

The Economic Contributions of Indiana's Energy Industry



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Executive Summary

This report presents the findings of a detailed analysis of the full economic contributions of Indiana's 14 investor-owned energy providers (i.e., Indiana's energy industry). This analysis considers how the approximately \$11 billion this industry spends annually on its operating budget and capital investments create economic opportunities for Hoosier workers and businesses in other industries. These so-called ripple effects created by this industry is measured both in the amount of GDP generated and the number of jobs supported by this spending. This report will also consider how the industry's economic activities contribute to state and local government revenues in Indiana.

Key Findings

- The annual operating budgets of Indiana's 14 investor-owned energy providers support 11,500 direct jobs in Indiana, as well as another 16,460 jobs throughout the state as a result of the industry's ripple effects. The total employment footprint of the energy industry's operations was nearly 28,000 jobs in Indiana in 2016. The combined effects of the operations of this industry also contribute an estimated \$4.1 billion to Indiana's GDP.
- The utilities industry as a whole has traditionally ranked among the highest-paid sectors due to the specialized and highly skilled nature of many of the occupations they employ. With regard to the energy industry's 11,500 direct jobs, these workers earn an average annual income of approximately \$92,000.
- Another benefit of this industry's need for highly skilled workers is that many of the industry's job openings are a good fit for military veterans. Indiana's investor-owned energy providers report that approximately 7 percent of their new hires in recent years have been service members. By contrast, veterans accounted for 4.6 percent of Indiana's total labor force in 2016.
- The state's energy industry also contributes to the state's economy through its significant capital investments, which have averaged \$2.5 billion annually between 2014 and 2016. The direct effects and economic ripple effects of these investments combined to generate an estimated 15,870 jobs in Indiana, as well as nearly \$1.5 billion in annual GDP.
- All told, Indiana's investor-owned energy providers—through the full effects of their operating expenditures and capital investments—support nearly 44,000 jobs in Indiana and generate nearly \$5.6 billion in GDP.
- The total jobs tally accounts for 1.1 percent of all jobs in Indiana in 2016, while the total GDP effect is the equivalent of 1.6 percent of the state's entire GDP.
- The economic activities of this industry are characterized by an employment multiplier of 2.15, which indicates that every job directly linked to the energy industry supports nearly 1.2 jobs in other industries in the state. Similarly, the GDP multiplier for the combined effects of this industry's operations and capital investments is 1.48, meaning that every dollar of direct GDP generated by this industry spurs another \$0.48 in economic activity elsewhere in the Indiana economy.
- The full effects of the Indiana energy industry also combine to contribute an estimated \$476 million in annual state and local government revenues.

Introduction

Most Hoosiers know that the state’s electricity and natural gas providers deliver a critical service. Not only is the availability of reliable energy fundamental to our daily lives, but this industry also forms an important pillar of Indiana’s energy-intensive economy. In fact, while Indiana is just the 17th-most populous state in the country, Hoosiers rank 9th nationally in terms of per capita energy use due to the state’s significant industrial energy consumption (see **Table 1**).

Table 1: Indiana Energy Consumption Quick Facts

Category	National Rank
Total Population	17
Residential Energy Use	14
Commercial Energy Use	17
Industrial Energy Use	5
Total Energy Use	10
Per Capita Energy Use	9

Source: U.S. Census Bureau Population Estimates (2017) and U.S. Energy Information Administration (2015)

So while it is easy to see the indispensable role the energy industry plays in support our daily lives and our economy, the fact that electricity and natural gas providers are economic drivers in their own right might be less well understood. This report aims to measure the full economic contribution that Indiana’s energy providers make to the state’s economy through their payrolls and supply chain purchases, as well as the impact of energy infrastructure construction projects. The data presented in this study is focused solely on the 14 investor-owned energy providers (i.e., the energy industry) operating in Indiana.

These investor-owned utilities employed a reported 11,500 workers in Indiana in 2016 with a combined payroll of nearly \$1.1 billion (see **Table 2**). According to the U.S. Bureau of Labor Statistics, the most common occupations employed in this industry include line installers and repairers, power plant operators, electrical engineers, equipment mechanics, and various management occupations. Given the specialized and highly skilled nature of these occupations, it is little wonder that the average annual income for workers at these utilities was roughly \$92,000 in 2016.

