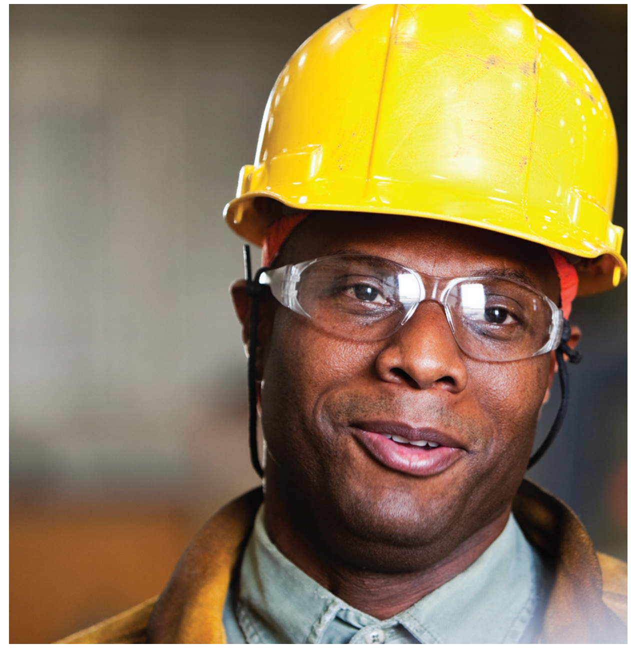
Appendix M

Economic Impact Report and Analysis: PennEast Pipeline Project Economic Impact Analysis

PennEast PIPELINE



ECONOMIC IMPACT

Report and Analysis

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PENNEAST PIPELINE PROJECT ECONOMIC IMPACT ANALYSIS

February 9, 2015

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EXECUTIVE SUMMARY

PennEast Pipeline Company, LLC (PennEast) has proposed a 114 mile long, primarily of 36-inch diameter, interstate natural gas pipeline project (the Project) from Pennsylvania to New Jersey. The Project will provide gas markets in eastern Pennsylvania, southeastern Pennsylvania, and New Jersey with the natural gas that is produced in the Marcellus shale play in Pennsylvania. The Project will have a substantial positive economic impact on Pennsylvania and New Jersey residents, commercial businesses, industrial production plants, and power generation. Economic benefits will generate from construction, ongoing operations, and the increased income derived from the potential downward price impact of a new, steady supply of natural gas in the region.

In Pennsylvania and New Jersey combined, the design and construction is estimated to generate an approximate $1.62 billion in one-time total economic impact, supporting about 12,160 jobs with $740 million in wages (see Table ES.1).

TABLE ES.1 - POTENTIAL ECONOMIC IMPACT FROM DESIGN AND CONSTRUCTION OF THE PROJECT

Impact Type	Pennsylvania and New Jersey
Total Output	$1.62 billion
Employment Supported	12,160 jobs
Labor Income Supported	$740 million

In Pennsylvania and New Jersey combined, the ongoing operations of the project is estimated to generate annually an approximate $23 million in total economic impact, supporting 98 jobs with $8.3 million in wages (see Table ES.2).

TABLE ES.2 - POTENTIAL ANNUAL ECONOMIC IMPACT FROM ONGOING OPERATIONS OF THE PROJECT

Impact Type	Pennsylvania and New Jersey
Total Output	$23 million
Employment Supported	98 jobs
Labor Income Supported	$8.3 million

A significant ongoing economic impact to be realized from this project is from the new and stabilized supply of natural gas to the consumers of New Jersey and Pennsylvania. This could help prevent supply constraints during peak heating season and could lower natural gas and electric bills.

1.0 INTRODUCTION

1.1 OVERVIEW OF PROJECT

PennEast Pipeline Company, LLC (PennEast) has proposed the construction of a 114 mile long, primarily of 36-inch diameter, interstate natural gas pipeline project (the Project). The Project will stretch from Luzerne County, Pennsylvania to Mercer County, New Jersey. The Project will provide gas markets in eastern Pennsylvania, southeastern Pennsylvania, and New Jersey with the natural gas that is produced in the Marcellus shale play in Pennsylvania. It is expected to be in service by the end of 2017.

In addition to the physical pipeline, there will be associated infrastructure along the route, including interconnect meter stations, launchers, receivers, mainline block valves, and a compressor station. This compressor station will be built in Carbon County, Pennsylvania and will provide sufficient compression for the Project[1].

PennEast conducted a Binding Open Season in August 2014 to allocate firm transportation service. Potential customers could bid on up to 1 billion cubic feet per day on the proposed pipeline for a minimum of 10 years. In total, those companies who participated have subscribed 785 million cubic feet per day[2] of firm transportation capacity on the new pipeline. Because these companies devoted their early commitment to the project efforts, they will receive initial allocation priority. Additional market participants have subscribed capacity on the project and PennEast has now allocated nearly 97 percent of the planned 1 billion cubic feet per day of capacity. PennEast continues to negotiate with other customers which will decide the final capacity of the Project facilities.

1.2 PURPOSE OF REPORT

The purpose of the report is to quantify the economic benefits resulting from the Project. This report first describes the project in detail in order to provide background on the company and its goals (Section 2). Next, the report analyzes the one-time economic and fiscal impact from construction (Section 3). The report then estimates the annual impact of the Project (Section 4). It concludes with a summary of the overall economic benefits for the six-county region, the Commonwealth of Pennsylvania, and the State of New Jersey (Section 5).

[1] PennEast Pipeline, “General Project Description” (2014) <http://penneastpipeline.com/>

[2] 78.5% of estimated pipeline capacity (1 billion cubic feet)

2.0 DESCRIPTION OF PROJECT

2.1 ORIGINATION/ PURPOSE OF PENNEAST

The purpose of the Project is to provide gas markets in eastern Pennsylvania, southeastern Pennsylvania, and New Jersey with the natural gas that is produced in the Marcellus shale play in Pennsylvania. PennEast proposes to construct and operate the Project facilities to provide approximately 1 billion cubic feet per day of year-round transportation service.

The Project is expected to provide access to lower cost natural gas in Pennsylvania and New Jersey. In response to interest from regional customers and recent market demands, PennEast developed this project to accommodate the increased deliveries of natural gas in the region. This new pipeline alternative will provide an additional supply of natural gas to the region, which will benefit consumers, utilities, and electric generators. The Project will create opportunities for customers to transport natural gas to where it is most needed and valued. In addition, customers will be offered a short-haul transportation option for direct access to Marcellus shale natural gas supplies. The Project will provide[3]:

1. Additional supply flexibility, diversity, and reliability
2. Liquid points for trading in locally produced gas
3. Direct access to premium markets in the northeast and mid-Atlantic regions
4. Pricing differentials between various interconnected market pipelines
5. Firm access to long-lived dry gas reserves.

This new pipeline will benefit families and businesses greatly by providing access to affordable, cleaner-burning natural gas. Reduced prices will lower gas and electric rates and reduce the risk of price volatility. In fact, the Project will play a significant role in the economic development of the entire region, as energy intensive industries are likely to expand in or relocate to an area with affordable and reliable energy sources.

2.2 PENNEAST PARTNERS

The Project is jointly financed by multiple partners across the region. AGL Resources, NJR Pipeline Company, PSEG Power, South Jersey Industries, Spectra Energy Partners and UGI Energy Services are the member companies that form the PennEast Pipeline Company, LLC.[4]

AGL Resources (NYSE: GAS) is an Atlanta-based energy services holding company with operations in natural gas distribution, retail operations, wholesale services, midstream operations and cargo shipping. AGL Resources serves approximately 4.5 million utility customers through its regulated distribution subsidiaries in seven states. The company also serves approximately 630,000 retail energy customers and approximately 1.2 million customer service contracts through its SouthStar Energy Services joint venture and Pivotal Home Solutions, which market

[3] PennEast Pipeline, “General Project Description” (2014) <http://penneastpipeline.com/>
[4] PennEast Pipeline, “Partners” (2014) <http://penneastpipeline.com/>

natural gas and related home services. Other non-utility businesses include asset management for natural gas wholesale customers through Sequent Energy Management, ownership and operation of natural gas storage facilities, and ownership of Tropical Shipping, one of the largest containerized cargo carriers serving the Bahamas and Caribbean region. AGL Resources is a member of the S&P 500 Index.

NJR Pipeline Company is a subsidiary of New Jersey Resources (NYSE: NJR), a Fortune 1000 company that provides safe and reliable natural gas and clean energy services, including transportation, distribution and asset management. NJR Pipeline is part of NJR's strong financial profile and ongoing commitment to invest in and own midstream assets, including natural gas storage and transportation pipelines. NJR's midstream assets are currently comprised of a 5.53 percent stake in Iroquois Pipeline and a 50 percent stake in Steckman Ridge, a 12 Bcf storage field in south central Pennsylvania, and now equity ownership in the PennEast Pipeline.

Public Service Enterprise Group (NYSE: PEG) is a publicly traded diversified energy company with annual revenues of $10 billion. Its operating subsidiaries are: PSEG Power, Public Service Electric and Gas Company (PSE&G) and PSEG Long Island.

South Jersey Industries (NYSE: SJI), an energy services holding company based in Folsom, NJ, operates its business through two primary subsidiaries. South Jersey Gas, one of the nation's fastest growing natural gas utilities, delivers clean, efficient natural gas and promotes energy efficiency to over 365,000 customers in southern New Jersey. SJI's non-regulated businesses, under South Jersey Energy Solutions, promote efficiency, clean technology and renewable energy by developing, owning and operating on-site energy production facilities – including Combined Heat and Power, Solar, and District Heating and Cooling projects; acquiring and marketing natural gas and electricity for retail customers; providing wholesale commodity marketing and risk management services; and offering HVAC and other energy-efficiency related services.

Spectra Energy Partners, LP (NYSE: SEP) is a Houston-based master limited partnership, formed by Spectra Energy Corp (NYSE: SE). SEP is one of the largest pipeline MLPs in the United States and connects growing supply areas to high-demand markets for natural gas, natural gas liquids, and crude oil. These assets include more than 17,000 miles of transmission and gathering pipelines, approximately 150 billion cubic feet of natural gas storage, and approximately 4.8 million barrels of crude oil storage.

UGI Energy Services is a subsidiary of UGI Corporation. UGI Energy Services markets natural gas, electricity and liquid fuels to approximately 30,000 businesses, commercial, industrial, institutional and government customers in nine states and Washington, DC. In addition, it stores and delivers natural gas and generates electricity. The UGI name has been known in the region for more than 130 years and is an integral part of the community. Its name is a brand built on a solid reputation for safe and reliable distribution of natural gas. UGI prides itself on being an active and responsible member of the community.

The Project will extend from interconnections with UGI Energy Services' Auburn gathering system, Williams Midstream's Springville Pipeline, Regency Energy Partner's Wyoming Pipeline, and the Transcontinental Gas Pipeline Company Leidy Line in Luzerne County, Pennsylvania to interconnections with UGI Utilities, Elizabethtown Gas, Columbia Gas Pipeline, Texas Eastern Transmission, Algonquin Gas Transmission, and Transco's Trenton-Woodbury Lateral.

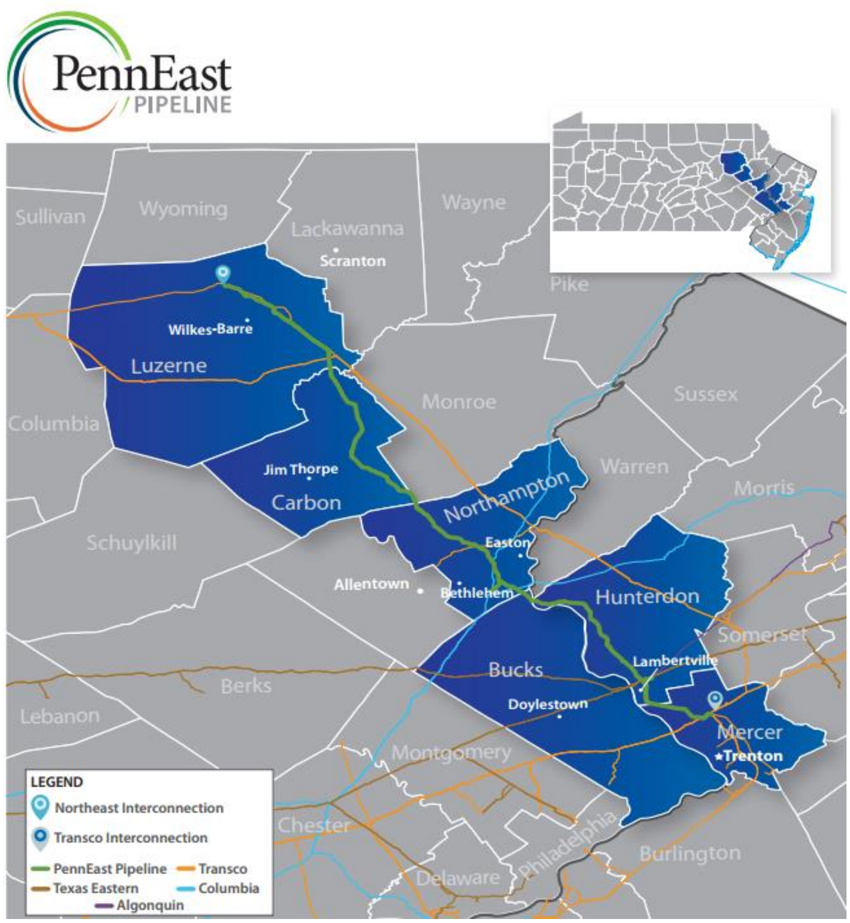
3.0 CAPITAL INFRASTRUCTURE ECONOMIC IMPACTS

3.1 GEOGRAPHY OF IMPACT

The Project will be built across six counties, bringing natural gas from the Marcellus shale in northeastern Pennsylvania to southeastern Pennsylvania and New Jersey. The economic impact of construction and ongoing operations from the Project were estimated for the Commonwealth of Pennsylvania, the State of New Jersey and the six-county area that the Project traverses (see Figure 3.1), defined as follows:

1. Luzerne County (Pennsylvania)
2. Carbon County (Pennsylvania)
3. Northampton County (Pennsylvania)
4. Bucks County (Pennsylvania)
5. Hunterdon County (New Jersey)
6. Mercer County (New Jersey)

FIGURE 3.1 – ROUTE OF PENNEAST'S PIPELINE THROUGH PENNSYLVANIA AND NEW JERSEY



Source: PennEast (2015)

Planned direct spending by PennEast was used to estimate total economic impact. Whereas many of the products and services used during construction will be supplied from within Pennsylvania and New Jersey, some materials and required technical expertise will be acquired from companies located outside of Pennsylvania and New Jersey. This analysis has taken the location of spending into account.

