OHIO STATE UNIVERSITY EXTENSION

Economic Impact Analysis of the Spectra Energy NEXUS Pipeline Project

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THE OHIO STATE UNIVERSITY
COLLEGE OF FOOD, AGRICULTURAL, AND ENVIRONMENTAL SCIENCES

Ohio State University Extension
Community Development
25 Agricultural Administration Building
2120 Fyffe Road, Columbus, OH 43210

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Project Team

Nancy Bowen is an Associate Professor & OSU Extension Field Specialist, Community Economics.

David Civittolo is an Associate Professor & OSU Extension Field Specialist, Community Economics.

Gregory Davis is an Professor & Assistant Director, Community Development.

Chris Penrose is an Associate Professor & OSU Extension Educator, Agriculture & Natural Resources.

Eric Romich is an Assistant Professor & OSU Extension Field Specialist, Energy Development.

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Acknowledgements

This economic impact analysis was conducted by a team of Ohio State University faculty from the Department of Extension in the College of Food Agricultural and Environmental Sciences. Spectra Energy helped fund the cost of data, software, and modeling necessary to carry out the project; the primary objective of which was to better understand the economic impact of the NEXUS gas transmission project in eleven Ohio counties.

The project team approaches each research opportunity with the desire to identify and fill critical knowledge gaps through applied research that will ultimately enhance educational programs to strengthen lives and communities. The project was approached from a neutral or non-biased position to ensure evidence-based findings were generated in accordance with common input/output methodologies.

Executive Summary

Spectra Energy Corp (Spectra Energy) is a pipeline and midstream company focused on gathering and processing, transmission and storage, and distribution of natural gas, as well as crude oil transportation and storage. Spectra is proposing to construct an interstate pipeline in Ohio and Michigan of approximately 243 miles in length and at a cost of $2.3 billion. Named the NEXUS project, its pre-construction activities have already begun. Construction activities would begin in 2017 and operations would commence in 2018. This report focuses on the economic impact of the NEXUS project from pre-construction through the first year of operation (2015-2018) and includes a discussion of social and environmental impacts.

The portion of pipeline in Ohio spans just over 200 miles across eleven counties. According to Spectra data, investment in the Ohio portion of the project is estimated at 83% of the total project, or $1.9 billion.

The estimated economic impact of the NEXUS project has been broken out into two phases: construction and operations. To construct a pipeline in Ohio of this magnitude, Spectra has estimated that 1,680 construction workers will be required at an estimated cost of $683 million in payroll. To operate the pipeline in Ohio, Spectra has estimated that 28 workers will be required with an estimated annual payroll of $2.3 million. This direct initial change in both construction and operations is estimated to result in the impacts described in this report (see summary Table 1).

Table 1 summarizes the total regional estimated direct[1], indirect[2] and induced[3] impacts of pipeline construction, compressor (CS) and metering (MS) station construction, and pipeline operations as a result of this direct project investment of $1.9 billion. Table 2 summarizes total estimated impacts by county.

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[1] **Direct Impact:** The initial changes that are a result of the activity or policy that takes place only in the industry immediately affected.
[2] **Indirect Impact:** The impact of local industries buying goods and services from other local industries (inter-industry transactions).
[3] **Induced Impact:** The effects of changes in household income. The response by an economy to an initial change (direct effect) that occurs through re-spending of income received.

Table 1. Summary of Estimated Economic Impacts of the NEXUS Pipeline Project

Activity	Jobs	Labor Income (Millions)	Value Added (Millions)
Pipeline Construction (one-time)	3,925	$374.4	$450.5
CS and MS Construction (one-time)	865	$78.2	$88.8
Pipeline Operations (annual)	44	$2.7	$3.7
Total	**4,834**	**$455.3**	**$543.0**

*Table summarizes the estimated total direct, indirect and induced economic impacts (2015-2018)

Table 2. Summary of Estimated Economic Impacts (Construction and Operations) by County

Location	Jobs	Labor Income (Millions)	Value Added (Millions)
Columbiana	684	$62.6	$72.8
Erie	570	$54.4	$65.5
Fulton	324	$30.9	$37.2
Lorain	408	$38.9	$46.8
Lucas	395	$36.3	$42.3
Medina	674	$62.6	$74.3
Sandusky	618	$59.0	$70.9
Stark	401	$38.2	$46.0
Summit	300	$28.6	$34.4
Wayne	120	$11.4	$13.8
Wood	340	$32.4	$39.0
Total	**4,834**	**$455.3**	**$543.0**

*Table summarizes the estimated total direct, indirect and induced economic impacts (2015-2018)

Below is a narrative summary of the total direct, indirect and induced economic impacts of jobs, labor income and value added, in addition to estimated tax revenue contributions for the NEXUS project in an eleven-county region of Ohio.

