PennEast PIPELINE







ECONOMIC IMPACT

Report and Analysis

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PENNEAST PIPELINE PROJECT ECONOMIC IMPACT ANALYSIS



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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.

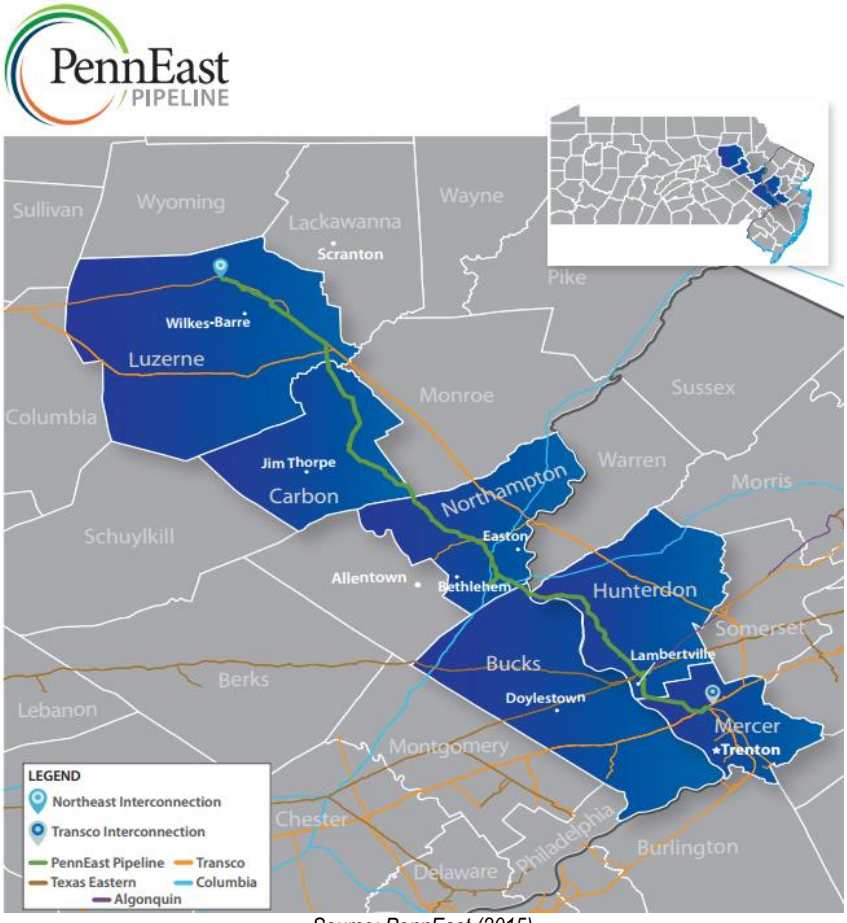
3.0 CAPITAL INFRASTRUCTURE ECONOMIC IMPACTS

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.