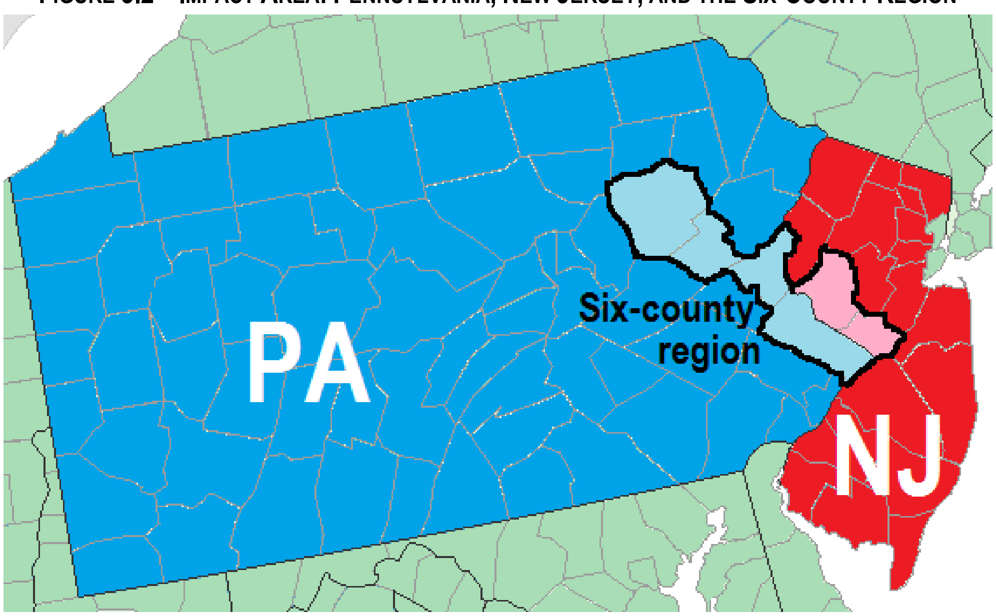
3.2 ECONOMIC IMPACT MODELING

The economic impact from the Project's expenditures can be modeled by constructing an input-output model. This was done using IMPLAN, an industry standard input-output model software program. Such models are designed to estimate two sets of spillover impacts from direct expenditures:

- The indirect effect, which measures the multiplier effect from the purchase of goods and services from local vendors; and
- The induced effect, which measures the multiplier effect from the spending of labor income by employees within a particular geography.

For the purposes of this report, economic impacts were measured for the six-county region, the Commonwealth of Pennsylvania, and the State of New Jersey. Because the pipeline runs through both states, the economic impacts within the six-county region are not entirely included in the impacts to Pennsylvania nor are they entirely included in the impacts to New Jersey. Rather, the impacts to Pennsylvania include the economic impact in the four Pennsylvania counties portion of the six county region and the corresponding spillover effects throughout the Commonwealth while the impacts to New Jersey include the economic impacts in the two New Jersey counties and the corresponding spillover effects throughout the state (see Figure 3.2).

FIGURE 3.2 – IMPACT AREA: PENNSYLVANIA, NEW JERSEY, AND THE SIX-COUNTY REGION



Source: U.S. Census Bureau (2014), Econsult Solutions (2014)

In turn, these impacts also represent increases in various tax bases for subject jurisdictions, resulting in increases in tax revenues for those jurisdictions. There are multiple other taxes impacted by the construction of the Project, however, for simplicity, we focused on the personal income tax impacts to the state governments of Pennsylvania and New Jersey. A fiscal impact model was generated to translate these economic impacts into their commensurate tax base expansions and therefore into the generation of state personal income tax revenues. [5]

3.3 DIRECT DESIGN AND CONSTRUCTION EXPENDITURES

PennEast will make a significant capital investment to design and construct the pipeline. In total, it is estimated that the design and construction of the Project will require an investment of $1.19 billion. The investment includes costs for land, materials, construction, and management. An estimated $99 million will be spent on environmental, engineering, inspection, and legal services. For economic impact modeling purposes, the geography of each expenditure is an important factor. While PennEast estimates that a significant amount of materials will be sourced from companies outside of Pennsylvania and New Jersey, the company anticipates a small portion will be spent in the six-county region. Additionally, transport and handling of all material will occur throughout the region. As a result, of the $239 million in material expenditure, 10 percent is estimated to be spent in the six-county region; however, other counties in Pennsylvania and New Jersey will benefit from direct construction expenditures. Of the $1.19 billion total in design and construction investment, it is estimated that about $891 million will be spent in the six-county region with benefits outside the six-county region (see Table 3.1).

PennEast will procure easements allowing PennEast to utilize certain portions of individual properties required for the Project, rather than purchase all the land required for the Project. For each parcel that the Project crosses, PennEast will procure an easement or Right-of-Way (ROW). The landowner will be compensated for the use of their property through a one-time upfront payment. Because this is not defined as a conveyance of property ownership, a portion of the land expenditures has been modeled as additional consumer spending.[6]

In the design and construction estimates, it is assumed that about 75 percent of expenditures for design and construction will be spent in Pennsylvania and the remaining 25 percent will be spent in the New Jersey. Regarding the land acquisition program, it is estimated that about two-thirds of the payments will be made in Pennsylvania while the remaining third will be made in New Jersey.

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[5] See Appendix A for additional detail on economic and fiscal impact methodology.

[6] $15 million in ROW agent labor costs were modeled as direct expenditures. $41 million in land payments to residents were modeled as additional consumer spending.

TABLE 3.1 – DESIGN AND CONSTRUCTION EXPENDITURE INPUTS IN THE ECONOMIC IMPACT MODEL FOR THE PROJECT ($ MILLION)

Design and Construction	Total Project Expenditure	Modeled Direct Expenditure
Land Acquisition Program[7]	$56	$15
Materials[8]	$239	$24
Construction Labor[9]	$733	$733
Project Management	$19	$19
All overhead construction services[10]	$99	$99
Other [11]	$45	$0
Total	**$1,193**	**$890**

Source: PennEast (2014)

3.4 DESIGN AND CONSTRUCTION ECONOMIC IMPACT

With the detailed budget projections provided by PennEast, an input-output model was designed to estimate the economic impact that the design and construction activity will generate. The upfront construction of the Project, scheduled to be completed at the end of 2017, will have an economic impact within the six-county region, the Commonwealth of Pennsylvania, and the State of New Jersey over the design and construction period. The estimated total impacts include direct output, employment, and labor income, along with the corresponding indirect and induced impacts, throughout the entire design and construction period.

In some cases, large and/or specialized construction projects require the use of construction workers who live outside of the region. The workforce for the Project is likely to be comprised of personnel from across the country due to the specialized nature of pipeline construction. Although the geographic distribution of the construction workforce is not finalized at this time, it is necessary to account for the non-resident construction workers who spend a portion of their income outside of the region. For example, a construction worker from Texas who moves to Pennsylvania for six months of construction work will not spend his entire income in the area. It is likely the construction worker will spend a portion of that income in Texas. Therefore, the following economic impacts do not include a portion of the induced spending of the non-resident construction workers. It is estimated that 25 percent of the disposable income of the construction workforce will be spent outside of Pennsylvania and New Jersey.

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[7] All land expenditures were modeled. $15 million in ROW agent labor costs were modeled as direct expenditures. $41 million in land payments to residents were modeled as additional consumer spending. Additional consumer spending is modeled as an induced impact and therefore not included as a modeled direct expenditure in Table 3.1.
[8] It is estimated that 10 percent of materials for the Project will be purchased in the six-county region. This will most likely be in the form of transport of materials purchased out of state.
[9] Although a portion of the induced spending takes place outside of the region, all of the direct construction labor expenditure is modeled. The non-local induced spending is accounted for in Table 3.2.
[10] These services include: environmental, engineering, inspection and legal services.
[11] PennEast anticipates spending $45 million in interest and other non-modeled expenditures.

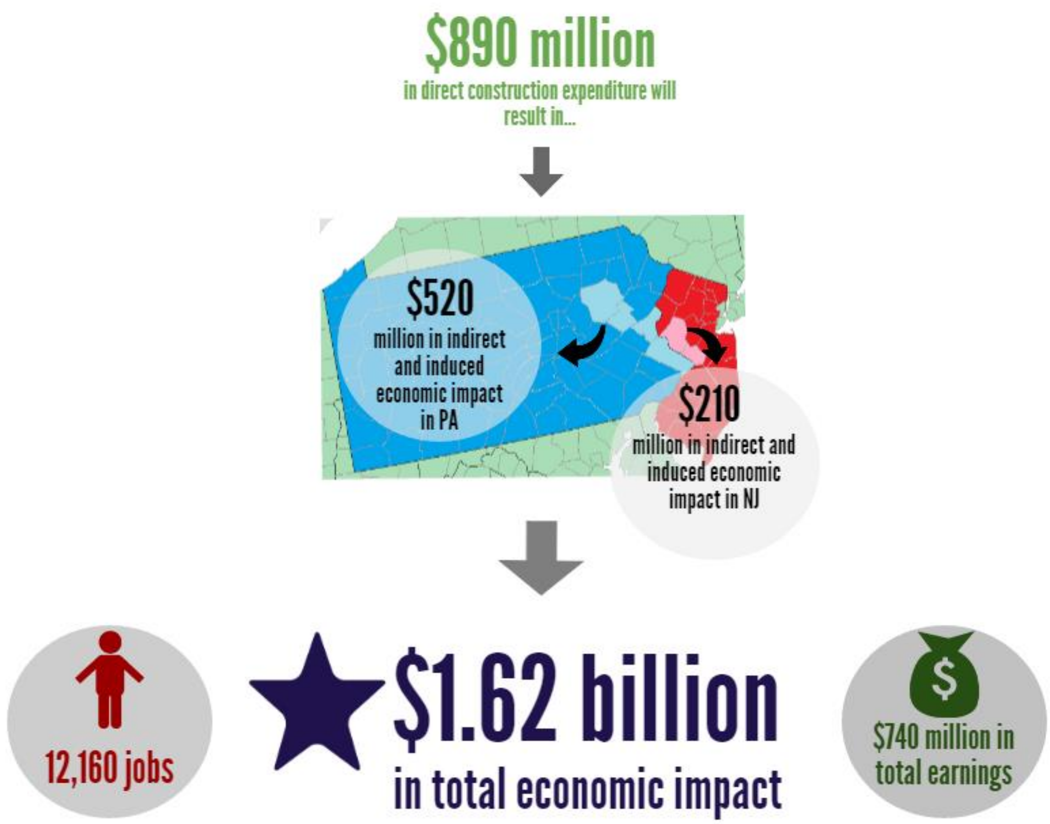
In Pennsylvania and New Jersey combined, the Project is estimated to generate an approximate $1.62 billion in total economic impact over the design and construction period, supporting 12,160 jobs with $740 million in wages (see Table 3.2 and Figure 3.3). The Project is estimated to generate approximately $1.44 billion in economic impact, supporting 11,210 jobs with $695 million in earnings in the six-county region.

TABLE 3.2 - POTENTIAL ECONOMIC IMPACT FROM DESIGN AND CONSTRUCTION OF THE PENN EAST PIPELINE ($ MILLION)

Impact Type	Total Impact in Pennsylvania and New Jersey	Six-County Region	Commonwealth of Pennsylvania	State of New Jersey
Direct Output	$890	$890	$670	$220
Indirect & Induced Output	$730	$550	$520	$210
Total Output	**$1,620**	**$1,440**	**$1,190**	**$430**
Employment Supported (jobs)	**12,160**	**11,210**	**9,290**	**2,870**
Labor Income Supported	**$740**	**$695**	**$540**	**$200**

Source: PennEast (2014), IMPLAN (2013), Econsult Solutions (2014)

FIGURE 3.3 - POTENTIAL ECONOMIC IMPACT FROM DESIGN AND CONSTRUCTION OF THE PROJECT



Source: PennEast (2014), PiktoChart (2014), Econsult Solutions (2014)

These economic impacts generated from the design and construction period also produce tax revenue gains for both Pennsylvania and New Jersey. There are many positive tax impacts from the project at the federal, state and local level. However, for simplicity, the study quantified only the impact on state income tax revenues. Due to the labor-intensive nature of design and construction, most of the tax benefit will come from the state income taxes in Pennsylvania and New Jersey. It is estimated that during the design and construction period, $11.1 million in personal income tax will accrue to Pennsylvania and $6.4 million in personal income tax will accrue to New Jersey (see Table 3.3)[12].

TABLE 3.3 – POTENTIAL PERSONAL INCOME TAX BENEFIT TO PENNSYLVANIA AND NEW JERSEY ($ MILLIONS)

Jurisdiction	Income Taxes
Pennsylvania	**$11.1**
New Jersey	**$6.4**

Source: IMPLAN (2014), Econsult Solutions (2014)

[12] The tax estimates were calculated using each state's published personal income tax collection effective rates, which are currently 2.043% and 3.185% in Pennsylvania and New Jersey, respectively.

4.0 ONGOING ANNUAL ECONOMIC IMPACT

4.1 ANNUAL IMPACTS

Once construction of the Project is complete, PennEast will have significant annual economic impact in two ways.

1. Operating, maintaining, and inspecting the physical pipeline and its facilities will require the creation of long-term jobs and the purchase of additional materials. This, in turn, will spur economic activity in the six-county region (Section 4.2).

2. As new natural gas supply is introduced to the market, prices of natural gas and electricity are likely to decrease. This translates into savings on energy bills that will then result in additional household income for residents of Pennsylvania and New Jersey, which will induce spending in multiple industries in both states creating an additional economic impact (Section 4.3).[13]

Both will lead to increased economic activity, employment, and tax revenues.

4.2 ANNUAL DIRECT OPERATION EXPENDITURES

PennEast will operate and maintain the pipeline, the compressor station, and all other facilities associated with the Project. Frequent maintenance surveys and inspections will be conducted on the ground providing information on encroachment, equipment operation, leak surveys, erosion, and cathodic protection system integrity, to name a few. To maintain the highest level of safe and efficient operation, PennEast will incur significant expenditures conducting ongoing operations and maintenance such as various equipment and material inspections/testing, one-call responses, and will purchase materials consumed in day-to-day operations of the pipeline and compressor station. These daily activities and expenditures are necessary to ensure PennEast provides safe and reliable delivery of natural gas supplies to the region.

PennEast estimates spending $13.2 million annually to operate and maintain the Project (see Table 4.1). The estimates used in the input-output model were based on the predicted operating budget for 2018. As detailed by PennEast, it is estimated that nearly all expenditures related to operating the Project will be sourced in Pennsylvania.

[13] While market-wide savings can be estimated using historic energy cost data, quantifying the extent of consume savings is beyond the scope of this report.

TABLE 4.1 – ANNUAL ESTIMATED OPERATING COSTS FOR THE PROJECT IN 2018 ($ MILLION)

Operations 2018	Total Expenditure in Pennsylvania and New Jersey
Labor	$2.4
Maintenance	$2.9
Operations	$7.9
Total	**$13.2**

Source: PennEast (2014)

ONGOING OPERATIONS ECONOMIC IMPACT

The ongoing operations of the Project will have an annual economic impact within the six-county region, Pennsylvania, and New Jersey. Across both Pennsylvania and New Jersey, the total annual economic impact is estimated to be $23 million, supporting 98 jobs with $8.3 million in wages. In the six-county region, the ongoing operations of the Project are estimated to generate a total annual economic impact of $20.3 million, supporting 80 total jobs with wages of about $6.4 million each year (see Table 4.2). In Pennsylvania, the total potential estimated economic impact will be approximately $20.9 million each year, supporting 88 jobs with $7.5 million in wages. Across New Jersey, operations of the Project are predicted to generate a total potential estimated annual economic impact of $2.1 million, supporting 10 jobs with $800,000 in wages.