Table 2: Indiana’s Investor-Owned Electric Power Industry by the Numbers, 2016

Category	Value
Electricity and Natural Gas Providers	14*
Employees	11,500
Payroll	\$1.06 billion
Supply Chain Spending	\$7.8 billion
Capital Expenditures	\$2.5 billion**
State and Local Taxes Paid	\$312.2 million

*Value represents investor-owned utilities only; **Value represents a three-year average for the years 2014-2016
 Source: Indiana Energy Association

One point of pride for the state's energy industry is the relatively high rate of military veteran hiring at these companies. The state's investor-owned energy providers report that approximately 7 percent of their new hires in 2015 and 2016 were former service members. As a point of comparison, data from the U.S. Census Bureau's American Community Survey show that military veterans accounted for 4.6 percent of Indiana's total labor force in 2016.

In addition to their payrolls, Indiana's electricity and natural gas providers also help to spur the state's economy through their supply chain purchases. The state's investor-owned energy providers report that they spent a combined \$7.8 billion on the goods and services they required in 2016. Beyond these general operating expenditures, these same firms spent an average of \$2.5 billion per year between 2014 and 2016 on capital projects in Indiana.

All told, this group of utilities spent more than an estimated \$11 billion on its Indiana-based activities in 2016. The remainder of this report will examine how this spending generates ripple effects that benefit many other areas of the state's economy.

Economic Contributions of Indiana’s Energy Industry

In the terminology of input-output economic analysis, the details provided previously in **Table 2** describe the “direct effects” of the state’s investor-owned electricity and natural gas providers. The economic activity generated by these direct effects—the purchase of goods and services along with the household spending of workers—cascade throughout the state’s economy. In order to estimate these so-called economic ripple effects, the Indiana Business Research Center (IBRC) research team used the IMPLAN economic modeling software to conduct an input-output analysis of the state’s energy industry.

The IMPLAN model provides a detailed account of the structure of the state’s economy. For instance, the model estimates that roughly 21 percent of the goods and services required by the state’s electric power generation firms (measured in dollars) are provided by other Indiana companies. Additionally, the employees of the state’s electricity and natural gas providers—as well as workers throughout their supply chain—spend their earnings on food, clothing, health care, entertainment, etc. Nearly all of this spending will occur in the state. The contributions from both of these spending streams—the supply chain purchases and the employee household spending—are represented in the “ripple effects” columns in the following tables. This same framework can also be applied to capital investments.

With respect to energy infrastructure construction projects, the research team made a few assumptions about the geographic destination of some of these expenditures in an effort to avoid overestimating the economic effects of capital investment. For example, given the highly specialized nature of much of the equipment and materials used to construct and operate energy industry infrastructure, researchers assumed that 40 percent of the industry’s capital expenditures went to purchase major equipment manufactured outside the state. This is considered an economic leakage as money spent outside Indiana has no economic effect in the state.

Similarly, much of the labor force used in these construction projects is specialized as well. Researchers assumed that 25 percent of the labor used in these projects went to workers who reside in other states. However, not all of the wages paid to out-of-state workers is counted as an economic leakage. Rather, the research team assumed that out-of-state workers will spend a portion of their earnings in Indiana on food, lodging, gasoline, etc. while they are on the job. The IBRC research team based their assumptions for the capital investment portion of the analysis on several previous detailed studies it had conducted on energy industry construction projects.

Economic Contributions of Energy Industry Operations

As referenced earlier, Indiana’s investor-owned energy providers combined to spend a reported \$7.8 billion on supply chain purchases in 2016 along with nearly \$1.1 billion in employee compensation. This combined \$8.9 billion operating budget translate into a nearly \$2.9 billion direct contribution to Indiana’s gross domestic product (GDP is simply a measure of the value of the total output of an industry or a state or a country after subtracting the costs of production inputs). As **Table 3** shows, the energy industry’s operating expenditures spurred an additional \$1.2 billion in GDP for other industries in the state, bringing the total economic footprint of these activities to an estimated \$4.1 billion in GDP.

A useful way to interpret the economic ripple effects of Indiana’s energy industry is to look at the multiplier. The ratio of the industry’s direct GDP estimate to its total GDP effect yields a multiplier of 1.43, meaning that every dollar of GDP created by the state’s investor-owned energy providers generates an estimated \$0.43 in additional economic activity in the state.

In terms of employment, in addition to the industry’s 11,500 direct workers, the economic activity initiated by Indiana’s investor-owned energy providers supports an estimated 16,460 jobs for other businesses in the state. Adding the employment direct effects to the ripple effects brings the total employment footprint of the industry’s operating expenses to nearly 28,000 jobs in Indiana. The multiplier of 2.43 suggests that every direct job in the energy industry supports another 1.43 in other industries in the state (or every 10 direct jobs leads to slightly more than 14 additional ripple effect jobs).