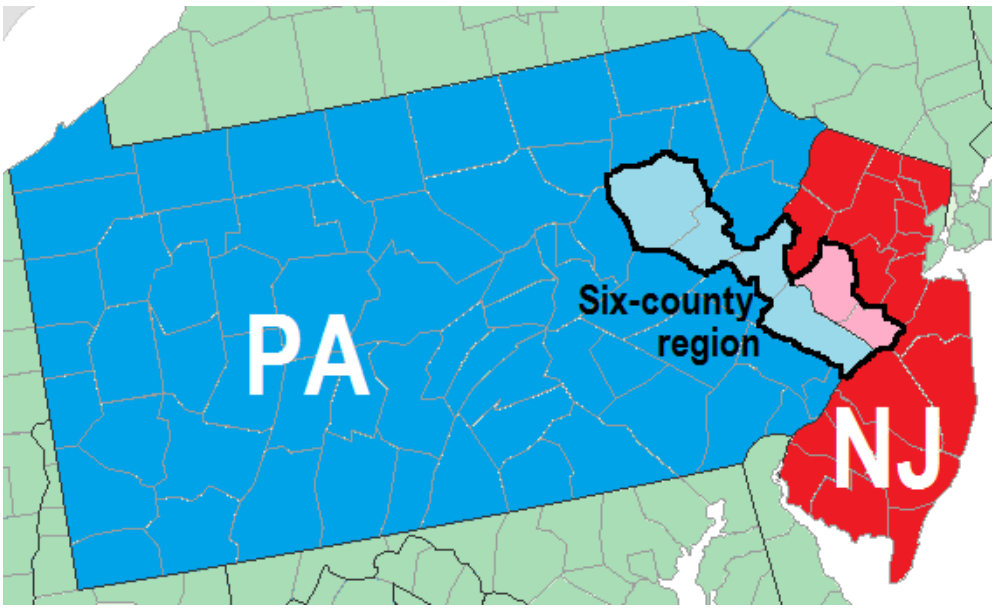
3.2 ECONOMIC IMPACT MODELING

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.

[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.

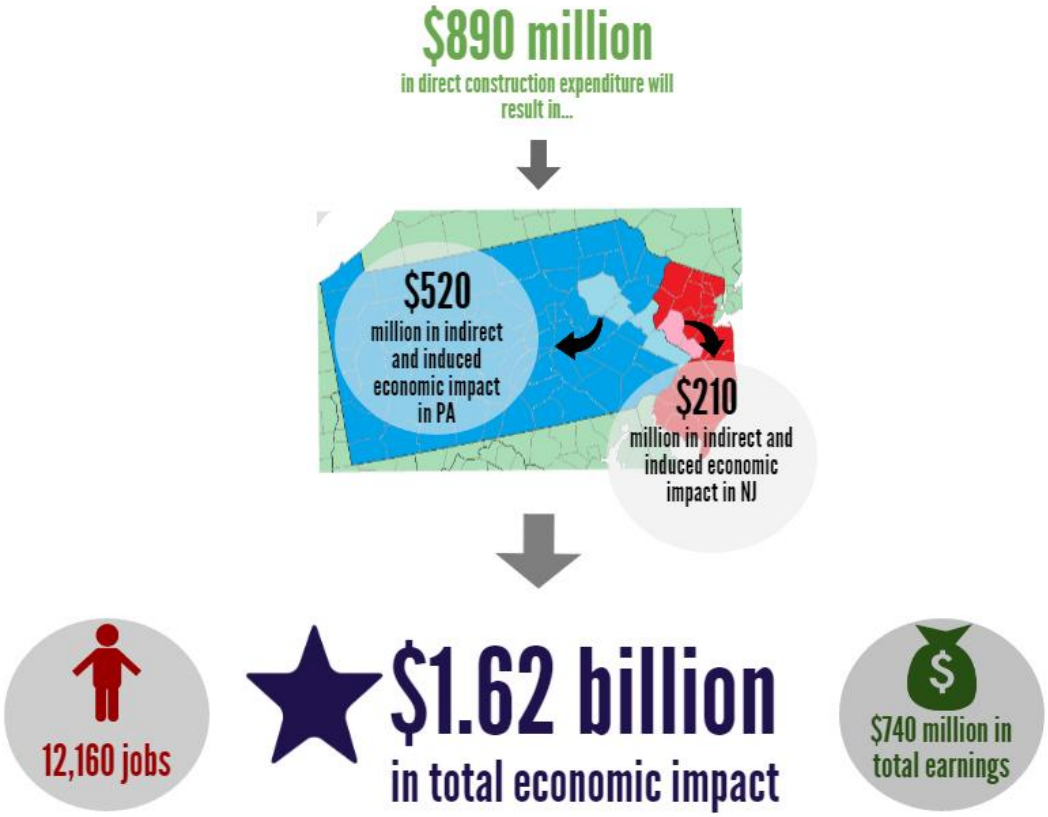
In Pennsylvania and New Jersey combined, the Project is estimated to generate an approximate $1.62 billion in total economic impact over the design and construction period, supporting 12,160 jobs with $740 million in wages (see Table 3.2 and Figure 3.3). The Project is estimated to generate approximately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