- One-time pipeline construction impact in the eleven county region, including pre-construction during 2015-2017, is estimated to have an impact of **3,925 jobs, $450.5 million** in value added, and **$374.4 million** in labor income during the construction phase of the project.
- The construction of compressor and metering stations in three counties (Columbiana, Lucas and Medina) during 2017 is estimated to have a one-time cumulative impact of **865 jobs, $88.8 million** in value added, and **$78.2 million** in labor income.
- It is estimated that pipeline operations will support a total of **44 jobs** (28 direct, 5 indirect, and 11 induced)**,** generate **$2.7 million** in associated labor income, and result in **$3.1 million** of additional economic activity annually as a result of ongoing operations beginning in 2018 going forward.

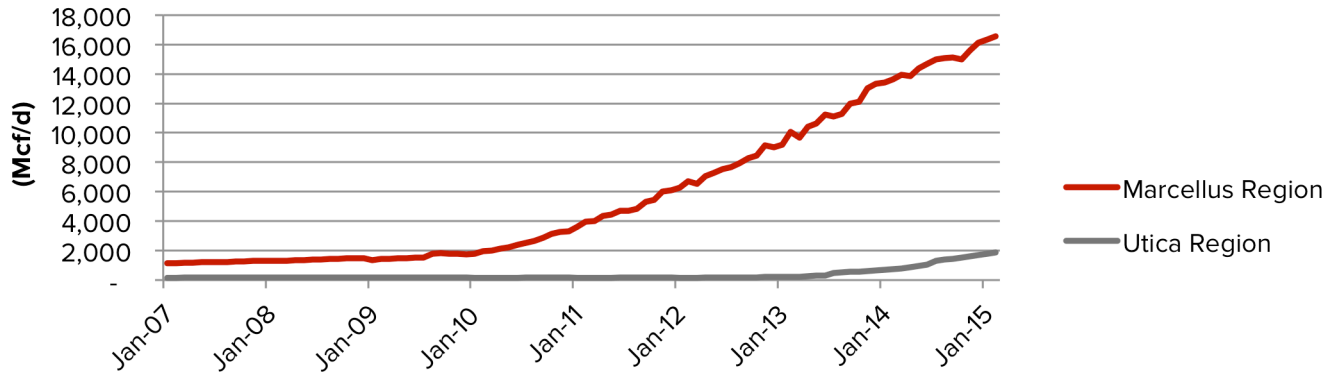
Background

The production and distribution of natural gas is critical to the United States, as it represents more than 27% of the nation's total primary energy consumption. In 2013, the total U.S. natural gas gross withdrawals reached a new high at 82 billion cubic feet per day (Bcf/d), with shale gas wells becoming the largest source of total natural gas production (USDOE/EIA, 2014). To help meet market demand, over 299,000 miles of onshore natural gas transmission pipelines and over 182,000 miles of hazardous liquid pipelines move these energy products throughout the U.S. every day (U.S. Department of Transportation, 2012). Each day, close to 70 million customers in the United States depend upon this national distribution network to deliver natural gas to their home or place of business (USDOE/EIA, 2008).

As illustrated in Figure 1, the combined total natural gas production in the Utica and Marcellus shale regions has increased by more than 1295% from 1,298 million cubic feet per day (Mcf/d) in January of 2007 to more than 18,200 Mcf/d in January of 2015. The recent increase in production has made the Marcellus region the largest natural gas producing region in the nation. Driven by growth in shale energy production from the Marcellus and Utica shale, new investment in midstream development projects including pipelines, midstream processing and fractionation plants in Ohio exceed $7 billion (JobsOhio, 2014). As an energy infrastructure company, Spectra Energy is engaged in the development of infrastructure to serve the needs and opportunities associated with shale gas plays – including the major shale gas projects covering the Utica Shale and Marcellus Shale plays.