Table 3: Economic Contribution of the Indiana Energy Industry’s Operating Expenditures, 2016

	Direct Effects	Ripple Effects	Total Effects	Multiplier
GDP (\$ million)	\$2,873.3	\$1,229.5	\$4,102.8	1.43
Employment	11,500	16,460	27,960	2.43

Source: IBRC, using results from the IMPLAN modeling software

Economic Contributions of Energy Industry Capital Investments

Switching gears to the Indiana energy industry’s construction activities, the annual capital investments worth an estimated \$2.5 billion translate into more than a \$900 million annual direct contribution to Indiana’s GDP (see **Table 4**). As these investments filter through the rest of the state’s economy they spur nearly \$570 million in additional economic activity, bringing the total annual GDP effect of energy industry capital investments to an estimated \$1.47 billion. The multiplier of 1.63 indicates that every dollar of direct GDP created by energy industry construction projects generates another \$0.63 in value added throughout the rest of the Indiana economy.

This level of capital investment also supports an estimated 8,890 direct jobs annually along with nearly 7,000 additional jobs in the state through the economic ripple effects. Adding these together, the estimated total annual employment contribution of energy industry capital investment stands at 15,870 jobs. The multiplier shows that every 10 jobs that are directly linked to capital investment projects support roughly eight additional jobs in other industries throughout Indiana.

Table 4: Economic Contribution of the Indiana Energy Industry’s Capital Investments, 2016

	Direct Effects	Ripple Effects	Total Effects	Multiplier
GDP (\$ million)	\$904.6	\$566.0	\$1,470.7	1.63
Employment	8,890	6,980	15,870	1.79

Source: IBRC, using results from the IMPLAN modeling software

Total Economic Contributions of Indiana’s Energy Industry

The full economic contributions that the state’s investor-owned energy providers make to Indiana come into focus when we sum the effects of the industry’s operations and its capital investments. All told, the state’s energy industry contributed nearly \$5.6 billion to Indiana’s GDP in 2016 and was responsible for a total of roughly 44,000 jobs (see **Table 5**). The GDP multiplier of 1.48 means that every dollar of GDP directly linked to the state’s energy providers generates another \$0.48 in GDP in other industries in Indiana. Meanwhile, the employment multiplier of 2.15 tells us that every job directly created by the operations and

capital investments of the energy industry support another 1.15 jobs elsewhere in the Indiana economy (or every 10 energy-related jobs support nearly 12 additional jobs in other industries).

To help put these numbers in perspective, the U.S. Bureau of Economic Analysis reports that Indiana’s total GDP in 2016 stood at \$347 billion and the state had nearly 3.86 million jobs. Given these numbers, this analysis shows that the combined effects of the state’s investor-owned energy providers accounts for 1.6 percent of Indiana’s entire GDP and is responsible for 1.1 percent of all jobs in the state.

Table 5: Total Economic Contribution of the Indiana Energy Industry, 2016

	Direct Effects	Ripple Effects	Total Effects	Multiplier
GDP (\$ million)	\$3,777.9	\$1,795.6	\$5,573.5	1.48
Employment	20,390	23,440	43,830	2.15

Source: IBRC, using results from the IMPLAN modeling software

Indiana Energy Industry’s Contributions to State and Local Government Revenue

In addition to the various contributions to GDP and employment outlined previously, the economic activity initiated by the Indiana’s energy industry also generates state and local government revenues. The state’s investor-owned energy providers report state and local tax payments of a combined \$312 million in 2016. Beyond these direct tax effects, the economic ripple effects associated with the energy industry’s operating budget and capital investments triggered an additional \$164 million in state and local government revenues, bringing the industry’s total tax effect to \$476 million in 2016 (see **Table 6**).

Table 6: The Energy Industry’s Effects on State and Local Government Revenues

	Direct Effects	Ripple Effects	Total Effects	Multiplier
Tax Revenue (\$ million)	\$312.2	\$163.8	\$476.0	1.52

Source: IBRC, using results from the IMPLAN modeling software

Conclusion

This analysis helps highlight that the state's energy industry is an important economic driver in Indiana. That is, through purchases of goods and services from Indiana suppliers—and by employing a highly skilled, well-paid labor force—the operating budgets of these energy providers have far-reaching positive economic effects in the state. Additionally, a modern and reliable energy generation and distribution infrastructure requires significant capital investment on a regular basis. This spending also packs an economic punch.

