoxide and particulate matter; hazardous air pollutants or air toxics; and greenhouse gases such as methane. DEP is responsible for overseeing air pollution and responding to events resulting in releases of air pollutants. DEP annually inventories self-reported emissions from natural gas operations.

Should we be concerned about earthquakes resulting from any aspect of shale gas development?

There has been no experience with seismic events in the Marcellus Shale region related to hydraulic fracturing itself. The state of Ohio observed some events related to permitted deep-well disposal of hydraulic fracturing wastewater and established rules for these disposal activities. Deep-well disposal is regulated by the U.S. EPA rather than by the DEP in Pennsylvania. At present little hydraulic fracturing wastewater from Pennsylvania is disposed of in deep wells in Pennsylvania.

Do local governments have any authority to regulate the environmental impacts of shale gas development?

In general, local governments do not have authority to regulate or oversee the environmental impacts of shale gas development. However, they can deal with companies directly to ensure that they understand the timing of key events, emergency procedures, and responses. Where the siting of wells raises particular issues, municipalities may comment within the short 15-day window provided by Act 13, but a better course would be to contact the companies ahead of time and reach an understanding of likely siting issues and concerns.

Can local governments do anything to control the physical impacts of the natural gas development?

Act 13 preempted practically all local government regulation, but these provisions were struck down by the Pennsylvania Supreme Court in its 2013 decision in *Robinson Township v. Commonwealth*. Some land use regulatory powers can be exercised by municipalities after the *Robinson Township* decision. Municipalities will need to adopt non-discriminatory ordinance provisions applicable to all forms of industrial development (not just oil and gas), and should specify key findings and requirements related primarily to “where” these activities will occur with the municipality, rather than “how” they will occur. Some regulation of timing, noise, lights, and traffic may be permitted, but not strictly “environmental” types of regulation. Consult your solicitor and watch for additional information from organizations, colleges, and continuing education programs as to the allowable actions.

Planning For Impact Fees

What are the impact fees and why do they matter?

Act 13 created impact fees, to be paid by gas operators, as the primary means of providing revenues for local governments to address impacts from the shale gas boom. Impact fees are particularly important to Pennsylvania local governments because they will generally receive little immediate boost in revenue from gas operations. They will see little changing property tax revenues because locally taxable real property does not include the value of oil and gas resources, and they are likely to see little change in earned income tax revenues because locally taxed earned income does not include shale gas royalties and rentals received by residents.

How are the fees determined?

Act 13 sets an impact fee rate schedule for each horizontal unconventional well. Producers pay a declining impact fee for up to 15 years on each well into a statewide fund. The exact fee varies from year to year based on: (1) how many years the well has been in operation; and (2) the average annual price of gas (based on the New York Mercantile Exchange price). At current natural gas prices, each unconventional well contributes \$50,000 the first year, \$40,000 the second year, \$30,000 the third year, \$20,000 each year for years 4-10, and \$10,000 each year for years 11-15. When prices are higher, the rate schedule is somewhat higher; and when lower, it is somewhat lower.

At current prices the total pay-in to the Commonwealth's impact fee fund over the life of a single well will be \$310,000. The obligation to pay the impact fee is suspended if the well is capped, or does not produce natural gas exceeding more than an average of 90,000 cubic feet per day within two years after paying the initial fee. The fee is not dependent on productivity of the well.

Forty to fifty percent of the impact fee is paid in the first three years, and the remainder over the next twelve years. This makes its financial benefit to the Commonwealth and the counties and municipalities sharing in fee receipts heavily dependent on new drilling. Statewide, the fee generated \$204.2 million in 2012, \$202.5 million in 2013, and \$224.5 million in 2014. Because the fee declines rapidly, maintaining similar funding levels will require substantial new wells to be spud each year to offset the revenue declines. For example, at current gas prices, about 1,200 new unconventional wells will need to be drilled in 2014 to offset the declining fee amounts being paid by those wells currently paying the fee, in order to achieve similar amounts of revenue for the 2015 collection and distribution.

How are the fees distributed?

The impact fees are collected by the Commonwealth and distributed through a complex formula specified in Act 13. The first \$25.5 million is earmarked for state agencies and county conservation districts to offset certain statewide impacts and meet state objectives. After this, 60 percent of the remaining funds are distributed to counties and municipalities using a set of formulas described below. The remaining 40 percent is deposited into the Marcellus Legacy Fund and disbursed to support statewide initiatives (including environmental stewardship, bridge improvements, water and sewer projects, the Commonwealth Financing Authority, and funding of county greenways and parks).

The local government allocations from the 60 percent pool are distributed among municipalities and counties. Counties with producing unconventional shale gas wells get 36 percent of this pool, based on the ratio of their wells to the total number of wells in the Commonwealth. Municipalities with producing unconventional shale gas wells get 37 percent of this pool, based on the ratio of their wells to the total number of wells in the Commonwealth. Finally, 27 percent of this pool is distributed to municipalities located in counties with producing wells, whether or not the municipality itself has producing wells. This share is determined first by determining the amount available within each county by determining the ratio of wells in the county to the total number of wells in the Commonwealth and then by allocating half the resulting share to municipalities that either have wells or are located contiguous to or within 5 miles of municipalities that have wells; and the other half to all municipalities in the county. Both of these “halves” are further subdivided by formulas that award more to municipalities based on their proportional share of population, and proportional share of road miles. In any year a municipality may receive no more than the greater of \$500,000 or 50 percent of its budget for the prior year.

Amounts may be small in some municipalities. Median fees received by a municipality in Washington County in 2012 were \$57,887, but the least amount received by a municipality in the county was \$223. In Greene County, median fees were \$119,209, while the least amount received by any municipality was \$9,349. Counties get larger amounts under the formulas; for example, Washington County received \$4.4 million and Greene County \$3.1 million in 2012. In general, municipalities with active wells will continue to receive larger amounts, while those without wells will receive lower amounts even though they may experience some impacts from traffic and demands on public services.