Spectra Energy's proposed NEXUS project involves a $2.3 billion interstate pipeline covering approximately 243 miles in Ohio and Michigan. Its construction will provide the transmission capacity to deliver up to 1.5 billion cubic feet per day (Bcf/d) of shale gas resources generated in Eastern Ohio to U.S. Midwest markets including Ohio, Michigan, Chicago and Ontario, Canada. The pipeline will serve local distribution companies, power generators and industrial users in these markets.

Figure 1: Total Natural Gas Production



Source: USDOE/EIA, 2015, *Drilling Productivity Report*

Regional Characteristics

Current project data provided by Spectra indicates over 200 miles of pipeline will be installed in Ohio from Columbiana County to Fulton County. The eleven-county area (Table 3) in question is comprised of small, medium, and large cities, villages and unincorporated townships.

Table 3: 11 County Characteristics

County	Population	Labor Force	Per Capita Personal income	Unemployment Rate
Columbiana	36,760	16,214	$33,699	8.1
Stark	375,432	187,194	$39.046	7.5
Summit	541,824	280,327	$44,024	7.2
Wayne	115,071	57,481	$33,952	6.3
Medina	174,914	95,141	$44,547	6.5
Lorain	302,827	155,408	$38,738	8.1
Erie	76,048	40,709	$42,097	7.5
Sandusky	60,098	32,184	$35,952	7.3
Wood	129,264	67,009	$38,936	7.2
Lucas	436,393	209,668	$38,604	8.5
Fulton	42,488	21,993	$37,597	8.2
Total	**2,291,119**	**1,163,328**		**Ohio 7.4**

Source: StatsAmerica http://www.statsamerica.org, 2013

Within the eleven counties, the affected population as of 2013 is 2,291,119. According to the IMPLAN regional profile, the land area of this eleven-county region is 5,019 square miles. Roughly 1.16 million individuals comprise the labor force in the eleven-county area with a per capita personal income that ranged from the lowest in Columbiana County at $33,699 to the highest per capita income of $44,547 in Medina County. With the infusion of a higher average wage (approximately $275 per day, or about $71,500 annually) as a result of the pipeline construction project, overall wage rates will be positively impacted.

For the year 2013, the unemployment rate in the State of Ohio was 7.4% (Bureau of Labor Statistics). Six of the counties (Columbiana, Stark, Lorain, Erie, Lucas, and Fulton) had a higher annual unemployment rate than the State of Ohio while five counties (Summit, Wayne, Medina, Sandusky, and Wood) had a lower annual unemployment rate (Ohio Labor Market Information).

Methodology

This study attempts to estimate economic impact using IMPLAN (IMpact analysis for PLANning) data and software, developed by the Minnesota IMPLAN Group, Inc. The IMPLAN database contains county, state, zip code, and federal economic statistics by region. IMPLAN can be used to estimate the effect of a given change or event (e.g. NEXUS project) on a regional or local economy (e.g. 11-county project region).

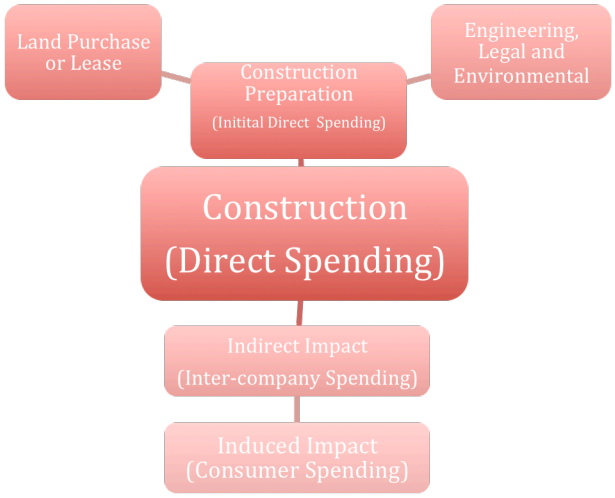
Using IMPLAN, we can estimate the extent to which construction and operation of the NEXUS Project in Ohio contributes to other employment, income and value added. The IMPLAN modeling provides estimates three types of effects, direct, indirect and induced using 2013 IMPLAN data (the most recent available).

