

Mariner East Pipeline Project

UNOCO PIPELINE
IN-USE • FUTURE SCHEDULING

- Potomac River / Chesapeake Bay Separation
- Chesapeake Bay Tunnel
- Maryland State Line
- Delaware State Line
- West Virg. State Line
- Allegany National Forest Crossing
- State Route Crossings
- Allegany National Forest Crossing
- Shenandoah State Park Crossing

The map shows the pipeline route starting near Salisbury, MD, passing through Pocomoke, Cambridge, and reaching West Virginia near Martinsburg. Key locations labeled include Salisbury, Pocomoke, Cambridge, Independence Gap, Hagerstown, Shavers Fork, Jackson Gap, Richwood, Marlinton, Stearns, New Martins, Cheat Dam, Tart Run, and Mount Hope.



ENERGY TRANSFER



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EXECUTIVE SUMMARY

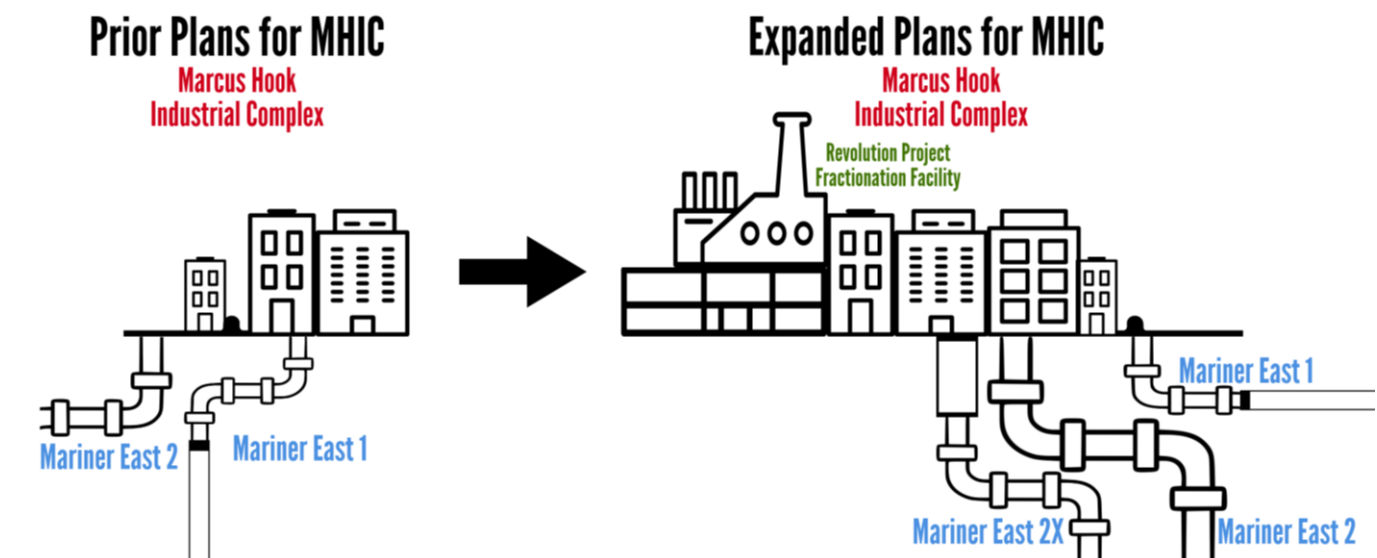
UPDATE TO PREVIOUS ECONOMIC IMPACT REPORT

In 2015, Econsult Solutions, Inc. (ESI) estimated the economic impact of Sunoco Logistics' Mariner East project based on the project budget. For that report, ESI estimated the economic impact from the then under construction Mariner East 1, the proposed Mariner East 2 and the associated upgrades being made to the Marcus Hook Industrial Complex (MHIC). Since that time, that potential economic impact has substantially increased due to several changes to the Mariner East project scope and the introduction of an additional phase, which have justified an update to the impact estimates.

- Construction of Mariner East 1 is now complete
- The demand during open season for Mariner East 2 led to a significant expansion in the system from what was originally at least a 16-inch pipeline to a 20-inch pipe.
- The expansion, Mariner East 2X, includes an additional 16-inch pipeline.
- To accommodate the completed and under construction pipelines, extensive improvements and additions have and will continue to take place at MHIC
- A new project has been announced. The Revolution Project spans across Pennsylvania via the Mariner East pipelines. As part of the Revolution Project, a new fractionation facility has been built at MHIC.

Due to the significant expansion of construction and operations associated with the Mariner East pipelines, MHIC, and the Revolution Project at MHIC (the fractionation facility), ESI has revised the economic impact report to reflect the changes in project scope. Also, important to note, Sunoco Logistics Partners, L.P. merged with Energy Transfer Partners in April 2017 and formed Energy Transfer Partners, L.P. (ETP).

FIGURE ES.1 – PRIOR PLANS FOR MHIC AND NEW EXPANDED PLANS FOR MHIC



ESTIMATED ECONOMIC IMPACT OF EXPANDED MARINER EAST PROJECT AND THE REVOLUTION FRACTIONATION FACILITY AT MHIC

The construction of the Mariner East pipelines, the Revolution project's fractionation facility at MHIC, and the repurposing of MHIC will impact the economy of the region. The revised total potential economic impact from all construction in the Commonwealth is estimated to be \$9.1 billion, supporting nearly 57,070 jobs during the construction period with earnings of \$2.7 billion (See Table ES.1). This is more than double the prior 2015 estimated economic impact from construction. The increase is due to the expansion of Mariner East 2 - the introduction of Mariner East 2X, and the fractionation facility at MHIC.

TABLE ES.1 – POTENTIAL ECONOMIC IMPACT FROM CONSTRUCTION SPENDING OF THE MARINER EAST PROJECTS IN THE COMMONWEALTH OF PENNSYLVANIA

Impact Type	Estimates as of 2015 Report	Updated Estimates
Total Economic Impact	\$4.2 billion	\$9.1 billion
Employment Supported	30,100 job-years	57,070 job-years
Employee Compensation	\$1.9 billion	\$2.7 billion

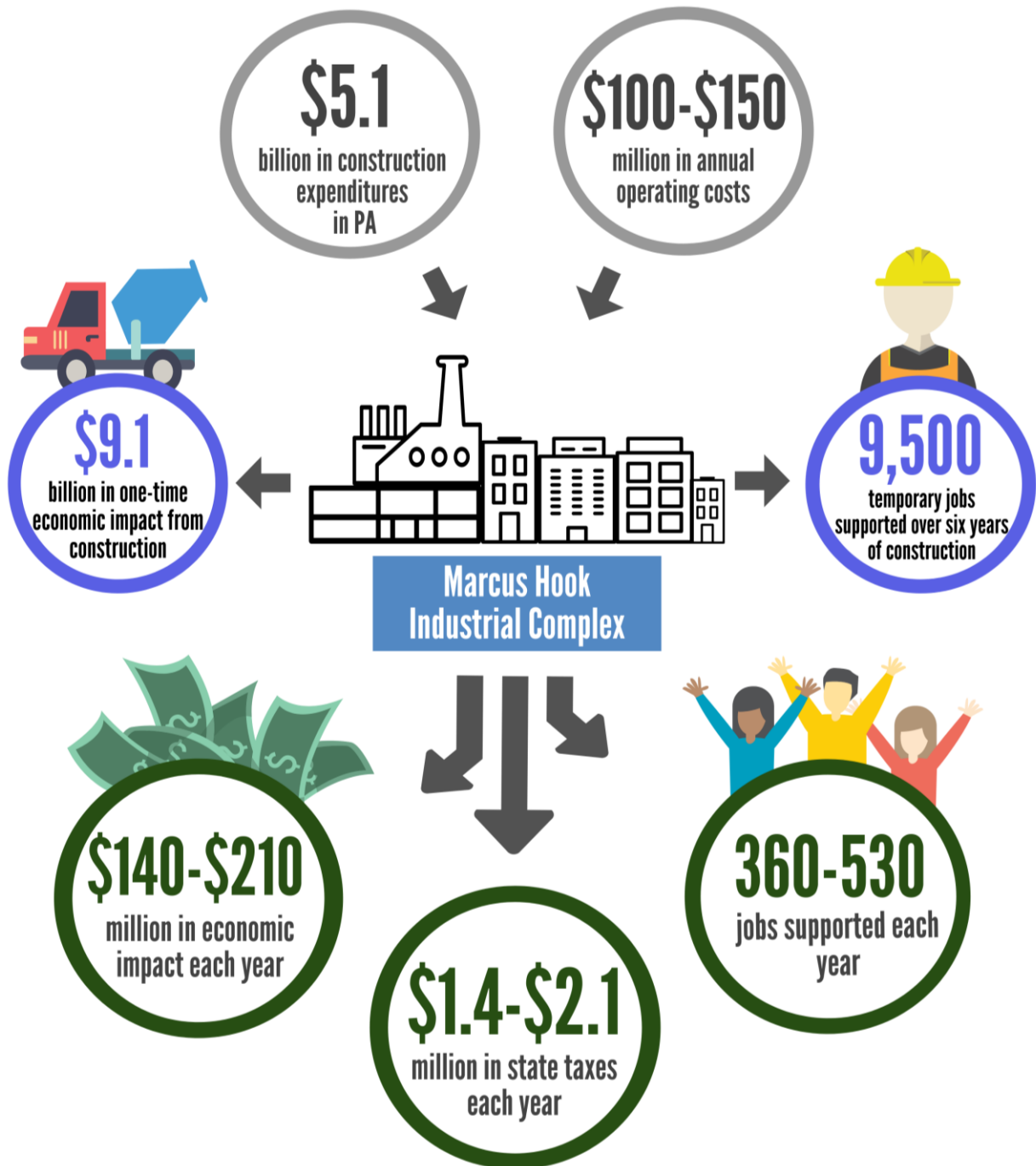
ETP's natural gas liquids operations at MHIC will generate annually recurring economic activity through the Commonwealth. Due to the increase in operations at MHIC, the economic impact estimates will be significantly higher than previously estimated in 2015. During the first full calendar year of operations in 2020, the total annual economic impact in the Commonwealth from the ongoing operations of the Mariner East projects, the fractionation facility and the associated improvements at MHIC will be between \$140 and \$210 million, supporting between 360 and 530 jobs with earnings between \$30 and \$45 million (see Table ES.2).

TABLE ES.2 – ESTIMATED RANGE OF POTENTIAL ANNUAL ECONOMIC IMPACT FROM OPERATIONS OF THE MARINER EAST PROJECTS, THE FRACTIONATION FACILITY AT MHIC AND ASSOCIATED UPGRADES AT MHIC IN THE COMMONWEALTH OF PENNSYLVANIA, 2020 (\$ MILLION)

Impact Type	Estimates as of 2015 Report	Updated Estimates
Total Economic Impact	\$100 - \$150	\$140 - \$210
Employment Supported	290 - 440	360 - 530
Employee Compensation	\$20 - \$35	\$30 - \$45

The transition of MHIC from oil refinery to NGL transport and processing center will have economic effects beyond the boundaries of the Mariner East pipelines and MHIC.

