

June 18, 2013

Executive Summary

As the economic value of natural gas production increases in Pennsylvania's Marcellus Shale, the local impact fee created by Act 13 of 2012 is failing to keep pace. While the total value of the gas produced in Pennsylvania has increased substantially between late 2010 and late 2012, fee revenues remained flat. On June 13, the Pennsylvania Public Utility Commission reported that drilling impact fee revenue for wells drilled in 2012 was \$202 million, essentially unchanged from the prior year.

Over the next decade, the value of natural gas produced in Pennsylvania will grow much more quickly than impact fee revenue. This is largely because of the unusual structure of Pennsylvania's impact fee, which is based on the price of natural gas and the year in which a well is drilled. This means the fee revenue varies based on the number of wells drilled each year and the price of natural gas, rather than the value of gas production.ⁱ Over time, total production and the value of gas produced will increase, but the effective rateⁱⁱ of the impact fee will decline.

Pennsylvania should adopt the approach taken by most energy-producing states by enacting a natural gas severance tax that is based on the economic value (reflecting both the price and volume) of gas produced.ⁱⁱⁱ Such an approach would generate substantially more revenue than the current impact fee that could be used to support education, health care, and statewide infrastructure projects, in addition to addressing local and environmental impacts that currently receive impact fee revenues.

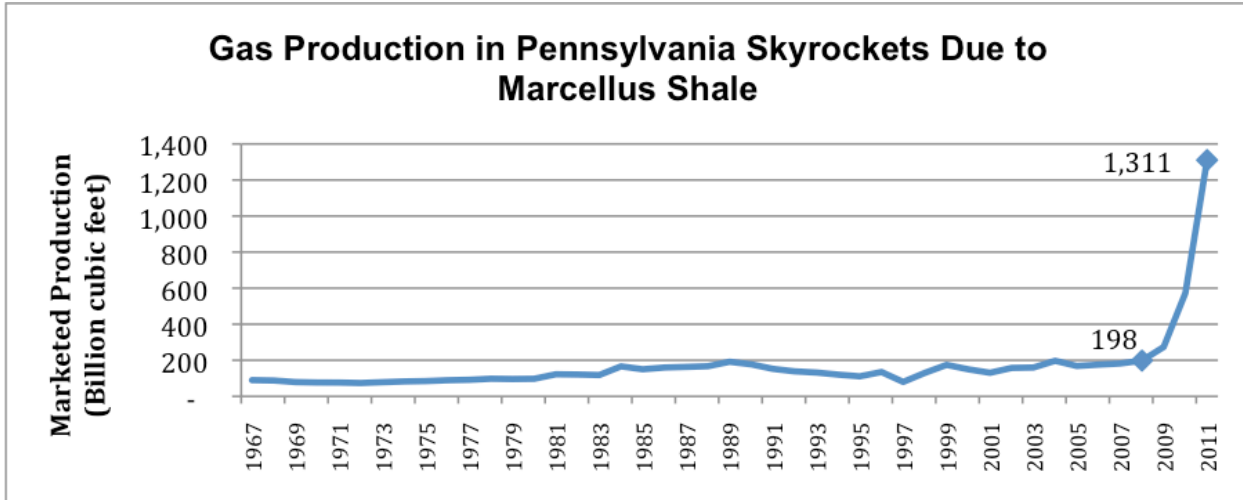
Using a moderate estimate of new wells and energy price forecasts produced by the U.S. Energy Information Administration, the Pennsylvania Budget and Policy Center (PBPC) estimates that in 2019-20 a 4% natural gas severance tax could generate \$1.2 billion annually, three times as much as the \$382 million that would be generated under the current impact fee.

The natural gas industry is seeking to export liquid natural gas to markets out of the state and outside the U.S., where it will command significantly higher prices. An artificially low impact fee will essentially subsidize out-of-state or overseas natural gas customers at the expense of Pennsylvania schools and services.