IMPLAN uses Multiplier Models built on Social Accounting Matrices (SAM) that capture dollar amounts of all business transactions in a regional economy (such as revenues and unemployment benefits). The multipliers measure impact based on industry inputs and based on the region's unique structure and trade situation. The analysis is based on the premise that sectors are linked; a change in one sector will create change in others. It is a tool that analyzes the impacts of economic changes, and requires at least one change factor (e.g. employment change, labor income change, or investment change) to generate resulting estimates.

Figure 2 is an illustration of the methodology used to model the pipeline construction in IMPLAN. Inputs include direct spending for

construction preparation (engineering, land purchase services, etc.) in addition to direct spending for construction, resulting in indirect (inter-company) and induced (consumer spending) impacts. This same methodology was used for the operations phase of the project.

Figure 2. NEXUS Project Economic Impact Methodology Diagram



Inputs for construction, construction preparation and operations were modeled separately in IMPLAN using an analysis-by-parts (ABP) approach. The ABP approach is used to more accurately estimate large construction-related activities that cross numerous industry subsectors (steel, concrete, construction services, etc.). Detailed project cost and employment data including estimated wages for construction and operations employees necessary for IMPLAN modeling were provided by Spectra.

Based on data provided by Spectra, it was determined that the percentage of local purchases for materials and equipment used to build the pipeline will reach approximately 7.5%, and this percentage was used in the analysis. The analysis also assumes that 60% of contractor and construction labor will be from local craft sources (data provided by Spectra). When modeling construction preparation services (including land acquisition, legal, environmental and design) SAM multipliers were used to capture regional spending.

For this analysis, the local region is defined as the eleven-county area where the proposed pipeline is to be placed. Economic impacts may affect other surrounding counties, but the focus of this analysis is only the region and counties affected.

Input-out analysis (including IMPLAN) is not precise (Swenson 2013). The IMPLAN model includes estimated data for jobs, labor incomes, value added and output based on the inter-relationships of industry on primarily a national basis, then adjusted for trade flows or supply and demand on the regional and local levels. The purpose of this analysis is to use IMPLAN as a tool to provide an estimate of the economic impact of this project, as closely as can be accomplished, using jobs and investment inputs provided by Spectra Energy.

Economic Impact – Construction Phase

This project's pipeline construction phase is expected to result in a one-time impact to the regional economy. It is estimated that the pipeline construction phase (including pre-construction, compressor and metering stations construction to occur in the years 2015-2017 could generate $539.3 million in value added impact and support 4,790 jobs in the eleven-county the region.

Table 4 shows the estimated direct, indirect and induced effects for construction activities related to building the pipeline and compressor and metering stations, including the estimated employment, labor income and value added, for the one-time construction phase in the years 2015-2017.

Table 4. Direct, Indirect, and Induced Effects of Construction Activities (2015-2017)*

Impact Type	Employment	Labor Income (Millions)	Total Value Added (Millions)
Direct Effect	1,524	$311.5	$311.7
Indirect Effect	1,097	$58.3	$76.4
Induced Effect	2,169	$82.8	$151.2
Total Effect	**4,790**	**$452.6**	**$539.3**

Source: IMPLAN

*Includes pre-construction in 2015 and 2016, and construction during nine-months in 2017

A significant component of the construction phase of the project are Impacts expected as a result of the estimated investment of $268.9 million (including 450 construction jobs) in counties where compressor stations (CS) or metering stations (MS) are planned. The investment, jobs, and location of the stations are listed in Table 5.

Table 5. Compressor and Metering Station Investment by County

County	Investment (000)	Construction Jobs	CS	MS
Columbiana	$134,019	225	1	3
Lucas	$67,430	112.5	1	
Medina	$67,430	112.5	1	
Total	**$268,879**	**450**	**3**	**3**

Source: Spectra Energy

Estimated totals for the direct, indirect and induced economic impact of the CS and MS construction are shown in Table 6 for Columbiana, Lucas and Medina counties, with Columbiana anticipating the greatest impact. This is due to the additional location of three metering stations and a larger investment in the compressor station. The total estimated one-time construction impact, including pipeline and CS and MS construction, are then combined for these three counties and shown in Table 6.