TABLE 4.2 - POTENTIAL ECONOMIC ANNUAL IMPACT FROM THE OPERATIONS OF THE PROJECT ($ MILLION)

Impact Type	Total Impact in Pennsylvania and New Jersey	Six-County Region	Commonwealth of Pennsylvania	State of New Jersey
Direct Output	$13.2	$13.2	$12.6	$0.6
Indirect & Induced Output	$9.8	$7.1	$8.3	$1.5
Total Output	**$23.0**	**$20.3**	**$20.9**	**$2.1**
Employment Supported (jobs)	**98**	**80**	**88**	**10**
Labor Income Supported	**$8.3**	**$6.4**	**$7.5**	**$0.8**

Source: IMPLAN (2013), Econsult Solutions (2014)

ONGOING OPERATIONS FISCAL IMPACT

The operations of the Project and its total economic impact will generate recurring personal income tax revenues to the Pennsylvania and New Jersey state governments (see Table 4.3). It is estimated that the ongoing operations of the Project will generate $154,000 annually in personal income tax revenue to Pennsylvania and $25,000 annually to New Jersey.[14]

TABLE 4.3 - POTENTIAL PERSONAL INCOME TAX BENEFIT TO PENNSYLVANIA AND NEW JERSEY

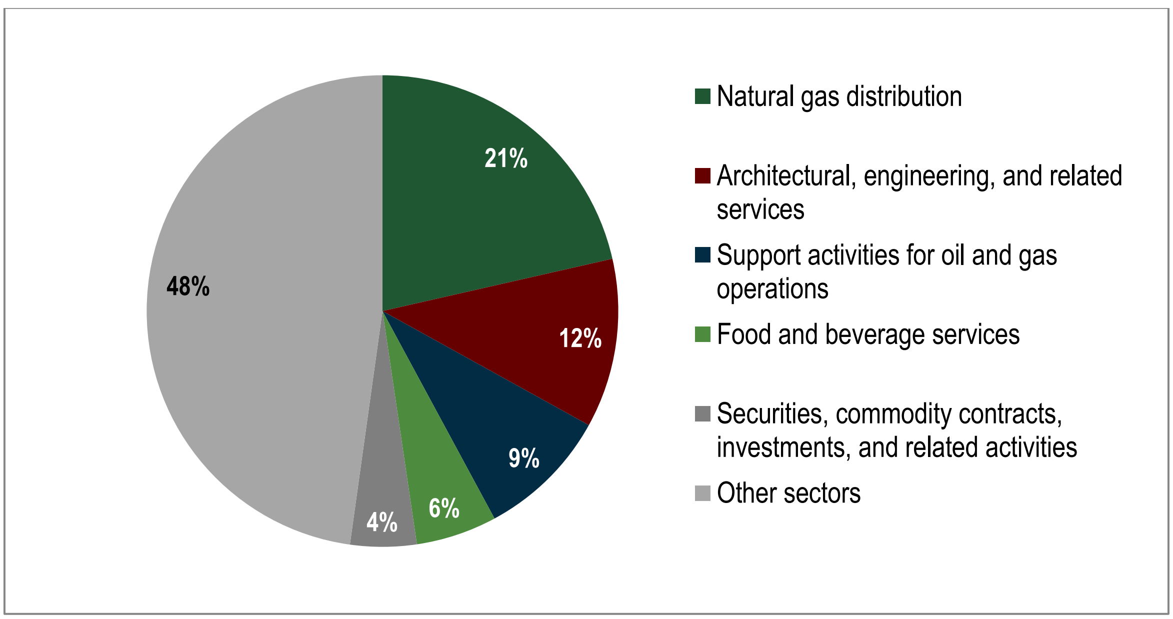
Jurisdiction	Income Taxes
Pennsylvania	$154,000
New Jersey	$25,000

Source: IMPLAN (2014), Econsult Solutions (2014)

ANNUAL JOB DISTRIBUTION

The ongoing operations of the Project will affect several different industries. At the six-county region level, 21 percent of the employment impact is estimated to be in the natural gas distribution industry. Other industries will also benefit from the Project's ongoing operations (see Figure 4.1).

FIGURE 4.1 - POTENTIAL EMPLOYMENT IMPACT FROM THE OPERATIONS OF THE PROJECT IN THE SIX-COUNTY REGION



Source: IMPLAN (2013), Econsult Solutions (2014)

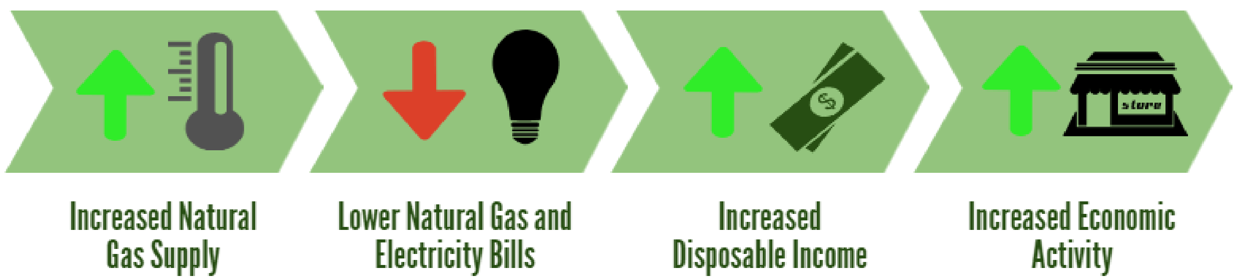
[14] The tax estimates were calculated using each state's published personal income tax collection effective rates, which are currently 2.043% and 3.185% in Pennsylvania and New Jersey, respectively.

4.3 ADDITIONAL ECONOMIC BENEFITS

The primary ongoing impact of PennEast Pipeline will be to expand and stabilize the supply of natural gas in both states, thus leading to a reduced price of natural gas to final customers. Lower natural gas prices will also lead to lower electricity prices as power generation throughout the region becomes more heavily dependent on natural gas as a fuel.

Lower energy bills lead to an increase in disposable income for consumers, allowing for additional spending in the economy (see Figure 4.2). This new spending can be estimated via the same input-output model used in this analysis. We estimate that every $10 million in increased disposable income, derived from lower energy prices, would generate a total economic impact of $13.5 million and support 90 jobs.

FIGURE 4.2 – RELATIONSHIP OF INCREASED NATURAL GAS SUPPLY TO BROADER ECONOMIC ACTIVITY



5.0 CONCLUSION

We forecast the PennEast Pipeline Project to generate a significant positive economic impact in Pennsylvania and New Jersey, increasing economic activity and supporting new jobs. Construction and ongoing operations of the Project will be economically beneficial to the counties in which the pipeline will traverse and both states as a whole. In addition, the possibility for increased income derived from potentially lower energy bills could induce spending in the regional economy and spur an even broader and larger economic impact.

The immediate construction and labor impacts of the Project are substantial and would greatly benefit local communities through construction, labor and project management jobs. We estimate the total economic impact in both states from design and construction to be $1.62 billion, supporting over 12,160 jobs with $740 million in wages.

The costs to operate and maintain the Project will generate annually recurring economic impacts in both states. The estimated total economic impact in both states from ongoing operations of the Project is $23 million, supporting about 98 jobs with $8.3 million in wages. In addition, labor from construction and the ongoing operations will generate fiscal benefits to each state government in the form of income taxes remitted.

An even greater recurring economic benefit to New Jersey and Pennsylvania homeowners and businesses will come from significant savings in utility bills that will result from an expanded and stabilized supply of natural gas. These savings will have the same economic effect as an increase in disposable income. The benefits of the Project to Pennsylvania and New Jersey residents, businesses, and local communities will have annual positive effects on the Pennsylvania and New Jersey economies. For each $10 million in increased disposable income, a total of $13.5 million in economic impact could be generated, supporting 90 jobs.

APPENDIX A – ECONOMIC AND FISCAL IMPACT MODEL THEORY

A.1 History

The theory behind input-output modeling stretches as far back as the mid-17th century, when Sir William Petty described the interconnectedness of “production, distribution, and wealth disposal.” While Perry can be credited with noticing links between economies, input-output modeling did not begin to take true form until the mid-18th century, when French physician François Quesnay created the Tableau Économique. His work detailed how a landowner spends his wages on goods from farms and merchants, who in turn spend their money on a host of goods and services. Over the course of the century, an algebraic framework was added by Achille-Nicholas Isnard. Robert Torrens and Léon Walras refined the model by establishing the connections between profits and production.

The modern input-output system can be attributed to Wassily Leontief. In his thesis, “The Economy as a Circular Flow” (1928), he outlined the economy as an integrated system of linear equations relating inputs and outputs. This framework soon gained popularity, and became a widely accepted analytical tool. In 1936, Leontief produced the first input-output analysis of the US. Leontief’s work became the US Department of Commerce’s Bureau of Economic Analysis’s (BEA) standard benchmark for US production in the 1950s. Leontief received a Nobel Prize for his work in 1973.

In 1976 the USDA Forest Service became required to submit five year management plans to the federal government concerning the socio-economic effects of resource use. Through extensive surveying, the impacts of each industry could be determined at local levels. This directly resulted in the creation of IMPLAN software for measuring economic impacts. By the late 1980s the University of Minnesota began to offer the software to a wider audience. Seeing the need to update economic databases and improve the existing software, the Minnesota IMPLAN Group (MIG) was formed in 1993. Using a similar methodology to the USDA Forest Service, MIG was able to provide a quality input-output modeling software to a wider range of users with frequent database updates.

A.2 Application

The use and application of multipliers are fairly basic and intuitive. Multipliers, in their most basic form, are the result of an algebraic analysis expressing how two inputs are interconnected in the production of an output. The result of the equation generates a multiplier that is broken down into direct, indirect, and induced effects. In a generalized example: if the multiplier for good “X” to good “Y” is 3, then the direct of good “X” on “Y” is 1, with indirect and induced effects of 2. Essentially, every unit of good “X” supports 2 units of good “Y”.

When implemented on a large complex scale, such as that of the US economy or any subsection of it, multiplier effects across industries can be complicated. However, the same general concept comes into play. Each industry has largely different and varied inputs into other industries. The quantity of the output is largely decided by the scale and efficiency of the industries involved. As a result, the sum of those inputs equates to an output product plus a value added/component. By arranging these inputs and outputs by industry in a matrix, and performing some algebra to find the Leontief inverse matrix, each industry's effect on final demand can be estimated. Additionally, the direct, indirect, and induced effects can also be determined. Direct effects include direct purchases for production, indirect effects include expenses during production, and induced effects concern the expenditures of employees directly involved with production. Using building construction as an example, the direct effects would include materials, brick, steel, and mortar, the indirect effects would involve the steel fabrication, concrete mixing, and the induced effects would consider the construction workers purchases from their wages. While impacts vary in size, each industry has rippling effects throughout the economy. By using an input-output model, these effects can be more accurately quantified and explained.

IMPLAN is one of several popular choices for regional input-output modeling. Each system has its own nuances in establishing proper location coefficients. IMPLAN uses a location quotient to determine its regional purchase coefficient (RPC). This represents the proportion of demand for a good that is filled locally; this assessment helps determine the multiplier for the localized region. Additionally, IMPLAN also accounts for inter-institutional transfers (eg. firms to households, households to the government, etc…) through its social account matrix (SAM) multipliers. IMPLAN takes the multipliers and divides them into 440 industry categories in accordance to the North American Industrial Classification System (NAICS) codes. A comprehensive breakdown of a region's multipliers by industry can be shown.

Despite the usefulness of input-output modeling, there are some shortcomings to the system. Notably, input-output models ignore economies of scale. Input-output models assume that costs and inputs remain proportionate through different levels of production. Further, multipliers are not generally updated on a timely basis; most multipliers are prone to be outdated with the current economy. If the multipliers are sourced from a year of a recession economy, the multipliers may not accurately represent the flows from an economic boom period. Additionally, the multipliers may not capture sudden legal or technological changes which may improve or decrease efficiency in the production process. Regardless, I-O models still serve as the standard in the estimation of local and regional impacts.

A.3 Economic Impact Model

The methodology and input-output model used in this economic impact analysis are considered standard for estimating such expenditure impacts, and the results are typically recognized as reasonable and plausible effects, based on the assumptions (including data) used to generate the impacts. In general, one can say that any economic activity can be described in terms of the total output generated from every dollar of direct output. If an industry in a given region sells $1 million of its goods, there is a direct infusion of $1 million into the region. These are referred to as *direct output*.

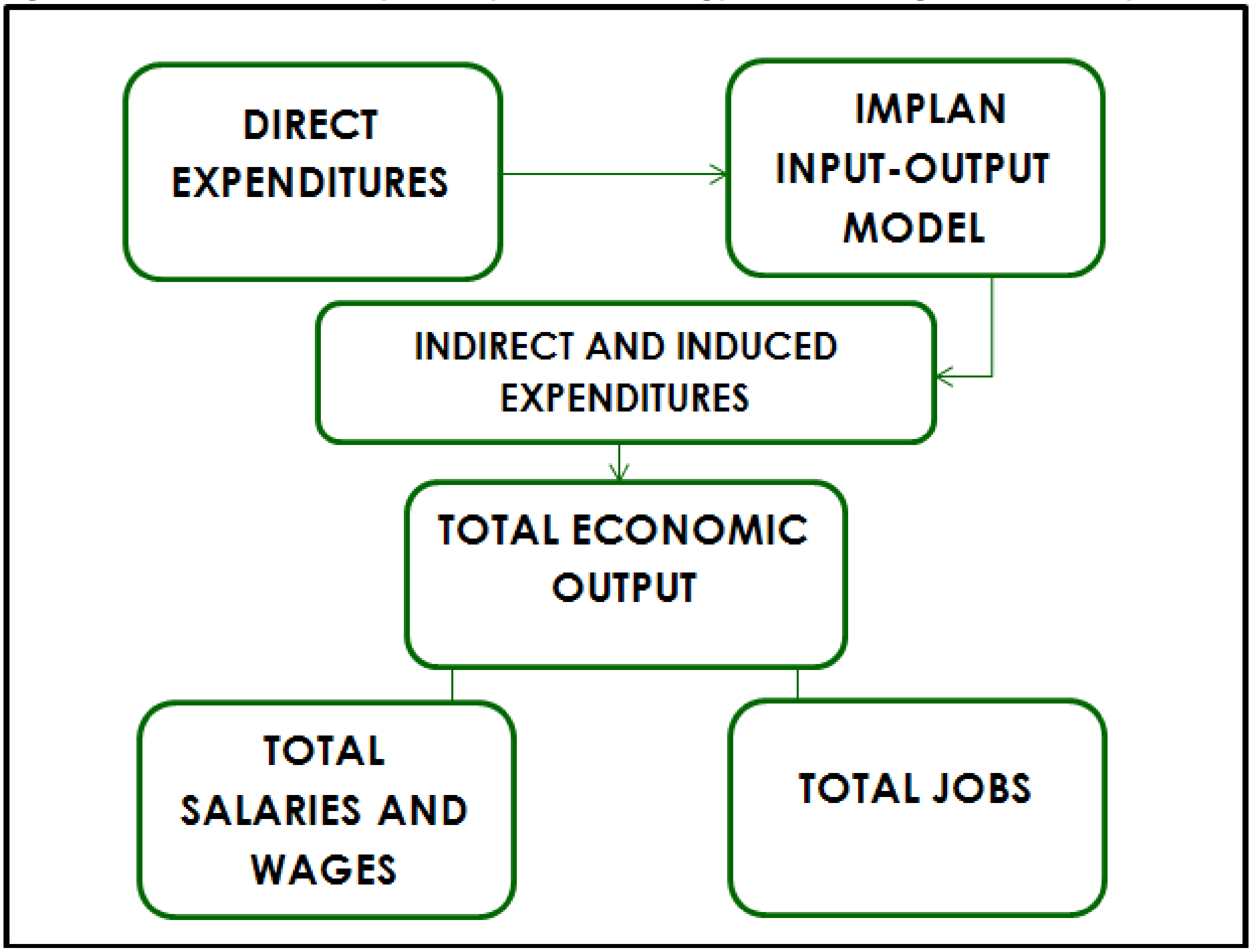
However, the economic impact on the region does not stop with that initial direct expenditure. Regional suppliers to that industry have also been called upon to increase their production to meet the needs of the industry to produce the $1 million in goods sold. Further, suppliers of these same suppliers must also increase production to meet their increased needs as well. These are referred to as *indirect output*. In addition, these direct and indirect output require workers, and these workers must be paid for their labor. These wages and salaries will, in turn, be spent in part on goods and services produced locally, engendering another round of impacts. These are referred to as *induced expenditures*.

