

# The Economic Impact of the Oil and Gas Industry in Pennsylvania

Prepared for the  
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## Appendix A: Economic Impact Model Results

A1	Output
A2	Employment
A3	Employee Compensation
A4	Proprietors’ Income
A5	Other Investor and Property Owner Income

# The Economic Impact of the Oil and Gas Industry in Pennsylvania

## Executive Summary

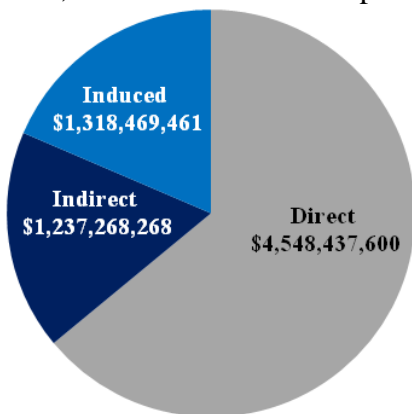
The Marcellus Shale Committee is an independent organization comprised of oil and gas companies actively engaged in developing natural gas resources of the Marcellus Shale in Pennsylvania as well as adjoining states. Member companies are also members of either the Independent Oil and Gas Association of Pennsylvania or the Pennsylvania Oil and Gas Association, the two largest oil and gas industry associations in the state. Due to the importance of Marcellus Shale development for the oil and gas industry and the state of Pennsylvania, the committee is sanctioned and supported by both associations. The committee asked the Pennsylvania Economy League of Southwestern Pennsylvania to perform an economic impact study of the Oil and Gas industry in Pennsylvania. This study looks at the industry's annual impact on the Commonwealth's economy using 2007 as a baseline year.

### *Measuring the current economic impact of the Oil and Gas industry*

Pennsylvania's economy benefits from the direct employment, compensation and output of the Oil and Gas industry as well as from the impacts of the industry's supply and distribution chain. The current jobs within the industry and many more in the broader economy would not exist without the activity of the Oil and Gas industry. Similarly, the wages paid to industry employees have an effect on the broader economy as employees use their compensation to buy goods and services. In this report, the Economy League measures direct, indirect and induced economic output as well as jobs and compensation created by the Oil and Gas industry in Pennsylvania.

### *The Oil and Gas industry generates more than \$7.1 billion a year for Pennsylvania*

Pennsylvania's Oil and Gas industry is a vital contributor to the state's economy, supporting annually through direct, indirect or induced impacts:



**Figure 1 - The Pennsylvania Oil and Gas industry creates \$4.5 billion in output directly, \$7.1 billion overall**

- **More than \$7.1 billion in economic output** - including \$4.5 billion in direct economic impact;
- **More than 26,500 full and part-time jobs** - for every direct Oil and Gas industry job, additional 1.52 full and part-time jobs are generated throughout the state;
- **Nearly \$1 billion in employee compensation** - generating an additional \$1.88 in spending for every dollar paid to employees;
- **\$842 million in proprietors' income**, including income to sole-proprietors and the self-employed; and
- **\$1.9 billion in investor and property owner income** - which includes rents received on properties along with royalties and dividends.

**Table 1 - Summary of the economic impact of the Oil and Gas industry in Pennsylvania**

	Direct Impact	Indirect Impact	Induced Impact	Total Impact	Multiplier <sup>1</sup>
Output	\$4,548,437,600	\$1,237,268,268	\$1,318,469,461	\$7,104,175,239	1.56
Employment	10,538	5,260	10,761	26,559	2.52
Employee Compensation	\$342,815,212	\$271,141,839	\$372,413,532	\$986,370,574	2.88
Proprietors Income	\$725,998,108	\$65,718,800	\$50,998,475	\$842,715,414	1.16
Other Investor and Property Owner Income	\$1,424,504,232	\$232,295,601	\$274,364,972	\$1,931,164,874	1.36

<sup>1</sup> The multiplier is calculated by dividing the total impact by the direct impact.

Average annual wages in the Pennsylvania Oil and Gas industry are higher than in the private sector overall. The average wage in Pennsylvania for jobs covered by the unemployment insurance system in the Oil and Gas Extraction sector in 2007 was \$63,065 - this is \$20,000 more than the private sector average wage across the Pennsylvania.

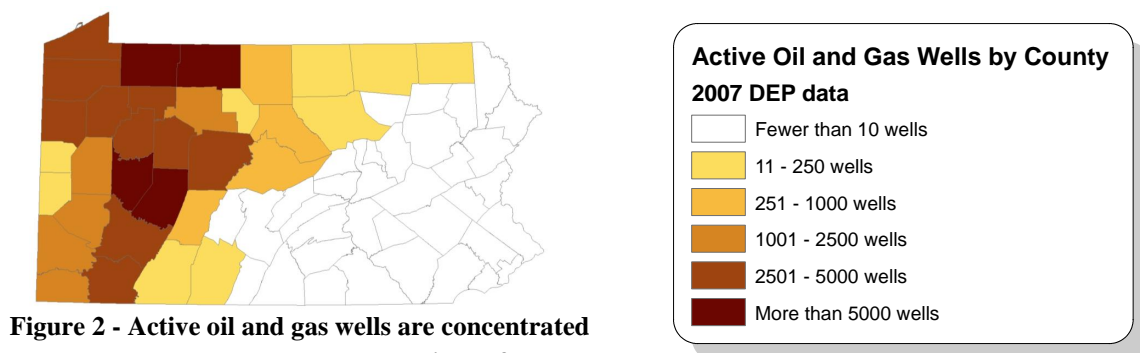
### ***The Oil and Gas industry pays millions of dollars to landowners across Pennsylvania***

Land lease payments made by the Oil and Gas industry represent **millions paid directly to landowners in Pennsylvania**. Royalty payments made to landowners from the Oil and Gas industry are estimated at **more than \$200 million annually**.

### ***The Oil and Gas industry is growing in Pennsylvania***

Between 2000 and 2007, the total number of new oil and gas wells drilled annually in Pennsylvania tripled from 1,354 wells in 2000 to 4,148 wells in 2007. Based on a sampling of well cost data provided to the Economy League, this translates into estimated spending of **\$1.2 billion** across the state on new drilling activity alone.

In 2007, there were close to 79,000 active wells in Pennsylvania, the third highest total of any state in the United States. Approximately 2,000 companies operate at least one well in Pennsylvania, with more than 200 companies operating 100 wells or more in the state.



**Figure 2 - Active oil and gas wells are concentrated across the western and northern portions of the state, most densely in Armstrong, Indiana, McKean and Warren counties**

# **1. Introduction**

## ***1.1 Origins of this report***

The Marcellus Shale Committee is an independent organization comprised of oil and gas companies actively engaged in developing natural gas resources of the Marcellus Shale in Pennsylvania as well as adjoining states. Member companies are also members of either the Independent Oil and Gas Association of Pennsylvania or the Pennsylvania Oil and Gas Association, the two largest oil and gas industry associations in the state. Due to the importance of Marcellus Shale development for the oil and gas industry and the state of Pennsylvania, the committee is sanctioned and supported by both associations. The committee asked the Pennsylvania Economy League of Southwestern Pennsylvania, LLC (Economy League) to perform an economic impact study of the Oil and Gas industry in Pennsylvania. This study looks at the industry's annual impact on the Commonwealth's economy, using 2007 as a baseline year.

The Economy League has been a force for positive change since its founding in 1936. It is widely recognized and well regarded as a nonpartisan research organization committed to sound public policy which enhances the competitiveness of the Commonwealth. The Economy League is the research affiliate of the Allegheny Conference on Community Development and provides research and analysis on specific public policy priorities for the region.

## ***1.2 The Oil and Gas industry has played a predominant role in Pennsylvania's history***

Pennsylvania's rich history in the Oil and Gas industry began with the world's first commercial oil well, the Drake Well, drilled in Titusville in 1859. Western Pennsylvania was the site of the world's first oil boom. The oil and gas industry began here and has remained continuously active in the state for 150 years. Since the 1920s, well production slowed and oil industry activity declined. Present oil production is mostly from stripper wells that produce less than 10 barrels per day.<sup>i, ii</sup>

Once economical means of transmitting natural gas were developed, Pennsylvania also became a leading producer in that sector.<sup>iii</sup> As the interest in using natural gas as a fuel increased, the Speechley Gas Pool Well in Venango in 1865 and the Murrys ville Gas Well in 1878 gave geologists an early opportunity to explore the resource. The excitement around the oil boom in the early 1860's was repeated on a smaller scale for natural gas in 1885. Further research and technological improvement led to the Leidy Natural Gas Boom in 1950.<sup>iv</sup> Pennsylvania's natural gas industry steadily increased through the 1980s, experienced a dip in production in the early part of the 1990s<sup>v</sup>, and has seen growth since then.

### ***1.3 Economic opportunities for growth of the Oil and Gas industry in Pennsylvania***

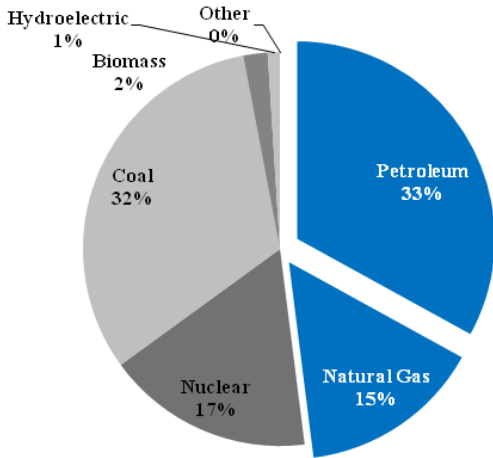
Today, robust growth in energy demand has resulted in increasing oil and gas prices and reinvigorated the search for production around the world, as well as in Pennsylvania. The price of natural gas at the wellhead has increased nationally by 100% in just the last five years.<sup>vi</sup> Geological prospects formerly deemed uneconomical have seen new drilling. Prices as well as technology improvements in horizontal drilling and hydraulic fracturing have spurred increased interest and activity.

The Marcellus Shale deposit, which has received recent attention, stretches across nearly two-thirds of the Commonwealth. The geology of the formation and a lack of critical technology made the deposit prohibitively expensive to access until recently. These economic factors have created opportunities for growth in the Oil and Gas industry in Pennsylvania. But long before the term “Marcellus Shale” became well-known in Pennsylvania, the Oil and Gas industry was already creating economic opportunities for Pennsylvanians.