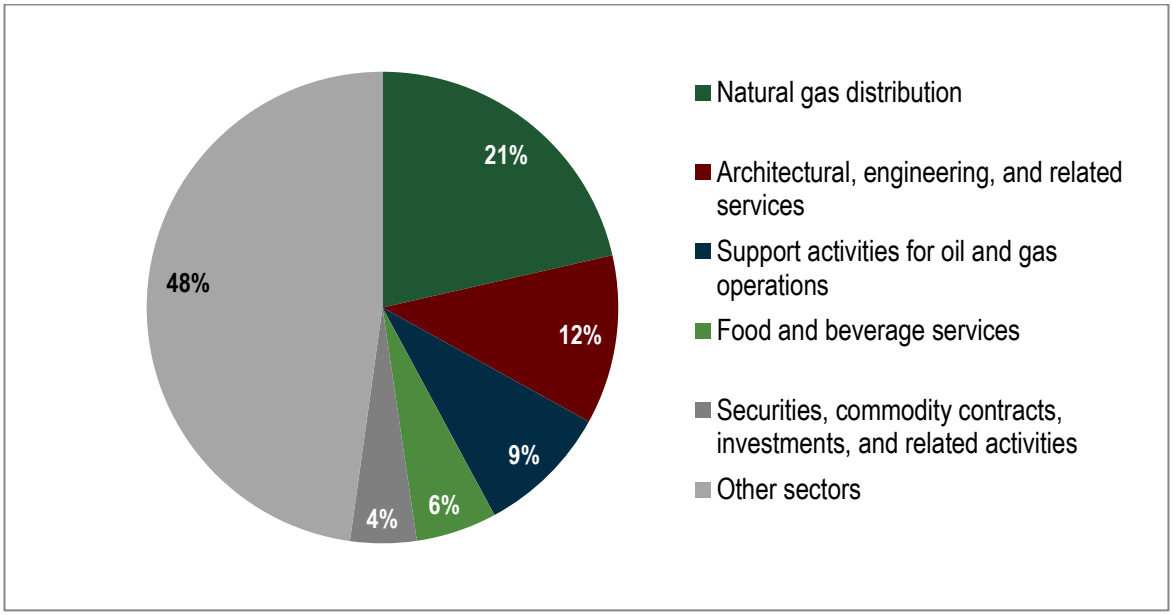
Jurisdiction	Income Taxes
Pennsylvania	$154,000
New Jersey	$25,000

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)

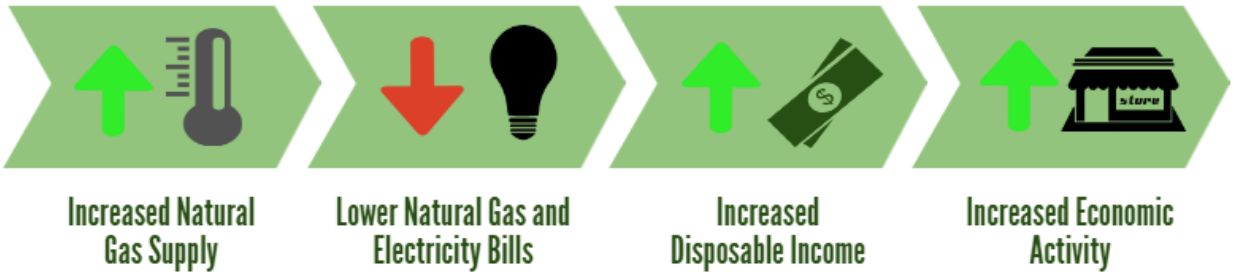
[14] The tax estimates were calculated using each state's published personal income tax collection effective rates, which are currently 2.043% and 3.185% in Pennsylvania and New Jersey, respectively.

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*.