Direct output are fed into a model constructed by Econsult Solutions and based on IMPLAN data. The model then produces a calculation of the total expenditure effect on the regional economy. This total effect includes the initial direct expenditure effect, as well as the ripple effects described, the indirect and induced expenditure effects.

Part of the total expenditure effect is actually the increase in total wages and salaries (usually referred to as labor income), which the model can separate from the expenditure estimates. Direct payroll estimates are fed into the "household' industry of the input-output model. Impacts of this industry are estimated using the personal consumption expenditure breakdown of the national input-output table and are adjusted to account for regional consumption spending and leakages from personal taxes and savings. The direct, indirect, and induced labor income represent a component of the total economic impact attributable to wages and salaries. Finally, the model calculates the total expenditures affecting the various industries and translates this estimate into an estimate of the total labor (or jobs) required to produce this output.

In short, the input-output model estimates the total economic activity in a region that can be attributed to the direct demand for the goods or services of various industries. This type of approach is used to estimate the total economic activity attributable to the expenditures associated with various types of spending in the region (see Figure A.1 and Table A.1).

Figure A.1 – Flowchart of Input-Output Methodology for Estimating Economic Impact



Source: Econsult Solutions, Inc. (2013)

TABLE A.1 – GLOSSARY OF TERMS FOR INPUT-OUTPUT MODELS

Multiplier Effect – the notion that initial outlays have a ripple effect on a local economy, to the extent that direct output lead to indirect and induced output.

Economic Impacts – total expenditures, employment, and labor income generated.

Fiscal Impacts – local and/or state tax revenues generated.

Direct Output – initial outlays usually associated with the project or activity being modeled; examples: one-time upfront construction and related expenditures associated with a new or renovated facility, annual expenditures associated with ongoing facility maintenance and/or operating activity.

Direct Employment – the full time equivalent jobs associated with the direct output.

Direct Labor income – the salaries and wages earned by employees, contractors, and proprietors as part of the direct output.

Indirect Output – indirect and induced outlays resulting from the direct output; examples: vendors increasing production to meet new demand associated with the direct output, workers spending direct labor income on various purchases within the local economy.

Indirect Employment – the full time equivalent jobs associated with the indirect output.

Indirect Labor income – the salaries and wages earned by employees, contractors, and proprietors as part of the indirect output.

Total Output – the sum total of direct output and indirect output.

Total Employment – the sum total of direct employment and indirect employment.

Total Labor income – the sum total of direct labor income and indirect labor income.

Source: Econsult Solutions (2013)

A.4 Fiscal Impact Model

The IMPLAN model provides estimates of the economic impact of a new project or program on the regional economy. It does provide only a rough estimate of the combined fiscal impact of the increased economic activity on state and local governments. Consequently, Econsult has constructed a model that takes the output from the IMPLAN model and generates detailed estimates of the increases in state tax collections that arise from the new project. For this report, state personal income taxes were modeled. The state personal income taxes are in fact a part of the total economic impact of a new project that is often ignored in conventional economic impact analyses.

The IMPLAN model provides estimates of direct, indirect, and induced expenditures, labor income, and employment within the defined region. The Econsult fiscal impact model combines the IMPLAN output with the relevant tax types and tax bases associated with the jurisdiction or jurisdictions for which fiscal impact is being modeled. Specifically for this report, the estimated labor income supported by the direct, indirect, and induced expenditures generated by the model and the effective income tax rate of each state were used to apportion the net increase in the personal income tax bases. The resulting estimates represent the projected personal income tax gains to the states as a result of the increased business activity and its attendant indirect and induced effects.

A.5 Sources

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Appendix N

Energy Market Savings Report and Analysis

PennEast PIPELINE

ENERGY MARKET SAVINGS

Report and Analysis

Report Submitted by:

Concentric Energy Advisors Inc.

CONCENTRIC ENERGY ADVISORS®

ESTIMATED ENERGY MARKET SAVINGS FROM ADDITIONAL PIPELINE INFRASTRUCTURE SERVING EASTERN PENNSYLVANIA AND NEW JERSEY

PREPARED FOR:

PENNEAST PIPELINE COMPANY, LLC

MARCH 2015

PREPARED BY:

WWW.CEADVISORS.COM

Concentric is a management consulting and financial advisory firm focused on the North American energy industry.

We offer a broad range of advisory and support services, and our expertise spans all aspects of the natural gas, power, and oil markets.

Concentric's workforce is comprised of energy industry experts who have held positions with utility companies, state and federal regulatory agencies, energy marketers, and global energy companies. Many members of Concentric's team have been working together for more than 25 years.

CONCENTRIC SPECIALIZES IN:

- Energy Markets
- Utility Regulation
- Finance and M&A
- Litigation and Dispute Resolution
- Management and Operations Support

Concentric's experts have performed numerous strategic natural gas market assessments throughout North America for pipelines, producers, natural gas storage providers, LNG developers, and lenders. These assessments have evaluated historical and future markets for energy assets, and have considered aspects including risk assessments, comparative cost assessments, valuations, quantifications of savings associated with new infrastructure, and regulatory environment and policy assessments.

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Concentric Energy Advisors, Inc. provides information and projections consistent with standard practices. The analyses contained herein require certain simplifying assumptions; however, it is the opinion of Concentric that these assumptions and the corresponding results reflected herein are reasonable. All analyses are based on the best information available at the time they were conducted. Concentric makes no warrantee or guarantee regarding the accuracy of any forecasts, estimates, or analyses, or that such work products will be accepted by any legal or regulatory body.

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SECTION 1:
INTRODUCTION

A. OVERVIEW

Concentric Energy Advisors, Inc. ("Concentric") has been retained by PennEast Pipeline Company, LLC ("PennEast") to independently evaluate and estimate the potential savings to energy market participants in eastern Pennsylvania and New Jersey associated with the PennEast Pipeline project.[1] As proposed, PennEast would be an approximately 114-mile, 36"-inch natural gas transmission pipeline capable of transporting approximately 1 Bcf/d of natural gas from northeastern Pennsylvania to Southeastern Pennsylvania and central New Jersey, with numerous receipt and delivery points, as well as various interconnections with other natural gas transmission pipelines along the route. The report herein provides an overview of Concentric's analysis and an estimate of the savings that could have been achieved by natural gas and electric consumers in this region in the winter of 2013/2014 due to the addition of the project's incremental pipeline capacity.

B. EXECUTIVE SUMMARY

The primary conclusions from Concentric's analysis are as follows:

- It is generally accepted that natural gas markets that are constrained during some or all of the year, and thus reflect higher and more volatile natural gas pricing during such periods, can benefit from additional pipeline capacity to mitigate the higher and more volatile pricing.
- It has been well documented that the winter of 2013/2014, with its relatively severe and prolonged cold, and resulting high levels of demand for natural gas from local natural gas distribution companies, industrial customers and electric generators, resulted in extremely volatile pricing and significantly higher natural gas prices in the U.S. Northeast than had ever been previously experienced. While the winter of 2013/2014 was colder than other recent winters, it did not reach extreme levels. Natural gas distribution companies ("LDCs") plan for "design" conditions that represent significantly colder than normal weather to ensure reliable service to its customers even during cold weather events, and the winter of 2013/2014 did not surpass LDC design conditions. Because natural gas demand is expected to grow, similar weather conditions could produce similar prices in the future, unless additional infrastructure is built to alleviate constraints.

[1] The sponsors of PennEast are: AGL Resources, NJR Pipeline Company, PSEG Power, South Jersey Industries, Spectra Energy Partners ("Spectra"), and UGI Energy Services (collectively, the "Sponsors").

- Additional natural gas pipeline capacity, such as proposed by PennEast, has the potential to provide significant value to energy consumers in eastern Pennsylvania and New Jersey by lowering natural gas prices during high price periods.
- To quantify the magnitude of the benefits that PennEast could provide, Concentric estimated what natural gas prices could have otherwise been in the winter of 2013/2014 if an additional 1Bcf/day of pipeline capacity had been available by evaluating the relationship between natural gas prices that actually occurred in eastern Pennsylvania and New Jersey relative to the natural gas demand experienced in the region on each day.[2] All other factors were held constant, including weather, operational issues, and the availability of natural gas and electric infrastructure.
- While recognizing that certain periods during the winter of 2013/2014 in eastern Pennsylvania and New Jersey experienced record high natural gas prices, but did not reach design conditions, we believe that using the most recent timeframe for which data is fully available most accurately reflects the current market dynamics, including recently constructed infrastructure projects, and provides a basis for reasonably estimating potential savings that could be achieved in similar circumstances absent additional infrastructure to mitigate the high natural gas prices experienced.
- Concentric focused on four primary areas of potential savings associated with additional pipeline infrastructure and lower market area natural gas prices:
    - Savings that could be achieved by electric consumers when natural gas-fired generation resources set the electric energy price based on lower market area natural gas prices ("Gas-Fired Generation Savings")
    - Savings that could be achieved by electric consumers when natural gas-fired generation resources could displace less efficient and more costly oil-fired generating resources, and set the electric energy price based on lower market area natural gas prices ("Oil-Fired Generation Displacement Savings")
    - Savings that could be achieved by industrial natural gas consumers that are purchasing natural gas supplies at lower market area natural gas prices ("Industrial Transport Customer Savings")
    - Savings that could be achieved by LDC customers when LDCs have the opportunity to purchase more natural gas supplies from lower-cost, local Marcellus Shale production as opposed to often higher-cost Gulf Coast production ("LDC Gas Supply Savings")
- Based on its analysis, and as summarized in Table 1, Concentric estimates that energy consumers in eastern Pennsylvania and New Jersey could have saved over $890 million in the winter of 2013/2014 had an additional 1 Bcf/d of pipeline capacity been available.

[2] Concentric relied on publicly-available pricing, demand, and weather data for the natural gas and electric markets for its analysis.

Table 1:
Estimated Savings if an Additional 1 Bcf/d of Pipeline Capacity Had Been Available for the Winter of 2013/2014

(All figures in $Millions)

	Eastern Pennsylvania	New Jersey	Total
Electric Market Savings			
Gas-Fired Generation	$ 225.8	$ 186.7	$ 412.5
Oil-Fired Generation Displacement	$ 70.2	$ 48.9	$ 119.1
Subtotal	$ 296.1	$ 235.5	$ 531.6
Gas Market Savings			
LDC Gas Supply Procurement	$ 36.4	$ 69.8	$ 106.2
Industrial Transportation Customer	$ 182.5	$ 73.1	$ 255.6
Subtotal	$ 218.9	$ 142.9	$ 361.8
Total Estimated Savings:	**$ 515.0**	**$ 378.4**	**$ 893.4**

- The estimated savings figures reflected in Table 1 conservatively exclude potential savings that may have been achieved in the electric market on "extreme peak days" in which temperatures were coldest and natural gas demand was highest, and thus natural gas prices were also highest.

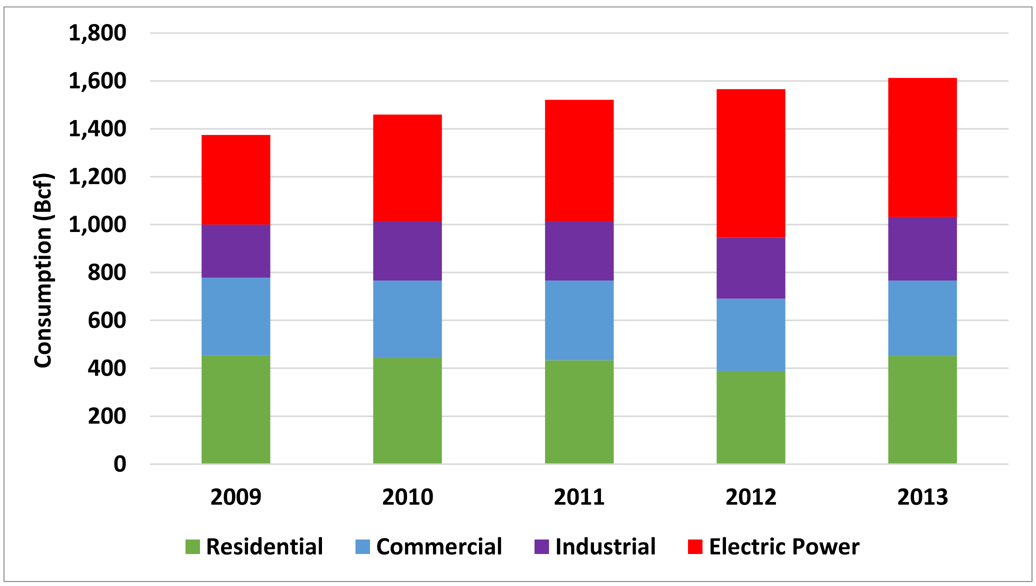
SECTION 2:
MARKET OVERVIEW

This section summarizes the eastern Pennsylvania and New Jersey natural gas market, providing context for the estimated savings analysis discussed in the following sections. First, a discussion of the natural gas demand by both LDCs and electric generators in the region is provided, followed by a discussion of the natural gas infrastructure and natural gas pricing in the region.

A. NATURAL GAS DEMAND

As illustrated in Figure 1, over the last five-year period for which data is available, *i.e.*, 2009 to 2013, the demand for natural gas in Pennsylvania[3] and New Jersey has steadily increased from approximately 1,400 Bcf/year to 1,600 Bcf/year, which translates in an increase in the average daily demand from 3,835 MMcf/d to 4,385 MMcf/d over the period.

Figure 1:
Annual Natural Gas Consumption in Pennsylvania and New Jersey4



Local natural gas distribution companies ("LDCs") deliver the majority of the natural gas consumed in eastern Pennsylvania and New Jersey, serving residential and commercial customers as well as a significant portion of the industrial and power generation load. Certain industrial customers and

[3] Note that the demand figures presented herein reflects data for the entire state of Pennsylvania as consumption by end use data specific to eastern Pennsylvania is not published by the U.S. Energy Information Administration ("EIA"). Demand trends in eastern Pennsylvania are expected to be similar to those experienced in the state as a whole.