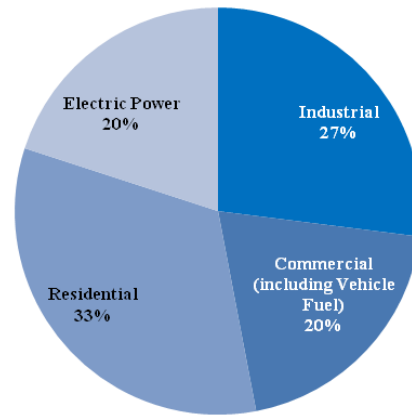
### ***1.4 Uses of oil and natural gas in the United States and Pennsylvania***

Oil and natural gas dominate the national energy market, respectively making up 41% and 23% of the country’s total energy consumption.<sup>vii</sup> Crude oil is processed to make motor gasoline, distillate fuel oil, and kerosene jet fuel. Of the 20.8 million barrels of oil Americans demand each day, 8.3 million come from domestic sources. Motor gasoline (44%) and distillate fuel (20%) are the two biggest uses, comprising nearly two thirds of total petroleum consumption. Jet fuel, residual fuel usage and liquefied petroleum gas round out the remaining 36%.<sup>viii</sup> In Pennsylvania, 33% of total energy consumed comes from petroleum (see figure 3).

Natural gas is best known for the blue flame used in cooking and home heating, although the gas is also used for generating electricity, as a motor vehicle fuel and in the industrial sector. The nation consumed approximately 23.1 trillion cubic feet of natural gas in 2007, down from its historic high of 23.3 trillion cubic feet in 2000.<sup>ix</sup> Use of natural gas as a source of energy, especially in the electric power generation industry, has increased because natural gas is the cleanest-burning fossil fuel and releases less carbon and other byproducts into the atmosphere.<sup>x</sup> At the national level, the share of electric power generated from natural gas grew from 12% in 1990 to 20% in 2006 as more natural gas fueled plants were built.<sup>xi</sup> Net imports of natural gas make up sixteen percent of the national natural gas consumption, most of which comes through pipeline systems from Canada.<sup>xii</sup> In Pennsylvania, 15% of total energy consumed comes from natural gas (see figure 3). It is an important raw material for the manufacturing industry, and the industrial sector consumes 27% of the natural gas used in the Commonwealth (see figure 4).



**Figure 3 - Petroleum and natural gas represent almost half the energy consumed in Pennsylvania**



**Figure 4 - Pennsylvania use of natural gas by sector<sup>xiii</sup>**



## **2. Production of oil and gas encompasses many industries**

Oil and natural gas production is a multistep process that touches many areas of the economy. It is much broader than extraction alone and involves economic activity before, during and after a well is drilled (categorized as ‘pre-drilling,’ ‘drilling’ and ‘post-drilling’ in figure 5.) A host of sectors are part of the supply chain for the Oil and Gas industry’s different planning, construction and transmission activities, and they all contribute to the economic impact.

### **2.1 *Pre-drilling***

Geologists use a variety of advanced methods to locate potential sources of oil and gas, including re-interpretation of existing subsurface data, seismic surveys and other non-invasive surveying methods. Once areas of prospective interest have been identified, oil and gas companies lease the oil and gas rights on what is typically farmland or forest from its owners for a defined period of time in the hope that the land will be productive. If the company decides to drill and gas is present, the producing leases will continue for the life of the well and the landowner<sup>xiv</sup> receives royalty payments for the gas produced from their land. The legislated oil or natural gas minimum royalty payment in Pennsylvania is a one-eighth royalty.<sup>xv</sup>

There are many steps between the decision to drill and drilling itself, including determining that the oil and gas rights belong to the landowner, securing a drilling permit from the Department of Environmental Protection, coordinating with other regulatory agencies as required, and sometimes the determination by a geophysical team of the optimal location of the well. Once these steps are complete, a local construction company must build an access road to the well’s location and well pad for the rig; moving the rig to the pad site follows this preliminary construction work.

### **2.2 *Drilling***

For gas well drilling, crews work around the clock drilling to the gas-bearing formation. During drilling, multiple strings of steel casing are cemented inside the wellbore to protect fresh water aquifers from contact with any drilling or produced fluids and to ensure that the gas can safely flow to the surface. The well is completed by perforating holes through the casing and cement within the producing zone, which allows the gas to flow into the well. To increase the flow rate of a well, hydraulic fracturing is often used to stimulate the formation that contains the gas. After the well is drilled and completed, the site is restored to its original contour, leaving a much smaller production pad where the wellhead, production equipment and tanks are located. Natural pressure of the natural gas in the reservoir rock normally allows it to flow to the surface without any mechanical help.

Drilling of oil wells follows a similar process, although the production equipment is sometimes different.

### **2.3 *Post-drilling***

To market natural gas, pipelines must be constructed to gather and transport the gas, normally to a larger gathering or transmission pipeline, a process that includes extensive analysis, permitting and acquisition of private right-of-way easements from property owners. Prior to marketing, natural gas frequently requires some processing. Although some processing may occur at the wellhead, most occurs at a separate plant following aggregation of gas from multiple wells where water vapor is removed and the heavier hydrocarbons, if any, are extracted to allow for safe transportation and use. The gas is compressed and shipped to local gas distribution companies or the mainline interstate transmission systems.<sup>xvi, xvii</sup> In Pennsylvania, crude oil is typically hauled by trucks from the field to refineries. There, Pennsylvania grade crude oil can be processed to gasoline, kerosene, fuel oil, gas oil, wax distillate and cylinder stock or bottoms.<sup>xviii</sup>

### Pre-drilling



1. Following preliminary geologic investigations, prospective sites are leased from land owners, involving lease bonus payments, followed by production royalties if drilling occurs and oil or gas is produced.
2. After drilling and other required permits are secured, a local construction company builds an access road to the well and pad for the rig.
3. A drilling rig is moved to the site.

### Drilling



1. Crews work around the clock to drill to the gas-bearing formation.
2. Various types of casing are inserted into the hole and cemented in place to protect the groundwater and deliver gas to the surface.
3. A liquid is pumped into the well to fracture the formation and provide a conduit for gas to flow to the well bore, then up through the casing to the surface.
4. The wellhead and surface production equipment are installed and the drilling site is restored.
5. The well is checked frequently to ensure gas is flowing out of the well safely.

### Post-drilling



1. The natural gas flows to the surface and through a gas-fluid separator at the well site.
2. Pipelines are built to gather and send the gas from the wells to a processing plant, then to market.
3. Natural gas is shipped by an interstate transmission pipeline and/or local distribution company to end users.

**Figure 5 - Drilling a well involves many different industries**

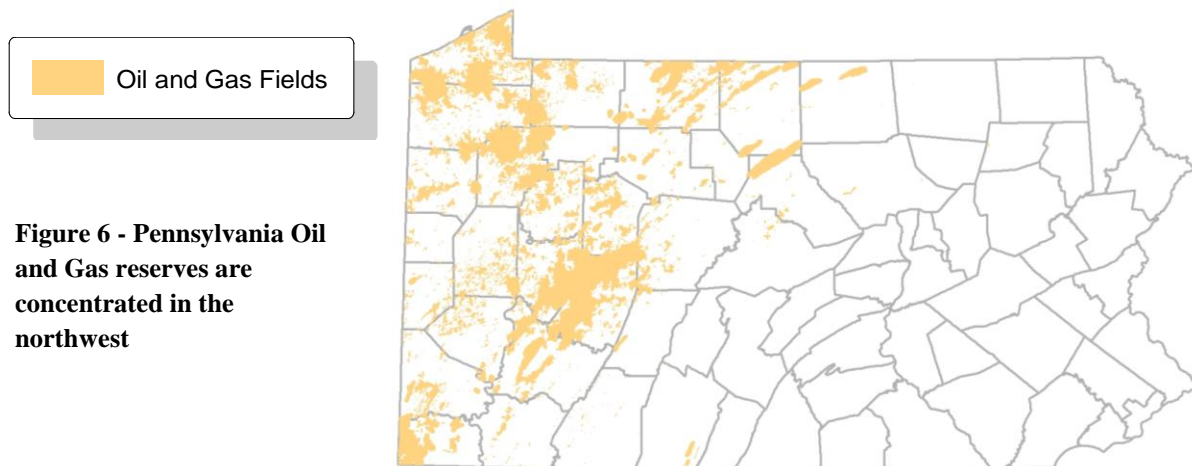
### 3. Overview of the Oil and Gas industry in Pennsylvania

#### 3.1 *Pennsylvania has extensive Oil and Gas resources*

Pennsylvania has the 21<sup>st</sup> largest proven onshore oil reserves in the United States.<sup>xix</sup>

Pennsylvania also has the 13<sup>th</sup> largest proven dry onshore natural gas reserves, about 1.4% of the total United States on- and off-shore proven reserves, at 3,050 billion cubic feet.<sup>xx</sup> The oil and gas fields are concentrated in the western part of the state (see figure 6).

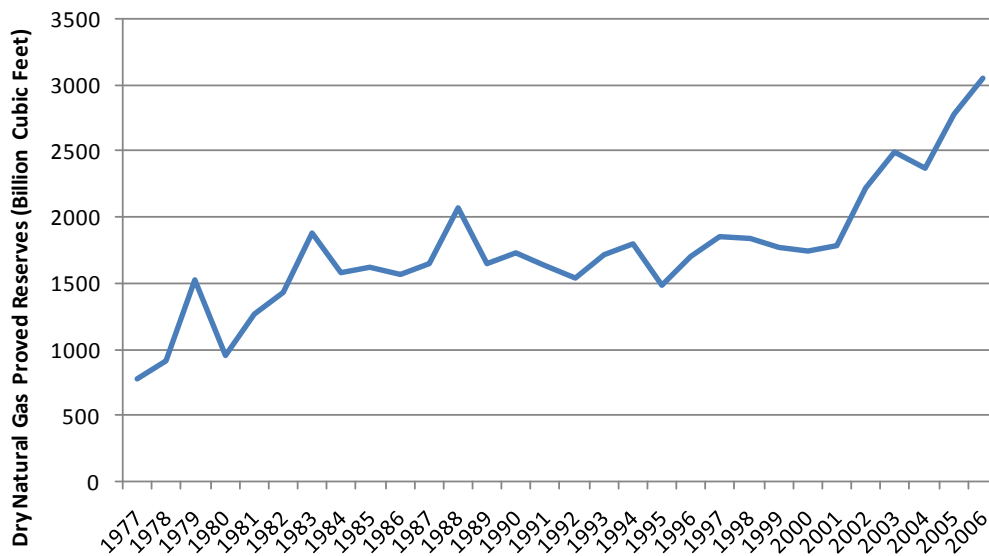
Oil production is concentrated in the northwest of the state. The natural gas industry covers a much larger area, stretching from southwestern Pennsylvania through the northern and central parts of the state. Production comes from the tight sands of the Silurian Medina Sandstone group, which begins in central Ohio running east through northwestern Pennsylvania. The upper Devonian sandstones cover most of the southwestern part of Pennsylvania and stretch through the central and northern parts of state. Lastly, the Oriskany Gas fields, which require a much deeper drilling depth and are drilled less extensively, begin in the northern part of the Commonwealth and run up through New York.