Pennsylvania Natural Gas Production Is Rising

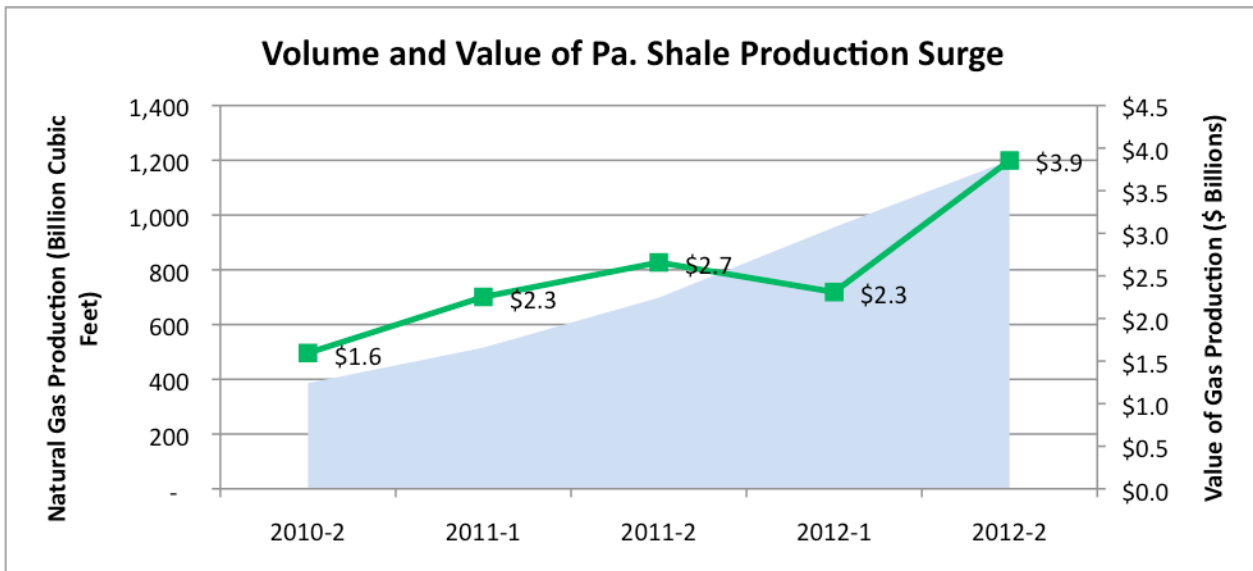
The volume of natural gas produced in Pennsylvania has grown significantly since 2008, a result of growth in "unconventional" wells that use hydrofracking technology and horizontal drilling techniques to extract gas from shale deposits. Since the second half of 2010, when new reporting requirements kicked in, the volume of shale gas has tripled.

The historical increase in production is even more dramatic, rising from 198 billion cubic feet in 2008 to 1.3 trillion cubic feet in 2011. In 2012, the Pennsylvania Department of Environmental Protection (DEP) reports unconventional gas production exceeded 2 trillion cubic feet.



Source. U.S. Energy Information Administration (<http://www.eia.gov/dnav/ng/hist/n9050pa2a.htm>)

As production has grown, the economic value of the gas produced has also grown significantly (despite falling natural gas prices), from \$1.6 billion to \$3.9 billion between the second half of 2010 and the second half of 2012.^{iv}



Source. Pennsylvania Department of Environmental Protection (DEP), U.S. Energy Information Administration (EIA)

The Act 13 Impact Fee Does Not Keep Pace

Although gas production and its economic value have risen significantly, Act 13 impact fee revenue has remained flat, bringing in \$204 million for wells drilled through 2011 and \$202 million through 2012.

Projected into the future, growth in the value of production will outpace the growth in impact fee revenue — even if prices stay low.

This is due to the unusual structure of the impact fee in Act 13, which generates revenue based on the number of wells drilled each year, the number of years since a well was drilled, and the price of natural gas, rather than the value of gas production. The fee was structured this way to generate a relatively fixed amount of revenue without being considered a traditional tax.