FIGURE ES.2 – AGGREGATE ECONOMIC IMPACT OF THE OPERATIONS AND CONSTRUCTION OF THE MARINER EAST PROJECTS, THE FRACTIONATION FACILITY AT MHIC AND ASSOCIATED UPGRADES AT MHIC IN THE COMMONWEALTH OF PENNSYLVANIA



1.0 INTRODUCTION

1.1 OVERVIEW OF ENERGY TRANSFER PARTNERS' ASSETS IN SOUTHEASTERN PENNSYLVANIA

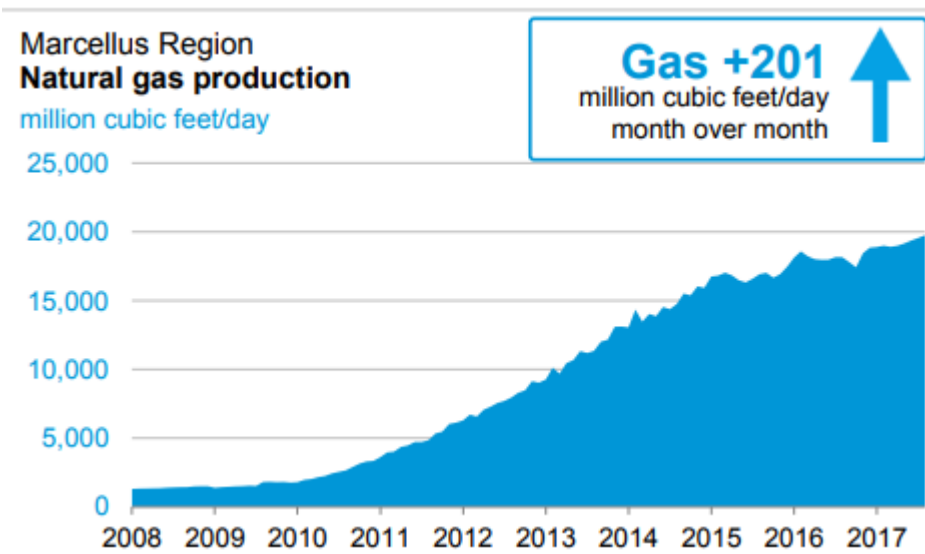
In April 2017, Sunoco Logistics Partners, L.P. merged with Energy Transfer Partners, creating Energy Transfer Partners, L.P. (ETP). The new entity has diverse holdings and operations across the country, including Sunoco Logistics Partners' refined products pipelines, crude oil pipelines, crude oil acquisition business, and marketing and terminal facilities. ETP now owns and operates the Marcus Hook Industrial Complex (MHIC) through its subsidiary, Sunoco Partners Marketing and Terminals, L.P. The approximately 800-acre facility was decommissioned as a refinery in 2011. At its height, MHIC refined 178,000 barrels of low-sulfur sweet crude oil per day, accounting for approximately 13 percent of the cumulative crude oil operating capacity of refineries on the East Coast.¹

Ever since the refinery was decommissioned, new uses for its capital infrastructure have been explored. MHIC was re-purposed as a natural gas liquids storage, distribution, and fractionation facility. With the fractionation facility at MHIC, shippers can transport C3+ from the Revolution system via the Mariner East pipelines to MHIC where it will break them into their individual hydrocarbons. MHIC is equipped with dock facilities capable of accommodating trucks, rail cars, and maritime vessels and can receive and deliver products to numerous third-party pipelines. The dock and pipeline infrastructure at the MHIC facility also permits access to various markets, including: Pennsylvania and New York terminals; New York Harbor and Northern New Jersey terminals via pipelines; and Baltimore, New England, and Europe.

1.2 EXPANDED OPERATIONS IN SOUTHEASTERN PENNSYLVANIA

Due to changes in the international and domestic oil and natural gas markets and its proximity to the Marcellus shale basin, MHIC was repurposed from a crude oil processing facility into an NGLs facility. The Marcellus shale basin has seen a rapid increase in the amount of natural gas extracted with estimates of plentiful supplies remaining (see Figure 1.1). NGLs, including propane, ethane, and butane, are by-products of wet natural gas extraction. As natural gas prices have remained low due to oversupply, companies have expanded to new opportunities by investing in the infrastructure needed to process, distribute, and store NGLs.

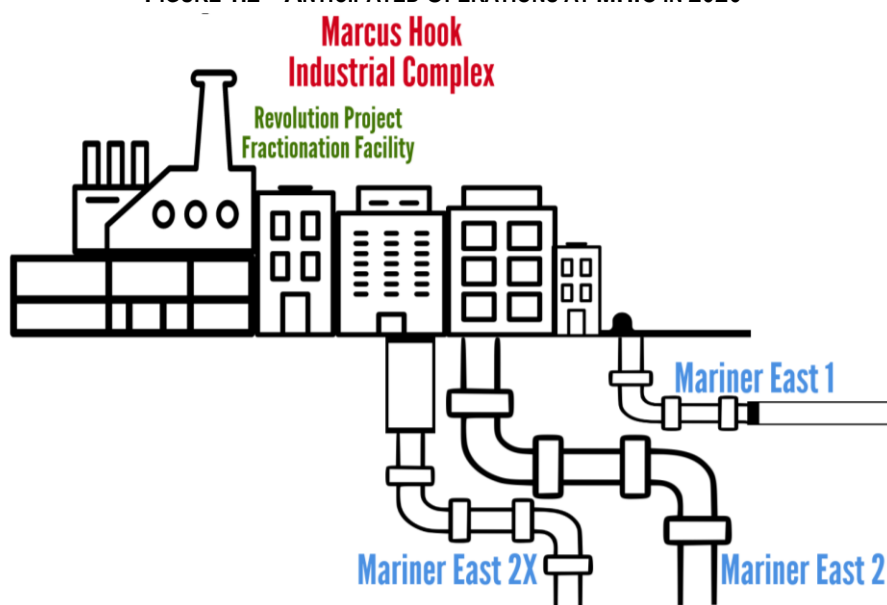
¹ American Petroleum Institute, "Impacts of East Coast Refinery Closures" (2012)

FIGURE 1.1 – MARCELLUS REGION NATURAL GAS PRODUCTION, 2008 – 2017

Source: EIA, Marcellus Region Drilling Productivity Report, July 2017

Flow of the existing Mariner East 1 pipeline has been reversed to bring NGLs to MHIC. Two other pipelines are under construction, Mariner East 2 and Mariner East 2X. In addition to expanding the Mariner East projects, ETP has constructed a new fractionation facility at MHIC. The fractionation facility is part of a larger project called the Revolution Project, which includes the construction of gathering systems and multiple pipelines. This facility allows ETP to produce NGLs including ethane, propane, and butane for distribution. The fractionation of these NGLs at MHIC expands opportunities of NGL distribution in the northeast and mid-Atlantic regions.

FIGURE 1.2 – ANTICIPATED OPERATIONS AT MHIC IN 2020



Source: Piktochart (2017), Econsult Solutions (2017)

MARINER EAST 1

ETP's Mariner East 1 project provides the service of transporting NGLs to MHIC from the Marcellus shale. The flow of Mariner East 1's existing 8-inch refined products pipeline was reversed and expanded with 50 miles of new pipeline near Pittsburgh to facilitate shipments of propane and other petroleum products from Houston, Pa. to MHIC. The extension of the pipeline was produced at US Steel's McKeesport facility in Pennsylvania², and coated at the Dura-bond facility in Duquesne, Pennsylvania.

The Mariner East 1 project was a repurposing project that included a reversal of supply flow of a pre-existing ETP pipeline. It changed the westward flow of refined products such as gasoline, diesel and jet fuel, to an eastward transport of propane, butane, and other NGLs from the Marcellus shale to the MHIC facility for storage, processing and distribution. A 50-mile addition to the pipeline was built, spanning from Mark West Liberty's Houston fractionation complex to an interconnection with the existing pipeline at Delmont, Pa. Mariner East 1 began shipping propane in late 2014. The new conveyance of NGLs to southern Pennsylvania should exert downward pressure on costs for many local producers and manufacturers and increase the locally available supply of propane for residential heating.³ ETP will service the state with the transport of 70,000 barrels of propane and ethane per day through the Mariner East 1 pipeline.

² The plant was idled indefinitely in June of 2016 and recently purchased by Durabond.

³ "ETP Partners L.P. Announces Successful Open Season for Project Mariner East", ETP Partners L.P. (2012)

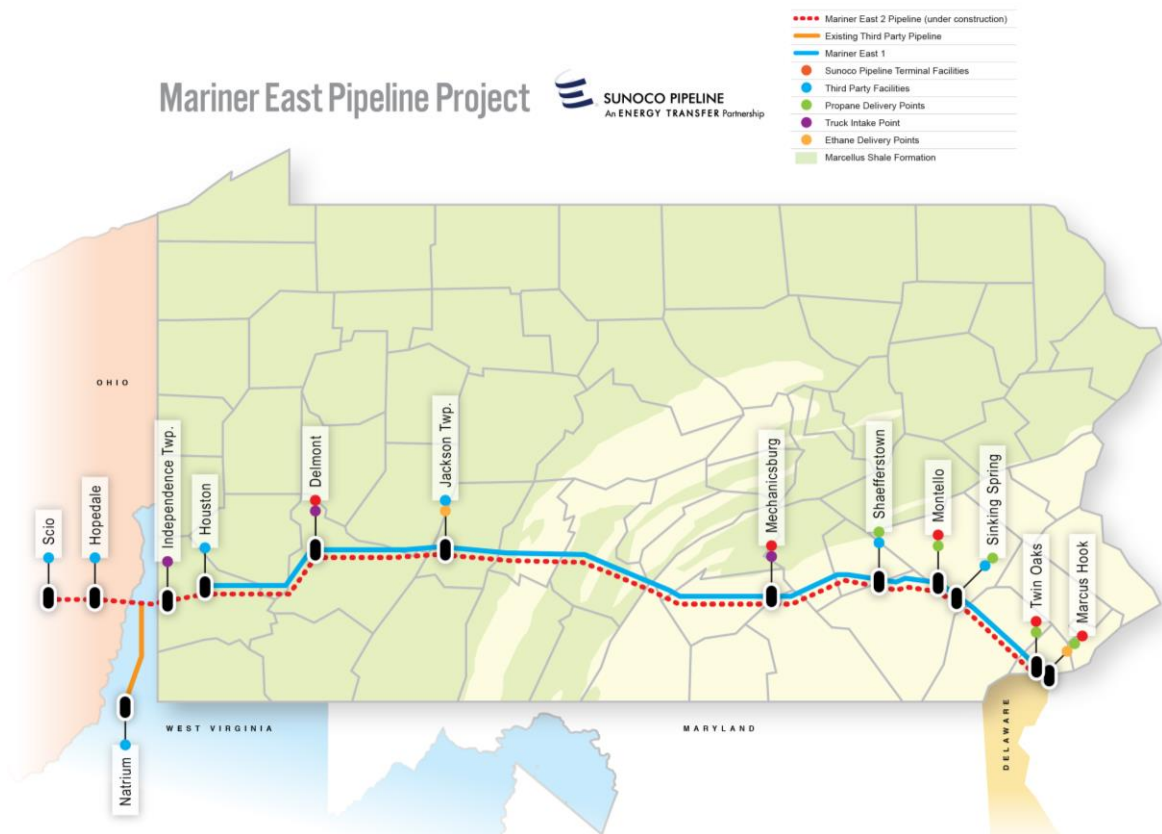
MARINER EAST 2 AND 2X

Due to the large amount of NGLs, such as propane, being extracted from the Marcellus shale, and an increased demand for processing, ETP is constructing Mariner East 2, a 20-inch pipeline, and a new 16-inch pipeline, referred to as Mariner East 2X throughout this report. These will originate in Eastern Ohio, West Virginia and Western Pennsylvania and will run mostly parallel with Mariner East 1 and transport additional NGLs to MHIC.