**Figure 6 - Pennsylvania Oil and Gas reserves are concentrated in the northwest**

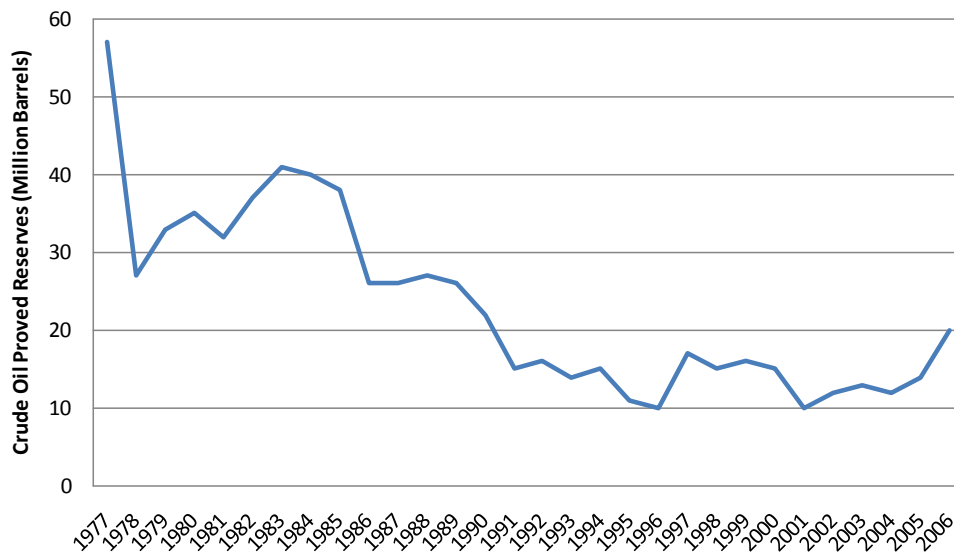
Source: Energy Information Agency, Department of Energy

Additional exploration has led to increases in the proven reserves of natural gas in the state over the past decade, and more recently has also increased the proven crude oil reserves (see figure 7 and figure 8).



**Figure 7 - Pennsylvania dry natural gas proved reserves have increased steadily**

Source: Energy Information Agency, Department of Energy



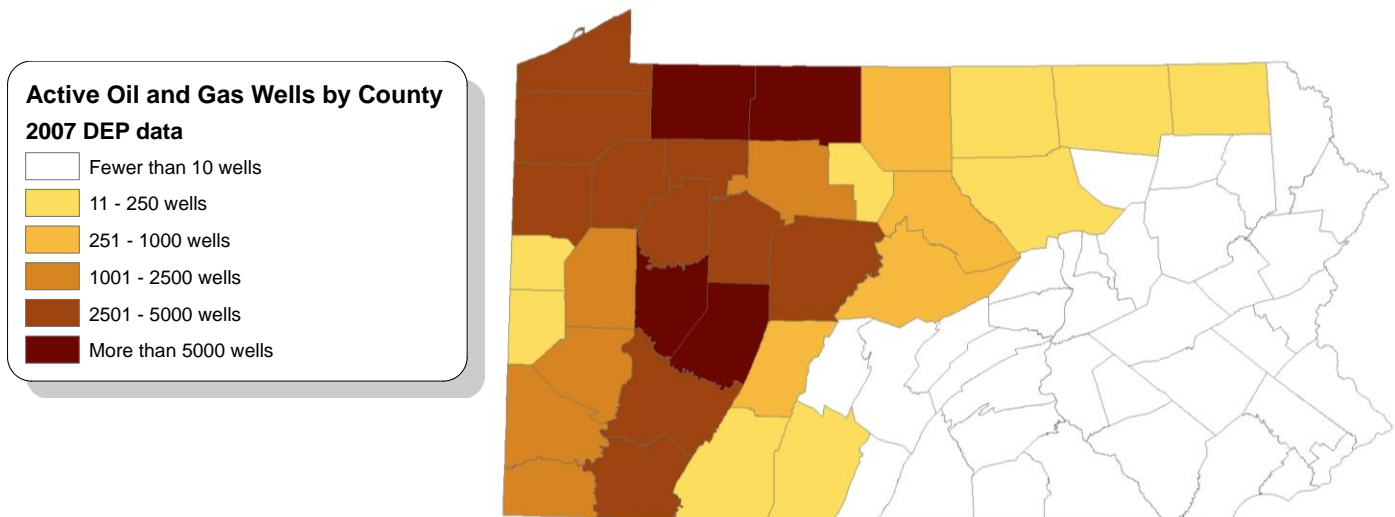
**Figure 8 - After a period of decline, Pennsylvania crude oil proved reserves have begun to increase**

Source: Energy Information Agency, Department of Energy

### ***3.2 Pennsylvania companies are turning a natural resource into jobs and investment***

To create economic value from the natural gas and crude oil resource base, Pennsylvania companies need to drill wells. Pennsylvania, although not ranking among the top states for proven reserves, does rank in the top 20 of producers of oil and top 16 producers of natural gas.<sup>xxi,xxii</sup> Based on Pennsylvania Department of Environmental Protection data, there were

approximately 79,000 active wells in Pennsylvania in 2007, with four counties (Armstrong, Indiana, McKean and Warren) each having more than 5,000 active wells. Pennsylvania has the third largest number of active wells in the United States.



**Figure 9 - Active oil and gas wells are concentrated in the west**

Source: Pennsylvania Department of Environmental Protection

In 2007, there are more than 200 companies in Pennsylvania that operate 100 wells or more in the state and 2,000 companies operating at least one well.<sup>xxiii</sup>

### 3.3 Activity has increased in recent years

To drill an oil or natural gas well, a permit must be issued by the Pennsylvania Department of Environmental Protection. In recent years, applications for permits have increased dramatically. Table 2 shows the number of permits issued in the last three years by type of well.

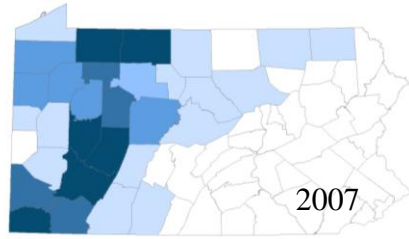
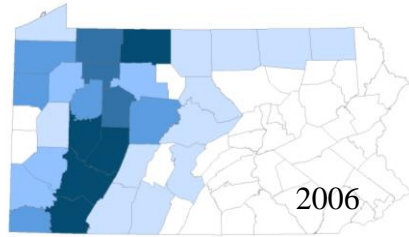
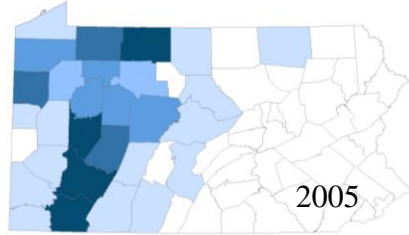
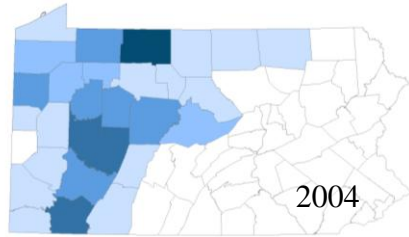
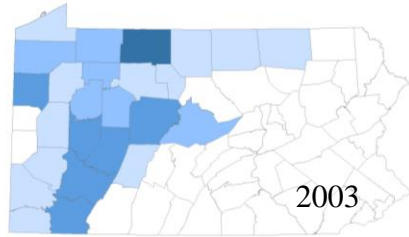
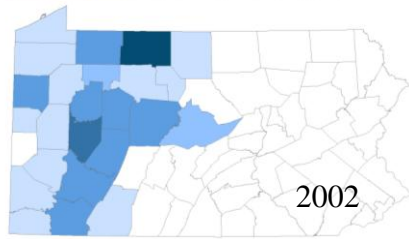
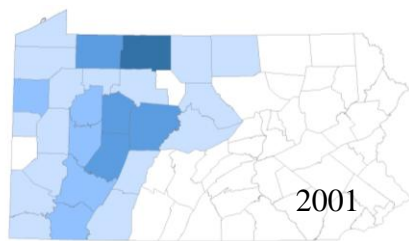
**Table 2 - Well permits issued in the last three years**

Year	Gas Well Permits	Oil and Gas Well Permits	Oil Well Permits	Coal Bed Methane Well Permits	Storage Well Permits	All well permits
2005	3848	741	1338	107	6	<b>6042</b>
2006	4581	942	1635	115	3	<b>7292</b>
2007	4593	730	1822	91	5	<b>7241</b>

In 2007, a total of 7,241 oil and natural gas permits were issued; of these, 1,822 were for oil wells, 4,593 were for natural gas wells, 730 were for oil and gas wells, 91 were for coal bed methane wells and five were for storage wells. Table 3 shows the number of wells by county.

**Table 3 - Well permits issued in 2007 by Pennsylvania county**

County	Gas Well Permits	Oil and Gas Well Permits	Oil Well Permits	Coal Bed Methane Well Permits	Storage Well Permits
Allegheny	64	0	0	0	0
Armstrong	577	10	0	0	0
Beaver	0	3	0	0	0
Bradford	3	0	5	0	3
Bucks	2	0	0	0	0
Butler	91	9	0	0	0
Cambria	50	0	0	7	0
Centre	59	1	0	0	0
Clarion	268	2	13	0	0
Clearfield	301	0	0	0	0
Clinton	40	0	0	0	0
Crawford	71	285	0	0	0
Elk	59	55	86	0	0
Erie	33	27	0	0	0
Fayette	326	9	0	4	0
Forest	13	40	279	0	0
Greene	345	26	2	45	0
Indiana	491	4	0	19	0
Jefferson	320	15	0	0	0
Lycoming	15	2	0	0	0
McKean	162	91	898	0	0
Mercer	105	46	0	0	0
Potter	58	5	44	0	2
Somerset	1	0	0	0	0
Susquehanna	14	0	0	0	0
Tioga	2	0	0	0	0
Venango	69	27	106	0	0
Warren	22	47	388	0	0
Washington	420	12	0	15	0
Westmoreland	612	14	1	1	0
<b>Total</b>	<b>4593</b>	<b>730</b>	<b>1822</b>	<b>91</b>	<b>5</b>



**Figure 10 - Number of oil and gas wells drilled by county shows increases from 2001 to 2007**

As permits are issued, companies are acting on those permits and drilling new wells. The number of new wells drilled annually in Pennsylvania has tripled since 2000 (see table 4 and figure 10).