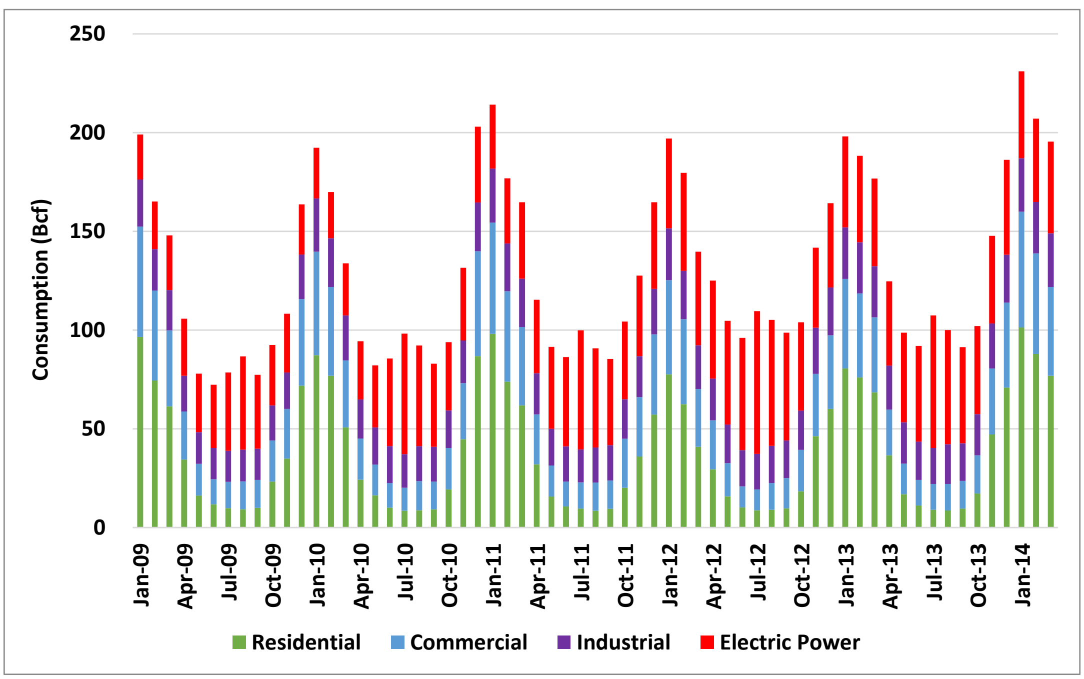
[4] EIA, Annual Natural Gas Consumption by End Use for New Jersey and Pennsylvania, release date December 31, 2014.

electric generators have direct connections to interstate pipelines, and thus are not served by the LDCs.

The power generation segment experienced the largest growth in natural gas consumption in Pennsylvania and New Jersey over the 2009 to 2013 period, with annual demand increasing from approximately 375,000 MMcf (*i.e.*, approximately 27% of the 2009 total natural gas consumption) to approximately 580,000 MMcf (*i.e.*, approximately 36% of the 2013 total natural gas consumption). As a result, the power generation segment is now the largest consumer of natural gas in Pennsylvania and New Jersey. In contrast, the share of natural gas consumption by the residential and commercial segments in Pennsylvania and New Jersey declined from 2009 to 2013, while the share of consumption by the industrial segment has remained almost constant.

The demand for natural gas in Pennsylvania and New Jersey rises significantly during winter months as residential and commercial customers use natural gas to heat their homes and businesses. In addition, demand by electric generators in the hot summer months for air conditioning load is increasing mid-summer demand, meaning the lowest natural gas use occurs in the shoulder months. Figure 2 illustrates the seasonality of the natural gas demand in Pennsylvania and New Jersey, whereby the average day consumption during January 2014 was approximately two and a half times greater than the average day consumption during September 2014. In addition, this chart illustrates the particularly high natural gas demand experienced last winter (*i.e.*, November 2013 through March 2014) due to the pervasive cold weather.

Figure 2:
Monthly Natural Gas Consumption in Pennsylvania and New Jersey[5]



5 EIA, Monthly Natural Gas Consumption by End Use for New Jersey and Pennsylvania, release date December 31, 2014.

LDCs in Eastern Pennsylvania and New Jersey

Eastern Pennsylvania is served by four LDCs: UGI Utilities, Inc. ("UGI Utilities"); UGI Penn Natural Gas, Inc. ("UGI Penn"); PECO Energy ("PECO"); and Philadelphia Gas Works ("PGW"). There are also four LDCs providing service in New Jersey: Public Service Electric and Gas ("PSEG"); New Jersey Natural Gas ("NJNG"); South Jersey Gas ("SJG"); and Elizabethtown Gas ("Elizabethtown"). Figure 3 shows the service territory for each LDC.

Figure 3:
Service Territories of LDCs in Eastern Pennsylvania and New Jersey

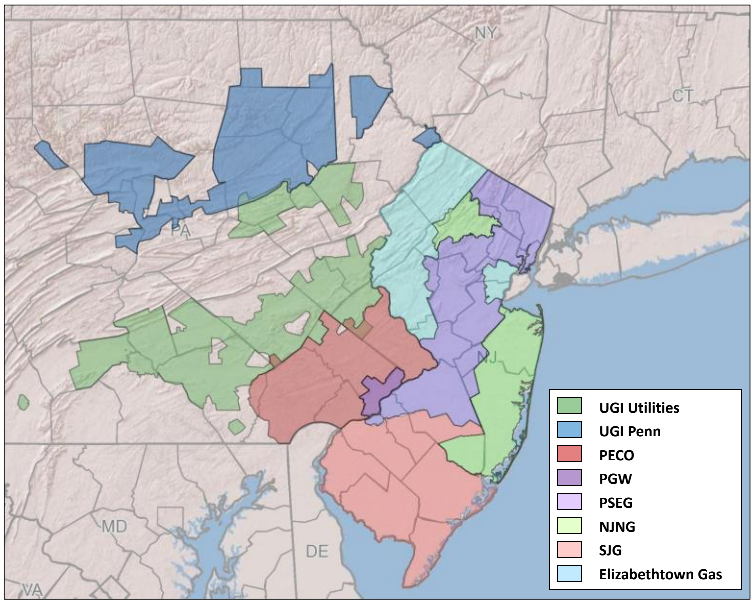


Table 2 presents summary operating statistics for each LDC in the region. As shown in Table 2, PSEG is the largest LDC, and significantly larger than the other LDCs in eastern Pennsylvania and New Jersey. All of these LDCs are projecting annual growth over the next three to five years, ranging from approximately 0.5% to 2.7%.

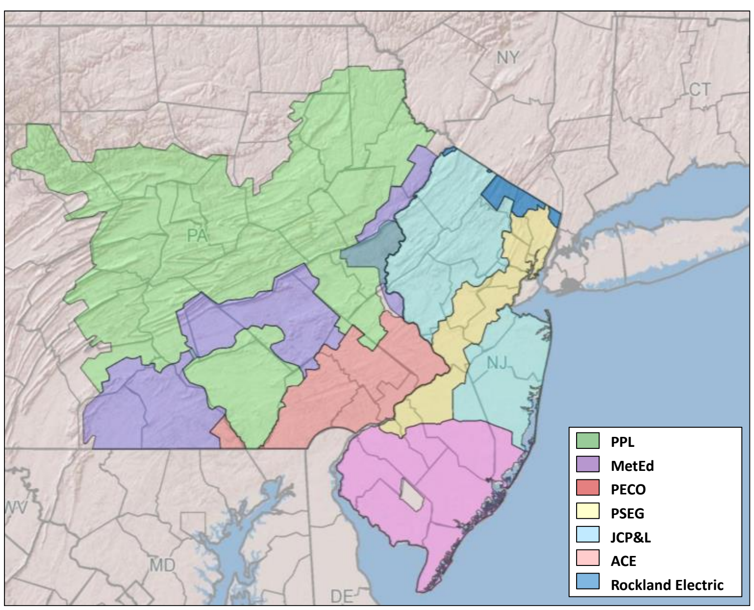
Table 2:
Eastern Pennsylvania and New Jersey LDC Summary Operating Statistics[6]

	No. of Natural Gas Customers	2013 Retail Sales Volumes (Mcf)	Peak Day Sendout (Mcf)
Eastern Pennsylvania			
UGI Utilities	357,408	116,675,523	654,050
UGI Penn	163,796	56,733,872	416,488
PGW	498,694	73,229,988	616,000
PECO	498,843	85,834,449	759,594
Subtotal	**1,518,741**	**332,473,832**	**2,446,132**
New Jersey			
PSEG	1,790,240	453,524,804	2,973,000
NJNG	501,595	67,616,570	690,415
SJG	359,732	58,997,922	495,056
Elizabethtown	278,871	52,732,119	440,148
Subtotal	**2,930,438**	**632,871,415**	**4,598,619**

Electric Utilities in Eastern Pennsylvania and New Jersey

As shown illustrated in Figure 4, there are seven investor-owned electric utilities serving customers in eastern Pennsylvania and New Jersey.

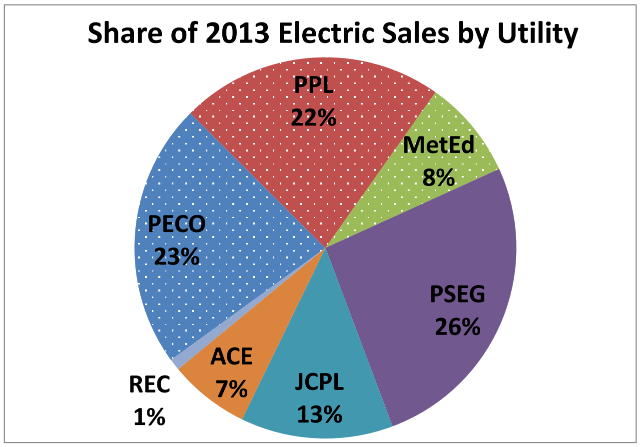
Figure 4:
Service Territories of Electric Utilities in Eastern Pennsylvania and New Jersey



6 Sources: EIA Form 176, Annual 1307(f) Filing materials, State LDC Filings, and information provided by LDCs.

In 2013, these seven electric utilities sold over 169 TWh of electricity to almost 7.5 million customers. As shown in Figure 5, electric sales are approximately evenly split between the utilities in eastern Pennsylvania (dotted on the graph) and those in New Jersey (solid on the graph).[7]

Figure 5:
Electric Sales by Utility in Eastern Pennsylvania and New Jersey

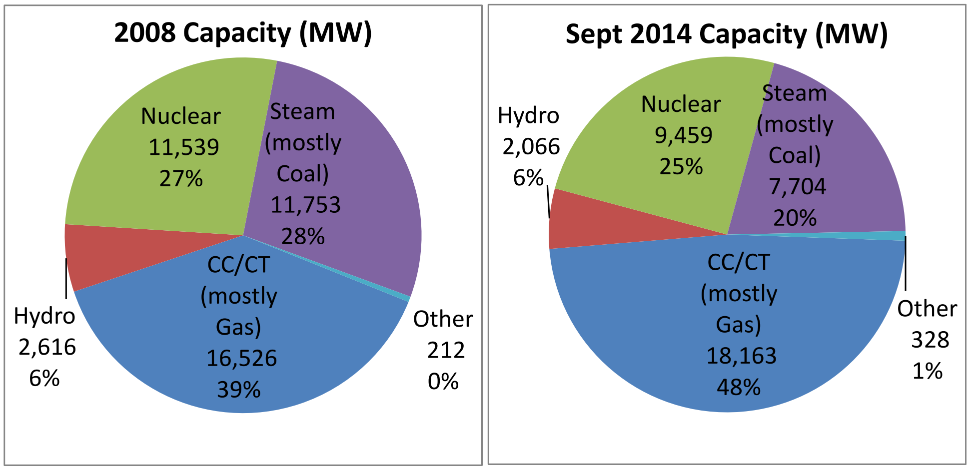


The eastern Pennsylvania and New Jersey electricity market is part of the PJM Interconnection, a regional transmission organization that coordinates the movement of wholesale electricity in the mid-Atlantic region. The power generators located in eastern Pennsylvania and New Jersey are dispatched by PJM in a least-cost manner, subject to certain market conditions and operational constraints. The last generating unit dispatched to serve demand within a particular area is known as the "marginal unit," which sets the electric price paid by all customers in that area. As shown in Figure 6, combined cycle ("CC") power plants and combustion turbines ("CT"), which are predominantly fueled by natural gas, hold the largest share of generation capacity in eastern Pennsylvania and New Jersey. In addition, natural gas-fired generation capacity has shown the largest growth over the last several years, while coal-fired generation has shown the largest decline, as a result of relatively low natural gas prices and increasing environmental restrictions on coal-fired generation.[8]

7 FERC Form 1 data, as compiled by SNL Financial.

8 Monitoring Analytics, LLC, "2014 Quarterly State of the Market Report for PJM: January through September," Table 12-10; and "2008 State of the Market Report for PJM," Table 3-37.

Figure 6:
Eastern Pennsylvania and New Jersey Generation Capacity



Growth in natural gas-fired generation is expected to continue. As stated by Market Monitoring Analytics, LLC in their most recent State of the Market Report for PJM:

> *A significant change in the distribution of unit types within the PJM footprint is likely as natural gas fired units continue to be developed and steam units continue to be retired. While only 282.5 MW of coal fired steam capacity are currently in the queue, 10,475.8 MW of coal fired steam capacity are slated for deactivation. Most of these retirements, 9,147 MW, are scheduled to take place by June 1, 2015, in large part due to the EPA's Mercury and Air Toxics Standards (MATS) set to go into effect at that time. In contrast, 39,287.9 MW of gas fired capacity are in the queue while only 1,793.0 MW of natural gas units are planned to retire. The replacement of older steam units by units burning natural gas could significantly affect future congestion, the role of firm and interruptible gas supply, and natural gas supply infrastructure.*[9]

While the statements by Marketing Analytics apply to the entire PJM region, the same conclusions hold for eastern Pennsylvania and New Jersey. Over 80% of the capacity currently in the queue for eastern Pennsylvania and New Jersey is natural gas-fired (totaling 13,140 MW), while less than 1% is fueled by coal.[10] As a result of the historical and expected future reliance on natural gas-fired generation to meet electricity needs, demand for natural gas by electric generators is expected to continue to grow.

9 Monitoring Analytics, LLC, "2014 Quarterly State of the Market Report for PJM: January through September," p. 399.

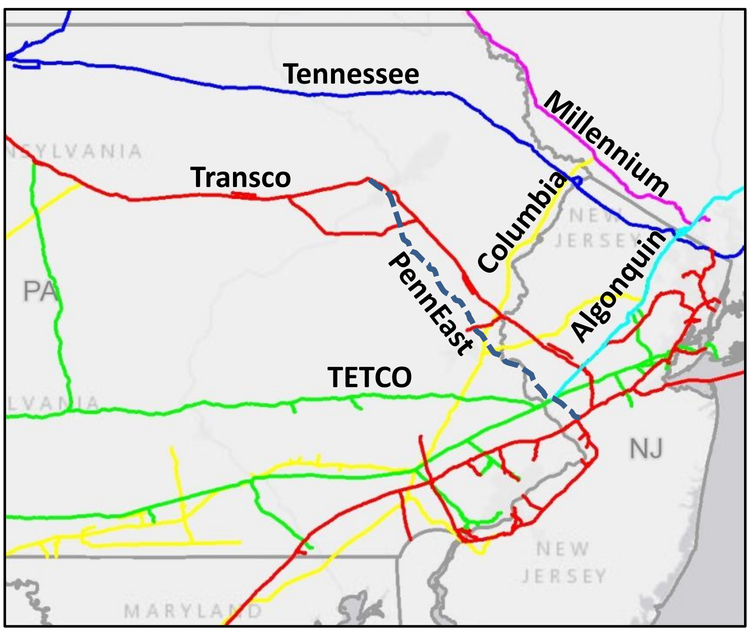
10 Monitoring Analytics, LLC, "2014 Quarterly State of the Market Report for PJM: January through September," Table 12-5.