Mariner East 2 will transport NGLs from both the Utica shale and the Marcellus shale to MHIC. Mariner East 2 will serve as a supplement to Mariner East 1 operations, allowing for a higher volume of NGLs to be transported from the Marcellus shale to various on- loading and off- loading sites within Pennsylvania, terminating at MHIC (see Figure 1.3). The new pipeline is projected to begin operating in 2018.

An additional 16-inch pipeline has been added to the project. This second pipeline will have a capacity of up to 250,000 barrels per day. In preparation for the service delivery of the vast quantities of NGLs to be transported to MHIC, ETP has and is building new propane, butane and ethane storage tanks.

FIGURE 1.3 – DIAGRAM OF THE MARINER EAST 1 AND 2 PIPELINES



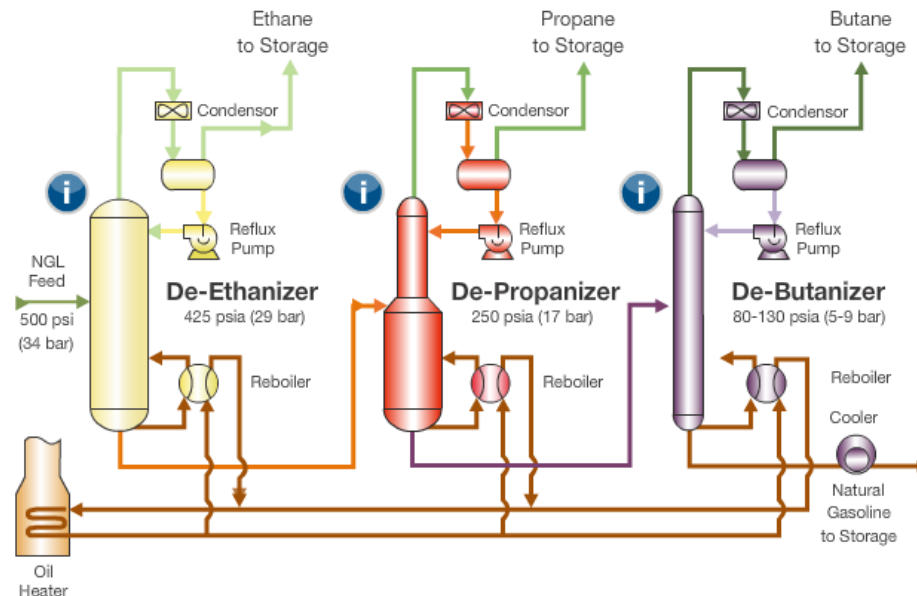
Source: Energy Transfer Partners (2018)

REVOLUTION PROJECT

The Revolution Project will significantly increase ETP's operations in the Marcellus Utica shale areas in Western Pennsylvania and will increase the amount of NGLs transported to MHIC via the Mariner East pipelines for domestic and international distribution. The Revolution Project includes construction of 110-miles of new gathering pipelines in Butler County, PA, and will use 20 miles of a 16-inch gathering pipeline already in operation. This pipeline will transport over 440 million cubic feet of NGLs per day. This pipeline will extend to ETP's new cryogenic gas processing plant, called the Revolution Plant, which will allow ETP to extract lighter, cleaner, and purer hydrocarbons. ETP expects this facility to allow for processing growth for additional third party gas suppliers. Along with 110 miles of gathering pipeline, ETP is constructing a natural gas residue pipeline that will connect with a purity ethane pipeline to the Mariner East system, and a C3+ pipeline and storage facility, also to the Mariner East system.

Along with the different pipelines undergoing construction through the Revolution Project, ETP also has constructed a fractionation facility located at MHIC. This facility allows ETP to separate different gases, including ethane, propane, and butane, after the NGL extraction process (see Figure 1.4). The following report includes the economic impact that this new fractionation facility has on Pennsylvania due to increased production of propane and reduced energy costs for consumers and businesses.

FIGURE 1.4 – IMAGE OF THE NGL FRACTIONATION PROCESS



Source: IHRDC(2017)⁴

⁴ International Human Resources Development Corporation, Gas Processing and Fractionation, https://www.ihrdc.com/els/po-demo/module14/mod_014_02.htm

1.3 PURPOSE OF REPORT

The purpose of this report is to provide revised estimates of the economic impacts from the construction and operations of the Mariner East pipelines and new economic impacts for the fractionation facility associated with the Revolution Project and associated improvements at MHIC. Section 2 steps through the methodology used in the economic impact analysis. Section 3 estimates the economic impact of the construction of the pipelines, the fractionation facility, and the associated renovations to MHIC. The estimated economic impact from operations is presented in Section 4. Section 5 discusses additional impacts from the Mariner East projects, including the increase in propane, ethane, and butane supplies at MHIC and the new opportunities they bring.

1.4 ABOUT ECONSULT SOLUTIONS, INC.

This report was authored by Econsult Solutions, Inc. (ESI). ESI is a Philadelphia-based economic consulting firm. It provides businesses and public policy makers with economic consulting services in urban economics, real estate economics, transportation, public infrastructure, economic development, public policy and finance, community and neighborhood development, and planning, as well as expert witness services in support of litigation.



2.0 METHODOLOGY

2.1 GEOGRAPHY OF IMPACT

The economic impact of construction and ongoing operations from the Mariner East projects, the fractionation facility, and the associated improvements at MHIC were estimated within the Commonwealth of Pennsylvania. It is expected that the majority of the potential Commonwealth impacts will take place in the southeastern Pennsylvania region (the City of Philadelphia and Montgomery, Bucks, Delaware and Chester counties) due to operations at MHIC. However, significant additional impact will take place throughout the state, particularly in the western part of the state. The pipelines and new operations at MHIC are expected to create and support employment throughout the state. Direct spending is used to estimate total economic impact.

To estimate the economic impact in the Commonwealth, the geographic source of the products and services are used to assign spending to the impact area. Therefore, it is assumed that not all of the spending will occur in the Commonwealth, as some services and products will be purchased from out-of-state suppliers. For instance, with data provided by ETP, we account for the proportion of the construction materials and equipment being manufactured in Pennsylvania, as some of it is of a specialized nature and not manufactured in the Commonwealth.

2.2 ECONOMIC IMPACT MODELING

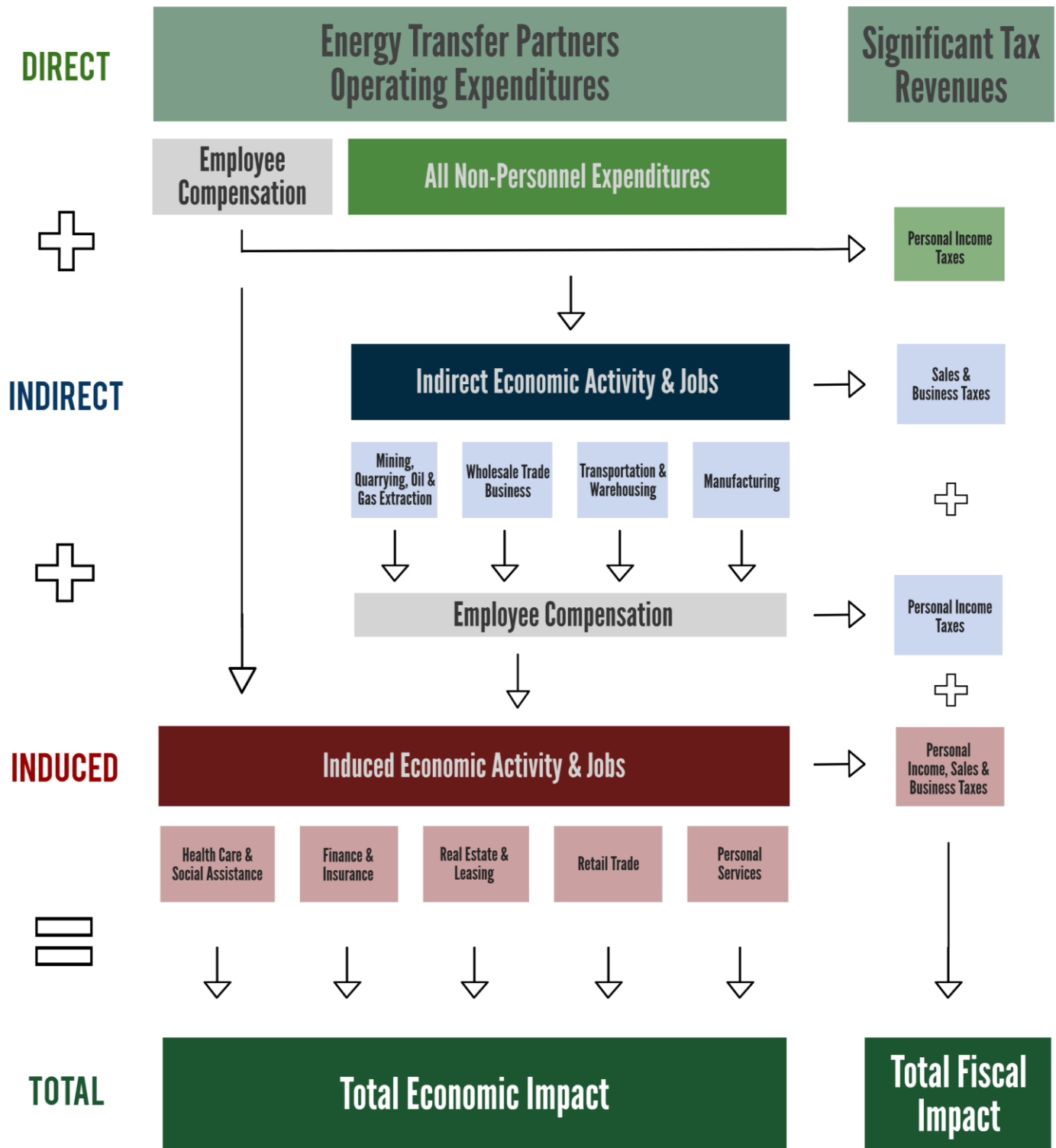
The total economic impact resulting from initial expenditures can be modeled by constructing an input-output model. This modeling was done using IMPLAN, an industry standard input-output modeling software program. Such models are designed to estimate two sets of spillover impacts from expenditures (see Figure 2.1):

- The indirect effect, which measures the multiplier effect from the purchase of goods and services from local vendors.
- The induced effect, which measures the multiplier effect from employees' spending of their wages within a particular geography.

For the purposes of this report, economic impacts were measured at the Commonwealth's economy level. These impacts also represent increases in various tax bases for the Commonwealth. A fiscal impact model was generated to translate these economic impacts into their commensurate tax base expansions and therefore into the generation of various tax revenues.⁵

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

FIGURE 2.1 – ECONOMIC IMPACT METHODOLOGY



Source: Piktochart (2017), Econsult Solutions (2017)

3.0 CONSTRUCTION IMPACT

3.1 DIRECT CONSTRUCTION EXPENDITURES

Since our geographic model is Pennsylvania, we are only modeling construction spending within Pennsylvania, not for the entirety of the projects. For instance, Mariner East 2 and 2X go beyond the western border of Pennsylvania. In addition, the construction materials and labor for the fractionation facility are highly specialized, and most was sourced from outside of Pennsylvania. For instance, over a third of the materials for the fractionation facility are sourced from Texas, which has the highest number of fractionation facilities in the country.

100% of the steel used for the 50- mile Mariner East 1 pipeline extension was manufactured in Pennsylvania.

