AN EXAMINATION OF NATURAL GAS AND ELECTRICITY COSTS IN NORTHEASTERN PENNSYLVANIA
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Introduction
The focus of this study is to determine how natural gas and electricity prices in the Northeastern Pennsylvania region compares to other surrounding regions. This study compares the Lackawanna and Luzerne County region with eight other regions in Pennsylvania, New York, and New Jersey.

The context of this analysis is economic development. Utility pricing is an important consideration in site selection, particularly for manufacturing and other energy-intensive industries. A region with lower utility costs (electricity and natural gas) than its peers holds a significant competitive advantage in attracting companies.

Research Methods
This study examines three hypothetical companies for electricity and natural gas usage. These case study companies are not meant to represent any particular company, industry, or usage pattern, but simply represent three different baseline usage levels.

For the electricity cost analysis, Company A represents an 80,000 square foot facility that uses 5,000,000 kilowatt hours (kWh) per year (62.5 kWh per square foot). Company B represents a 120,000 square foot facility that uses 12,000,000 kilowatt hours per year (95 kWh per square foot). Company C represents a 200,000 square foot facility that uses 19,000,000 kilowatt hours per year (100 kWh per square foot).

For the natural gas cost analysis, Company A represents an 80,000 square foot facility that uses 10,000 million cubic feet (Mcf) of natural gas per year. Company B represents a 120,000 square foot facility that uses 50,000 Mcf per year. Company C represents a 200,000 square foot facility that uses 200,000 Mcf per year. For each user, it is assumed that electricity and natural gas usage are uniform throughout the year.

The data from this study has been derived primarily from tariffs. Utility companies are considered natural monopolies and are therefore highly regulated and very transparent. Tariffs, which are documents that outline utility companies’ rate schedules and policies, were obtained from the utilities themselves or from the state agencies that regulate public utilities. These tariffs explain every charge on the bill, what the charges are going to pay for, and the methodology that was used to calculate the price. Calculations of energy costs incurred by each firm were determined through these tariffs. In regions served by multiple utilities in different territories, the most prominent utility serving the largest geographic area was used as the representative. In the case of Lancaster/York, the two counties are served by UGI Utilities and Columbia Gas, respectively. Since this region is about evenly split between service territories, prices contained here reflect natural gas pricing for York County. Natural gas pricing for Lancaster County would match that of the Lehigh Valley region, which is also served by UGI Utilities.
There are many different factors that are used to determine the true cost of both electric and gas bills. The largest area of uncertainty that this analysis does not capture is the ability of large energy users to negotiate with utilities directly for prices. However, it is assumed that the scheduled rates for electricity and natural gas will provide a useful baseline for an apples-to-apples comparison of Northeastern Pennsylvania with other regions in the northeastern United States.

The cost data obtained from tariffs include only the costs associated with distribution of the electricity and natural gas. In Pennsylvania, electricity markets are deregulated, meaning that users are free to select a supplier from whom to purchase electricity. There are an abundance of suppliers, each offering different pricing structures. For the purposes of this report, the electricity cost analysis was limited to costs associated with purchasing electricity through the local utility.

Besides regional fluctuations, the price of electricity also fluctuates by the hour. This price can fluctuate based on time of day, the current demand load and the time of the year—electric prices are generally higher in the summer than in the winter. Most homes and business use a seasonal rate, which uses an aggregate price to determine the rate. Larger industrial firms—such as the hypothetical companies presented in this report—oftentimes have their electricity charged at the current hourly rate. This rate is monitored by PJM Interconnection LLC (PJM), which is a third party regional transmission organization (RTO) that coordinates the wholesale distribution grid within the areas covered by this report. This report will use the rate found on the PJM website at noontime of an average work day.

Similarly, natural gas costs also reflect that two-fold structure: the distribution component, which is the cost associated with receiving gas service from a local utility that distributes the gas to end users via a local pipeline network, and the commodity component, which is the cost of the gas itself and associated costs with transporting it from the region in which it was produced to the region in which it is being used via interstate pipelines, referred to here as the marketer gas cost. Non-proprietary data on marketer gas cost was not available for this analysis, so costs were estimated using a methodology that models price based on distance from the Marcellus shale region. Distance that natural gas must be transported is assumed to be the largest factor in the variation in marketer gas cost between regions.
Background & Overview of Cost Factors

Natural gas, within the regions examined, is produced from the Marcellus Shale. The Marcellus Shale is located in Northern and Western Pennsylvania as well as stretches into neighboring states. A large portion of the shale formation extends into New York, but that state has not permitted extraction of gas through hydraulic fracturing (fracking). The Marcellus Shale has been a large source of high quality gas. The proximity of the production results in lower prices of gas locally. Furthermore, many of the pipelines that would ship the gas have not yet been built or are still in the process of being built. This has led to an oversupply of local markets, which drives price down. Previous research by The Institute has indicated that this competitive advantage can be the foundation of a regional economic development strategy focused on energy-intensive manufacturing.