B. EXISTING NATURAL GAS INFRASTRUCTURE

LDCs purchase natural gas in production area supply basins (*e.g.*, Gulf Coast; Marcellus), transport it over natural gas pipelines, and then deliver it to end-use customers over the local distribution system. Accordingly, LDCs typically have a number of natural gas supply contracts as well as various firm transportation contracts for capacity on pipelines, and they pass on the costs of these contracts to the customers for which they purchase natural gas supplies. Certain customers (typically very large customers, *e.g.*, industrials and electric generators) do not purchase their natural gas from the LDC, instead they buy their natural gas from a third-party marketer at a mutually agreeable price, usually tied to local market area natural gas prices. Regardless of the price paid, natural gas generally must travel from production area supply basins to the market area through the interstate pipeline system.

As illustrated in Figure 7, eastern Pennsylvania and New Jersey natural gas markets are served by five major long-haul pipelines Transcontinental Gas Pipeline ("Transco") and Texas Eastern Transmission ("TETCO") are the largest. The proposed PennEast project is also illustrated by a dotted line on the map.[11]

Figure 7:
Major Natural Gas Pipelines in Eastern Pennsylvania and New Jersey



Transco, TETCO, and Tennessee all originate in the Gulf of Mexico, and were originally built to transport Gulf of Mexico gas supplies thousands of miles to consuming markets in the Northeast that did not have sufficient natural gas production to meet demand. However, in the past decade, advances in drilling technologies have made the extraction of natural gas from shale deposits across North America more economic, adding substantial new natural gas production in places that did not previously have significant natural gas production. Specifically, the Marcellus and Utica Shale

11 Note that the pipeline locations are approximate for illustrative purposes.

formations, which cover a significant portion of Pennsylvania, West Virginia and Ohio, as well as portions of several neighboring states, are now producing approximately 19 Bcf/d of natural gas. Pennsylvania natural gas production ranked second in the nation as of 2013, after Texas, and recently surpassed production in Louisiana and offshore Gulf of Mexico production.[12]

The original pipeline network was not designed to transport the significant quantities of gas now being produced in the Marcellus and Utica Shale region, creating a need for additional pipelines, pipeline reversals, and pipeline expansions. A number of new natural gas pipeline projects, including PennEast, have been proposed to transport the prolific natural gas production in the Pennsylvania area to serve demand.

C. NATURAL GAS PRICING

There are generally two primary categories of natural gas pricing points: production area pricing points and market area pricing points. Production area pricing points represent the price of the natural gas commodity in a region in which there is significant natural gas production, (*i.e*., the wellhead, or the aggregation of production from different areas). Relevant production area price points for eastern Pennsylvania and New Jersey include Henry Hub, a major trading point in Louisiana that serves as a nation-wide benchmark price for natural gas, and more recently prices in the Marcellus Shale production area, including the Transco Leidy Line ("Transco Leidy") index, which represents the price of natural gas receipts onto Transco in northeastern Pennsylvania.

Market area pricing points represent the price of the natural gas commodity in the area in which it will be consumed, and reflects not only the cost of the commodity itself, but also the cost of transportation and other value drivers based on circumstances in that particular market. Relevant market area pricing points for eastern Pennsylvania and New Jersey include the Transco Zone 6 Non-New York ("TZ6NNY") index price.[13]

A "basis differential" is the difference between the price of natural gas at two pricing points at a given point in time (*e.g*., the difference between the Transco Leidy and TZ6NNY prices. Basis differentials reflect the value (but not necessarily the cost) of transportation between two pricing points at a particular time. To the extent that the basis differential between two points is substantially higher than the cost of transportation between those same two points, and that differential is sustained over a reasonably long period, this is an indication that there are pipeline constraints between those points, and provides a signal to pipeline project developers that there may be sufficient demand to contractually support the construction of new pipeline capacity to alleviate those constraints.

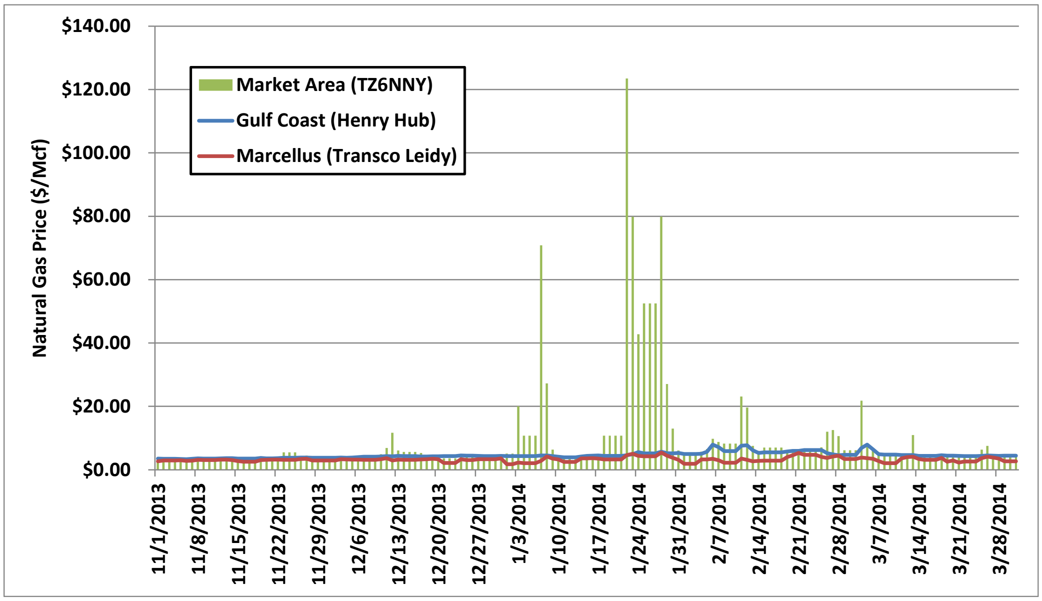
12 EIA, Natural Gas Marketed Production by State.

13 There are other published production area and market area prices in the eastern Pennsylvania and New Jersey area, but for the purposes of this report, the focus will be on Transco Leidy and Transco Zone 6 non-New York.

WINTER 2013/2014

It has been well documented that the winter of 2013/2014, with its relatively severe and prolonged cold, and resulting high levels of demand for natural gas from local natural gas distribution companies, industrial customers and electric generators, resulted in extremely volatile pricing and significantly higher natural gas prices in the U.S. Northeast than had ever been previously experienced despite certain new infrastructure projects being added to the region. It is important to note that while the weather was colder than previous winters, the weather did not reach peak design day conditions for which LDCs typically plan. Figure 8 illustrates the relationship between production area prices (represented by Henry Hub and the Transco Leidy index prices) versus the market area prices (represented by the TZ6NNY index price) for the winter of 2013/2014.

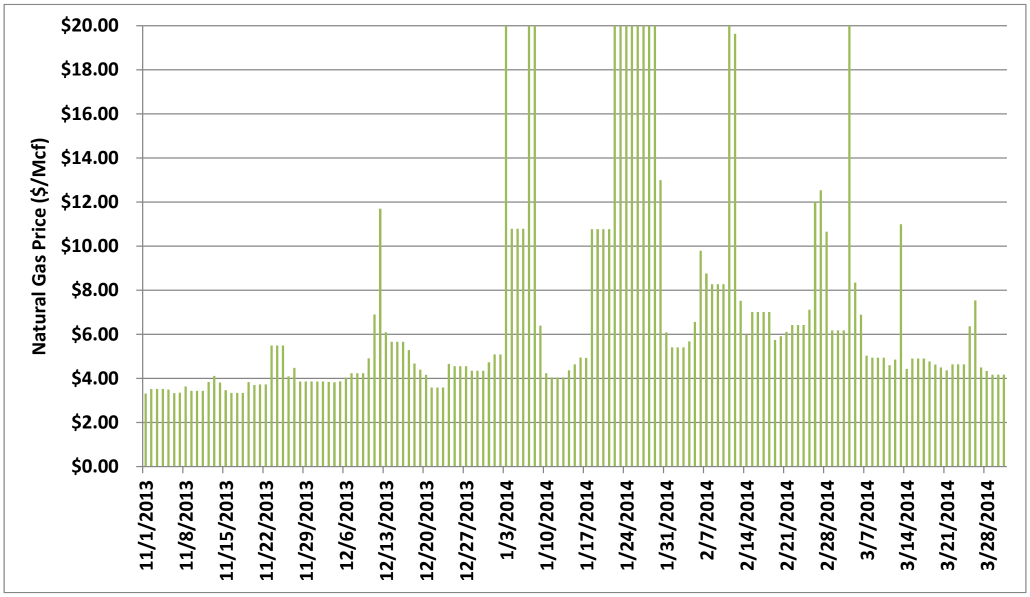
Figure 8:
Daily Spot Natural Gas Prices – Winter 2013/2014



As shown in Figure 8, the TZ6NNY prices reached well over $100/Mcf in January 2014, and as shown in the detailed graph in Figure 9, the TZ6NNY price exceeded $20/Mcf (the previous high price in this region) on 13 days during the winter of 2013/2014.[14]

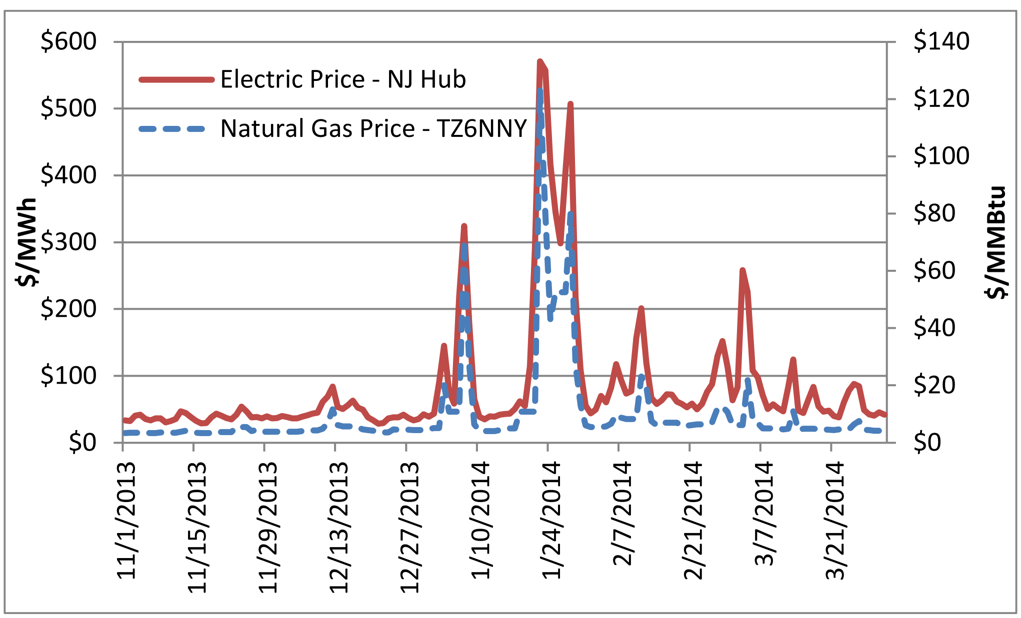
[14] Daily spot midpoint prices as reported by Intercontinental Exchange, Inc.

Figure 9:
TZ6NNY Natural Gas Prices (Truncated at $20) – Winter 2013/2014[15]



The higher natural gas prices experienced in the winter of 2013/2014 caused a substantial increase in energy costs for natural gas consumers purchasing their supplies in the market area. In addition, due to the nature of the electric markets, wherein generators bids are significantly affected by their fuel cost, the price of natural gas significantly affected the price of electricity. For example, Figure 10 illustrates the impact to electric prices in New Jersey associated with high natural gas prices.

Figure 10:
Winter 2013/2014 Electric and Natural Gas Prices



15 SNL Financial.

To put the impact on electric prices from high natural gas prices into perspective, Table 3 illustrates the magnitude by which wholesale electric prices in eastern Pennsylvania and New Jersey were higher than the previous winter. In each case, average wholesale electric prices were more than double the prices experienced the previous winter.

Table 3:
Comparison of Wholesale Electric Prices in Eastern Pennsylvania and New Jersey Over the Past Two Winters

	Avg. Wholesale Electric Prices		
	Winter 2012/2013 ($/MWh)	Winter 2013/2014 ($/MWh)	Percent Increase
Eastern Pennsylvania			
Met-Ed Zone	$ 37.48	$ 78.27	109%
PECO Zone	$ 37.16	$ 78.68	112%
PPL Zone	$ 37.06	$ 78.36	111%
New Jersey			
PSEG Zone	$ 42.48	$ 87.67	106%
Jersey Central P&L Zone	$ 39.08	$ 82.07	110%
Atlantic City Electric Zone	$ 37.94	$ 79.82	110%

There are a number of reasons for the spikes in spot natural gas prices that were experienced last winter in major demand centers along the east coast, which include: (i) colder than normal weather that increased peak demands; (ii) reductions in the availability of natural gas supply and pipeline transportation attributable to these weather conditions; (iii) lower than expected storage inventories; and (iv) increased reliance on natural gas for power generation in competitive wholesale electric markets.[16] However, while the winter of 2013/2014 was colder than other recent winters, it did not reach extreme levels. LDCs plan for "design" conditions that represent significantly colder than normal weather to ensure reliable service to its customers even during cold weather events. The Polar Vortex and the rest of the winter of 2013/2014 did not surpass LDC design conditions. Because natural gas demand from LDCs and electric generators is expected to grow, similar weather conditions in the future could produce similar natural gas, and thus electric prices, unless additional infrastructure is built to alleviate constraints.

[16] Natural gas-fired electric generators do not have an electricity market mechanism to recover fixed demand charges associated with reserving capacity on interstate pipelines and thus rely on interruptible pipeline transportation, a circumstance that can cause increased competition for natural gas, and thus cause an increase in the price of natural gas and electricity prices.

SECTION 3:
ANALYSIS FRAMEWORK

It is generally accepted that natural gas markets that are constrained during some or all of the year, and thus reflect higher and more volatile natural gas pricing during such periods, can benefit from additional pipeline capacity to mitigate the higher and more volatile pricing. Given this, the objective of Concentric's analysis was to estimate, based on recent history (*i.e.*, the winter of 2013/2014), what the market area price of natural gas paid by customers would have been had an additional 1 Bcf/d of pipeline capacity been available to transport natural gas supplies into the eastern Pennsylvania and New Jersey region. It should be noted that our analysis assumed that all other circumstances that existed in the winter of 2013/2014 were unchanged, including factors such as weather, operational issues, other natural gas supply and transportation infrastructure, and electric market infrastructure. Clearly, different circumstances going forward will produce different results. However, similar market conditions that recently produced such high natural gas prices can occur again, and the analysis presented herein provides an estimate of the magnitude of the potential financial benefits to market participants that could have been attained if additional pipeline capacity had been available to provide greater access to natural gas, particularly when natural gas demand in this region was at its highest.