The modeled construction costs in Pennsylvania include engineering and architectural services, material costs, and general construction sourced within Pennsylvania. The construction expenditures associated with the pipelines and renovations at MHIC are provided in aggregate for the construction period. The model accounts for specific spending allocation for each expenditure within the Commonwealth. For modeling purposes, ETP provided detailed procurement data, which allowed ESI to separate purchases made in PA to purchases made outside of the state.

For parts of the project, there was significant sourcing of materials and labor within Pennsylvania.

- Of the total pipeline and MHIC construction, it is estimated that 50 percent of engineering services were supplied by companies within the Commonwealth.⁶
- For modeling purposes, it was assumed of all material purchased, 25 percent was American steel manufactured in Pennsylvania.⁷
- ETP purchased (from Pennsylvania manufacturers) the 50 miles of pipeline being added to the existing pipeline for Mariner East 1. In the economic impact model, all construction and contingency expenditures are allocated to be spent within the Commonwealth, as they are mostly the labor component of construction.
- For Mariner East 2 and 2X, it is estimated that 50 percent of engineering services will be supplied by companies within the Commonwealth.⁸
- For Mariner East 2 and 2X and the associated MHIC renovations, approximately 25 percent of material purchases were made within Pennsylvania.

The 20-inch Mariner East 1 pipeline was coated by Dura-bond, a protective coatings facility in Duquesne, Pennsylvania. 75 employees at Dura-bond were supported by this project alone.

⁶ Direct expenditure amounts and allocations within the Commonwealth are assumptions. Actual spending may be different.

⁷ This includes the pipeline and the MHIC renovations associated with Mariner East 1.

⁸ Direct expenditure amounts and allocations within the Commonwealth are assumptions. Actual spending may be different.

In aggregate, construction spending in Pennsylvania for all three pipelines, the associated MHIC renovations, and the fractionation facility is approximately \$5.1 billion (see Table 3.1).

TABLE 3.1 – TOTAL CONSTRUCTION EXPENDITURES FOR THE MARINER EAST PIPELINES, FRACTIONATION FACILITY, AND ASSOCIATED IMPROVEMENTS AT MHIC IN PA (\$ MILLION)

Construction	Mariner East Projects
Modeled Commonwealth Expenditure	\$5,091

Source: Energy Transfer Partners (2017)

3.2 CONSTRUCTION ECONOMIC IMPACT

The economic impact was modeled for all construction costs associated with the Mariner East projects by combining the economic impact from construction of the pipelines, MHIC, and the fractionation facility. The estimated total impacts include direct output, employment, and employee compensation, along with the corresponding indirect and induced impacts. In total, the construction of the Mariner East projects is estimated to generate a potential one-time economic impact of nearly \$9.1 billion in the Commonwealth, supporting 57,070 jobs (during the entire construction period)⁹ with earnings of \$2.7 billion (see Table 3.2).

TABLE 3.2 – POTENTIAL ECONOMIC IMPACT FROM CONSTRUCTION OF THE MARINER EAST PIPELINES, FRACTIONATION FACILITY, AND ASSOCIATED IMPROVEMENTS AT MHIC IN THE COMMONWEALTH OF PENNSYLVANIA (\$ MILLION)

Impact Type	Commonwealth of Pennsylvania
Direct Output	\$5,091
Indirect & Induced Output	\$3,978
Total Output	\$9,069
Employment Supported (FTE)	57,070
Employee Compensation¹⁰	\$2,697

Source: IMPLAN (2015)

⁹ It is important to note that these jobs will occur over the course of the entire construction period. The estimated 57,070 total job-years are equal to 9,500 jobs each year over the assumed construction length of six years (2014 – 2019).

¹⁰ Employee compensation, as defined by IMPLAN, includes wages, benefits and payroll taxes

3.3 FISCAL IMPACT FROM CONSTRUCTION

Construction expenditures for the Mariner East projects will generate one-time tax revenues for the Commonwealth throughout the construction period. The construction of the Mariner East projects will potentially generate an estimated \$122 million in total to the Commonwealth over the length of the construction period (see Table 3.3). This includes personal income taxes, sales taxes, and businesses taxes generated by the direct, indirect, and induced activities from construction of all pipelines, MHIC, and the fractionation facility.

TABLE 3.3 – POTENTIAL ONE-TIME FISCAL IMPACT DURING THE CONSTRUCTION OF THE MARINER EAST PIPELINES, FRACTIONATION FACILITY, AND ASSOCIATED IMPROVEMENTS AT MHIC IN THE COMMONWEALTH (\$ MILLION)

Tax Type	Direct	Indirect and	Total
		Induced	
Personal Income	\$46	\$37	\$83
Sales & Use ¹¹	\$3	\$27	\$30
Business ¹²	\$0	\$9	\$9
Total	\$49	\$73	\$122

Source: Econsult Solutions (2017) IMPLAN (2015)

3.4 TOTAL LABOR IMPACT

Upfront construction associated with the Mariner East projects will impact multiple industries across the Commonwealth. The bulk of the employment generated will be in construction trades. Since construction labor duration and timing vary significantly over this type of large scale project, input-output models aggregate these various construction jobs over the full construction period.

The 57,070 FTE jobs are the sum of all the direct, indirect, and induced jobs over the full construction period. The direct investment by ETP in the construction of the Mariner East projects will also support jobs through its spillover economic impacts. Within the Commonwealth of Pennsylvania, approximately 59 percent of the employment impact, or approximately 33,760 jobs, will be in the construction industry over the construction period. The remaining 41 percent of the employment impact will

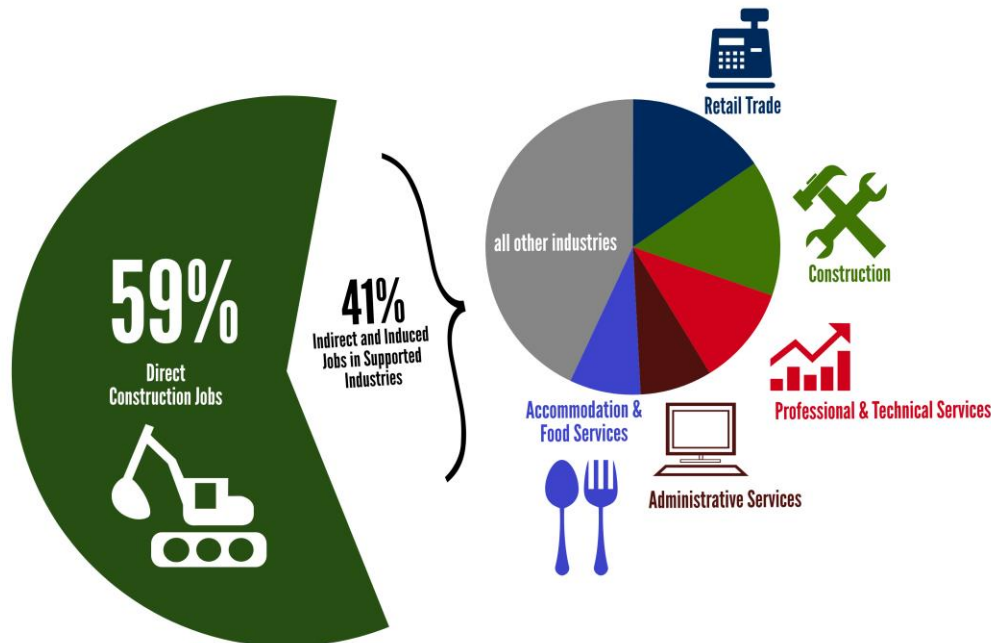
The construction of Mariner East 2 supported \$45 million in wages for Steamfitters Local 420, the labor union that services the entire state of Pennsylvania's gas pipeline distribution.

¹¹ In 2015, ETP estimated that it would remit \$1.8 million in sales tax to the Commonwealth during the construction period. With additional construction expenditures, the total sales taxes paid by ETP will now be an estimated \$2.7 million over the entire construction period. This amount was split across each of the projects based on its proportion of total construction expenditure.

¹² SXL pays a utility gross receipts tax and a public utility realty tax to the Commonwealth every year, though this was not estimated in this report.

occur in industries other than construction, such as retail trade, profession and technical services, administrative services, and food services and drinking places (see Figure 3.1).

FIGURE 3.1 – POTENTIAL TOTAL EMPLOYMENT IMPACT FROM CONSTRUCTION OF THE MARINER EAST PIPELINES, FRACTIONATION FACILITY, AND ASSOCIATED IMPROVEMENTS AT MHIC IN THE COMMONWEALTH¹³



Source: IMPLAN (2015), Piktochart (2017)

3.5 ANNUAL LABOR IMPACT

It is estimated that 57,070 direct, indirect, and induced jobs will be supported over the length of the construction period.¹⁴ This is equivalent to approximately 9,500 jobs each year for six years (see Table 3.4). Of these 9,500 jobs, 5,680 direct jobs will be supported annually by the construction of the pipelines and the renovations at MHIC. In total, 5,240 of these direct jobs will be in the construction industry. Annually, the other jobs directly related to the Mariner East project construction include an estimated 370 professional, scientific, and technical services jobs and 70 wholesale trade business jobs. The 3,820 indirect and induced jobs will be supported through the construction project's spillover economic impacts in various industries.

¹³ The figure includes direct, indirect, and induced employment.

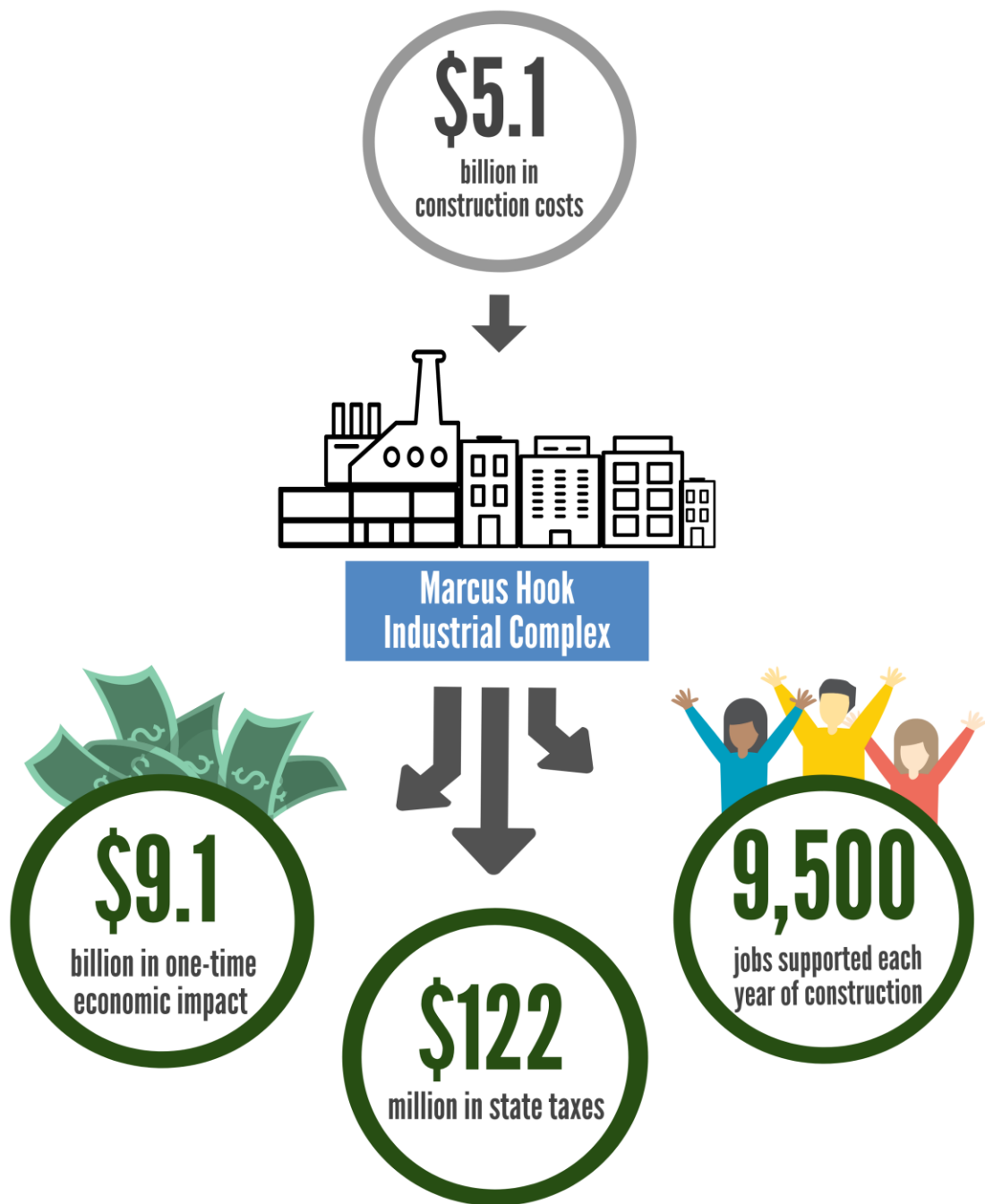
¹⁴ Construction started in 2014 and will be completed in 2019.