**Table 4 - Number of new wells drilled in Pennsylvania has tripled since 2000<sup>xxiv</sup>**

Year	Number of new wells drilled
2000	1,354
2001	1,972
2002	1,790
2003	2,358
2004	2,779
2005	3,655
2006	4,184
2007	4,148

Like the existing active wells (see figure 9 above), new wells are concentrated in the western part of Pennsylvania. From 2000 through 2007, McKean, Armstrong, Indiana, Fayette and Warren counties were the location for the most new wells drilled (see table 5 for the top ten drilling locations). The top five counties accounted for half of the total number of wells drilled from 2000 through 2007, and the top 10 accounted for more than three-quarters of the total number of wells drilled over the same period.

**Table 5 - Top 10 counties for number of oil and gas wells drilled between 2000 and 2007**

County	Number of new wells drilled from 2000 through 2007	Percent of total
McKean	3,248	14.6%
Armstrong	2,194	9.9%
Indiana	1,954	8.8%
Fayette	1,923	8.6%
Westmoreland	1,872	8.4%
Warren	1,443	6.5%
Jefferson	1,220	5.5%
Mercer	1,167	5.2%
Forest	1,125	5.1%
Clearfield	1,124	5.1%

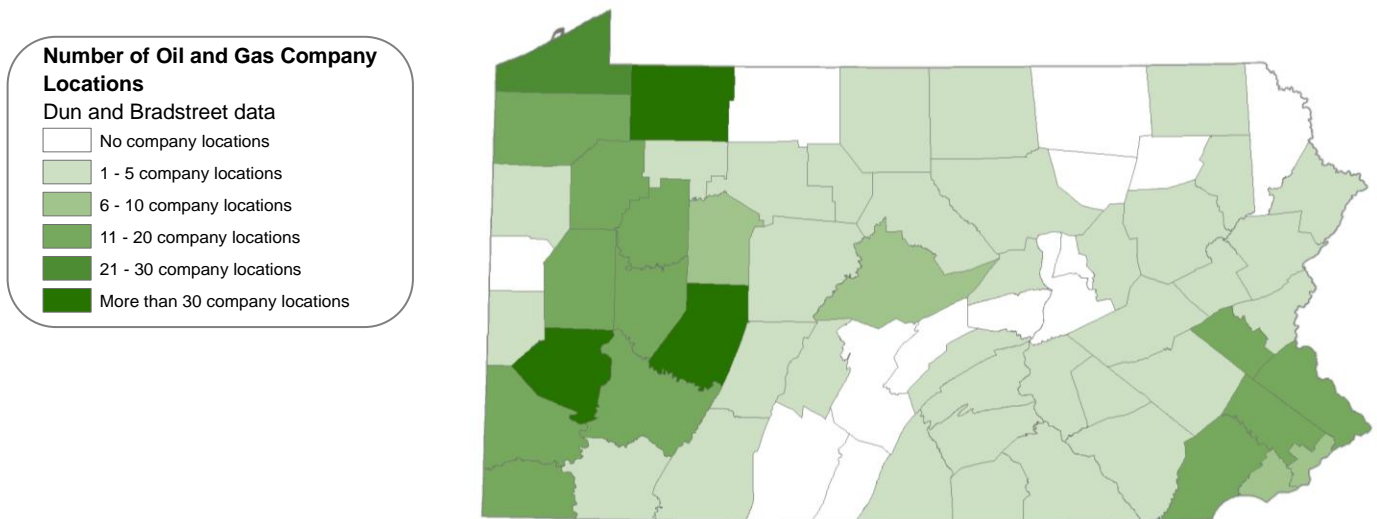


### ***3.4 Pennsylvania produces natural gas for local consumption***

In 2006, the most recent data available, Pennsylvania consumed an estimated 746 billion cubic feet (Bcf) of natural gas while Pennsylvania Oil and Gas industry companies produced 183 Bcf.<sup>xxv</sup> This represents 25% of Pennsylvania's natural gas consumption.<sup>xxvi</sup>

### ***3.5 The Pennsylvania Oil and Gas industry generates wealth in both rural and urban areas***

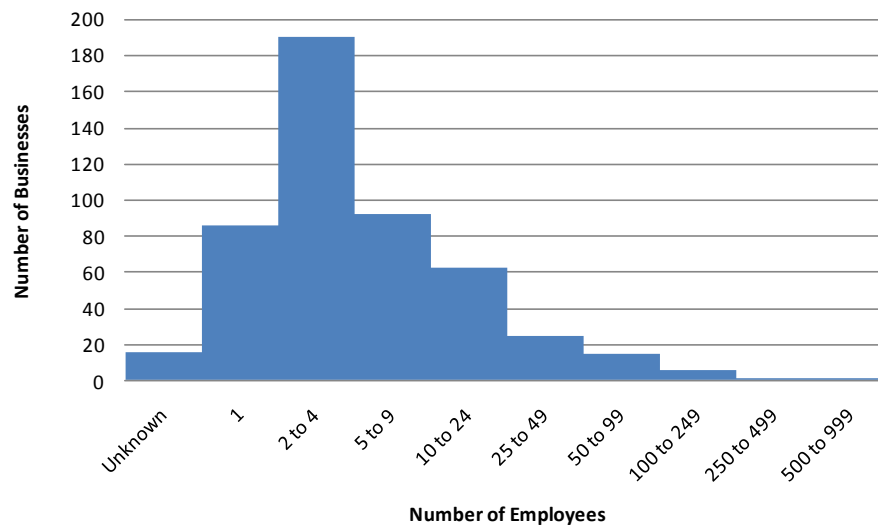
The Oil and Gas industry generates wealth in rural areas through extraction, which provides work for construction companies and is a source of lease and royalty payments. The industry also creates wealth in metropolitan areas where company headquarters are located. This widespread impact can be seen through the location of wells in figure 9 above, added to the locations of Oil and Gas industry company offices in figure 11.<sup>xxvii</sup>



**Figure 11 - Oil and gas company locations in Pennsylvania**

Source: Economy League research, Dun and Bradstreet

The majority of oil and gas company locations in Pennsylvania are small, with 75 percent having fewer than 10 employees (see figure 12).



**Figure 12 - Number of employees at oil and gas business locations across Pennsylvania**

Source: Economy League research, Dun and Bradstreet

## 4. Measuring the economic impact of the Oil and Gas industry in Pennsylvania

The economic impact of the Oil and Gas industry in Pennsylvania is not limited to the employment, compensation, and output of the industry itself. Through its supply chain, the Oil and Gas industry creates jobs in related industries. These jobs would not exist without the activity of the Oil and Gas industry. Similarly, the wages paid to employees have an effect on the broader economy as employees use their compensation to buy goods and services.

To estimate the overall economic impact of the Oil and Gas industry in Pennsylvania, the Economy League used an input-output model for the state supplemented with analyses based on discussions with experts in the Oil and Gas industry. This dual analysis allowed the Economy League to evaluate the impacts generated by the input-output model and explain more intuitively how some of the results from the formal model can be understood.

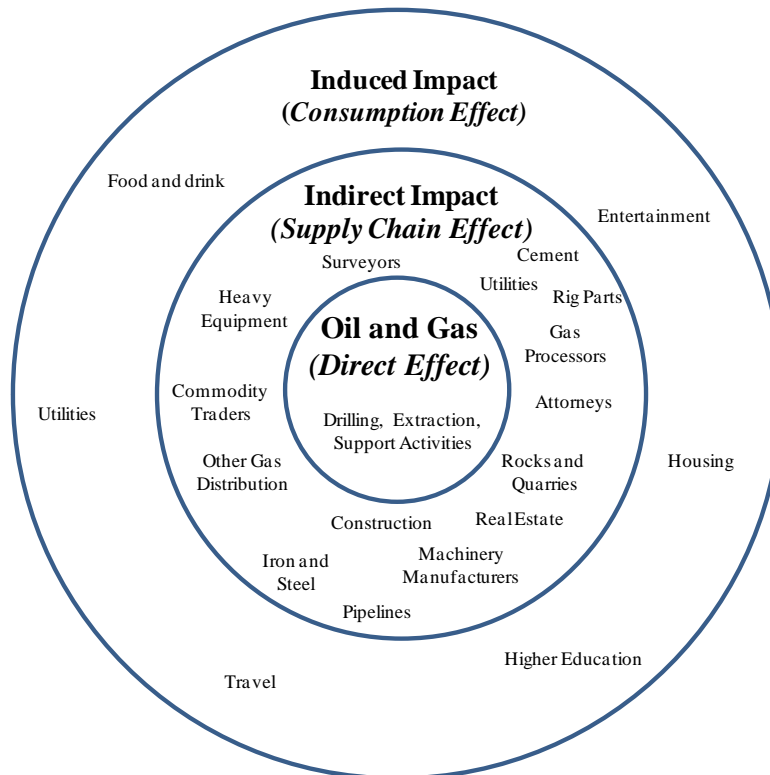
There are several input-output models commonly used by economists to estimate multiplier effects. Because of the complexity of measuring multiplier effects, all of the models have limitations. Still, economists generally agree that the models can provide an approximate measure of the indirect and induced spending, total jobs and personal income generated by a given amount of direct spending in a particular geographic area. The Economy League employed the IMPLAN input-output model in developing the estimates of the Pennsylvania Oil and Gas industry's impacts on the state economy.

The IMPLAN model organizes the economy into 505 separate industries and has comprehensive data on every geographic area of the United States, sourced from federal agencies such as the Bureau of Economic Analysis<sup>xxviii</sup>. It was initially developed and used in 1984 by the U.S. Department of Agriculture, in conjunction with the University of Minnesota. In 1993, the technology was transferred to a new company, the Minnesota IMPLAN Group, Inc. or MIG, Inc. Today, their tools are in use by more than 1,000 public and private institutions.

### 4.1 *The concept of indirect and induced economic impacts*

The impact of Pennsylvania's Oil and Gas industry on the state economy is greater than the total of the industry's direct spending on payroll, goods and services and construction. This is because money spent by the Oil and Gas industry is spent again by the recipient employees and local businesses. Businesses make their own purchases and hire employees, who then spend their salaries and wages throughout the local, regional and state economies - termed ***Indirect Spending***. Employees use their salaries and wages to purchase goods and services from other businesses - termed ***Induced Spending***. A chain reaction of indirect and induced spending continues, with subsequent rounds of additional spending gradually diminished through savings,

taxes, and expenditures made outside the state. This economic ripple effect is measured by IMPLAN and other input-output economic models, using a series of multipliers to provide estimates of the number of times each dollar of input, or direct spending, cycles through the economy in terms of indirect and induced output, or additional spending, personal income, and employment. A key advantage of the IMPLAN model is that it allows the user to determine which industries receive the most indirect and induced benefit from Pennsylvania's Oil and Gas industry. Figure 13 presents an illustration of direct, indirect and induced impacts of the Oil and Gas industry.