No other major energy-producing state structures its drilling tax or fee this way. Of the top 10 natural gas-producing states, which account for 90% of natural gas produced in the U.S., only two – Pennsylvania and Alaska – do not have a tax based directly on the value of production, commonly called a severance tax. Alaska has a unique tax system for its oil and gas production, including a 25% to 75% tax (depending on price) based on the net value of production,^v which allows the state to issue checks each year to Alaska residents. Looking at all 32 gas-producing states, 25 have state or local severance taxes based on the value of production.^{vi}

Many gas-producing states also impose state conservation fees and local property taxes on gas production. This is not the case in Pennsylvania, as a 2002 Pennsylvania Supreme Court ruling struck down local assessment of property taxes on oil and gas.^{vii}

Over time, Pennsylvania’s impact fee grows much more slowly than the value of the gas, causing the effective rate of the fee to fall to 2% or less. PBPC estimates the value of gas production through 2019 using two scenarios. The moderate scenario projects 1,400 new wells are drilled each year, with gas prices increasing to \$4.70 per thousand cubic feet (MCF) by 2019.^{viii} Under the more conservative scenario, gas prices fall to \$3 per MCF and only 1,100 wells are drilled per year. As a point of reference, there were 1,360 unconventional wells drilled in 2012, according to SPUD reports from the DEP.^{ix} The figures in brown are actual collections of impact fees for 2011 and 2012, both collected in the 2012-13 fiscal year.

As Gas Production Increases, Impact Fee’s Effective Rate Drops								
(Fee in \$ millions)			Moderate Forecast					
Fee Year	FY Fee Paid	Impact Fee	New Horizontal Wells	New Vertical Wells	Total Production (BCF)	Price per MCF (EIA 2013 Forecast)	Value of Production (\$ Millions)	Effective Rate
2011	2012-13	\$204	3,874	1,005	1,214	\$3.50	\$4,249	4.8%
2012	2012-13	\$202	1,223	137	2,155	\$2.78	\$5,990	3.4%
2013	2013-14	\$229	1,100	150	3,150	\$3.44	\$10,842	2.1%
2014	2014-15	\$233	1,250	150	4,006	\$3.35	\$13,431	1.7%
2015	2015-16	\$261	1,250	150	4,698	\$3.40	\$15,970	1.6%
2016	2016-17	\$294	1,251	150	5,194	\$3.95	\$20,509	1.4%
2017	2017-18	\$321	1,250	150	5,593	\$4.16	\$23,245	1.4%
2018	2018-19	\$354	1,251	150	5,982	\$4.52	\$27,042	1.3%
2019	2019-20	\$382	1,250	150	6,349	\$4.70	\$29,807	1.3%
(Fee in \$ millions)			Conservative Forecast					
Fee Year	FY Fee Paid	Impact Fee	New Horizontal Wells	New Vertical Wells	Total Production (BCF)	Price per MCF	Value of Production (\$ Millions)	Effective Rate
2011	2012-13	\$204	3,874	1,005	1,214	\$3.50	\$4,249	4.8%
2012	2012-13	\$202	1,223	137	2,155	\$2.78	\$5,990	3.4%
2013	2013-14	\$228	1,100	100	3,027	\$3.41	\$10,419	2.2%
2014	2014-15	\$219	1,000	100	3,662	\$3.00	\$10,985	2.0%
2015	2015-16	\$237	1,001	100	4,162	\$3.00	\$12,485	1.9%
2016	2016-17	\$262	1,000	100	4,512	\$3.00	\$13,536	1.9%
2017	2017-18	\$283	1,001	100	4,791	\$3.00	\$14,374	2.0%
2018	2018-19	\$310	1,000	100	5,075	\$3.00	\$15,224	2.0%
2019	2019-20	\$332	1,001	100	5,349	\$3.00	\$16,048	2.1%

Why Use Effective Rates?