TABLE 3.4 – POTENTIAL ESTIMATED ANNUAL EMPLOYMENT IMPACT FROM CONSTRUCTION OF THE MARINER EAST PIPELINE, FRACTIONATION FACILITY AND ASSOCIATED IMPROVEMENTS AT MHIC IN THE COMMONWEALTH OF PENNSYLVANIA (\$ MILLION)

Industry	Annual Direct Jobs	Annual Indirect and Induced Jobs	Total Annual Jobs
Construction	5,240	40	5,280
Professional, Scientific, and Technical Services	370	420	790
Wholesale / Retail Trade	70	790	860
Health Care and Social Assistance	0	570	570
Administrative and Support Services	0	300	300
Accommodation and Food Services	0	300	300
All Other Industries	0	1,400	1,400
Total Annual Jobs Supported	5,680	3,820	9,500

Source: IMPLAN (2015)

FIGURE 3.2 – AGGREGATE IMPACT OF CONSTRUCTION OF THE MARINER EAST PIPELINE, FRACTIONATION FACILITY AND ASSOCIATED IMPROVEMENTS AT MHIC IN THE COMMONWEALTH OF PENNSYLVANIA



Source: Piktochart (2017), IMPLAN (2015)

4.0 THE ECONOMIC IMPACT FROM EXPANDED OPERATIONS

4.1 OVERVIEW

In 2013, operations at MHIC were minimal, with very little activity occurring. With the transition of MHIC to an NGLs facility and the completion of Mariner East 1, MHIC operations grew for the first time since its steady decline since the mid-2000s. The operating budget at MHIC grew by approximately 43 percent from 2014 to 2015.

Now, the expanded Mariner East projects operations will significantly increase at MHIC with these new inputs and processes. By 2020, ETP estimates that the total operating budget for operations at MHIC, including the fractionation facility, will range from \$100 to \$150 million each year.

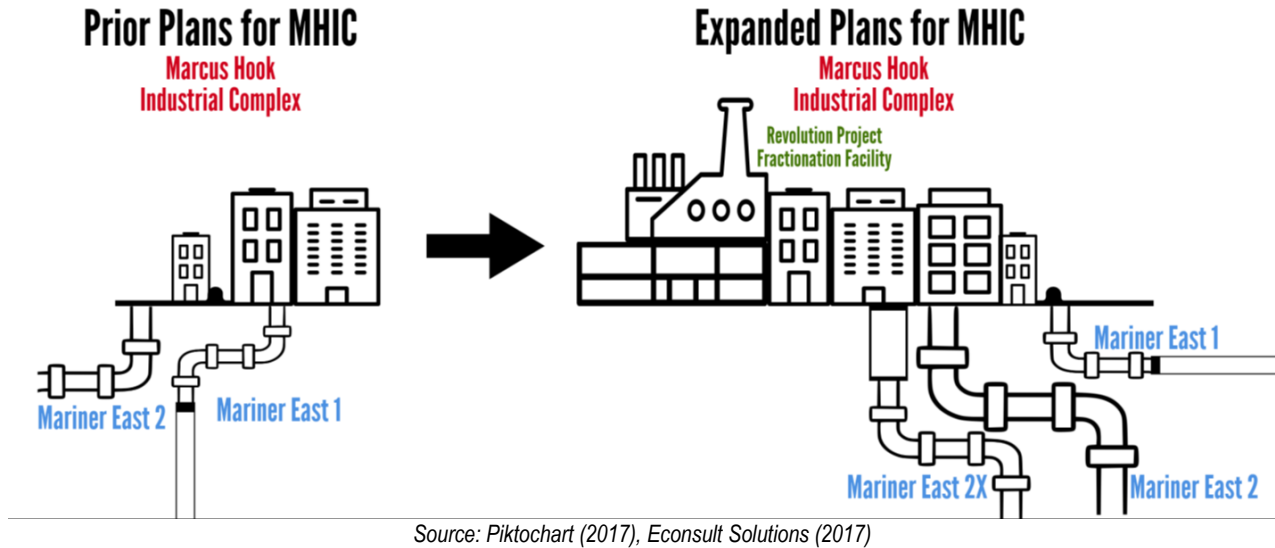
This section details the economic impact of the operations of the pipelines, the fractionation facility, and MHIC at three points in time:

- 2014, before the addition of these projects,
- Prior anticipated stabilization year of 2017, which included Mariner East 1, Mariner East 2 and the associated improvements at MHIC. ESI estimated the potential economic impacts in 2015 when Mariner East 1 was under construction and Mariner East 2 was proposed as a 16-inch pipeline¹⁵, and
- New anticipated stabilization year of 2020, which includes Mariner East 1, Mariner East 2, Mariner East 2X, the fractionation facility and associated improvements at MHIC. As of the writing of this report, Mariner East 1 and the fractionation facility are complete and Mariner East 2 and Mariner East 2X are under construction (see Figure 4.1).

While the majority of operations are at MHIC in southeastern PA, specific areas across the entire commonwealth benefit from these new investments including manufacturing and drilling operations in the greater Pittsburgh region

¹⁵ 2017 was not remodeled with the new data sent in 2017. Rather, these estimates provide insight on the estimated economic impacts in 2015 before the project scope expanded significantly.

FIGURE 4.1 – PRIOR PLANS FOR MHIC (2017) AND NEW EXPANDED PLANS FOR MHIC (2020)



4.2 PRE – MARINER EAST - 2014 ACTUAL OPERATIONS AT MHIC

DIRECT OPERATING BUDGET

Prior to the addition of the Mariner East projects, MHIC had approximately \$23.4 million in annual operating costs, approximately \$6.9 million of which was spent on wages and salaries for its employees (see Table 4.1).

TABLE 4.1 – ESTIMATED ANNUAL OPERATING EXPENDITURES
AT MHIC IN 2014 (\$ MILLION)

Operation Expenditure	
Categories	2014 Annual Budget
Wage/Salary	\$6.9
Contract Services	\$7.2
Utilities	\$9.3
Total	\$23.4

Source: Sunoco Logistics (2014)

ONGOING ECONOMIC IMPACT

In 2014, during the planning and construction of Mariner East 1, operations generated an annual economic impact of approximately \$35.4 million, and supported 90 FTE jobs with earnings of \$10.2 million in the Commonwealth (see Table 4.2).

**TABLE 4.2 – ECONOMIC IMPACT FROM OPERATIONS OF MHIC
IN THE COMMONWEALTH OF PENNSYLVANIA IN 2014 (\$ MILLION)**

Impact Type	Commonwealth of Pennsylvania
Direct Output	\$23.4
Indirect & Induced Output	\$12.0
Total Output	\$35.4
Employment Supported	90
Employee Compensation	\$10.2

Source: IMPLAN (2013)

FISCAL IMPACT FROM ONGOING OPERATIONS

The organizational structure and industry segment determined the taxes that Sunoco Logistics directly paid. Therefore, sales and use tax and business taxes were estimated from the activities of the induced and indirect economic impacts only. It is estimated that \$431,100 in taxes to the Commonwealth government were generated in 2014 as a result of the operations at MHIC (see Table 4.3).

TABLE 4.3 – ESTIMATED FISCAL IMPACT FROM THE OPERATION OF MHIC IN 2014 IN THE COMMONWEALTH

Tax Type	Direct¹⁶	Indirect and Induced	Total
Personal Income	\$212,700	\$99,800	\$312,400
Sales & Use	N/A	\$89,000	\$89,000
Business	N/A	\$29,700	\$29,700
Total	\$212,700	\$218,500	\$431,100

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

¹⁶ The organizational structure and industry segment determined the taxes that Sunoco Logistics must directly pay. Therefore, sales and use tax and business taxes were estimated from the activities of the induced and indirect economic impacts only. Sunoco Logistics did pay additional fees and taxes to the Commonwealth government, though they were not included in this calculation.

4.3 PRIOR REPORT ESTIMATES FOR MARINER EAST PROJECT STABILIZATION YEAR 2017

DIRECT OPERATING BUDGET

Sunoco Logistics provided estimated operational costs for a potential stabilization year of 2017 when ESI conducted the economic impact analysis in 2015. It was anticipated that as of 2017 the Mariner East 1 and Mariner East 2 pipelines and the associated improvements at MHIC would be complete. The costs to maintain uninterrupted service delivery by the Mariner East pipelines were largely made up of labor, contract services, utilities, and maintenance. Sunoco Logistics estimated that overall operating costs occurring in the Commonwealth would be between \$60 million to \$90 million annually beginning in 2017. Because the operating expenditures at MHIC were preliminary estimates for 2017, ranges were provided to account for possible adjustments (see Table 4.4).

**TABLE 4.4 – RANGE OF ESTIMATED ANNUAL OPERATING EXPENDITURES
FOR THE MARINER EAST PROJECTS, PREVIOUSLY PROJECTED FOR 2017 (\$ MILLION)¹⁷**

Operation Expenditure Categories	Lower-End Expenditure Estimates	Upper-End Expenditure Estimates
Payroll Distribution	\$8.0	\$12.0
Benefits	\$1.0	\$1.5
Contract Services	\$2.6	\$3.9
Operating Supplies	\$0.2	\$0.3
Maintenance Materials	\$0.8	\$1.3
Maintenance	\$4.8	\$7.2
Utilities	\$41.6	\$62.4
Employee Related	<\$0.1	<\$0.1
Other	\$0.9	\$1.3
Total	\$60.0	\$90.0

Source: Sunoco Logistics (2014)

¹⁷ These include operating expenses at MHIC and additional operating costs along the pipeline.

ONGOING ECONOMIC IMPACT

In our 2015 report, we estimated that the operations of the Mariner East 1 and 2 pipelines and MHIC in 2017 would have a potential annual economic impact of \$97 million to \$146 million, supporting 290 to 440 FTE jobs with earnings of \$22 million to \$33 million each year in the Commonwealth (see Table 4.5).