Table 6. Total Estimated One-Time Construction Economic Impact for Columbiana, Lucas and Medina Counties (2015-2017)

County	Jobs			Labor Income (Millions)			Value Added (Millions)		
	Pipeline	CS & MS	Total	Pipeline	CS & MS	Total	Pipeline	CS & MS	Total
Columbiana	238	426	**664**	$22.7	$38.7	**$61.4**	$27.3	$43.8	**$71.1**
Lucas	158	135	**293**	$15.0	$20.3	**$35.3**	$$18.1	$23.0	**$41.1**
Medina	447	215	**662**	$42.7	$19.2	**$61.9**	$51.4	$22.0	**$73.4**
Total	**843**	**776**	**1,619**	**$80.4**	**$78.2**	**$158.6**	**$78.7**	**$88.8**	**$185.6**

Source: IMPLAN

Pipeline construction impact (other than CS and MS) has also been broken out to demonstrate potential economic impact at the county level. Table 7 shows estimated county level impact based on pipeline mileage as a percentage of total mileage, assuming that the cost of pipeline construction and operations is equal along the 200.37-mile stretch.

Table 7. Estimated Pipeline Construction (Direct, Indirect and Induced) Impact by County Based on Mileage (2015-2017)

Location	Pipeline Mileage	Jobs	Labor Income	Value Added
Columbiana	12.16	238	$22.7	$27.3
Erie	29.12	570	$54.4	$65.5
Fulton	16.55	324	$30.9	$37.2
Lorain	20.83	408	$38.9	$46.8
Lucas	8.05	158	$15.0	$18.1
Medina	22.84	447	$42.7	$51.4
Sandusky	31.55	618	$59.0	$70.9
Stark	20.47	401	$38.2	$46.0
Summit	15.30	300	$28.6	$34.4
Wayne	6.12	120	$11.4	$13.8
Wood	17.36	340	$32.4	$39.0
Total	**200.37**	**3,925**	**$374.4**	**$450.5**

Source: Spectra, IMPLAN and OSU
Note: Numbers may not equal totals due to rounding

The estimated employment impact includes direct jobs created during the construction phase of the project (nine months) in addition to the indirect jobs impacted as a result of purchases of goods and services made related to the project and the additional ripple effect of the induced jobs impacted when employees and contractors spend dollars locally for food, lodging and other expenses.

The estimated value added impact reflects the direct, indirect, and induced effects of the rounds of spending that occur as a result of the initial investment. The impacts are estimated by the IMPLAN multipliers as a component of the overall construction portion of the project.

As a result of the initial direct investment associated with the NEXUS Project, employment in a wide range of industries will also be supported. The largest share of employment is expected in the sectors most directly related to the project, specifically construction and the construction services sectors, which together will support an estimated 1,680 temporary positions.

Table 8 shows the ten sectors most impacted indirectly as a result of the initial direct NEXUS project-related investment. Following households at 995 jobs, the architectural and engineering sector ranks number one at 479 jobs supported. Closely following are the employment services, real estate, restaurant and hospital sectors. These sectors will most likely benefit from the influx of construction workers during 2017, the year when the actual construction is expected to take place.