Revenue policies vary from state to state, from what is taxed, what rates are used, and what deductions or credits are permitted to how the tax is calculated. This makes it difficult to have a like (or “apples to apples”) comparison of policies over time or between jurisdictions. Economists and researchers have long used effective rates because they solve this comparison problem by focusing on the net impact rather than specific features. Effective rates are calculated by comparing what a state collects in tax or fee revenue compared to the economic value of what is being assessed. In this case, we compare what the Act 13 impact fee generates to the economic value of the natural gas produced. Calculating an effective rate, whether it is energy-based or income-based, allows for a more complete comparison – and a much better way to evaluate a revenue stream than merely comparing statutory rates.^x

Production-based Severance Tax Generates More Revenue

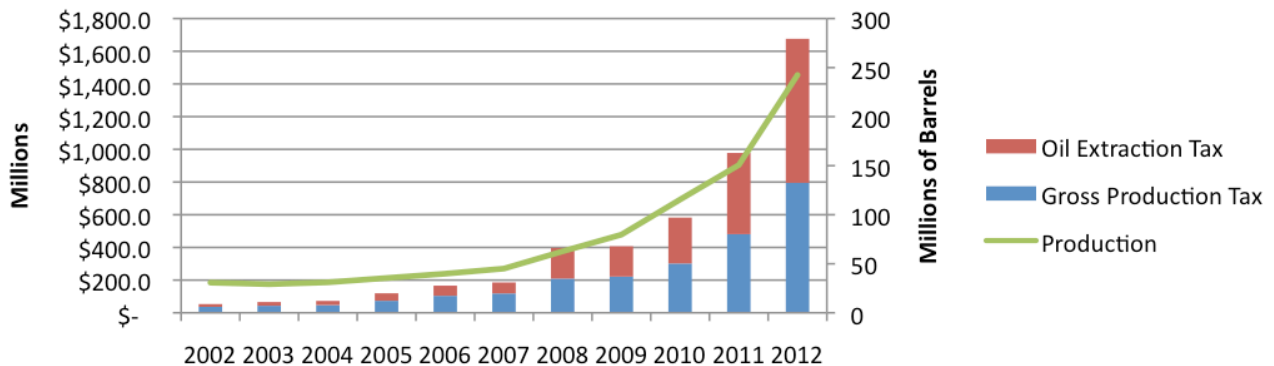
Most major oil- and gas-producing states use production-based severance taxes rather than an impact fee to collect revenue from the extraction of one-time natural resources. The table below lists the economic value of oil and gas production of four western energy states and the effective tax rate of each state’s severance tax in Fiscal Year 2010. Three of the four states have structured their taxes in a way that generates more than 4% – in the cases of Montana and North Dakota, substantially higher taxes are levied. Colorado’s effective tax rate is lower because it allows companies to take a credit against severance taxes for property taxes paid.

Oil and Natural Gas Production Tax Effective Rate, FY 2010

	Production Taxes	Production Value	Effective Tax Rate
Colorado	64,982,616	6,785,746,679	1.0%
Montana	210,335,320	2,012,566,089	10.5%
North Dakota	594,422,795	6,629,885,189	9.0%
Wyoming	174,006,343	3,618,357,300	4.8%

Source. Pennsylvania Budget and Policy Center calculations based on Headwaters Economics data.