TABLE 4.5 – POTENTIAL ANNUAL ECONOMIC IMPACT FROM OPERATIONS OF THE MARINER EAST PROJECTS IN THE COMMONWEALTH OF PENNSYLVANIA IN 2017, BASED ON PREVIOUS BUDGET ESTIMATES (\$ MILLION)

Impact Type	Lower -End Impact Estimate	Upper-End Impact Estimate
Direct Output	\$60	\$90
Indirect & Induced Output	\$37	\$56
Total Output	\$97	\$146
Employment Supported	290	440
Employee Compensation	\$22	\$33

Source: IMPLAN (2013)

FISCAL IMPACT FROM ONGOING OPERATIONS

In our 2015 report, we estimated that between \$0.8 million and \$1.2 million would be generated annually in total tax revenues to the Commonwealth as a result of the operations of Mariner East 1, 2, and MHIC (see Table 4.6).

TABLE 4.6 – POTENTIAL FISCAL IMPACT FROM THE OPERATION OF THE MARINER EAST PROJECTS IN 2017 IN THE COMMONWEALTH, BASED ON PREVIOUS BUDGET ESTIMATES (IN THOUSANDS OF \$)

Tax Type	Direct¹⁸	Indirect and Induced	Total
Personal Income	\$190 - \$290	\$255 - \$380	\$445 - \$670
Sales & Use	N/A	\$305 - \$460	\$305 - \$460
Business	N/A	\$75 - \$110	\$75 - \$110
Total	\$190 - \$290	\$635 - \$950	\$825 - \$1,240

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

¹⁸ The organizational structure and industry segment determine the taxes that Sunoco Logistics must directly pay. Therefore, sales and use tax and business taxes were estimated from the activities of the induced and indirect economic impacts only. Sunoco Logistics paid additional fees and taxes to the Commonwealth governments which were not included in this calculation.

4.4 EXPANDED OPERATIONS AT NEW STABILIZATION YEAR OF 2020

DIRECT OPERATING BUDGET

By 2020, the expanded ongoing operations at MHIC will generate economic impacts greater than previously estimated due to the expanded Mariner East projects. Using budgets provided by ETP, overall operating costs are estimated to be approximately between \$98 and \$147 million in 2020 for spending in Pennsylvania (see Table 4.7). Because the operating budget for 2020 is still preliminary at this time, the direct output and therefore the overall economic impact is subject to change. To account for possible adjustments to the 2020 budget, the operating inputs and economic impacts are shown as ranges.

TABLE 4.7 – ESTIMATED ANNUAL OPERATING EXPENDITURES FOR THE MARINER EAST PIPELINE, FRACTIONATION FACILITY AND ASSOCIATED IMPROVEMENTS AT MHIC IN 2020 (\$ MILLION)

2020 Projected Budget	Lower-End Budget Estimates	Upper-End Budget Estimates
MHIC Operations	\$82	\$124
Pipeline Operations	\$16	\$24
Annual Operations	\$98	\$147

Source: Energy Transfer Partners (2017)

ONGOING ECONOMIC IMPACT

These annual operating expenditures will generate recurring economic impacts in the statewide economy each year. The potential impacts associated with the operations of the pipelines, fractionation facility, and MHIC will depend on the direct operations expenditures, which are preliminary. In 2020, with the completion of the Mariner East 1, 2, and 2X, the fractionation facility, and associated improvements at MHIC, the operations are estimated to generate a potential annual economic impact between \$142 and \$213 million, supporting between 360 and 530 FTE jobs with earnings between \$31 and \$46 million each year in the Commonwealth (see Table 4.8).

TABLE 4.8 – POTENTIAL ANNUAL ECONOMIC IMPACT FROM OPERATIONS OF THE MARINER EAST PIPELINE, FRACTIONATION FACILITY AND ASSOCIATED IMPROVEMENTS AT MHIC IN THE COMMONWEALTH OF PENNSYLVANIA IN 2020 (\$ MILLION)

Impact Type	Lower -End Impact Estimate	Upper-End Impact Estimate
Direct Output	\$98	\$147
Indirect & Induced Output	\$44	\$66
Total Output	\$142	\$213
Employment Supported	360	530
Employee Compensation.	\$31	\$46

Source: IMPLAN (2015)

FISCAL IMPACT FROM ONGOING OPERATIONS

Operations of the Mariner East pipelines, fractionation facility, and associated improvements at MHIC will generate recurring annual tax revenues for the Commonwealth. Sales and use tax and business taxes were estimated from the activities of the induced and indirect economic impacts only. As a result of the Mariner East pipelines, fractionation facility, and associated improvements at MHIC, between \$1.4 and \$2.1 million will be generated in total tax revenues to the Commonwealth each year beginning in 2020 (see Table 4.9).

TABLE 4.9 – POTENTIAL FISCAL IMPACT FROM THE OPERATION OF THE MARINER EAST PIPELINE, FRACTIONATION FACILITY AND ASSOCIATED IMPROVEMENTS AT MHIC IN 2020 IN THE COMMONWEALTH (IN THOUSANDS OF \$)

Tax Type	Direct¹⁹	Indirect & Induced	Total
Personal Income	\$560 - \$880	\$360 - \$530	\$940 - \$1,420
Sales & Use	N/A	\$330 - \$490	\$330 - \$490
Business	N/A	\$110 - \$160	\$110 - \$160
Total	\$560 - \$880	\$790 - \$1,185	\$1,380 - \$2,070

Source: Econsult Solutions (2017), IMPLAN (2015)

¹⁹ The organizational structure and industry segment determine the taxes that SXL must directly pay. Therefore, sales and use tax and business taxes were estimated from the activities of the induced and indirect economic impacts only. ETP does pay additional fees and taxes to the Commonwealth governments which were not included in this calculation.

REAL ESTATE TAX

In addition to income, sales, and business taxes generated by the operations at MHIC, ETP pays property taxes for MHIC. The renovations will increase the property value of the site as additions are made to accommodate the new pipelines. According to a recent assessment, the fair market value of the properties will increase to \$180 million, up from its previous assessment of \$52 million. As a result of the increase in property values, ETP will pay a total of \$7.1 million annually in property taxes to the Chichester School District, Marcus Hook Borough, and Delaware County (see Table 4.10). This is an increase of \$4.8 million in combined local real estate tax revenues annually.²⁰

**TABLE 4.10 – POTENTIAL PROPERTY TAX REVENUE PAID BY ETP FOR
THE MARCUS HOOK INDUSTRIAL COMPLEX (\$ MILLIONS)**

Property Tax Calculation	MHIC (before renovations)	MHIC (after renovations)	Total Increase
Fair Market Value	\$52	\$180	\$128
Assessed Value	\$32	\$114	\$82
Chichester School District	\$1.6	\$5.0	\$3.3
Marcus Hook Borough	\$0.5	\$1.4	\$1.0
Delaware County	\$0.2	\$0.7	\$0.5
Total Property Taxes Paid	\$2.3	\$7.1	\$4.8

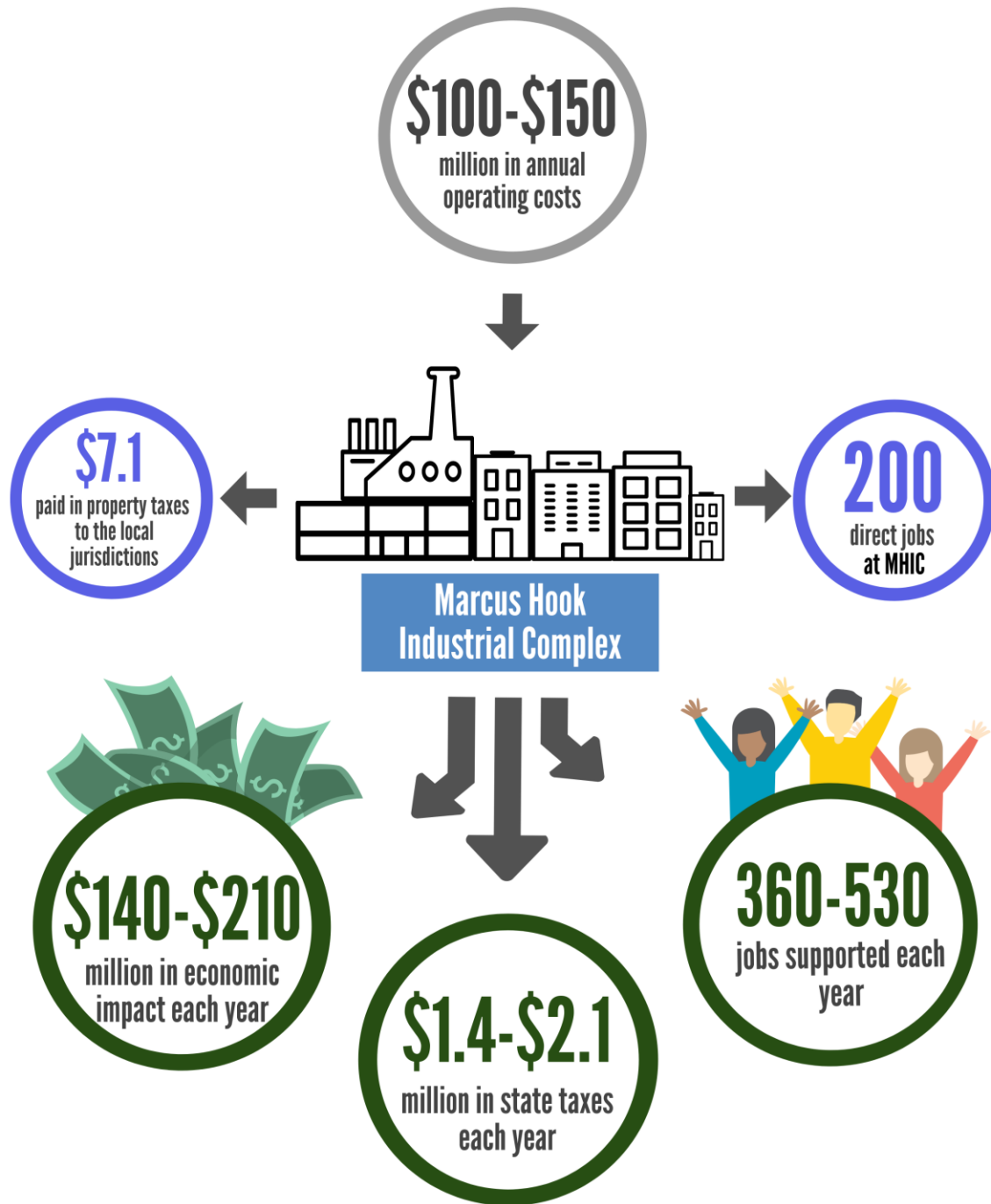
Source: PIVOT (2017), Delaware County Daily Times (2017)

²⁰ The property tax revenues were not calculated by ESI. The taxes shown were taken as reported by the Delaware County Daily Times and Pivot Today. The after renovations estimates appear to include the early payment discount.