**Figure 13 - The Oil and Gas industry has an impact on the broader economy through indirect and induced spending**

## 4.2 *Impact summary*

To determine the impact of the Oil and Gas industry in Pennsylvania, the Economy League developed a definition of the core industry that consists of the following IMPLAN industry sectors.

- *Oil and gas extraction;*
- *Drilling oil and gas wells; and*
- *Support activities for oil and gas operations.*

The IMPLAN model determines impacts this industry has on the state, including employment, output, employee compensation, proprietors' income and property income, defined as follows:

- **Output** - Value of an industry's total production in the study area.
- **Employment** - Includes both full- and part-time workers.
- **Employee Compensation** - Payroll costs for the industry, including salaries and benefits.
- **Proprietor's Income** - Payments received by self-employed individuals as income including income received by private business owners.
- **Other Investor and Property Owner Income** - Payments for rents received on properties, royalties from contracts, dividends paid by corporations and corporate profits earned by corporations.

As shown in table 6, Pennsylvania's Oil and Gas industry is a vital contributor to the state's economy, providing support through direct, indirect or induced impacts:

- Over \$7.1 billion in economic output, including \$4.5 billion in direct economic impact;
- More than 26,500 full and part-time jobs; for every direct Oil and Gas industry job, an additional 1.52 jobs are generated throughout the state;
- Nearly \$1 billion in employee compensation. Employee compensation has the highest multiplier effect of any measured impact, generating an additional \$1.88 in spending for every dollar paid to employees;
- \$842 million in proprietors' income; and
- \$1.9 billion in investor and property owner income, which includes rents received on properties along with royalties and dividends.

**Table 6 - Summary of Oil and Gas industry economic impact in Pennsylvania**

	<b>Direct Impact</b>	<b>Indirect Impact</b>	<b>Induced Impact</b>	<b>Total Impact</b>	<b>Multiplier<sup>1</sup></b>
Output	\$4,548,437,600	\$1,237,268,268	\$1,318,469,461	\$7,104,175,239	1.56
Employment	10,538	5,260	10,761	26,559	2.52
Employee Compensation	\$342,815,212	\$271,141,839	\$372,413,532	\$986,370,574	2.88
Proprietors Income	\$725,998,108	\$65,718,800	\$50,998,475	\$842,715,414	1.16
Other Investor and Property Owner Income	\$1,424,504,232	\$232,295,601	\$274,364,972	\$1,931,164,874	1.36

<sup>1</sup> The multiplier is calculated by dividing the total impact by the direct impact.

### 4.3 *Output: Pennsylvania's Oil and Gas industry generates more than \$7.1 billion annually*

As previously mentioned, the Oil and Gas industry in Pennsylvania provides an overall impact of over \$7 billion to the state's economy, two-thirds of which (\$4.7 billion) comes from the Oil and Gas industry sectors. The direct output impact represents the economic value created by the industry in a year, including the value of the product created through the use of labor, intellectual and physical capital and the support services that make it available to the market.

The impact of royalty payments is evident in the Oil and Gas industry's \$180 million impact in the *lessors of nonfinancial intangible assets* category (which includes *oil royalty companies and lessors*). Not surprisingly, *petroleum refineries* are the beneficiary of a \$154 million impact, while the *housing* industry received an estimated \$153 million induced impact. *Management of companies and enterprises* and *wholesale trade* also benefit from impacts from the Oil and Gas industry exceeding \$100 million.

Table 7 lists the output impact of the Oil and Gas industry and the five sectors that experience the largest indirect and induced impact on output.

**Table 7 - Output impact of the Oil and Gas industry in Pennsylvania**

		Direct Impact	Indirect Impact	Induced Impact	Total Impact	Percent of Total
<b>Total Oil and Gas</b>		<b>\$4,548,437,600</b>	<b>\$139,875,194</b>	<b>\$4,663,379</b>	<b>\$4,692,976,096</b>	<b>66.1%</b>
	Oil and gas extraction	\$3,369,400,832	\$106,263,704	\$4,619,220	\$3,480,283,648	49.0%
	Drilling oil and gas wells	\$784,136,064	\$2,237,736	\$2,944	\$786,376,768	11.1%
	Support activities for oil and gas operations	\$394,900,704	\$31,373,754	\$41,215	\$426,315,680	6.0%
Lessors of nonfinancial intangible assets		\$0	\$176,410,336	\$3,649,260	\$180,059,600	2.5%
Petroleum refineries		\$0	\$128,095,928	\$26,083,618	\$154,179,536	2.2%
Owner-occupied dwellings		\$0	\$0	\$153,161,584	\$153,161,584	2.2%
Management of companies and enterprises		\$0	\$131,025,112	\$16,176,510	\$147,201,616	2.1%
Wholesale trade		\$0	\$50,958,132	\$66,920,732	\$117,878,864	1.7%
Other		\$0	\$610,903,566	\$1,047,814,378	\$1,658,717,943	23.3%
<b>TOTAL IMPACT - ALL INDUSTRIES</b>		<b>\$4,548,437,600</b>	<b>\$1,237,268,268</b>	<b>\$1,318,469,461</b>	<b>\$7,104,175,239</b>	<b>100.0%</b>

### *Impact of Royalty Payments to Pennsylvania Residents*

The Economy League modeling shows a \$180 million impact from *lessors of nonfinancial intangible assets*, including Oil and Gas royalty payments made to landowners. A second estimate confirms this impact to Pennsylvania landowners.

When a landowner and gas company agree to drilling for natural gas or oil on a property, the landowner will typically receive one-eighth of the revenue (the statutory minimum in Pennsylvania) generated for the life of the well. Since the actual terms of these deals are in private contracts and unavailable, we must estimate from publicly available data.

In 2007, Pennsylvania reported natural gas production of 183 billion cubic feet (Bcf). This gas sold for an average price of approximately \$8.09 per mcf<sup>xxx, xxxi</sup>, which corresponds to \$1.48 billion in natural gas revenue. At 12.5%, natural gas landowners earned about \$185 million in royalty payments.

Likewise, Pennsylvania produced 3,626,000 barrels of oil at an average price of \$66.05 per barrel, generating over \$239 million in revenue and approximately \$30 million in royalty payments.

Adding these two figures together, we arrive at \$215 million a year, or \$589,041 daily, in royalty payments from oil and gas sales distributed primarily to landowners in the rural counties of Pennsylvania.

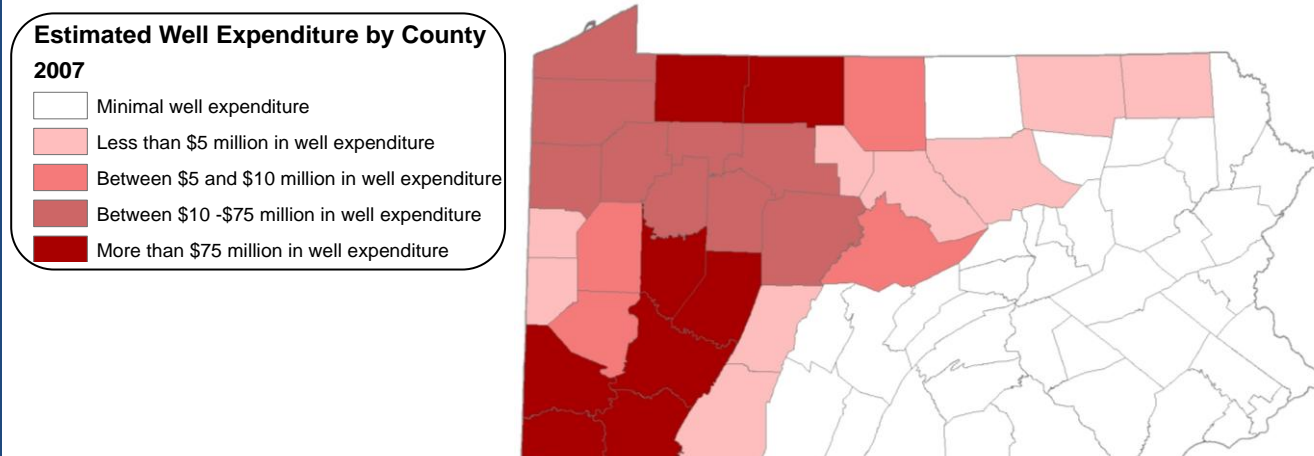
This indicates that royalty payments made to landowners from the Oil and Gas industry can be estimated at more than \$200 million annually.

### *Understanding the Economic Contribution of a New Well*

Each new oil or natural gas well represents anywhere between \$150,000 and \$5 million in investment by an oil and gas company in Pennsylvania, depending on the type of well being drilled. In addition to tangible investments in the casing and equipment, this expenditure includes associated investments in the well through site preparation, drilling and installation. These services are often provided by local contractors, creating employment and economic activity in the largely rural areas where drilling occurs.

In 2007, 4,148 news wells were drilled. Based on a sampling of well cost data provided to the Economy League, this translates into estimated spending of \$1.2 billion across the state. The map (figure 14 below) shows the concentration of investment in Armstrong, Fayette, Greene, Indiana, McKean, Warren, Washington and Westmoreland counties.

This indicates that each new well drilled in Pennsylvania represents a significant expenditure, and the scale and geographic dispersion of the investment contributes to the economy in rural parts of the Commonwealth.



**Figure 14 - Estimated well expenditure is concentrated in the southwest and northwest of Pennsylvania**



#### 4.4 *Employment: Pennsylvania's Oil and Gas industry generates more than 26,500 jobs*

Among the more than 26,500 full- and part-time jobs supported by the Oil and Gas industry, the three core industry sectors generate nearly 11,000, almost all directly. The *food services and drinking places* industry sees the largest employment impact outside the Oil and Gas industry. Not surprisingly, nearly all of this impact is induced. Nearly all of the impacted industries benefit more from the induced effect than the indirect effect.

*Management of companies and enterprises* benefits from the largest indirect impact. Other industries receiving the largest impact from the Oil and Gas industry in Pennsylvania include *wholesale trade*, whose impact is split between indirect and induced effects; *hospitals and health care providers*, recipients of induced impacts; *real estate*, which has both indirect and induced impacts and *legal services*, which has the second largest indirect impact.

Listed in table 8 is the employment impact of the Oil and Gas industry and the five sectors that experience the largest indirect and induced impact on employment.