A Lesson for PA: As Production Has Increased, so Has North Dakota's Revenue

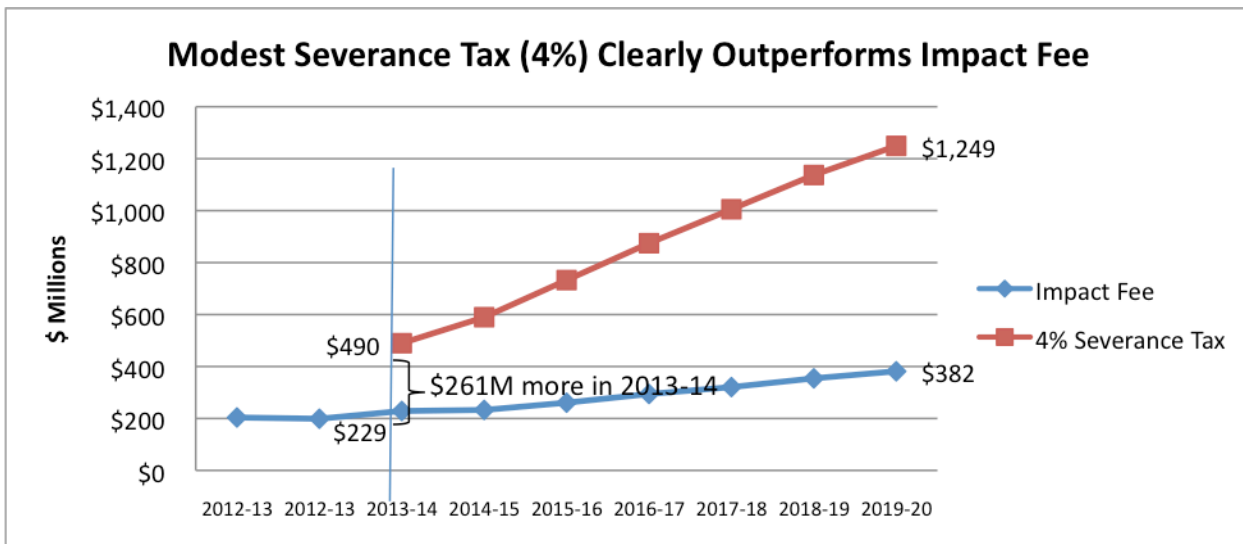


Source. North Dakota Office of State Tax Commission, 2012

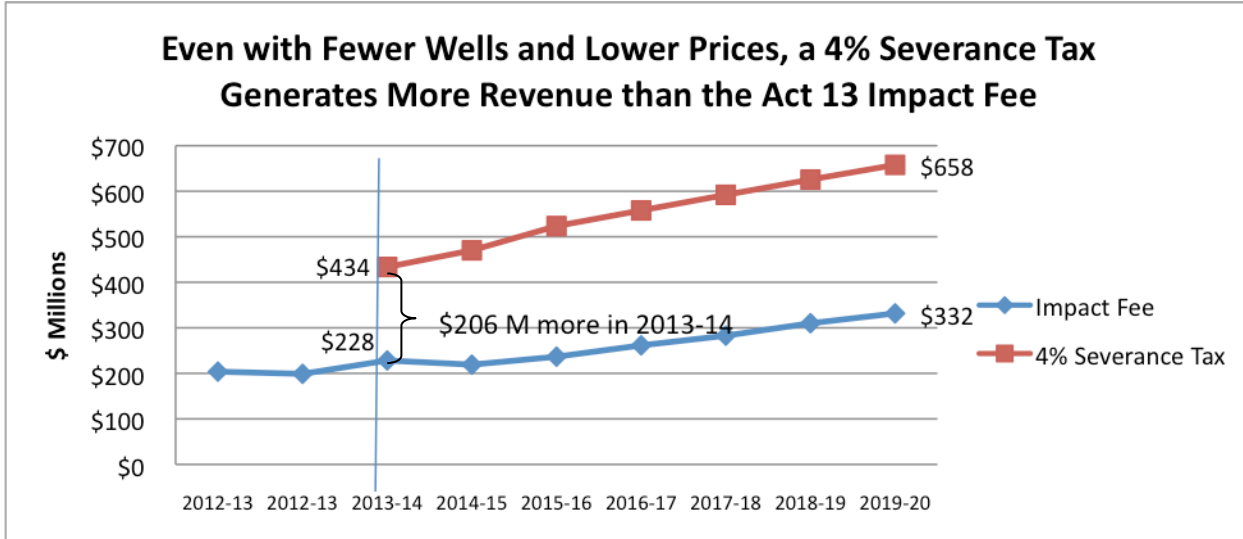
North Dakota is experiencing a boom in shale oil production, much like we have seen here in Pennsylvania with natural gas. One big difference is that North Dakota has a strong severance tax that captures benefits for its state’s 700,000 residents in a way Pennsylvania has not. As oil and gas production has increased, so have collections. In 2012, North Dakota collected in excess of **\$1.6 billion** in revenue from its oil extraction and gross production taxes.^{xi} Tax collections have increased steadily with the increases in production – as the tax is based on the value of production. Pennsylvania, on the other hand, has seen stagnant impact fee collections in the first two years – with much more modest increases projected as production grows.