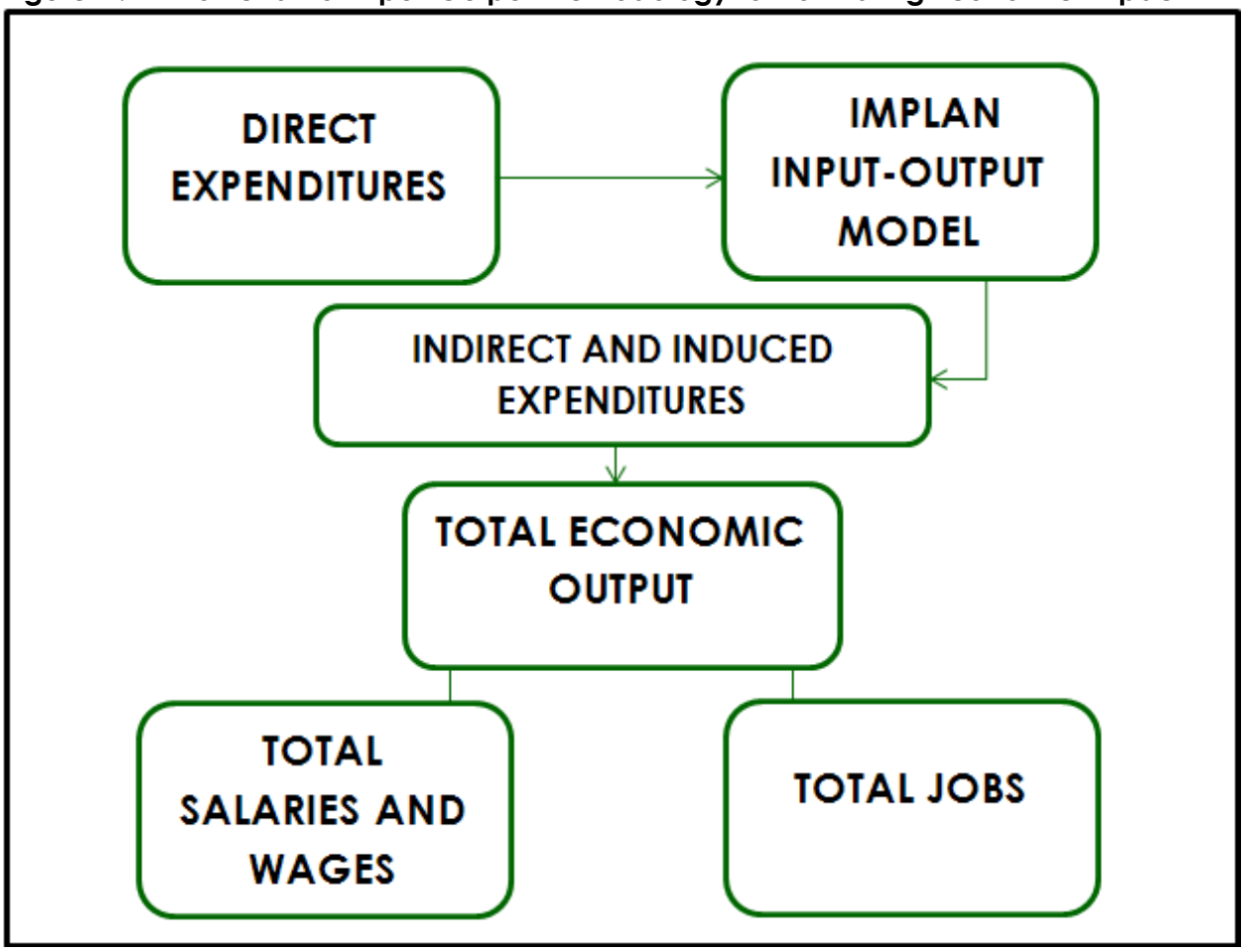
However, the economic impact on the region does not stop with that initial direct expenditure. Regional suppliers to that industry have also been called upon to increase their production to meet the needs of the industry to produce the $1 million in goods sold. Further, suppliers of these same suppliers 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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