Once the gas has been extracted and refined, it is distributed through local utility companies. Utility companies route natural gas to end users and charge a fee for distribution, but not the price of the gas. The companies that supply the gas itself and transport it via interstate pipelines are not monopolies and compete to offer lower prices.

Electricity prices differ from state to state and even from region to region, with areas sometimes only a few dozen miles from each other having electricity prices that diverge significantly from one another. These fluctuations are caused by the costs that go into the generation, transmission and delivery of electric power. Besides generation fees, or the fees that actually go towards the production of electricity, and a multitude of taxes and surcharges that each state imposes upon electricity providers, there are other costs to consider when determining the price of electricity, such as financing and maintaining a power plant, fuel used by a power plant and financing and maintaining the electric grid necessary to allow the distribution and transmission of electric power to homes and business. Regional variation in each of these factors gives each area its own unique electric profile that must be considered when estimating cost.
Electricity Costs

Though each company calculates electricity costs in diverse ways with only a few charges being analogous, the total cost calculated from such factors can still be used to make side by side comparisons between regions. The results of these calculations confirmed what national averages indicated: that Pennsylvania electricity is cheaper than New Jersey’s, which in turn is cheaper than New York’s.

Northeastern Pennsylvania had the lowest electricity costs in the Pennsylvania region; as well as overall. The highest electricity Costs were seen in New York’s Southern Tier. That being said, electricity prices were fairly consistent between regions and company sizes.

Source: Utility Company 2017 Tariffs
Company A—80,000 square foot facility that uses 5,000,000 kWh per year

For Company A, the average annual cost was $33,040.15. northeastern Pennsylvania had the lowest cost of $24,914.67. The most expensive location was the New York Capital Region—$41,486.04.

Source: Utility Company 2017 Tariffs

Company B—120,000 square foot facility that uses 12,000,000 kWh per year

Company B had an average annual cost of $76,233.02. NEPA was the least expensive location with an annual cost of $58,317.27. The most expensive location was the NY Capital Region with an annual cost of $94,276.96.

Source: Utility Company 2017 Tariffs
Company C—200,000 square foot facility that uses 19,000,000 kWh per year

Company C had an average annual electricity cost of $122,058.13. Once again, NEPA was the cheapest—$91,585.27—and the NY Capital Region was the most expensive—$147,065.74.

Pennsylvania has several strategic factors that make it a more appealing state, than adjoining New York or New Jersey. Pennsylvania is ranked third in the nation for net generation of electricity, beating out both New York and New Jersey. Even when combined, New York and New Jersey do not generate as much electric power as Pennsylvania. This is reflected in Pennsylvania’s average price per kilowatt hour which is lower than both New Jersey and New York, with electricity being about a third more expensive in New Jersey and more expensive by over a half in New York. These factors translate into a greatly lowered electric bill that translates to a significant competitive advantage.
The charge for all three companies was lowest in Northeastern Pennsylvania with the York/Lancaster region coming in a strong second, with prices that were only about 6 percent more than the Northeast. This trend can be seen in other states as well with Jersey bills having less charges than New York bills. The Northeastern region of Pennsylvania had the lowest electricity generation fees out of any other region that was researched, with the only price that came close to it coming from the Southern Tier region of New York, one of the areas with the highest electricity costs.
Natural Gas Cost Analysis

There are two components to natural gas cost for households and businesses alike. The first is the cost of the gas itself and associated costs with transporting it from the region in which it was produced to the region in which it is being used via interstate pipelines, referred to here as the marketer gas cost. The second component is the cost associated with delivery of gas service from a local utility, which distributes the gas via the local pipeline network.

Gas Distribution Costs

The chart on the right examines the average utility rate per million cubic feet of gas (Mcf) of natural gas. Compared to other regions in this study, NEPA and Lehigh Valley (UGI) have slightly lower utility costs. The average utility rate for companies A, B, and C is $2.31. The highest utility costs were seen in the Philadelphia area with an average utility rate of $6.27. This is significantly higher than other areas examined. The second highest was Central New Jersey with an average rate of $3.90. The lowest rate was $0.41 in the York/Lancaster area (Columbia Gas).
On the left, we examine the total annual utility costs for each of the three companies. The lowest utility costs were seen in York and Lancaster, Pennsylvania. Here, our three hypothetical companies' annual distribution costs would amount merely $4,194.14, $19,950.72, $82,815.00. The most expensive option was Philadelphia—especially for a large company like Company C which would have to spend $1,250,304.79.

The impact of utility costs is significant, however it is the cost of gas which has the greatest impact on overall price.

**Marketer Gas Price**

The commodity price of natural gas changes frequently, and is difficult to model and forecast. The single biggest variable of the Marketer Gas price is distance from the source of the gas. In addition to the costs of production, it costs money to transport natural gas long distances via interstate pipelines. Reasons for this include the cost of operating pipeline infrastructure as well as line loss, which refers to the leaked or unaccounted for gas that necessitates users purchase a slightly larger quantity of gas than is actually needed.