Moderate Production-based Severance Tax Could Generate \$1 Billion Annually

Using the moderate scenario outlined above (1,400 new wells each year and gas prices increasing to \$4.70 per MCF by 2019), PBPC estimates a 4% severance tax could generate more than \$490 million in the coming fiscal year.^{xii} By 2019-20, the projected revenue increases to \$1.2 billion. That is \$261 million more in 2013-14 and \$867 million more in 2019-20 than is expected from the current impact fee.



Using the more conservative outlook (1,100 new wells each year and gas prices at \$3 per MCF), PBPC estimates a 4% severance tax could yield almost double the revenue that would be generated by the impact fee. In 2013-14, a 4% tax could generate \$206 million additional dollars. By 2019-20, the 4% tax would generate \$658 million, an additional \$326 million more than what could be expected from the impact fee.



The Governor’s Office calls Pennsylvania’s impact fee an “innovative approach.”^{xiii} The results are clear: the impact fee is a good deal for drillers, as it leaves more money in their pockets than a modest natural gas severance tax. It is not such a good deal for Pennsylvania, including those living in communities affected by drilling.

Conclusion

Natural gas drilling in Pennsylvania depends on the price of natural gas and how profitably it can be extracted and sold. Tax rates have little impact on this equation. States with high severance tax rates, like North Dakota, have seen revenues proportionally increase as more oil and gas is developed. Despite having a low impact fee, Pennsylvania has seen a decline in the number of wells drilled in Pennsylvania in 2012.^{xiv} These developments are clearly happening for reasons other than tax policy.

Many researchers have written that energy taxes are exported to energy purchasers. The Washington, D.C.-based Tax Foundation considers severance taxes to be passed on to the buyers of the energy and, in its state tax burden rankings, reassigns severance taxes from Wyoming and Texas to states that buy energy.^{xv} Similarly, Florida uses sales taxes and other charges to export public costs to tourists. Failing to have a meaningful extraction tax on natural gas production in Pennsylvania provides cheaper energy for out-of-state users without providing adequate revenue to pay for environmental cleanup and post-production costs. If the state’s natural gas is exported overseas, demand for the gas will increase, likely resulting in an increase in local prices for gas for consumers, and the existing impact fee will capture little of this increased value.

At a time when Pennsylvania’s tax revenues are stagnant and lawmakers are looking for additional revenue to prevent further cuts to education, health care, human services, and infrastructure, Pennsylvania should replace its current ineffective drilling impact fee with a reasonable natural gas severance tax.

Endnotes

ⁱ The impact fee is determined each year based on which one of the five price ranges the fee year's average selling price falls into. For example, with an average price of \$2.78 per thousand cubic feet (MCF), the 2012 impact fee falls under the \$2.26 to \$2.99 per MCF range. The economic value represents the amount of natural gas produced and its selling price.

ⁱⁱ Effective rate is measured by dividing the impact fee collected by the value of natural gas produced that year.

ⁱⁱⁱ Of the top ten natural gas-producing states in 2011, only two states (Alaska and Pennsylvania) do not levy a severance tax on the value of gas production. Alaska levies a net income-based production tax, which was recently changed to a 35% rate (with incentives that decrease the effective tax rate), in addition to their corporate income tax. All told, taxes and fees on oil and gas production in Alaska made up 85% of the state government's revenue <http://www.aoga.org/facts-and-figures/state-revenue/>.