**Table 8 - Employment impact of the Oil and Gas industry in Pennsylvania**

		Direct Impact	Indirect Impact	Induced Impact	Total Impact	Percent of Total
<b>Total Oil and Gas</b>		<b>10,538</b>	<b>395</b>	<b>10</b>	<b>10,942</b>	<b>41.2%</b>
	Oil and gas extraction	7,074	223	10	7,307	27.5%
	Drilling oil and gas wells	1,356	4	0	1,360	5.1%
	Support activities for oil and gas operations	2,108	168	0	2,276	8.6%
Food services and drinking places		0	55	1,139	1,194	4.5%
Management of companies and enterprises		0	574	71	644	2.4%
Wholesale trade		0	274	360	635	2.4%
Hospitals		0	0	615	615	2.3%
Offices of physicians- dentists- and other health care providers		0	0	582	582	2.2%
Other		0	3,963	7,985	11,947	45%
<b>TOTAL IMPACT - ALL INDUSTRIES</b>		<b>10,538</b>	<b>5,260</b>	<b>10,761</b>	<b>26,559</b>	<b>100.0%</b>

## 4.5 Employee Compensation & Proprietors' Income: Pennsylvania's Oil and Gas industry generates more than \$1.8 billion annually

Employee compensation and proprietors' income are payments made to employees of companies, the self employed and income received by private business owners.

### 4.5.1 Employee Compensation

Pennsylvania's Oil and Gas industry generates through direct, indirect and induced means, nearly \$1 billion in employee compensation, including salaries and benefits. More so than any other measured impact, employee compensation flows into other industries, with just 36% of the total impact generated within the Oil and Gas industry.

*Management of companies and enterprises* received the largest compensation benefit, over \$70 million in indirect and induced impact. Other beneficiaries include *wholesale trade*, whose \$42 million impact is split between indirect and induced impacts; *health care providers and hospitals*, whose impacts are entirely induced; and *legal services*, where the \$27 million in impact primarily comes from indirect sources primarily in the form of payments from industries.

Listed in table 9 is the employee compensation impact of the Oil and Gas industry and the five sectors that experience the largest indirect and induced impact on employee compensation.

**Table 9 - Employee compensation impact of the Oil and Gas industry in Pennsylvania**

		Direct Impact	Indirect Impact	Induced Impact	Total Impact	Percent of Total
<b>Total Oil and Gas</b>		<b>\$342,815,212</b>	<b>\$14,223,175</b>	<b>\$245,352</b>	<b>\$357,283,732</b>	<b>36.2%</b>
	Oil and gas extraction	\$170,490,256	\$5,376,899	\$233,731	\$176,100,880	17.9%
	Drilling oil and gas wells	\$63,248,996	\$180,497	\$237	\$63,429,732	6.4%
	Support activities for oil and gas operations	\$109,075,960	\$8,665,779	\$11,384	\$117,753,120	11.9%
Management of companies and enterprises		\$0	\$63,078,396	\$7,787,730	\$70,866,128	7.2%
Wholesale trade		\$0	\$18,266,654	\$23,988,672	\$42,255,328	4.3%
Offices of physicians-dentists- and other health care providers		\$0	\$0	\$34,573,340	\$34,573,340	3.5%
Hospitals		\$0	\$0	\$33,245,806	\$33,245,806	3.4%
Legal services		\$0	\$19,027,514	\$7,762,902	\$26,790,414	2.7%
Other		\$0	\$156,546,100	\$264,809,730	\$421,355,826	42.7%
<b>TOTAL IMPACT - ALL INDUSTRIES</b>		<b>\$342,815,212</b>	<b>\$271,141,839</b>	<b>\$372,413,532</b>	<b>\$986,370,574</b>	<b>100.0%</b>

#### 4.5.2 Proprietors' Income

The \$842 million impact on proprietors' income, which is defined as payments received by self-employed individuals as income (including income received by private business owners), is more likely to be captured by the Oil and Gas industry than any other impact. Eighty-nine percent of the industry's total impact arises within the industry, with impacts to sectors such as *real estate* and *legal services* being minimal.

Listed in table 10 is the proprietors' income impact of the Oil and Gas industry and the five sectors that experience the largest indirect and induced impact on proprietors' income.

**Table 10 - Proprietors' income impact of the Oil and Gas industry in Pennsylvania**

		Direct Impact	Indirect Impact	Induced Impact	Total Impact	% of Total
<b>Total Oil and Gas</b>		<b>\$725,998,108</b>	<b>\$23,758,350</b>	<b>\$940,838</b>	<b>\$750,697,328</b>	<b>89.1%</b>
	Oil and gas extraction	\$684,186,176	\$21,577,772	\$937,973	\$706,701,952	83.9%
	Drilling oil and gas wells	\$14,900,272	\$42,522	\$56	\$14,942,850	1.8%
	Support activities for oil and gas operations	\$26,911,660	\$2,138,056	\$2,809	\$29,052,526	3.4%
Real estate		\$0	\$2,699,858	\$6,187,559	\$8,887,416	1.1%
Legal services		\$0	\$5,099,936	\$2,080,687	\$7,180,624	0.9%
Offices of physicians-dentists- and other health care providers		\$0	\$0	\$6,863,606	\$6,863,606	0.8%
Lessors of nonfinancial intangible assets		\$0	\$5,541,557	\$114,634	\$5,656,191	0.7%
Scientific research and development services		\$0	\$3,491,211	\$487,296	\$3,978,506	0.5%
Other		\$0	\$25,127,888	\$34,323,855	\$59,451,743	\$0
<b>TOTAL IMPACT - ALL INDUSTRIES</b>		<b>\$725,998,108</b>	<b>\$65,718,800</b>	<b>\$50,998,475</b>	<b>\$842,715,414</b>	<b>100.0%</b>

*Looking at growth in annual average wages paid by the Pennsylvania Oil and Gas industry*

Average annual wages in the Pennsylvania Oil and Gas industry are higher than in the private sector overall (see table 11). Average wages for jobs covered by the unemployment insurance system in the Oil and Gas industry have increased substantially between 2005 and 2007, while the rest of the Pennsylvania private sector has increased at a much slower pace.

**Table 11 - Pennsylvania average wages in the Oil and Gas industry compared to Pennsylvania private sector<sup>xxxii</sup>**

	<b>2003</b>	<b>2004</b>	<b>2005</b>	<b>2006</b>	<b>2007</b>	<b>2003-05 percent change</b>	<b>2005-07 percent change</b>
Oil and gas extraction	\$50,914	\$51,976	\$52,990	\$62,618	\$63,065	4%	19%
Drilling oil and gas wells	\$46,365	\$42,307	\$43,325	\$47,100	\$59,684	-7%	38%
Support activities for oil and gas operations	\$45,536	\$49,053	\$47,441	\$52,836	\$59,287	4%	25%
Total, all private sector industries	\$36,483	\$38,066	\$39,264	\$41,019	\$42,944	8%	9%

#### 4.6 *Other Investor and Property Owner Income: Pennsylvania's Oil and Gas industry generates nearly \$2 billion annually.*

The Oil and Gas industry in Pennsylvania has a notable impact on investor and property owner income in the state, generating nearly \$2 billion in payments for rents received on properties, royalties from contracts, dividends paid by corporations and corporate profits earned by corporations. Over three fourths of this impact occurs in the Oil and Gas industry. This demonstrates one aspect of the impact of the Oil and Gas industry through the lease payments made by the industry to Pennsylvania landowners, often in rural areas. *Owner-occupied dwellings* have a \$118 million impact, all induced, while *lessors of nonfinancial intangible assets* (including *oil royalty companies and lessors*) benefits from a \$68 million impact, nearly all of which is indirect, flowing from the Oil and Gas industry.

Listed in table 12 is the other investor and property owner income impact of the Oil and Gas industry and the five sectors that experience the largest indirect and induced impact on other investor and property owner income.

**Table 12 - Other investor and property owner income impact of the Oil and Gas industry in Pennsylvania**

		Direct Impact	Indirect Impact	Induced Impact	Total Impact	% of Total
<b>Total Oil and Gas</b>		<b>\$1,424,504,232</b>	<b>\$52,118,379</b>	<b>\$1,507,388</b>	<b>\$1,478,130,072</b>	<b>76.5%</b>
	Oil and gas extraction	\$1,082,300,416	\$34,133,448	\$1,483,761	\$1,117,917,696	57.9%
	Drilling oil and gas wells	\$120,143,512	\$342,861	\$451	\$120,486,824	6.2%
	Support activities for oil and gas operations	\$222,060,304	\$17,642,070	\$23,176	\$239,725,552	12.4%
Owner-occupied dwellings		\$0	\$0	\$118,649,320	\$118,649,320	6.1%
Lessors of nonfinancial intangible assets		\$0	\$66,599,404	\$1,377,689	\$67,977,088	3.5%
Real estate		\$0	\$11,536,788	\$26,440,116	\$37,976,904	2.0%
Monetary authorities and depository credit intermediaries		\$0	\$13,237,144	\$13,410,465	\$26,647,608	1.4%
Power generation and supply		\$0	\$9,968,235	\$10,969,503	\$20,937,740	1.1%
Other		\$0	\$78,835,651	\$102,010,491	\$180,846,142	9.4%
<b>TOTAL IMPACT - ALL INDUSTRIES</b>		<b>\$1,424,504,232</b>	<b>\$232,295,601</b>	<b>\$274,364,972</b>	<b>\$1,931,164,874</b>	<b>100.0%</b>

### *Impact of Land Lease Payments to Pennsylvania Residents*

Before a well is drilled, the Oil and Gas industry is already making payments to landowners. Oil and gas companies lease what is typically farmland or forest from its owners for a defined period of time, with the option to explore and drill a well on the land. These land leases are negotiated privately between the landowner and the oil and gas company, but are based on a fixed price, per-acre cost for each property.

Based on information shared with the Economy League by representative companies, the per acre land lease price paid in 2007 is estimated to be anywhere in the \$10 to \$2,000 range, with higher prices paid at the end of 2007. Indications are that payments per acre are substantially higher in 2008 due to interest in the Marcellus Shale.

Estimating total 2007 land lease payments was not possible because it involves the disclosure of confidential information. However, data collected from a few representative companies indicated that land lease payments totaled hundreds of millions in 2007, with the higher per acre prices driving much larger total payments in 2008.

Land lease payments represent millions paid directly to landowners in Pennsylvania.