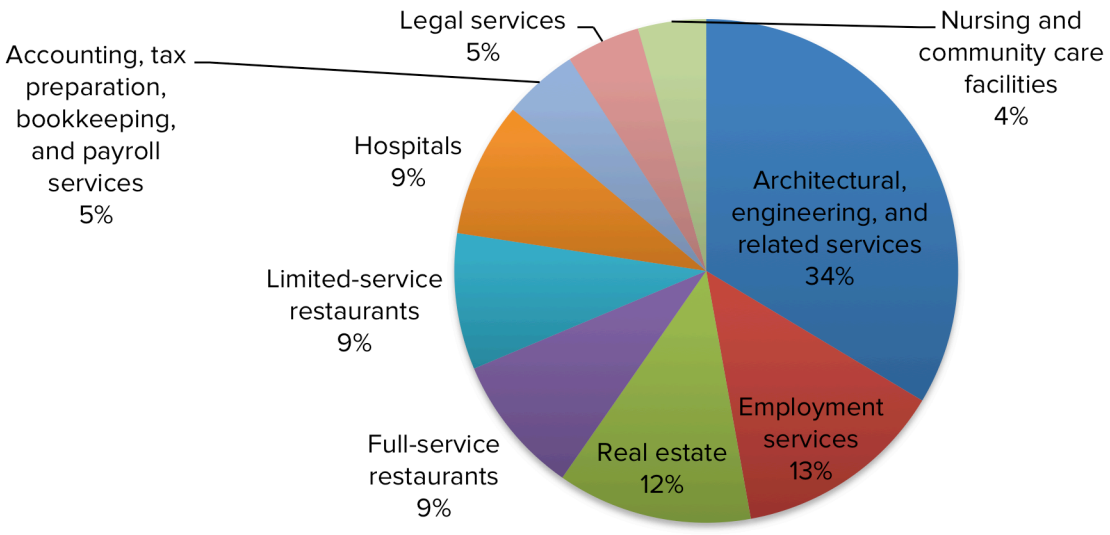
Table 8. Top Ten Sectors Impacted by Construction Employment

Employment Sector	Jobs
Private households	995
Architectural, engineering, and related services	479
Employment services	193
Real estate	178
Full-service restaurants	128
Limited-service restaurants	125
Hospitals	124
Accounting, tax preparation, bookkeeping, and payroll services	69
Legal services	68
Nursing and community care facilities	62
Total	**2,422**

Source: IMPLAN

In Figure 3, these same industry sectors, other than households, are represented as a percentage of jobs supported. One-third of the estimated job impact supported by the construction investment is in the architectural and engineering (including environmental) and related services sector. Restaurants, including limited and full-service restaurants, share almost equally in the number and percentage of jobs supported, with 258 jobs and 18% of the share of employment. As expected, employment services, most likely due to the spike in hiring activity, accounts for an estimated 13% of jobs supported as a result of the initial construction impact.

Figure 3. Top Sectors by Percentage Employment



Source: IMPLAN

Table 9. Top Ten Sectors by Value Added Contribution

Sector	Jobs	Contribution
Private households	995.5	244,966,915
Real estate	178.4	27,706,349
Architectural, engineering, and related services	479.3	27,432,219
Owner-occupied dwellings	0.0	22,732,224
Hospitals	123.7	7,810,050
Employment services	193.4	7,747,397
Legal services	67.8	6,173,383
Offices of physicians	60.1	5,659,639
Wholesale trade	38.0	5,308,838
Monetary authorities and depository credit	26.0	4,385,142
Total	**2,162**	**$359,922,148**