To determine the potential natural gas cost savings that could have been realized by energy consumers had an additional 1 Bcf/d of capacity previously been available due to PennEast, Concentric estimated the market area natural gas prices in eastern Pennsylvania and New Jersey that may have otherwise occurred during the winter of 2013/2014, *i.e.*, November 2013 through March 2014. We focused our analysis on this region since it is the area that will be directly served by PennEast, and thus, natural gas prices in this region will be most directly affected by the addition of such incremental pipeline capacity.[17]

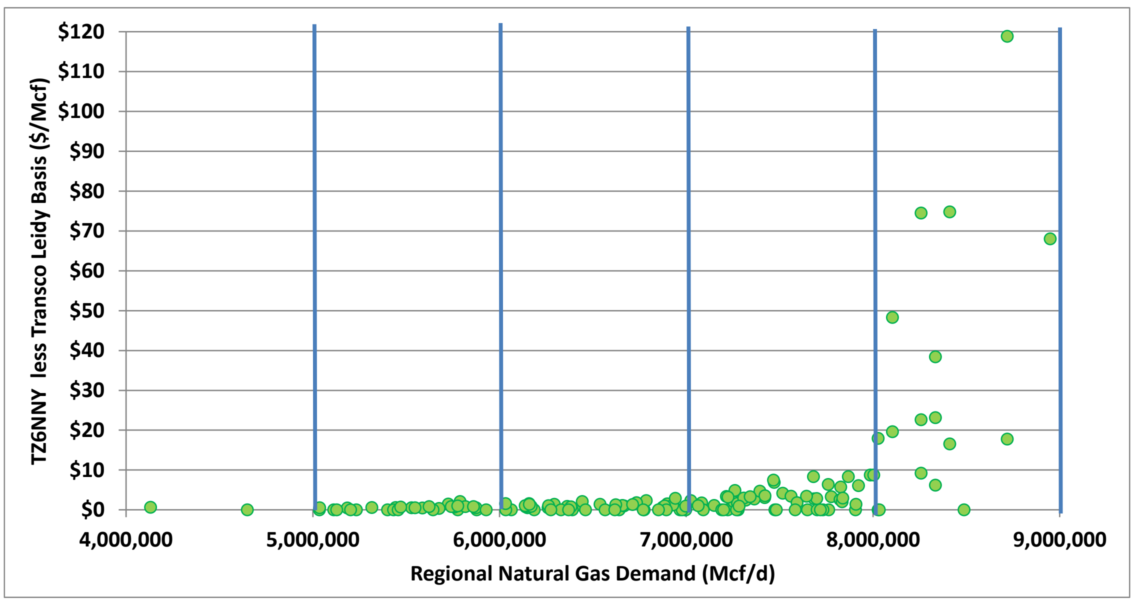
Concentric based the analysis on the winter of 2013/2014 because it is the most recent winter season for which pricing and market information is available. While recognizing that certain periods during the winter of 2013/2014 experienced very high natural gas prices, we believe that using the most recent timeframe for which data is available most accurately reflects the current market dynamics and provides a reasonable estimate of potential savings that could be achieved in similar circumstances. For example, the pipeline infrastructure in the eastern Pennsylvania and New Jersey region that is currently operational is similar to the pipeline infrastructure that was operational for the winter of 2013/2014, and that is much less the case for periods prior to the winter of 2013/2014. In particular, there was substantial new pipeline infrastructure that came online just before the winter of 2013/2014 that served the eastern Pennsylvania and New Jersey

[17] Concentric recognizes that the availability of additional pipeline capacity in eastern Pennsylvania and New Jersey could not only reduce natural gas prices within this particular region, but, assuming there were no constraints during some or all of the year, also reduce natural gas prices in adjacent regions (*e.g.*, New York City) by increasing availability of natural gas in these adjacent markets as well. These lower natural gas prices could also reduce energy prices in the electric markets in adjacent areas. However, for purposes of this analysis, the estimated savings associated with 1 Bcf/d of incremental pipeline capacity was focused solely on eastern Pennsylvania and New Jersey.

region (*e.g.*, Spectra 's New Jersey-New York Expansion project; Transco's Northeast Supply Link) that was not online in earlier periods.[18]

To estimate the natural gas price reductions that would have otherwise occurred with additional pipeline capacity, Concentric evaluated the basis differentials between Transco Leidy and TZ6NNY that occurred during the winter of 2013/2014 relative to the amount of natural gas demand experienced in eastern Pennsylvania and New Jersey each day. Figure 11 illustrates the relationship between demand and basis differentials for the region. The published daily Transco Leidy index prices were used as a proxy for the production area price of natural gas to be received by PennEast, as this pricing point is reflective of natural gas receipts into Transco in eastern Pennsylvania from the Marcellus supply region. The published daily TZ6NNY index prices were used as a proxy for the prices of natural gas delivered by PennEast into the eastern Pennsylvania and New Jersey markets. The TZ6NNY index prices reflect the price of natural gas deliveries off of Transco for the region south and west of New York City, including eastern Pennsylvania and New Jersey.

Figure 11:
Scatterplot of Winter 2013/2014 Natural Gas Demand and Basis Differentials



As expected, the daily basis differentials are high when demand is high, and basis differentials are lower when demand is low, reflecting the supply/demand balance in the market. The relationship between the daily basis differentials and natural gas demand for the region was utilized to develop

18 Spectra's New Jersey-New York project, which provided an additional 800 MMcf/ of pipeline capacity into service effective November 1, 2013, is an extension of the Algonquin Gas Transmission and Texas Eastern Transmission pipeline systems, allowing gas supplies off of both of those systems, including from the Marcellus, to serve northern New Jersey and the greater New York City metropolitan area. Transco's Northeast Supply Direct project, which went into service in stages in August and November 2013, provided an additional 250 MMcf/d of pipeline capacity directly to customers in Pennsylvania, New Jersey and New York.

revised basis differentials that were assumed would have otherwise occurred had an additional 1 Bcf/d of pipeline capacity been serving the region. The analysis assumed that the basis differentials on each day would have been reduced by a specific percentage had additional pipeline capacity been available. The assumed percentage reductions were established by calculating the average basis differential for all of the days in which the demand on those days was within a particular 1 Bcf increment ("tranche"), and then comparing the average basis differential from one tranche to the next tranche when demand was lower by 1 Bcf, or stated differently, pipeline supplies and capacity available to market participants was 1 Bcf higher.

For example, when demand in the winter of 2013/2014 in eastern Pennsylvania and New Jersey was the highest – between 8.0 Bcf and 9.0 Bcf ("Tranche 1") – basis differentials were also relatively high, ranging from approximately $6.00/Mcf to $119/Mcf. However, when demand was 1 Bcf lower – between 7.0 Bcf and 8.0 Bcf ("Tranche 2") – the basis differentials were much lower on average, and on many days under $5.00/Mcf. In fact, as shown in Table 4, the average basis differential associated with demand levels in Tranche 2 was 90% lower than the average basis differential associated with demand levels in Tranche 1 (*i.e.*, the percentage difference between $37.62/Mcf and $3.69/Mcf). Thus, it was assumed that if an additional 1 Bcf/d of pipeline capacity had been available in the winter of 2013/2014, the basis differentials experienced on the days in which demand was highest, *i.e.*, between 8.0 and 9.0 Bcf/d, would have been 90% lower than they otherwise were. In other words, the analysis assumed that the basis differentials at those demand levels would have been more reflective of the basis differentials that were actually experienced when demand for pipeline capacity was approximately 1 Bcf/d lower, and thus a greater potential for parties to access natural gas supplies.

Table 4:
Assumed Basis Differential Reductions Based on Demand

		Avg. Basis Differential Winter 2013/14	% Change in Avg. Basis Relative to Next Tranche
Tranche 1:	8.0 Bcf/d to 9.0 Bcf/d	$ 37.62	90%
Tranche 2:	7.0 Bcf/d to 7.9 Bcf/d	$ 3.69	68%
Tranche 3:	6.0 Bcf/d to 6.9 Bcf/d	$ 1.18	36%
Tranche 4:	5.0 Bcf/d to 5.9 Bcf/d	$ 0.75	19%
Tranche 5:	4.0 Bcf/d to 4.9 Bcf/d	$ 0.61	n/a

This process for determining the percentage reduction in the basis differentials was also used for the days that experienced lower demand (*i.e.*, demand in Tranches 2, 3 and 4), although as shown in Table 4, the assumed percentage reductions in the basis differentials were much lower at the lower demand levels. Also, as shown in Table 4, the analysis assumed that if gas demand on a day was lower than 5.0 Bcf, then then there would have been no change in the actual basis differential.

The revised market area price was determined by adding the revised basis differential to the actual production area price (*i.e.*, Transco Leidy) on each day. Thus, while the revised basis differentials were assumed to be reduced by the percentages noted in Table 4, the assumed reductions in the market area (*i.e.*, TZ6NNY) prices represented a lower percentage.[19] Also, if the revised basis differential was unchanged relative to the actual basis differential, the revised TZ6NNY price was assumed to be the same as the actual TZ6NNY price.

[19] For example, if the actual TZ6NYY price on particular day was $6.00/Mcf and the Transco Leidy price was $2.00/Mcf, the basis differential would have been $4.00/Mcf. Assuming the demand on that day was between 7.0 and 8.0 Bcf, then the assumed reduction in the basis differential on that particular day due to the addition of an additional 1 Bcf/d of capacity would have been 68%. Thus, the revised basis differential would have been $1.38/Mcf (*i.e.*, a 68% reduction from $4.00/Mcf), and the revised TZ6NNY price was assumed to be $3.38/Mcf (*i.e.*, the Transco Leidy price of $2.00/Mcf plus the revised basis differential of $1.38/Mcf). Therefore, this means that the percentage reduction in the actual TZ6NNY price relative to the revised TZ6NNY price on that particular day was assumed to be 44% (*i.e.*, the percentage reduction from $6.00/Mcf to $3.38/Mcf).

SECTION 4:
AREAS OF POTENTIAL ENERGY COST SAVINGS

Lower natural gas prices can provide benefits to energy consumers in a number of different respects. For purposes of Concentric's analysis, we evaluated four primary areas in which energy cost savings could have been achieved by consumers from lower natural gas prices due to the availability of an additional 1 Bcf/d of pipeline capacity. Two of these areas relate to the electric market, and two of those areas relate to the natural gas market:

- Savings that could be achieved by electric consumers when natural gas-fired generation resources set the electric energy price based on lower market area natural gas prices ("Gas-Fired Generation Savings")
- Savings that could be achieved by electric consumers when natural gas-fired generation resources could displace less efficient and more costly oil-fired generating resources, and set the electric energy price based on lower market area natural gas prices ("Oil-Fired Generation Displacement Savings")
- Savings that could be achieved by industrial natural gas consumers that are purchasing natural gas supplies at lower market area natural gas prices ("Industrial Transport Customer Savings")
- Savings that could be achieved by LDC customers when LDCs have the opportunity to purchase more natural gas supplies from lower-cost, local Marcellus Shale production as opposed to often higher-cost Gulf Coast production ("LDC Gas Supply Savings")

The basis for savings in each of these areas and the approach utilized by Concentric to estimate savings for each area are described in more detail below. As described, we estimate that had an additional 1 Bcf/d of pipeline capacity been available in the winter of 2013/2014, natural gas prices in eastern Pennsylvania and New Jersey would have otherwise been tempered and not reached the levels that they in fact did, and consumers in the region could have potentially saved, on a combined basis, over $890 million in reduced natural gas and electric power costs.

A. GAS-FIRED GENERATION SAVINGS

As previously noted, the wholesale generating resources in eastern Pennsylvania and New Jersey are a part of PJM, and natural gas-fired generation plays a critical role in PJM, with the costs of such generating resources often setting the price of power that consumers pay. Natural gas-fired generators operating in the competitive electric markets in these regions typically purchase gas at local spot market prices, meaning that they make daily purchases of natural gas when their facilities are called upon by PJM to operate. As a result, the availability of additional natural gas in eastern Pennsylvania and New Jersey during the winter of 2013/2014 could have lowered natural gas prices in this region and correspondingly reduced wholesale electric energy prices. In other words, if an additional 1 Bcf/d of capacity had been available to market participants in the winter of 2013/2014, thus dampening market area natural gas prices, that would in turn have translated into lower electric energy prices in those hours when electric prices were largely set by gas-fired generation.

Accordingly, for purposes of the analysis, Concentric utilized its estimate of lower natural gas prices to estimate the savings that could have been achieved in the electric market during hours in which natural gas-fired generation largely set the energy price in eastern Pennsylvania and New Jersey. To quantify the potential benefits to electricity customers, we utilized the following information and assumptions pertaining to the winter of 2013/2014:

- Hourly electric energy prices reported by PJM for the day ahead energy market for the PJM zones in eastern Pennsylvania and New Jersey;[20]
- Hourly electric demand (*i.e.*, load) for the PJM zones in eastern Pennsylvania and New Jersey;
- Data provided by the PJM market monitor regarding the fuel type of the generating units setting the electric energy prices in each hour.

The data provided by the PJM market monitor reflect the percentage of five-minute increments in each hour in which a specific fuel type set the energy price. Concentric assumed that the fuel type in each hour that set the price for the largest percentage of the five-minute increments established the price overall in that hour. To the extent that two or more fuel types set the energy price for an equivalent percentage of the five-minute increments in a particular hour, it was assumed that, if natural gas was one of those fuel types, natural gas-fired generation set the price in that hour. Alternatively, it was assumed that if an oil or oil-based fuel type was one of the fuel types that equally set the energy price in a particular hour (but natural gas was not), it was assumed that an oil-fired generating unit set the price in that hour. Table 5 provides a summary of the number of the hours in the winter of 2013/2014 in which it was assumed that natural gas-fired generation or oil-fired generation set the electric energy price in eastern Pennsylvania and New Jersey.

Table 5:
Number of Hours Natural Gas or Oil-Fired Generation Assumed to Set the Wholesale Electric Energy Price in Eastern Pennsylvania and New Jersey

	Nat Gas	Oil
Nov-13	144	24
Dec-13	159	43
Jan-14	152	77
Feb-14	314	30
Mar-14	256	38
Total	**1025**	**212**

First, for each hour of the winter of 2013/2014, the actual electric energy cost based on the energy price and electric demand data reported by PJM was determined. Then, based on our analysis, if the

20 The PJM zones for which hourly price and load were obtained were: the New Jersey Hub, Metropolitan Edison Company, PECO and PPL.

estimated revised natural gas price applicable in any hour would have been lower had additional pipeline capacity otherwise been available, and natural gas was the marginal fuel setting the price of electric energy in that particular hour, a new electric energy price was calculated. Specifically, the new electric energy price was calculated by assuming that the percentage reduction in the natural gas price in any hour would translate into an equivalent percentage reduction in the electric energy price. For example, if the market area natural gas price (*i.e.*, the TZ6NNY price) was assumed to be reduced by 20% on a particular day due to the availability of additional pipeline capacity, then it was generally assumed that the electric energy prices in the hours of that day when the price was set by a natural gas-fired generating unit would have also been reduced by 20%. Therefore, for those hours during the winter of 2013/2014 in which natural gas was setting the electric energy price, a revised electric energy cost was calculated, which was then compared to the actual electric energy cost in that hour to determine the potential savings associated with providing additional pipeline capacity.

The exception is that Concentric conservatively assumed that there would be no such electric market savings on days when demand for pipeline capacity in eastern Pennsylvania and New Jersey was very high ("extreme peak days"). Currently, during the winter peak period, gas is primarily flowing from the Marcellus and Gulf Coast producing areas to markets in eastern Pennsylvania and New Jersey and the major pipelines serving the area are very highly utilized. PennEast would provide an additional 1 Bcf/d of capacity to the region generally and, as discussed, thus tend to reduce natural gas prices that would otherwise be experienced. However, during periods of extremely high demand when pipeline capacity in the region is highly constrained, the addition of such additional capacity may not result in lower market area prices in areas north (or downstream) of the terminus of PennEast without additional pipeline capacity on other pipelines (*e.g.*, Transco or TETCO) to allow additional gas to reach markets in northern New Jersey (see the map in Figure 7).