Carey, Kathleen E. "New Sunoco Assessment Means Another \$4.8M in Tax Revenue." *The Delaware County Daily Times*, October 27, 2017, www.delcotimes.com/article/DC/20171026/NEWS/171029705

Hostutler, Mark. "Sunoco Pipeline's Upgrades in Marcus Hook to Yield Massive Boost in Tax Revenue," PIVOT .Today, November 1, 2017, pivot.today/2017/11/sunoco-pipelines-upgrades-marcus-hook-yield-massive-boost-tax-revenue/

FIGURE 4.2 – AGGREGATE IMPACT OF OPERATIONS IN 2020 FROM THE MARINER EAST PIPELINES, FRACTIONATION FACILITY AND ASSOCIATED IMPROVEMENTS AT MHIC IN THE COMMONWEALTH OF PENNSYLVANIA



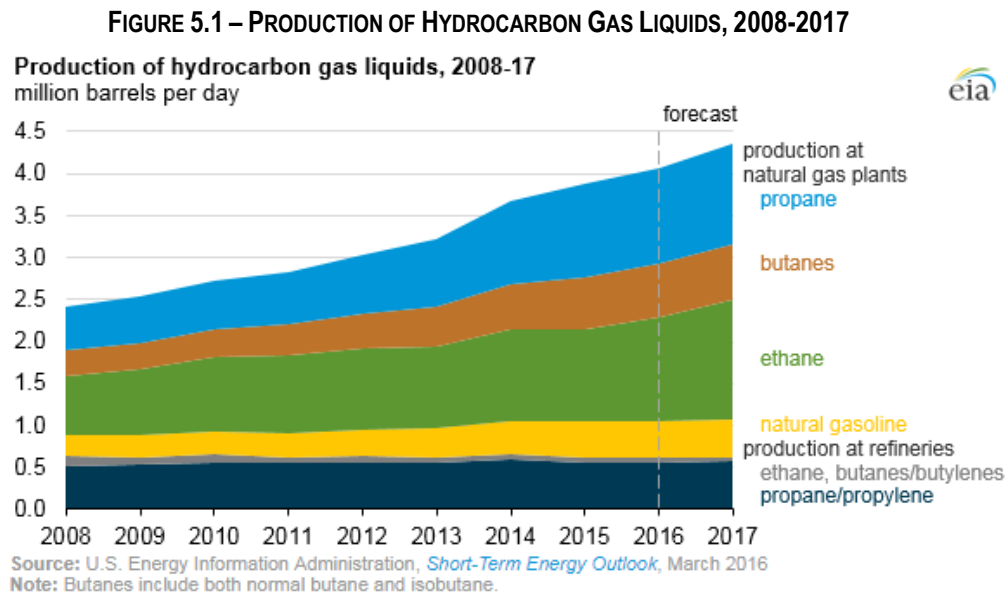
Source: Piktochart (2017), IMPLAN (2015)

5.0 ADDITIONAL ECONOMIC IMPACTS

5.1 OVERVIEW

The U.S. NGL production market has changed considerably over the last several years as US production increases, low natural gas prices are causing companies to explore more opportunities in the NGL markets, and new infrastructure and capital investment are creating more opportunities for NGL extraction, distribution, and use as feedstock in manufacturing and industrial process. Production of propane, butane and ethane has increased and is forecasted to continue to increase in the US (see Figure 5.1).

The expansion of the Mariner East pipelines and the introduction of the Revolution Project will greatly increase the transportation, storage, and distribution capacity of NGLs in southeastern Pennsylvania, creating a supply for home and commercial heating and manufacturing and industrial feedstocks. In addition, MHIC has become the major distribution center for NGLs from Marcellus shale, and is helping create new opportunities for the US economy.²¹



Source: EIA, *Petroleum, Short-Term Energy Outlook*, March 2016

NGLs are an important input in manufacturing regionally and worldwide. The new service delivery will permit businesses in the state to have easier access to NGL inputs. Additional business and

²¹ U.S. Energy Information Administration, *Short-Term Energy Outlook*, March 2016 <https://www.eia.gov/todayinenergy/detail.php?id=25572>

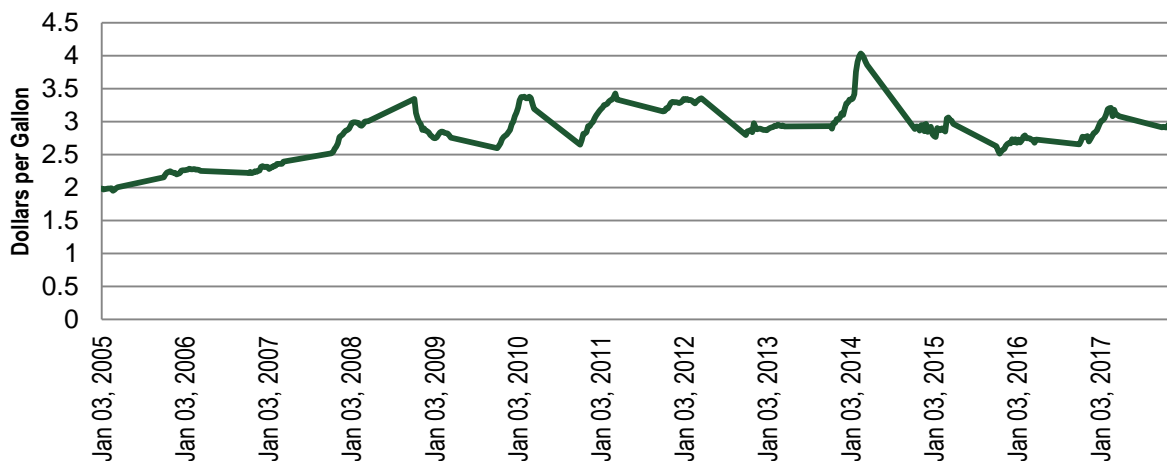
job opportunities may become available in the state due to the stabilized regional supply of NGL. The Commonwealth is poised to regain some of its prominence as a manufacturing hub by adapting to the available supply and proximity of NGLs from the Marcellus shale.

5.2 INCREASED REGIONAL PROPANE STOCKS

As discussed in our 2015 report, the Mariner East pipelines makes the transport of propane in Pennsylvania more efficient, reduces transportation costs, and could help stabilize the retail price of propane in Pennsylvania. Propane is most commonly used for residential central heating, with higher demand in the winter.

The winter of 2013-2014 was especially harsh for the Northeast and demand for propane increased dramatically while the supply plummeted, accounting for a 33 percent price increase from approximately \$3 per gallon to \$4 per gallon (see Figure 5.2). More than 30 states declared emergencies and loosened trucking regulations to ease propane deliveries from the Gulf Coast and other areas where the propane was being processed from natural gas. As can be seen in Figure 5.2, residential propane prices reached an all-time high that winter. Since, prices have reduced to below \$3 per gallon in 2016 and have seen a modest rise to under \$3.50 a gallon in 2017.

FIGURE 5.2 – WEEKLY PENNSYLVANIA RESIDENTIAL PROPANE PRICE (DOLLARS PER GALLON)

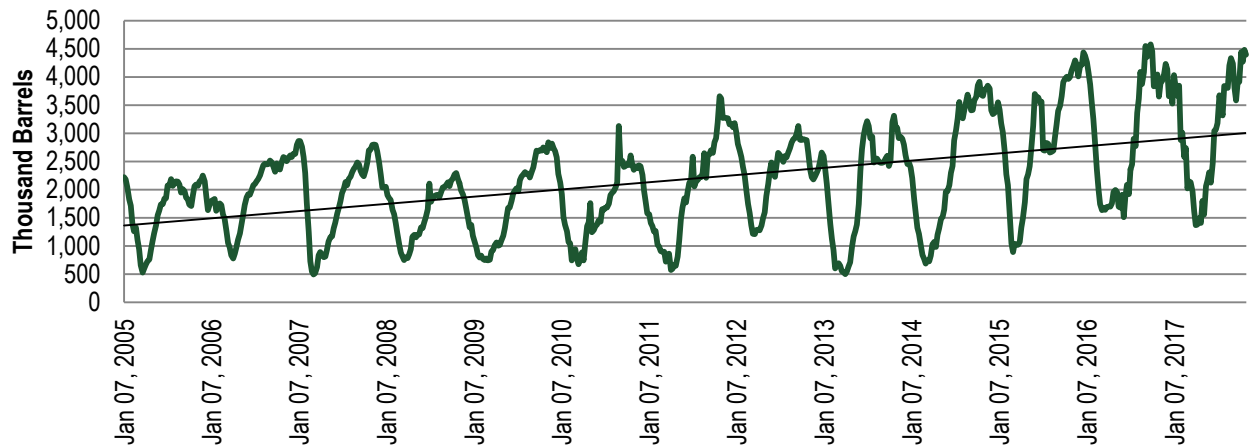


Source: EIA, Petroleum, Heating Oil Propane, Source Key W_EPLLPA_PRS_SPA_DPG, 2017

The additional barrels of propane delivered to and soon to be produced at MHIC will boost the region's reserves, easing supply constraints during the peak heating season. The fractionation facility's extraction of propane from the NGLs shipped to MHIC will allow for a quicker response to regional propane demand during extreme weather events.

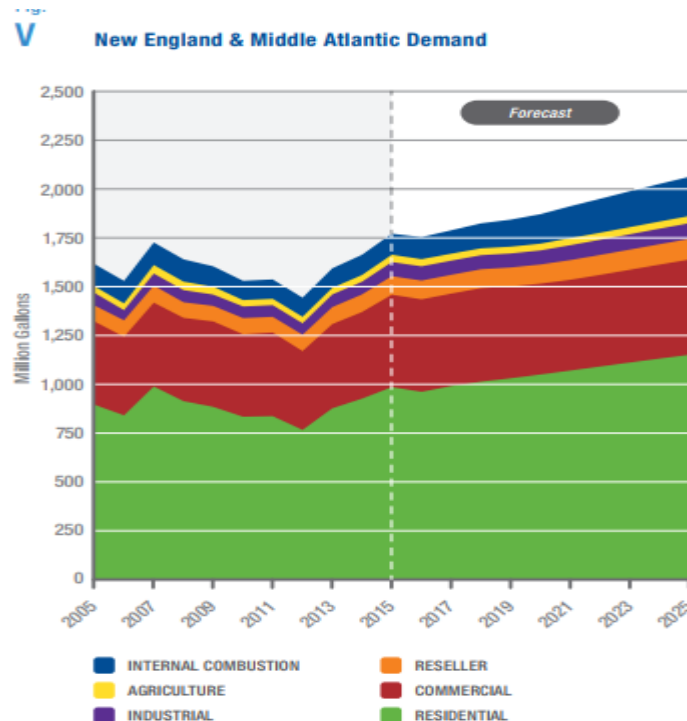
As the supply grows and prices stabilize, it is forecasted that more new residential construction will be outfitted to have propane heat and existing homes and businesses will convert to propane heat in the northeast region of the U.S. The largest demand driver is forecasted to be residential use.