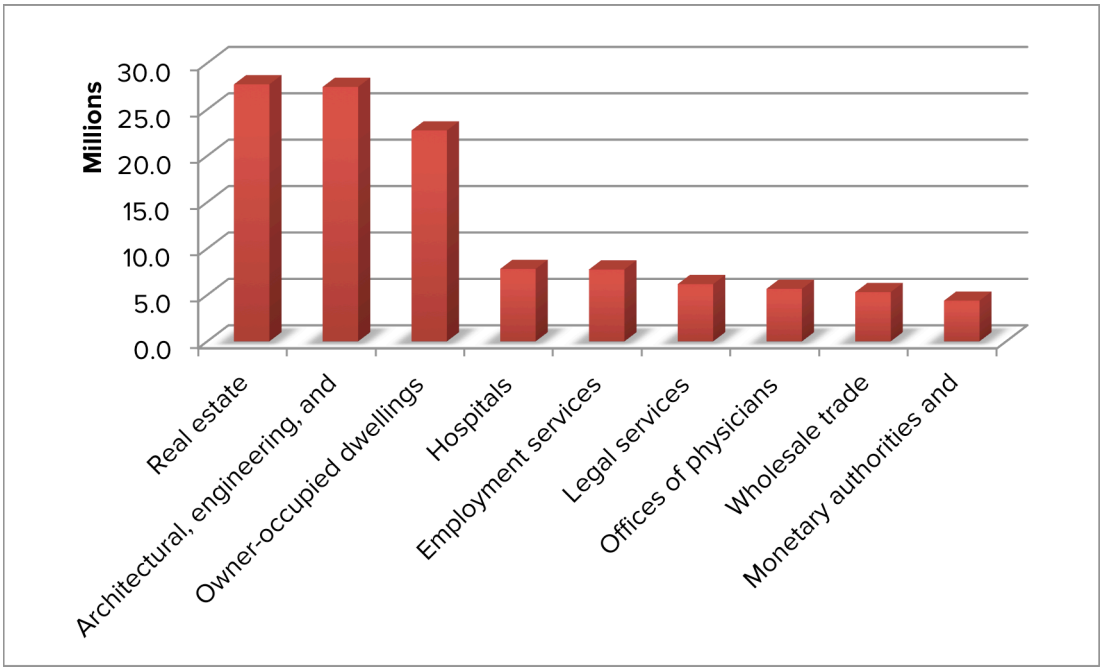
Source: IMPLAN

When considering the value-added spending that will occur as a result of the pipeline construction activity, Table 9 indicates that owner-occupied dwellings (i.e. housing rented by owners to workers) and real estate sectors are the top two sectors impacted. This is primarily the result of the housing required by workers during construction phase of the project. The table lists the top ten affected sectors during this phase of the project.

Note that although the spending contribution of owner-occupied dwellings is ranked number one, 0 jobs are supported as a result. The impact in this case is related to increasing income opportunities for owners of rental housing in the region.

Figure 4 provides a comparative perspective of the top sectors indirectly impacted as a result of the direct construction spending. The real estate and architectural, engineering, and related services both exceed an estimated $27 million in value added to the regional GDP. Following closely behind is the owner-occupied dwellings sector, which could benefit from an increased demand for housing. Other sectors that would potentially benefit from the initial construction investment in terms of increased employment and spending include: hospitals, employment and legal services, physicians, wholesale trade and banking.

Figure 4. Value Added Spending Contribution by Sector



Source: IMPLAN

Economic Impact – Operations Phase

Additional economic impact (albeit of a much lower order of magnitude than construction impact) will be realized when the pipeline becomes operational in 2018. Unlike construction impact, however, operational impact is an ongoing, annual effect. The economic impact expected from the ongoing operation of the pipeline, beginning in 2018 and going forward, is estimated to be $3.7 million annually. It is estimated that pipeline operations could support a total of 44 jobs (28 direct, 5 indirect, and 11 induced jobs).

Table 10. Estimated Direct, Indirect and Induced Economic Impact Pipeline Operations by County

Location	Jobs	Labor Income (Thousands)	Value Added (Thousands)	Annual Estimated Property Tax (Thousands)
Columbiana	18	$1,173.7	$1,614.1	$86.1
Lucas	14	$886.7	$1,214.4	$75.1
Medina	12	$614.3	$914.1	$78.4
Total	**44**	**$2,674.7**	**$3,742.6**	**$239.6**

Source: IMPLAN

Since operations are conducted at the compressor stations proposed in three counties (Columbiana, Medina and Lucas), estimated impacts are shown for these three counties only (see Table 10). As for top ten sectors impacted by the pipeline operations, Table 11 provides a summary of the estimated annual contribution of jobs, labor income and value added for the combined three counties.

Table 11. Top Ten Sectors Impacted by Employment, Labor Income and VA

Sector	Jobs	Labor Income	Value Added (VA)
Pipeline transportation	28.0	$2,248,926	$2,782,238
Employment services	1.1	$35,607	$44,001
Maintenance and repair construction of nonresidential structures	1.0	$67,155	$68,407
Hospitals	1.0	$64,077	$65,329
Limited-service restaurants	1.0	$17,505	$27,633
Full-service restaurants	1.0	$18,587	$20,884
Real estate	0.8	$18,734	$125,995
Retail - General merchandise stores	0.6	$14,409	$23,517
Retail - Food and beverage stores	0.5	$14,430	$21,075
Nursing and community care facilities	0.5	$17,498	$18,068
Total	**35.6**	**$2,516,927**	**$3,197,148**

Source: IMPLAN

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