### *Impact of Land Lease Payments to the Commonwealth of Pennsylvania*

The Commonwealth of Pennsylvania also leases land to the Oil and Gas industry, and received \$4.3 million in lease payments on state owned lands in 2007.<sup>xxxiii</sup> After a shift in policy in 2008, 74,023 acres of state forest land were offered for lease sale. Bids per acre ranged from \$1,151 to \$5,848 for the state forest land. The highest bids for the land came to a total of close to \$190 million.<sup>xxxiv</sup>

Land lease payments represented \$4.3 million paid directly to the Commonwealth of Pennsylvania in 2007, with an additional \$190 million already realized in 2008.

## 5. Conclusion

This report revealed the following conclusions about the Pennsylvania Oil and Gas industry:

The Oil and Gas industry has played a prominent role in Pennsylvania's history, and has the opportunity for growth due to increasing prices and demand for energy.

Activity in the Oil and Gas industry has been growing in recent years, with a tripling in the number of wells drilled between 2000 and 2007. Economic and technological changes have stimulated interest in the Marcellus Shale, and based on the 2007 impact of the Oil and Gas industry, this has the potential to generate substantial positive economic impact in Pennsylvania.

Pennsylvania has extensive oil and gas resources, which companies are turning into jobs and investment. A host of sectors are part of the supply chain for the Oil and Gas industry, generating indirect and induced economic impact in addition to the direct impact of industry activity.

Pennsylvania's Oil and Gas industry is a vital contributor to the state's economy. Through its economic activity, the industry generates more than 26,500 jobs overall; 10,538 jobs directly, and a further 16,021 through indirect and induced effects. The Oil and Gas industry generates more than \$7.1 billion in economic output in total, including \$4.5 billion in direct economic impact.

Average annual wages in Pennsylvania's Oil and Gas industry are higher than average for the state, and growth in industry wages between 2005 and 2007 strongly outpaced the state average. The industry pays more than \$340 million in employee compensation, and stimulates a further \$643 million for a total of nearly \$1 billion in employee compensation across the state's economy resulting from Oil and Gas industry activity.

The Oil and Gas industry generates wealth in rural counties through royalty payments to landowners, estimated at nearly \$200 million in 2007, and through land lease payments, which are currently experiencing unprecedented growth in per-acre prices.

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- <sup>i</sup> Energy Information Agency, *State Energy Profiles - Pennsylvania*.
- <sup>ii</sup> Energy Information Agency, *Crude Oil Production* (Northeast defined as Pennsylvania and states north and east)
- <sup>iii</sup> “Pennsylvania History - Pennsylvania on the Eve of Colonization”  
[http://www.legis.state.pa.us/WU01/VC/visitor\\_info/pa\\_history/whole\\_pa\\_history.htm](http://www.legis.state.pa.us/WU01/VC/visitor_info/pa_history/whole_pa_history.htm)
- <sup>iv</sup> “Striking Oil.” [www.explorepahistory.com](http://www.explorepahistory.com)
- <sup>v</sup> Energy Information Agency, *Pennsylvania Natural Gas Withdrawals from Gas Wells (1970 - 2006)*
- <sup>vi</sup> Energy Information Agency, *Natural Gas Wellhead Value and Marketed Production (2002 - 2007)*
- <sup>vii</sup> Energy Information Agency, *Energy Consumption Estimates by Source and End-Use Sector, 2005*
- <sup>viii</sup> Energy Information Agency, *Petroleum Products Consumption*
- <sup>ix</sup> Energy Information Agency, *Natural Gas Consumption*  
[http://tonto.eia.doe.gov/dnav/ng/ng\\_cons\\_sum\\_dcu\\_nus\\_a.htm](http://tonto.eia.doe.gov/dnav/ng/ng_cons_sum_dcu_nus_a.htm)
- <sup>x</sup> *Natural Gas and the Environment*, NaturalGas.org
- <sup>xi</sup> Energy Information Agency, *Net Generation by State by Type of Producer by Energy Source, 1990-2006*
- <sup>xii</sup> Energy Information Agency *Natural Gas Supply* <http://www.eia.doe.gov/neic/infosheets/natgassupply.html>
- <sup>xiii</sup> Energy Information Agency, *Natural Gas Consumption by End Use (2007)*
- <sup>xiv</sup> The term “landowner”, as used in this report is intended to mean the owner of the oil and gas rights. While the owner of the oil and gas rights is the owner of the surface estate in most areas of Pennsylvania, there are some areas of the Commonwealth where oil and gas rights have been separated or “severed” from the surface estate. In the case of severed estates, oil and gas lease bonuses, royalty payments and other benefits are realized by the oil and gas owner.
- <sup>xv</sup> Pennsylvania Department of Environmental Protection, *Fact Sheet: Landowners and Oil and Gas Leases in Pennsylvania*
- <sup>xvi</sup> NaturalGas.org, *Natural Gas - From Wellhead to Burner*
- <sup>xvii</sup> Energy Information Association, *Natural Gas Basics 101*
- <sup>xviii</sup> Analytical Testing Services, *Crude Oil 101 - Refining*. [http://wetestit.com/Crude\\_101.htm](http://wetestit.com/Crude_101.htm)
- <sup>xix</sup> Energy Information Administration, *Crude Oil Proved Reserves as of 12/3/2006*
- <sup>xx</sup> Energy Information Administration *Dry Natural Gas Proved Reserves as of 12/31/2006*
- <sup>xxi</sup> Energy Information Administration, *Crude Oil Production (2007)*
- <sup>xxii</sup> Energy Information Administration, *Natural Gas Gross Withdrawals and Production (2006)*
- <sup>xxiii</sup> Pennsylvania Department of Environmental Protection, *Active Operators with more than 100 Wells (2007)*
- <sup>xxiv</sup> Pennsylvania Department of Environmental Protection, *Wells Drilled By County Summary 2000 through 2007*
- <sup>xxv</sup> Energy Information Agency, *Advance Summary U.S. Crude Oil, Natural Gas, and Natural Gas Liquid Reserves 2007 Annual Report*
- <sup>xxvi</sup> Energy Information Agency, *International and Interstate Movements of Natural Gas by State as of 12/31/2006*
- <sup>xxvii</sup> Dun and Bradstreet databases, search conducted using SIC code 13 which captures the Oil and Gas Industry
- <sup>xxviii</sup> IMPLAN's state and industry specific input-output multipliers are based on numerous data sources, including the Bureau of Economic Analysis (BEA) Covered Employment and Wages, BEA Regional Economic Information System Data, BEA Output data, National Income and Product Accounts, BEA current benchmark I-O Study, the Consumer Expenditure Survey among others. The IMPLAN model assembles all of the data into a consistent accounting framework following the definitions and conventions of the US input-output benchmark study and the US National Income and Product Accounts.
- <sup>xxix</sup> \$8.087 used for price of natural gas based on the percent change from Ohio’s wellhead to city gate prices (PA Wellhead price was unavailable), Ohio data from Energy Information Administration
- <sup>xxx</sup> Energy Information Agency, *Natural Gas Gross Withdrawals and Production as of 12/31/2006*
- <sup>xxxi</sup> Energy Information Agency, *Spot Prices for Crude Oil and Petroleum Products 2006*
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<sup>xxxii</sup> Bureau of Labor Statistics, *Quarterly Census of Employment and Wages*

<sup>xxxiii</sup> Commonwealth of Pennsylvania Department of Conservation and Natural Resources, *Oil and gas position statement, 2008*

<sup>xxxiv</sup> Commonwealth of Pennsylvania Department of Conservation and Natural Resources, *Results of September 3, 2008 Oil and Gas Lease Offering*

## Appendix A: Economic Impact Model Results

### *A1 Employment*

	Direct Impact	Indirect Impact	Induced Impact	Total Impact	% of Total
<b>Total Oil and Gas</b>	<b>10,538</b>	<b>395</b>	<b>10</b>	<b>10,942</b>	<b>41.2%</b>
Oil and gas extraction	7,074	223	10	7,307	27.5%
Drilling oil and gas wells	1,356	4	0	1,360	5.1%
Support activities for oil and gas operations	2,108	168	0	2,276	8.6%
Food services and drinking places	0	55	1,139	1,194	4.5%
Management of companies and enterprises	0	574	71	644	2.4%
Wholesale trade	0	274	360	635	2.4%
Hospitals	0	0	615	615	2.3%
Offices of physicians- dentists- and other health care providers	0	0	582	582	2.2%
Real estate	0	141	322	463	1.7%
Legal services	0	326	133	458	1.7%
Food and beverage stores	0	21	390	411	1.5%
General merchandise stores	0	18	340	358	1.3%
Civic- social- professional and similar organizations	0	157	199	355	1.3%
Employment services	0	175	171	347	1.3%
Nursing and residential care facilities	0	0	345	345	1.3%
Social assistance- except child day care services	0	0	312	312	1.2%
Motor vehicle and parts dealers	0	14	262	276	1.0%
Monetary authorities and depository credit intermediaries	0	122	124	246	0.9%
Colleges- universities- and junior colleges	0	12	222	234	0.9%
Truck transportation	0	128	103	230	0.9%
Private households	0	0	225	225	0.8%
Securities- commodity contracts- investments	0	109	115	224	0.8%
Miscellaneous store retailers	0	11	208	219	0.8%
<b>TOTAL IMPACT - ALL INDUSTRIES</b>	<b>10,538</b>	<b>5,260</b>	<b>10,761</b>	<b>26,559</b>	<b>100.0%</b>