As a result, shippers (*e.g.*, LDCs) that directly connect to PennEast, or hold pipeline capacity to take gas from PennEast to points north of PennEast will still achieve benefits, even on extreme peak days; however, parties that have not contracted for pipeline capacity and are paying local market prices may not see a price benefit provided by the additional capacity of PennEast on extreme peak days when pipeline utilization is very high. In contrast, Concentric expects that parties south of the terminus of PennEast would be able to realize a benefit from lower gas prices resulting from the addition of PennEast capacity throughout the winter, including on extreme peak days, either through upstream capacity on other pipelines not being utilized because of parties using PennEast capacity, or through the ability to effectuate deliveries in those locations through displacement or backhauls.

While information is available regarding when gas-fired generating units set the electric energy price in PJM, information is not publicly available as to which gas-fired generating unit or the location of the unit setting the price. Based on the assumption that lower natural gas prices may not be realized at points north of PennEast during extreme peak days, and since it is not known whether the location of the generation unit setting the electric energy price was north or south of PennEast, it was conservatively assumed that no savings would be achieved by lower electric energy prices on extreme peak days.

Concentric defined an extreme peak day as any day when demand in eastern Pennsylvania and New Jersey was greater than 8 Bcf or the HDDs were greater than 46.[21] As previously discussed (see Table 4), it was estimated that for those high demand days, the basis differential between Transco Leidy and TZ6NNY would have otherwise been reduced by 90%, and thus the TZ6NNY price would have also been reduced, due to an incremental 1 Bcf/d of pipeline capacity into the region. However, since demand on those days was very high, and thus have been defined as extreme peak days, the natural gas price benefit in the market area on such days was conservatively assumed to not flow through to the electric market for purposes of estimating the savings herein.

Based on its analysis, Concentric estimated that electric consumers in eastern Pennsylvania and New Jersey could have saved approximately $226 million and $187 million, respectively, in the winter of 2013/2014 had an additional 1 Bcf/d of capacity been available to temper natural gas prices when gas-fired generators set the electric price. Concentric recognizes that the electric energy markets are very complex, reflecting the bidding behavior of numerous generating units based on their respective cost structures, market strategies and market conditions. As described, the analysis reflected herein makes the simplifying assumption that all else would have been equal in a circumstance in which natural gas prices were reduced. While this may not have in fact been the case, we believe it is a reasonable means of estimating the savings that could have been achieved in the wholesale electric market associated with gas-fired generation had additional pipeline capacity been available.

B. OIL-FIRED GENERATION DISPLACEMENT SAVINGS

Electric generation fueled by oil-based products (*e.g.*, light fuel oil, heavy fuel oil, kerosene) are generally more expensive than other forms of generation and thus are utilized to produce power only during periods of peak electric demand when less expensive generating resources are either already operating or otherwise unavailable. The availability of 1 Bcf/d of incremental pipeline capacity into eastern Pennsylvania and New Jersey in the winter of 2013/2014 would have created an opportunity for natural gas-fired generation that was unable to purchase natural gas, either due to constrained pipeline capacity or because gas prices were too high, to operate instead of oil-fired generation in those hours when oil-fired generation was called upon by PJM to operate. Effectively, the availability of additional natural gas could have created the opportunity for natural gas-fired generation to displace oil-fired generation, and thus potentially lower costs to electric consumers in the hours in which such displacement could have occurred. Additionally, over the longer-term, with increased access to natural gas supplies, lower cost natural gas-fired generating capacity could also be constructed to displace the more expensive oil-fired generating units, creating the further opportunity for future savings to electric consumers.

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21 Heating degree days ("HDDs") are defined as the magnitude of the difference that the actual temperature is less than 65 degree Fahrenheit. For example, if the average daily temperature on a particular day was 30 degrees Fahrenheit, then that day would be characterized as having 35 HDDs (*i.e.*, the difference between 65 and 30). Not surprisingly, since natural gas demand is largely a function of weather, when the HDDs on a particular day were greater than 46, the demand was also greater than 8 Bcf.

Accordingly, Concentric estimated the savings that may have been achievable in the electric market during hours in which oil-fired generation set the electric energy price in eastern Pennsylvania and New Jersey during the winter of 2013/2014. This analysis relied upon the same hourly pricing, load and marginal fuel data from PJM as just described in the Gas-Fired Generation Savings analysis. Furthermore, it was assumed that in those specific hours when oil-fired generation was setting the electric energy price, that price would have otherwise been no higher than the electric energy price in an hour during that same day when the electric energy price was set by a natural gas-fired generator. Thus, the estimated savings in those hours when oil-fired generation was setting the electric energy price were based on the difference between the actual electric energy price and the revised electric energy price estimated to have occurred if additional natural gas pipeline capacity and supply had been available, multiplied by the applicable load in that hour. Again, however, the exception is that Concentric's analysis also conservatively did not assume any savings associated with natural gas-fired generation displacing oil-fired generation during extreme peak days. This was done for the same reasons previously discussed regarding the Gas-Fired Generation Savings analysis.

With the opportunity for oil-fired generation to be displaced by lower cost natural gas-fired generation, it is estimated that electric consumers in eastern Pennsylvania and New Jersey could have saved approximately $70 million and $49 million, respectively, in the winter of 2013/2014 had an additional 1 Bcf/d of capacity been available to temper natural gas prices.

C. INDUSTRIAL TRANSPORTATION CUSTOMER SAVINGS

Unlike most residential and smaller commercial natural gas customers, many industrial customers, which can have very substantial daily natural gas requirements, procure their own natural gas supplies as opposed to having their LDC purchase such supplies on their behalf. Such industrial customers are referred to as "transportation" customers of the LDC since the LDC only has to transport through their distribution system, not purchase, the gas for these industrial customers.[22] Industrial transportation customers generally purchase their supplies from third-party marketers and these supplies are typically priced based on market area price indices (as opposed to production area price indices reflective of Marcellus or Gulf Coast prices).

To estimate the savings that industrial transportation customers in eastern Pennsylvania and New Jersey may have achieved in the winter of 2013/2014 due to additional pipeline capacity dampening market area natural gas prices, Concentric first determined the total natural gas demand for these customers. Table 6 illustrates the 2013 annual demand for the industrial transportation customers in the service territories of the LDCs in eastern Pennsylvania and New Jersey.[23]

22 Customers for which the LDC both purchases natural gas supply and pipeline transportation service, as well as distributes that gas to the customer, are known as "sales" customers.

23 The 2013 data was the most recently available information at the time this analysis was conducted.

Table 6:
2013 Annual Natural Gas Demand for the Industrial Transportation Customers in Eastern Pennsylvania and New Jersey

	Annual Demand (Mcf)	Assumed Daily Demand (Mcf/d)
Eastern Pennsylvania		
PECO Energy	27,022,708	74,035
Philadelphia Gas Works	7,454,323	20,423
UGI Penn Natural Gas	19,576,624	53,635
UGI Utilities	31,175,995	85,414
Subtotal	**85,229,650**	**233,506**
New Jersey		
New Jersey Natural Gas	2,753,001	7,542
Elizabethtown Gas	11,468,722	31,421
Public Service Electric & Gas	28,671,461	78,552
South Jersey Gas	13,684,531	37,492
Subtotal	**56,577,715**	**155,007**

While natural gas usage patterns vary by customer based on their specific circumstances, industrial customers' demand as a whole is generally much less weather-sensitive than it is for residential and commercial natural gas customers. Therefore, it was assumed that these industrial customers have consistent demand throughout the year.

Next, to estimate the potential savings that these customers could have achieved, Concentric assumed that all of the industrial transportation customers in eastern Pennsylvania and New Jersey purchase their natural gas supplies at market-area prices, and thus would have benefitted from additional pipeline capacity lowering the market area spot natural gas prices last winter. Thus, the estimated savings for the industrial transportation customers were calculated by multiplying the daily demand for these customers by the difference between the actual market area price (again, the TZ6NYY price) and the revised market area price discussed previously. Again, the exception was that no savings were assumed to be achievable by industrial transportation customers in northern New Jersey on extreme peak days. As described previously, the analysis conservatively assumed that market area prices north of PennEast would not be reduced as a result of additional capacity on extreme peak days, and thus industrial transportation customers located north of

PennEast in northern New Jersey that were purchasing natural gas supplies at market area prices would not have achieved the benefit of a natural gas price reduction on extreme peak days.[24]

Based on the analysis, it is estimated that industrial transportation consumers in eastern Pennsylvania and New Jersey could have saved approximately $182 million and $73 million, respectively, in the winter of 2013/2014 had an additional 1 Bcf/d of capacity been available and otherwise dampened market area natural gas prices.

D. LDC GAS SUPPLY SAVINGS

Most LDCs do not purchase a significant amount of natural gas to serve their sales customers at market area prices, but rather purchase supplies directly in producing areas and transport the gas over long-haul pipelines to their distribution systems. Thus, most LDC customers are largely insulated from market area price spikes, such as occurred in the winter of 2013/2014 in the U.S. Northeast. LDCs in the Northeast have traditionally relied upon gas supply purchased in the Gulf Coast, transporting that gas via long-haul pipelines to their service territories. However, with the advent of significant natural gas supply development in the Marcellus and Utica shale basins located close to the Northeast markets, many LDCs have diversified a portion of their gas supply portfolios to access natural gas from the Marcellus and Utica basins. The continued prolific development of natural gas supplies from these shale basins has caused an abundance of supply in the region, and thus prices in these producing regions have consistently traded below the prices for natural gas produced along the Gulf Coast. Figure 12 illustrates the differences in natural gas prices in the Marcellus versus the Gulf Coast during the winter of 2013/2014.

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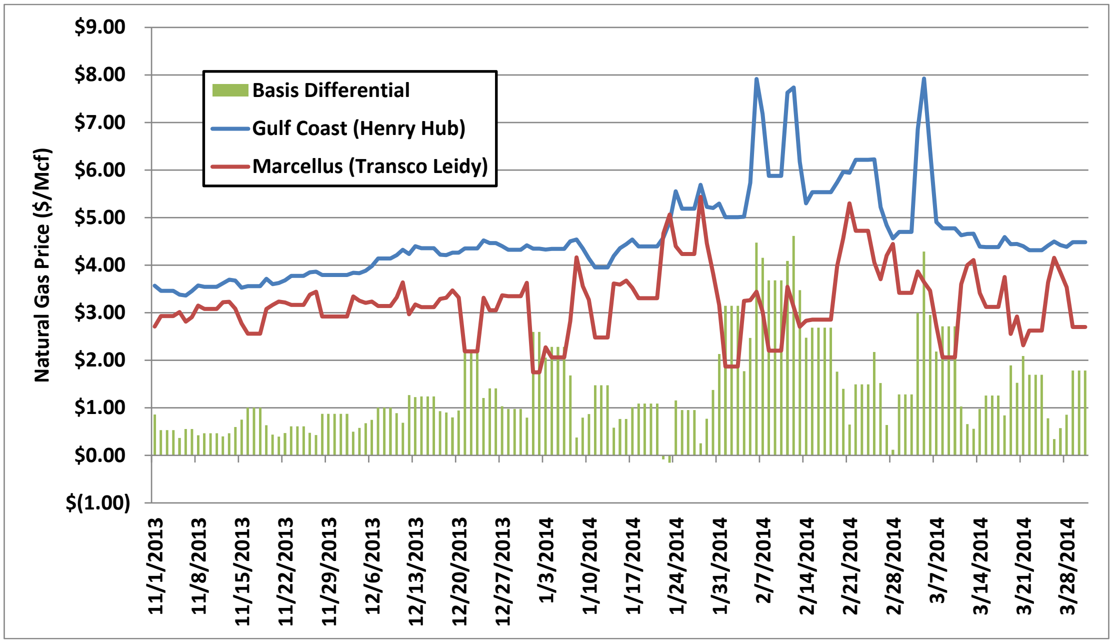
[24] Concentric assumed that the demand associated with the industrial transportation customers of PSEG and Elizabethtown were representative of the industrial transportation customer demand in northern New Jersey that may not otherwise benefit on an extreme peak day from a natural gas price reduction associated with incremental pipeline capacity. The entire service territory of these two LDCs is not located in northern New Jersey. In addition, a portion of NJNG's service territory is also located in northern New Jersey. However, for purposes of the analysis, Concentric believes that using the demand of the industrial transportation customers of PSEG and Elizabethtown as representative of such demand in northern New Jersey is reasonable.

Figure 12:
Natural Gas Price Differences between the Marcellus and Gulf Coast Producing Areas



The basis differential between natural gas prices in the Marcellus and along the Gulf Coast, creates an opportunity for LDCs to attain savings by switching the location of their purchases from the Gulf Coast to the Marcellus. Concentric has not evaluated whether or to what extent LDCs in eastern Pennsylvania and New Jersey have shifted their natural gas purchases, or whether they intend to do so in the future. Rather, for purposes of the analysis, Concentric has assumed that half of the 1 Bcf/d of capacity of PennEast could have been utilized to purchase Marcellus supplies rather than Gulf Coast supplies. Additionally, Concentric assumed that pipeline transportation costs, including the cost required for pipeline fuel, are equivalent from the Gulf Coast versus the Marcellus, and that LDCs would have been able to realize the full pricing differential between the Gulf Coast and Marcellus prices last winter.

Accordingly, it is estimated that LDCs in eastern Pennsylvania and New Jersey could have saved approximately $106 million in total in the winter of 2013/2014 had PennEast been available and provided an opportunity for greater reliance on relatively cheaper Marcellus production. Allocating the total savings to eastern Pennsylvania and New Jersey based on each region’s respective gas sales volumes for 2013 would result in an estimated savings of $36 and $70 million, respectively.

SECTION 5:
ANALYSIS RESULTS

Table 7 summarizes the estimated savings for each of the four categories that Concentric evaluated, with the savings presented separately for eastern Pennsylvania and New Jersey.

Table 7:
Estimated Energy Savings if an Additional 1 Bcf/d of Pipeline Capacity Had Been Available for the Winter of 2013/2014

(All figures in $Millions)

	Eastern Pennsylvania	New Jersey	Total
Electric Market Savings			
Gas-Fired Generation	$ 225.8	$ 186.7	$ 412.5
Oil-Fired Generation Displacement	$ 70.2	$ 48.9	$ 119.1
Subtotal	$ 296.1	$ 235.5	$ 531.6
Gas Market Savings			
LDC Gas Supply Procurement	$ 36.4	$ 69.8	$ 106.2
Industrial Transportation Customer	$ 182.5	$ 73.1	$ 255.6
Subtotal	$ 218.9	$ 142.9	$ 361.8
Total Estimated Savings:	**$ 515.0**	**$ 378.4**	**$ 893.4**

As reflected in Table 7, it is estimated that natural gas and electric customers in eastern Pennsylvania and New Jersey could have saved approximately $893 million during the winter of 2013/2014 had an additional 1 Bcf/d of incremental natural gas pipeline capacity been available, with approximately 60% of those savings benefiting electric consumers and 40% benefiting natural gas consumers.

It is important for policy makers and other stakeholders to understand that while the potential savings estimated herein are quite large, in periods of elevated demand when market area natural gas prices can increase significantly, the opportunity for achieving consumer savings from lowering natural gas prices through additional pipeline capacity can be substantial. As discussed, the analysis herein has excluded potential savings in the electric market and for industrial transportation customers in northern New Jersey on extreme peak days, which are the days when natural gas demand and market area gas prices were highest, and in fact, higher than ever before experienced. Therefore, to the extent that additional infrastructure such as PennEast could have also had the effect of reducing market area natural gas prices on those extreme peak days, there is the potential that significant savings in addition to the savings reflected in Table 7 could have been achieved.

Concentric Energy Advisors