All told, the combined effects of the industry's operations and investments support a total of nearly 44,000 jobs in the state. The employment multiplier for these activities indicate that every worker directly linked to Indiana's energy industry supports more than one additional job in other industries in the state. From the perspective of economic activity, the combined effects of the state's investor-owned energy providers account for 1.6 percent of Indiana's total GDP.

These numbers demonstrate that the benefits provided by the state's energy industry extend well beyond the essential services it provides to Hoosier households and businesses. This analysis shows that the state's investor-owned energy providers also make significant contributions to the Indiana economy.

Appendix

Key Terms

Direct Effects: Refers to the change in GDP or employment in the state that can be attributed specifically to the energy industry's operations or capital investments.

Ripple Effects: A combination of the indirect and induced effects generated by the direct effects. Indirect effects measure the change in GDP or employment caused when the energy industry increases its purchase of goods and services from suppliers and, in turn, those suppliers purchase more inputs and so on throughout the economy. Induced effects reflect the changes—whether in GDP or employment—that result from the household spending of employees directly linked to the energy industry, along with the employees of their suppliers.

Total Effects: The sum of the direct effects and ripple effects. The IMPLAN model also tracks the tax effects associated with all the transactions and economic activity associated with the direct and ripple effects. For example, household spending at retailers generates state sales tax. In addition, those retailers also pay property taxes to local governments. As a result, this analysis was also able to estimate the state and local government tax flows.

Multiplier: The multiplier is the magnitude of the economic response in a particular geographic area associated with a change in the direct effects. The multiplier equals the Total Effect divided by the Direct Effect.

GDP: Also known as value added, GDP is a measure of the economic activity generated by a given industry. GDP is the difference between an industry's total output and the cost of its production inputs. GDP consists of four components: employee compensation, proprietor income, other property income and indirect business tax.

About IMPLAN Economic Impact Modeling Software

IMPLAN is built on a mathematical input-output (I-O) model that expresses relationships between sectors of the economy in a chosen geographic location. In expressing the flow of dollars through a regional economy, the input-output model assumes fixed relationships between producers and their suppliers based on demand. It also omits any dollars spent outside of the regional economy—say, by producers who import raw goods from another area, or by employees who commute and do their household spending elsewhere.

The idea behind input-output modeling is that the inter-industry relationships within a region largely determine how that economy will respond to economic changes. In an I-O model, the increase in demand for a certain product or service causes a multiplier effect, layers of effect that come in a chain reaction. Increased demand for a product affects the producer of the product, the producer's employees, the producer's suppliers, the supplier's employees, and so on—ultimately generating a total effect in the economy that is greater than the initial change in demand. For instance, say demand for Andersen Windows' wood window products increases. Sales grow, so Andersen has to hire more people, and the company may buy more from local vendors, and those vendors in turn have to hire more people ... who in turn buy more groceries. The ratio of that overall effect to the initial change is called a regional multiplier and can be expressed like this:

$$(\text{Direct Effect} + \text{Indirect Effects} + \text{Induced Effects}) / (\text{Direct Effect}) = \text{Multiplier}$$

Multipliers are industry- and region-specific. Each industry has a unique output multiplier, because each industry has a different pattern of purchases from firms inside and outside of the regional economy. (The output multiplier is in turn used to calculate income and employment multipliers.)

Estimating a multiplier is not the end goal of IMPLAN users. Most wish to estimate other numbers and get answers to questions such as: How many jobs will this new firm produce? How much will the local economy be affected by this plant closing? What will the effects be of an increase in product demand? Based on those user choices, IMPLAN software constructs “social accounts” to measure the flow of dollars from purchasers to producers within the region. The data in those social accounts will set up the precise equations needed to finally answer those questions users have—about the impact of a new company, a plant closing or greater product demand—and yield the answers.

IMPLAN constructs its input-output model using aggregated production, employment and trade data from local, regional and national sources, such as the U.S. Census Bureau’s annual *County Business Patterns* report and the U.S. Bureau of Labor Statistics’ annual report called *Covered Employment and Wages*. In addition to gathering enormous amounts of data from government sources, the company also estimates some data where they haven’t been reported at the level of detail needed (county-level production data, for instance), or where detail is omitted in government reports to protect the confidentiality of individual companies whose data would be easily recognized due to a sparse population of businesses in the area.

The IBRC’s analysts have attended advanced training in the use of the IMPLAN modeling software. The estimates that the IBRC analysts generate are scrutinized closely to ensure that they are accurate and reflect the most trustworthy application of the modeling software. In all instances, the most conservative estimation assumptions and procedures are used to produce the IMPLAN results.