## A2 Output

		Direct Impact	Indirect Impact	Induced Impact	Total Impact	% of Total
<b>Total Oil and Gas</b>		<b>\$4,548,437,600</b>	<b>\$139,875,194</b>	<b>\$4,663,379</b>	<b>\$4,692,976,096</b>	<b>66.1%</b>
	Oil and gas extraction	\$3,369,400,832	\$106,263,704	\$4,619,220	\$3,480,283,648	49.0%
	Drilling oil and gas wells	\$784,136,064	\$2,237,736	\$2,944	\$786,376,768	11.1%
	Support activities for oil and gas operations	\$394,900,704	\$31,373,754	\$41,215	\$426,315,680	6.0%
Lessors of nonfinancial intangible assets		\$0	\$176,410,336	\$3,649,260	\$180,059,600	2.5%
Petroleum refineries		\$0	\$128,095,928	\$26,083,618	\$154,179,536	2.2%
Owner-occupied dwellings		\$0	\$0	\$153,161,584	\$153,161,584	2.2%
Management of companies and enterprises		\$0	\$131,025,112	\$16,176,510	\$147,201,616	2.1%
Wholesale trade		\$0	\$50,958,132	\$66,920,732	\$117,878,864	1.7%
Real estate		\$0	\$27,941,494	\$64,036,572	\$91,978,072	1.3%
Hospitals		\$0	\$0	\$72,496,840	\$72,496,840	1.0%
Offices of physicians- dentists- and other health		\$0	\$0	\$68,349,984	\$68,349,984	1.0%
Legal services		\$0	\$46,187,592	\$18,843,752	\$65,031,344	0.9%
Food services and drinking places		\$0	\$2,767,330	\$57,063,172	\$59,830,504	0.8%
Monetary authorities and depository credit intermediaries		\$0	\$28,857,872	\$29,235,724	\$58,093,596	0.8%
Petrochemical manufacturing		\$0	\$47,639,908	\$4,331,712	\$51,971,620	0.7%
Power generation and supply		\$0	\$20,902,120	\$23,001,652	\$43,903,772	0.6%
Insurance carriers		\$0	\$6,306,006	\$34,880,636	\$41,186,640	0.6%
Truck transportation		\$0	\$17,764,450	\$14,275,604	\$32,040,054	0.5%
Securities- commodity contracts- investments		\$0	\$15,199,022	\$16,092,421	\$31,291,442	0.4%
Management consulting services		\$0	\$21,607,588	\$7,128,024	\$28,735,610	0.4%
Motor vehicle and parts dealers		\$0	\$1,388,186	\$26,210,596	\$27,598,782	0.4%
Scientific research and development services		\$0	\$24,169,740	\$3,373,560	\$27,543,300	0.4%
All other miscellaneous professional and technical		\$0	\$20,679,348	\$4,252,892	\$24,932,240	0.4%
<b>TOTAL IMPACT - ALL INDUSTRIES</b>		<b>\$4,548,437,600</b>	<b>\$1,237,268,268</b>	<b>\$1,318,469,461</b>	<b>\$7,104,175,239</b>	<b>100.0%</b>

### A3 Employee Compensation

		Direct Impact	Indirect Impact	Induced Impact	Total Impact	% of Total
<b>Total Oil and Gas</b>		<b>\$342,815,212</b>	<b>\$14,223,175</b>	<b>\$245,352</b>	<b>\$357,283,732</b>	<b>36.2%</b>
	Oil and gas extraction	\$170,490,256	\$5,376,899	\$233,731	\$176,100,880	17.9%
	Drilling oil and gas wells	\$63,248,996	\$180,497	\$237	\$63,429,732	6.4%
	Support activities for oil and gas operations	\$109,075,960	\$8,665,779	\$11,384	\$117,753,120	11.9%
Management of companies and enterprises		\$0	\$63,078,396	\$7,787,730	\$70,866,128	7.2%
Wholesale trade		\$0	\$18,266,654	\$23,988,672	\$42,255,328	4.3%
Offices of physicians- dentists- and other health care providers		\$0	\$0	\$34,573,340	\$34,573,340	3.5%
Hospitals		\$0	\$0	\$33,245,806	\$33,245,806	3.4%
Legal services		\$0	\$19,027,514	\$7,762,902	\$26,790,414	2.7%
Food services and drinking places		\$0	\$867,013	\$17,878,072	\$18,745,086	1.9%
Securities- commodity contracts- investments		\$0	\$7,138,509	\$7,558,110	\$14,696,619	1.5%
Scientific research and development services		\$0	\$12,332,762	\$1,721,380	\$14,054,142	1.4%
Monetary authorities and depository credit intermediaries		\$0	\$6,842,753	\$6,932,349	\$13,775,103	1.4%
Management consulting services		\$0	\$9,128,652	\$3,011,408	\$12,140,060	1.2%
Motor vehicle and parts dealers		\$0	\$570,312	\$10,768,172	\$11,338,485	1.1%
Nursing and residential care facilities		\$0	\$0	\$10,826,004	\$10,826,004	1.1%
Insurance carriers		\$0	\$1,631,057	\$9,021,925	\$10,652,981	1.1%
Colleges- universities- and junior colleges		\$0	\$533,567	\$9,891,824	\$10,425,391	1.1%
Nondepository credit intermediation and related activities		\$0	\$5,849,470	\$4,293,445	\$10,142,914	1.0%
Truck transportation		\$0	\$5,292,598	\$4,253,159	\$9,545,756	1.0%
Food and beverage stores		\$0	\$464,103	\$8,691,373	\$9,155,475	0.9%
Civic- social- professional and similar organizations		\$0	\$3,942,172	\$5,001,019	\$8,943,191	0.9%
Architectural and engineering services		\$0	\$6,496,687	\$2,130,307	\$8,626,993	0.9%
Employment services		\$0	\$4,013,007	\$3,924,737	\$7,937,744	0.8%
<b>TOTAL IMPACT - ALL INDUSTRIES</b>		<b>\$342,815,212</b>	<b>\$271,141,839</b>	<b>\$372,413,532</b>	<b>\$986,370,574</b>	<b>100.0%</b>

## A4 Proprietors' Income

	Direct Impact	Indirect Impact	Induced Impact	Total Impact	% of Total
<b>Total Oil and Gas</b>	<b>\$725,998,108</b>	<b>\$23,758,350</b>	<b>\$940,838</b>	<b>\$750,697,328</b>	<b>89.1%</b>
Oil and gas extraction	\$684,186,176	\$21,577,772	\$937,973	\$706,701,952	83.9%
Drilling oil and gas wells	\$14,900,272	\$42,522	\$56	\$14,942,850	1.8%
Support activities for oil and gas operations	\$26,911,660	\$2,138,056	\$2,809	\$29,052,526	3.4%
Real estate	\$0	\$2,699,858	\$6,187,559	\$8,887,416	1.1%
Legal services	\$0	\$5,099,936	\$2,080,687	\$7,180,624	0.9%
Offices of physicians- dentists- and other health care providers	\$0	\$0	\$6,863,606	\$6,863,606	0.8%
Lessors of nonfinancial intangible assets	\$0	\$5,541,557	\$114,634	\$5,656,191	0.7%
Scientific research and development services	\$0	\$3,491,211	\$487,296	\$3,978,506	0.5%
Management consulting services	\$0	\$2,552,862	\$842,151	\$3,395,013	0.4%
Pipeline transportation	\$0	\$2,156,322	\$280,036	\$2,436,358	0.3%
Architectural and engineering services	\$0	\$1,805,089	\$591,901	\$2,396,990	0.3%
Wholesale trade	\$0	\$1,034,608	\$1,358,699	\$2,393,307	0.3%
Truck transportation	\$0	\$1,272,597	\$1,022,665	\$2,295,262	0.3%
Power generation and supply	\$0	\$976,848	\$1,074,969	\$2,051,817	0.2%
Hospitals	\$0	\$0	\$1,831,453	\$1,831,453	0.2%
Accounting and bookkeeping services	\$0	\$1,062,917	\$745,376	\$1,808,293	0.2%
Pharmaceutical and medicine manufacturing	\$0	\$633	\$1,356,537	\$1,357,170	0.2%
Scenic and sightseeing transportation and support	\$0	\$586,989	\$724,444	\$1,311,432	0.2%
Motor vehicle and parts dealers	\$0	\$65,783	\$1,242,052	\$1,307,835	0.2%
Private households	\$0	\$0	\$1,115,610	\$1,115,610	0.1%
Computer systems design services	\$0	\$717,967	\$386,246	\$1,104,212	0.1%
Automotive repair and maintenance- except car wash	\$0	\$130,123	\$944,506	\$1,074,629	0.1%
Advertising and related services	\$0	\$621,681	\$376,254	\$997,935	0.1%
<b>TOTAL IMPACT - ALL INDUSTRIES</b>	<b>\$725,998,108</b>	<b>\$65,718,800</b>	<b>\$50,998,475</b>	<b>\$842,715,414</b>	<b>100.0%</b>

## *A5 Other Investor and Property Owner Income*

		Direct Impact	Indirect Impact	Induced Impact	Total Impact	% of Total
<b>Total Oil and Gas</b>		<b>\$1,424,504,232</b>	<b>\$52,118,379</b>	<b>\$1,507,388</b>	<b>\$1,478,130,072</b>	<b>76.5%</b>
	Oil and gas extraction	\$1,082,300,416	\$34,133,448	\$1,483,761	\$1,117,917,696	57.9%
	Drilling oil and gas wells	\$120,143,512	\$342,861	\$451	\$120,486,824	6.2%
	Support activities for oil and gas operations	\$222,060,304	\$17,642,070	\$23,176	\$239,725,552	12.4%
Owner-occupied dwellings		\$0	\$0	\$118,649,320	\$118,649,320	6.1%
Lessors of nonfinancial intangible assets		\$0	\$66,599,404	\$1,377,689	\$67,977,088	3.5%
Real estate		\$0	\$11,536,788	\$26,440,116	\$37,976,904	2.0%
Monetary authorities and depository credit intermediaries		\$0	\$13,237,144	\$13,410,465	\$26,647,608	1.4%
Power generation and supply		\$0	\$9,968,235	\$10,969,503	\$20,937,740	1.1%
Management of companies and enterprises		\$0	\$16,915,888	\$2,088,455	\$19,004,342	1.0%
Wholesale trade		\$0	\$7,534,890	\$9,895,189	\$17,430,078	0.9%
All other miscellaneous professional and technical services		\$0	\$6,511,330	\$1,339,113	\$7,850,443	0.4%
Legal services		\$0	\$5,240,212	\$2,137,917	\$7,378,129	0.4%
Nonstore retailers		\$0	\$406,533	\$6,565,383	\$6,971,916	0.4%
Offices of physicians- dentists- and other health care providers		\$0	\$0	\$6,856,438	\$6,856,438	0.4%
Telecommunications		\$0	\$1,960,103	\$3,470,917	\$5,431,021	0.3%
Food services and drinking places		\$0	\$246,184	\$5,076,389	\$5,322,573	0.3%
Petrochemical manufacturing		\$0	\$4,114,166	\$374,085	\$4,488,251	0.2%
Insurance agencies- brokerages- and related services		\$0	\$664,479	\$3,708,623	\$4,373,103	0.2%
Petroleum refineries		\$0	\$3,625,548	\$738,255	\$4,363,802	0.2%
Nondepository credit intermediation and related activities		\$0	\$2,512,095	\$1,843,849	\$4,355,943	0.2%
Insurance carriers		\$0	\$582,028	\$3,219,394	\$3,801,423	0.2%
Pharmaceutical and medicine manufacturing		\$0	\$1,696	\$3,634,571	\$3,636,267	0.2%
Other State and local government enterprises		\$0	\$923,619	\$2,533,649	\$3,457,268	0.2%
<b>TOTAL IMPACT - ALL INDUSTRIES</b>		<b>\$1,424,504,232</b>	<b>\$232,295,601</b>	<b>\$274,364,972</b>	<b>\$1,931,164,874</b>	<b>100.0%</b>