You can view the distribution formulas and actual distribution percentages at the Act 13 website maintained by the Public Utility Commission.

http://www.puc.state.pa.us/filing_resources/issues_laws_regulations/act_13_impact_fee.aspx.

How can counties and municipalities use the fees?

Under Act 13, county and municipal governments can spend impact fees on the following items:

1. Construction, reconstruction, maintenance and repair of roadways, bridges and public infrastructure
2. Water, storm water and sewer systems, including construction, reconstruction, maintenance and repair
3. Emergency preparedness and public safety, including law enforcement and fire services, hazardous material response, 911, equipment acquisition and other services
4. Environmental programs, including trails, parks and recreation, open space, flood plain management, conservation districts and agricultural preservation
5. Preservation and reclamation of surface and subsurface waters and water supplies
6. Tax reductions, including homestead exclusions
7. Projects to increase the availability of safe and affordable housing to residents
8. Records management, geographic information systems and information technology
9. Delivery of social services
10. Judicial services
11. Deposit into the county or municipality's capital reserve fund if the funds are used solely for a purpose set forth in this subsection
12. Career and technical centers for training of workers in the oil and gas industry
13. Local or regional planning initiatives under the Pennsylvania Municipalities Planning Code.

Does anyone review how the local governments spend their impact fees?

Each year, counties and municipalities must report to the Public Utility Commission how they have allocated their expenditures among these 13 categories. In the first reporting year, many municipalities saved the money or reported that they had not determined how it would be used. This should change as experience is gained with this new source of revenue.

How can counties and municipalities use their impact fees sustainably?

According to PUC records, most Pennsylvania counties and municipalities spent the bulk of their initial impact fees on public infrastructure, public safety, and some for work on stormwater and sewer systems, with the largest percentage being held by local governments as a capital reserve.

Because impact fees will be available during the “boom” years of shale gas development, but not for long after, it is highly appropriate to plan for these expenditures in ways that provide lasting value to the local economy and community resources. Important uses by municipalities include infrastructure (transportation, water and sewer), and environmental capital expenditures that will provide long-term value.

Effective expenditures will require planning. Some municipalities were not prepared for impact fee revenues in the first years of distribution, and many received fairly small allocations, making it difficult to implement capital projects. In the early years it will be useful to expend some of the impact fee funds on planning efforts designed to ensure sustainable uses of the funds for lasting capital projects in later years.

For instance, one municipality used part of its impact fees to pay for the services of a municipal planner which developed two growth plans for the municipality. The first plan was for a recreation area and the second was for general economic development, including residential housing and small businesses. Both projects are designed to draw more residents into the area and increase the tax base. County governments can also coordinate regionally appropriate expenditures through use of funds for planning and addressing needs that require municipalities to coordinate with one another to address shale impacts and development needs systematically.

Public Health Issues

What is the status of research into the public health impacts of shale gas development?

At the present time, a variety of public health research projects have been completed and several are underway to better understand whether natural gas development activities affect public health. The work completed to date demonstrates a need for a coordinated research initiative that would evaluate the relevant issues in a scientifically rigorous, systematic and unbiased way. Such an initiative should be supported with a diverse and transparent funding stream and a regularly updated multi-year strategic research plan.

Also greatly needed is a population-based health registry that collects and tracks data about the health conditions of individuals. The Geisinger Marcellus Shale Research Initiative, in partnership with two other health care systems, has undertaken a multi-year project to analyze comprehensive health data from residents in six northeastern counties to determine if health conditions documented in their records are associated with natural gas activities. This will be potentially the largest database available to examine these issues.

Employment Opportunities

What is known about employment opportunities?

One of the most important impacts of the Marcellus Shale play is the opportunity for a local workforce to work for the industry. Shale gas operations create or support a variety of jobs that are valuable in any economy and are particularly so in the rural communities where most shale gas sites are located. Because the industry is relatively new, policymakers and public officials are unsure just how many jobs will materialize in the Commonwealth, which sectors will see the greatest amount of growth, and how local residents can gain the skills and experience necessary to take advantage of the jobs the industry brings.

What employment opportunities can we expect for the longer term?

By nature, natural gas extraction is highly variable, with demand for labor increasing and decreasing as production levels ebb and flow. And because a majority of job opportunities materialize in the drilling and pipeline infrastructure phases (some estimate as high as 98 percent of all opportunities), employment is largely contingent on new wells being drilled and new pipeline being laid. Because the drilling, hydraulic fracturing, and pipeline phases require a highly-specialized skill set, many out-of-state workers, who gained experience in previous natural gas development areas, gained employment within the Commonwealth in the initial years of development. Since 2008, a majority of hires have come from within the Commonwealth, but more than a quarter of the jobs (about 26 percent) have come from elsewhere. A 2011 report sought to identify more specific areas of employment growth generated by Marcellus Shale development. Researchers identified these areas by interviewing and surveying industry leaders familiar with workforce needs. The report revealed that the largest areas of employment growth included: General Office administration (20 percent), General Labor (20 percent), Heavy Equipment operation (17 percent), and CDL Drivers (10 percent).

How can we support longer term employment opportunities?

In Pennsylvania, the National Governor's Association and the Team Pennsylvania Foundation have partnered to establish a long-term initiative to improve science, technology, engineering and mathematics (STEM) education programs at all levels of education and increase the number of students entering STEM-related careers. Equipping students with more transferable skills learned in broader STEM-oriented programs may help to alleviate adverse effects of any future decline in employment in the case of a resource bust. Rather than re-training, these workers may be able to transition into other technology-oriented industries.

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