Detailed data on natural gas commodity prices by region was unavailable. For the purposes of this study, the Marketer Gas Price was determined by measuring the approximate distance in miles the natural gas would have to travel to reach each region based on known prices for some regions for 2016, based on data provided by UGI for this analysis. That data was used to model the relationship between distance from the Marcellus region and commodity price. This methodology produced findings within 20 percent for each region for which 2016 gas costs were available.

The below chart shows our projected gas prices with a 20 percent margin of error. As such, it is predicted that Northeastern Pennsylvania and Southern New York would be able to purchase natural gas at the lowest price due to their proximity to the Marcellus shale formation. Each other region included in this analysis appear to have higher commodity costs. Southern New Jersey, New York Capital Region, and the Philadelphia area are the furthest from the Marcellus Shale, therefore, these areas were predicted to have the highest gas prices.
The combined all-in natural gas costs for each of the three hypothetical companies is presented below. Among all three case studies, Northeastern Pennsylvania performs no worse than the third lowest costs among the nine regions analyzed. The most apparent competitors to the region are the Southern Tier region of New York due to that region’s low marketer gas costs and the York/Lancaster region in southern Pennsylvania due to its lower utility gas distribution costs.

**Company 1—80,000 square foot facility that uses 10,000 Mcf of natural gas per year**

The Average annual cost of gas and utility for Company A was $53,328.66. NEPA was well below this with an annual cost of $33,769.92. The least expensive area to purchase natural gas was the southern Tier of NY with annual costs of $32,185.15. The most expensive area was Philadelphia, PA where annual costs amounted to $92,089.79.
**Company 2**—**120,000 square foot facility that uses 50,000 Mcf per year**

For Company B, the average annual cost of gas and utility was $237,939.18. NEPA had the lowest costs—$133,368.92. Philadelphia, Pa was the most expensive region with annual costs of $458,029.79.

**Company 3**—**200,000 square foot facility that uses 200,000 Mcf per year**

For Company C, the average annual costs of gas and utility were $819,250.58. NEPA was below this with annual costs of $493,518.92, but the cheapest region was the southern tier of NY—$337,560.92. The most expensive region was, once again, Philadelphia with an annual cost of $1,830,304.79.
The chart below shows that utility costs – the cost to distribute gas within the local pipeline network - are still a significant portion of total natural gas expenses. Although NEPA and New York’s southern tier have very similar natural gas prices, New York’s southern tier has very low utility costs, which give it the edge it needs to slightly undercut NEPA. Regardless, the region’s competitiveness in electricity costs as well as its low marketer gas costs put Northeastern Pennsylvania in a strong position to attract a diverse array of industries. In terms of energy costs, the region’s stiffest competition is likely to be from other regions that share its close proximity to a natural gas source rather than more urban regions like Philadelphia and Northern and Central New Jersey where energy costs are higher.

Source: Utility Company 2017 Tariffs
Conclusion

Taken together, the Southern Tier of New York—an average annual energy expense of $270,851.35—and northeastern Pennsylvania—an average annual energy expense of $278,491.66—both have a competitive advantage over nearby regions. Lehigh Valley, PA ($340,080.52) and York/Lancaster, PA ($313,653.46) follow. The most expensive region is Philadelphia, PA with an annual average cost of $863,594.38—over double the cost of every Pennsylvania region. The regions within New Jersey were collectively the most expensive on average, though none were as high as Philadelphia.

Each of the states that were researched for this report offer various incentives for businesses. New York has the Excelsior Program, which is a program that offers tax breaks for hiring new workers, investment spending, and real-estate purchases with discounted utilities offered dependent on industry and region. New York also offers the Recharge New York Program, which offers seven year long term low cost energy contracts to energy intensive industries.

New Jersey offers the Grow NJ Assistance Program, which rewards job retention and growth in New Jersey by offering tax incentives for each job retained varying based upon industry. The New Jersey Advantage Program offers favorable financing for business that originate from the state.
Pennsylvania has the High Performance Building Program, which offers grants for up to 10 percent of a buildings costs for high energy buildings, the Pennsylvania Industrial Development Authority (PIDA) which finances a portion of industrial jobs so long as jobs are being created and has throughout the state Keystone Special Development Zones (KSDZ) which offers a tax credit for jobs that a firm creates within a certain zone.

In addition to the programs listed, all states have a suite of various tax breaks and low cost loans offered to industries based on size and number of full time positions. Both Pennsylvania and New Jersey have various provisions that offer tax breaks and grants for those businesses that choose to reduce emissions and acquire or even generate green electricity through such means as solar or wind.

None of this, however takes into account the total cost of operations. Labor, another major operational cost is not factored in nor are the tax consequences of operations. As of 4th quarter 2016 average manufacturing wages in northeastern Pennsylvania were $49,757 and were nearly $58,000 in southern New York.

Further, it should be noted that other aspects of manufacturing include access to major transportation networks (roads, ports, and air) as well as supplier networks, distribution outlets and population centers. A cursory review of the manufacturing supplier network at two digit NAICS shows that northeastern Pennsylvania’s in region supplier purchases are at 33 percent compared to southern New York which is only at 22 percent, thus supporting the theory that more resources are available to energy intensive manufacturers in Lackawanna and Luzerne Counties.