FIGURE 5.3 – WEEKLY CENTRAL ATLANTIC (PADD 1B) ENDING STOCKS OF PROPANE AND PROPYLENE (THOUSAND BARRELS), JAN 7, 2005 – NOV 6, 2017



Source: EIA, Petroleum & Other Liquids, Source Key WPRST1B1, 2017

FIGURE 5.4 – NEW ENGLAND AND MIDDLE ATLANTIC DEMAND FOR PROPANE, ACTUAL AND FORECAST



Source: ICF International, Inc. Propane Market Outlook 2016

5.3 ETHANE PRODUCTION

Ethane is primarily used as a feedstock to produce ethylene, which is used in plastics manufacturing. The US is seeing dramatic changes in the ethane market as its use as a feedstock to produce ethylene is forecasted to greatly increase. This is due to the recent dramatic expansion of ethane crackers in the US, with nine plants just completed or under construction in 2017, four expansions, one restart, and six more proposed. Most are in Texas and Louisiana; however, one is under construction in Western Pennsylvania (see Figure 5.5).²²

FIGURE 5.5 – NEW US CRACKERS COMPLETE, UNDER CONSTRUCTION, FID MADE

Company	C2 capacity (kt/year)	Downstream (kt/year)	Location	Start-Up
OxyChem/Mexichem	544	Feed existing VCM plant of 1,050	Ingleside, Texas	Q1 2017 (done)
Dow Chemical	1,500	ELITE PE (400), LDPE (350), EPDM (200), elastomers (320)	Freeport, Texas	Mid-2017 (mech complete Q1)
ExxonMobil Chemical	1,500	mLLDPE plus LLDPE (650x2) at Mont Belvieu	Baytown, Texas	End 2017
Chevron Phillips Chemical	1,500	Bimodal HDPE (500), mLLDPE (500) at Sweeny	Cedar Bayou, Texas	Q4 2017, PE mid-2017
Formosa Plastics	1,250	PE (525), LDPE (625.5), MEG (1,000), plus DEG, TEG, PEG	Point Comfort, Texas	H2 2018
Sasol	1,500	LDPE (450), LLDPE (450), EO/EG (300), ethoxylates, detergent alcohols (300)	Lake Charles, Louisiana	H2 2018 LDPE early 2019, Others H2 2019
Westlake (Axial)/Lotte	1,000	MEG (700) by Lotte, feed into existing PVC for Westlake	St Charles, Louisiana	Q4 2018
Shintech	500	VCM (300), PVC (300), caustic soda (200)	Plaquemine, Louisiana	2018
Shell	1,500	HDPE/LLDPE (550x2), HDPE (500)	Monaca, Pennsylvania	Early 2020s

9 new crackers = 10.8m tonnes/year
Through 2018/2019 = 9.3m tonnes/year

Source: Petrochemical Update (May 2017)

²²Petrochemical Update, "Insights from the First Wave of US Ethylene Projects Drive Second Wave Decisions," May 5, 2017, <http://analysis.petchem-update.com/engineering-and-construction/insights-first-wave-us-ethylene-projects-drive-second-wave-decisions>

ICF reports diverging market trends between the Marcellus shale region and the Gulf Coast, which is evident in ethane cracker locations: the Marcellus region will remain over-supplied with low prices until there is additional export capacity and new petrochemical facilities come online, whereas the Gulf Coast is experiencing greater demand and higher prices and will need to import ethane from the Marcellus region to alleviate demand.²³ This presents opportunities for MHIC and the Revolution Project to meet ethane demand needs in the Gulf Coast.

The great supply of ethane is also creating other opportunities at MHIC.

- It will have another first for the US as ETP develops an ethane distribution facility that will prepare and load refrigerated ethane for truck delivery.²⁴
- Once completed, Mariner East 2 will deliver ethane to the Competitive Power Ventures power plant in Cambria County, PA. Construction began on the ethane and natural gas fired power plant in October 2017 and will generate electricity for more than one million homes in the Commonwealth.²⁵

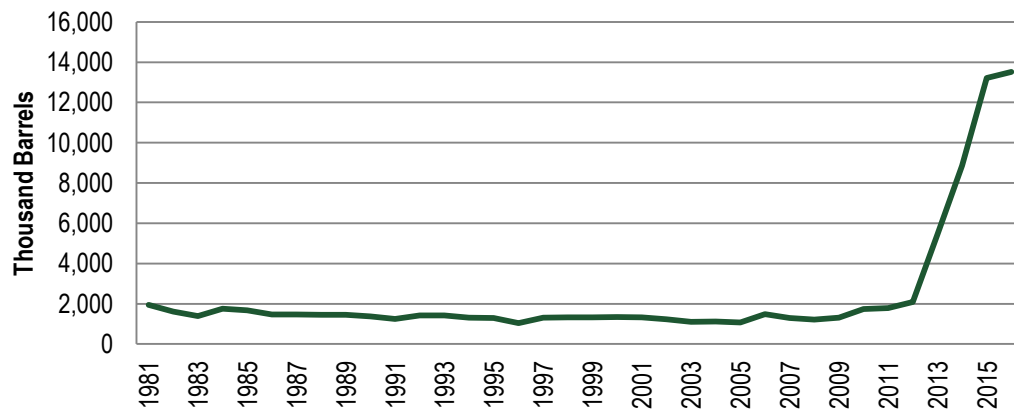
5.4 BUTANE PRODUCTION

Butane production in PADD 1 was stable for 30 years until its production increased by more than 600 percent in 2015 (see Figure 5.6). Butane is not as heavily used as a petrochemical feedstock as ethane or propane. Its largest use is as a blending agent for gasoline (see Figure 5.7). Like ethane and propane, supply of butane greatly increased in the Commonwealth. It can be transported by the Mariner East pipelines, processed at the fractionation facility, and distributed from MHIC. This presents more possibilities for the Commonwealth in the petrochemical, fuel, and energy markets.

²³ Sloan, Michael and Kuhle, Eric, "Gulf Coast Exports Signal Growing Divide in US Ethane Markets," ICF International, Quick Take, 2016, <https://www.icf.com/resources/white-papers/2016/gulf-coast-exports-signal-growing-divide-in-us-ethane-markets>

²⁴ Cocklin, Jamison, "Sunoco's Ethane Truck Terminal in Pennsylvania Moving More NGLs, Natural Gas Intelligence, October 9, 2017, <http://www.naturalgasintel.com/articles/112018-sunocos-ethane-truck-terminal-in-pennsylvania-moving-more-ngls>

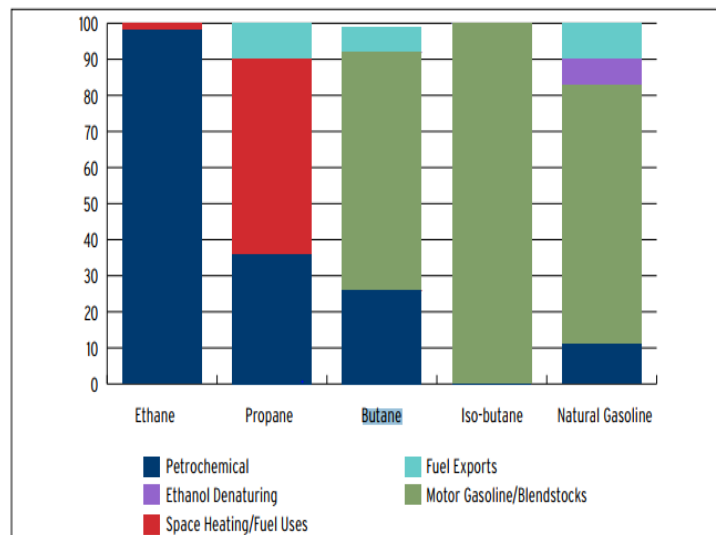
²⁵ CPV Marcellus-Fired Power Plant in Cambria, PA Breaks Ground, Marcellus Drilling News, October 26, 2017, <http://marcellusdrilling.com/2017/10/cpv-marcellus-fired-power-plant-in-cambria-pa-breaks-ground/>

FIGURE 5.6 – EAST COAST (PADD 1) GAS PLANT PRODUCTION OF NORMAL BUTANE-BUTYLENE (THOUSAND BARRELS)

Source: EIA, Natural Gas Field Plant Production: Normal Butane, Source Key WPRST1B1, 2017

FIGURE 5.7 – PRIMARY NGL USES

Figure 6: Who Consumes What? NGL Consumption by Sector and Source



Source: Enventure

Source: Brookings Natural Gas Briefing Document #1 (March 2013)

APPENDIX A – DETAILED ECONOMIC AND FISCAL IMPACT METHODOLOGY

A.1 OVERVIEW

Economic impact estimates are generated by utilizing **input-output models** to translate an initial amount of direct economic activity into the total amount of economic activity that it supports, which includes multiple waves of spillover impacts generated by spending on goods and services and by spending of employee compensation by employees. This section summarizes the methodologies and tools used to construct, use, and interpret the input-output models needed to estimate this project's economic impact.

A.2 INPUT-OUTPUT MODEL THEORY

In an inter-connected economy, every dollar spent generates two spillover impacts: First, some amount of the proportion of that expenditure that goes to the purchase of goods and services gets circulated back into an economy when those goods and services are purchased from local vendors. This represents what is called the “indirect effect,” and reflects the fact that local purchases of goods and services support local vendors, who in turn require additional purchasing with their own set of vendors.

First, some amount of the proportion of that expenditure that goes to the purchase of goods and services gets circulated back into an economy when those goods and services are purchased from local vendors. This represents what is called the “indirect effect,” and reflects the fact that local purchases of goods and services support local vendors, who in turn require additional purchasing with their own set of vendors.

Second, some amount of the proportion of that expenditure that goes to employee compensation gets circulated back into an economy when those employees spend some of their earnings on various goods and services. This represents what is called the “induced effect,” and reflects the fact that some of those goods and services will be purchased from local vendors, further stimulating a local economy.

The role of input-output models is to determine the linkages across industries in order to model out the magnitude and composition of spillover impact to all industries of a dollar spent in any one industry. Thus, the total economic impact is the sum of its own direct economic footprint plus the indirect and induced effects generated by that direct footprint.

A.3 INPUT-OUTPUT MODEL MECHANICS

To model the impacts resulting from the direct expenditures, Econsult Solutions, Inc. developed a customized economic impact model using the IMPLAN input/output modeling system. IMPLAN



represents an industry standard approach to assess the economic and job creation impacts of economic development projects, the creation of new businesses, and public policy changes within its surrounding area. IMPLAN has developed a social accounting matrix (SAM) that accounts for the flow of commodities through economics. From this matrix, IMPLAN also determines the regional purchase coefficient (RPC), the proportion of local supply that satisfies local demand. These values not only establish the types of goods and services supported by an industry or institution, but also the level in which they are acquired locally. This assessment determines the multiplier basis for the local and regional models created in the IMPLAN modeling system. IMPLAN takes the multipliers and divides them into 536 industry categories in accordance to the North American Industrial Classification System (NAICS) codes.

The IMPLAN modeling system also allows for customization of its inputs which alters multiplier outputs. Where necessary, certain institutions may have different levels of demand for commodities. When this occurs, an “analysis-by-parts” (ABP) approach is taken. This allows the user to model the impacts of direct economic activity related to an institution or industry with greater accuracy. Where inputs are unknown, IMPLAN is able to estimate other inputs based on the level of employment, earnings, or output by an industry or institution.\

A.4 EMPLOYMENT AND WAGES SUPPORTED

IMPLAN generates job estimates based on the term “job-years”, or how many jobs will be supported each year. For instance, if a construction project takes two years, and IMPLAN estimates there are 100 employees, or more correctly “job-years” supported, over two years, that represents 50 annual jobs. Additionally, these can be a mix of a full and part-time employment. Consequently, job creation could feature more part-time jobs than full-time jobs. To account for this, IMPLAN has a multiplier to convert annual jobs to full-time equivalent jobs.

Income to direct, indirect, and induced jobs is calculated as employee compensation. This includes wage and salary, all benefits (e.g., health, retirement) and payroll taxes (both sides of social security, unemployment taxes, etc.). Therefore, IMPLAN’s measure of income estimates gross pay opposed to just strictly wages.

A.5 TAX REVENUE IMPACT

The economic impacts in turn produce one-time or ongoing increases in various tax bases, which yield temporary or permanent increases in various tax revenues. To estimate these increases, Econsult Solutions, Inc. created a tax revenue impact model to translate total economic impacts into their commensurate tax revenue gains. These tax revenue gains only account for a subset of the total tax revenue generation that an institution or industry may have on the economy. Furthermore, where institutions are tax exempt, only the tax revenue generation from supported indirect and induced industries is accounted for.