^{iv} Gas production figures are reported by the Pennsylvania Department of Environmental Protection, statewide unconventional gas production reports (reported each six months since the second half of 2010), <https://www.paoilandgasreporting.state.pa.us/publicreports/Modules/DataExports/DataExports.aspx>. The economic value of gas is estimated using the Henry Hub price of natural gas, as reported by the St. Louis Federal Reserve Bank, over the same period, <http://research.stlouisfed.org/fred2/series/GASPRICE/downloaddata?cid=32217>.

^v Alaska Department of Revenue, Tax Division, *Annual Report: Fiscal Year 2012*, page 54, <http://www.tax.alaska.gov/programs/documentviewer/viewer.aspx?861r>

^{vi} Pennsylvania Budget and Policy Center review of state tax websites and the 2012 update of the National Conference of State Legislatures' oil and gas severance tax summary table, <http://www.ncsl.org/issues-research/energyhome/oil-and-gas-severance-taxes.aspx>. Louisiana and North Dakota have per MCF rates, which are adjusted annually based on the price of natural gas.

^{vii} http://www.lexisnexis.com/Community/workerscompensationlaw/cfs-file.ashx/_key/CommunityServer.Components.SiteFiles/Documents/Independent-Oil-and-Gas-of-Pa.-v.-Bd.-of-Assessment_2C00_-572-A.-240.pdf.

^{viii} Prices from the U.S. Energy Information Administration 2013 forecast, http://www.eia.gov/forecasts/aeo/excel/aeotab_13.xlsx

^{ix} SPUD reports can be accessed here: http://www.depreportingservices.state.pa.us/ReportServer/Pages/ReportViewer.aspx?/Oil_Gas/Spud_External_Data.

^x The paper, *State Taxation, Exploration, and Production in the U.S. Oil Industry*, by Kunce, Gerking, Morgan and Maddox (2001) describes the utility of effective rates as follows: "The myriad of state-specific special features described above creates considerable complexity in tracking tax law over time. Rather than itemize tax code details, effective tax rates are used to translate dynamic tax policy into a tractable form. Effective rates can be expressed as the ratio of taxes (or royalties) collected from a particular tax to the value of production. Thus, the calculation of specific effective tax rates fully account for exemptions, incentives, different tax bases, and frequent changes in tax law." Page 7, <http://legisweb.state.wy.us/2001/interim/app/reports/oiltaxpaper%2011-26-01.pdf>.

- ^{xi} North Dakota Tax Commission, *State and Local Taxes: An Overview and Comparative Guide, 2012* (commonly referred to as the Red Book) <http://www.nd.gov/tax/genpubs/2012-redbook.pdf?20130613143558>.
- ^{xii} Our moderate estimate of production is based on 1,400 new wells being drilled each year and 2013 U.S. Energy Information Administration forecasts of natural gas prices rising to \$4.70 per MCF by 2019.
- ^{xiii} Patrick Henderson, Energy Executive, Office of Gov. Tom Corbett, “AP gas analysis is flawed,” Bloomsburg Press Enterprise, May 15, 2013 <http://www.pressenterpriseonline.com/daily/051513/page/13/story/ap-gas-analysis-was-flawed>.
- ^{xiv} The average number of drilling rigs operating in Pennsylvania dropped from 115 in 2011 to 78 in 2012, according to data published by Baker Hughes Incorporated, http://investor.shareholder.com/common/download/download.cfm?companyid=BHI&fileid=626305&filekey=01BDC780-AD32-4BD4-B958-6C00C5E09C55&filename=Monthly_Avg_1992-2012.xls.
- ^{xv} Elizabeth Malm and Gerald Prante, *Annual State-Local Tax Ranking (2010)*, Tax Foundation, October 23, 2012, <http://taxfoundation.org/article/annual-state-local-tax-burden-ranking-2010-new-york-citizens-pay-most-alaska-least>.