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# An Assessment of the Economic and Fiscal Impacts of the Dakota Access Pipeline in North Dakota, South Dakota, Iowa and Illinois

Prepared for  
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An Assessment of the Economic Impact of the Dakota Access Pipeline, 2014

0.0 Executive Summary

This report examines the economic and fiscal impacts of the Dakota Access Pipeline on the region and the four states through which it will be built (North Dakota, South Dakota, Iowa and Illinois). It involves a more than 1,100 mile<sup>1</sup> pipeline that will be built at a cost of more than \$3.8 Billion. This pipeline will have a transportation capacity of over 450,000 barrels per day of crude oil from the Bakken oil fields of northwest North Dakota to a hub in Patoka, Illinois. The goal in building this pipeline is to move that crude oil to domestic refineries more safely and at a lower cost than the current alternatives.

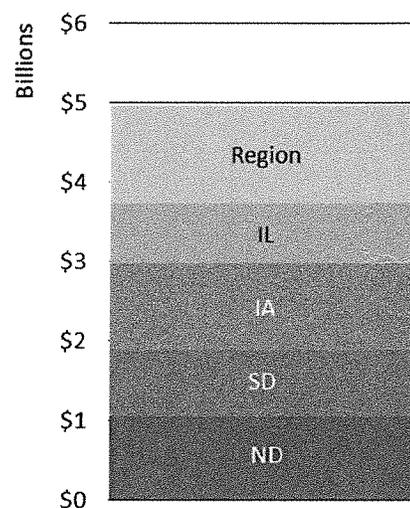
This report endeavors to estimate the economic and fiscal impacts of the pipeline project and to address these issues relating to crude oil transportation in the region.

0.1 Impact on the Region

During the construction stage, the four-state region will experience:

- An employment increase of nearly 33,000 job-years<sup>2</sup> resulting from the direct and the secondary impacts of the spending
- The average annual compensation for those jobs will exceed \$57,000
- About 39% of the jobs will be construction jobs, engineering and architectural services will account for about 6% of that increase, followed by food services, real estate and employment services
- The increase in employment will generate a \$1.9 Billion increase in labor income
- And a nearly \$5 Billion increase in production and sales in the region<sup>3</sup>

Figure 1. DAPL Pipeline Output



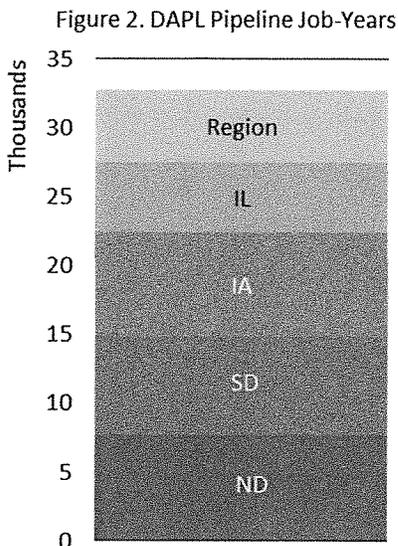
<sup>1</sup> The mileage numbers are approximations based on engineering plans

<sup>2</sup> The term “job-year” is used throughout this report to indicate the equivalent amount of work done by one person for one year. Much of the labor done by construction workers will be temporary, for seasonal periods less than a year or with substantial overtime hours. The 33,000 job-years of work is the full-time equivalent of 33,000 40 hours-per-week jobs for one year but will be distributed over the two-year construction stage or however long the construction stage requires.

<sup>3</sup> Not all workers, materials and equipment for this project can be provided within the four-state region. Some of the workers will come from outside of the region, some of the materials will be purchased from outside of the region. As a result, some of the economic impact will extend far beyond the boundaries of this region. While the analysis in this study only examines the impacts within the region and each of the four states, the economic impact

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It is not possible to estimate the tax impacts for the region as a whole. This is no doubt larger than the sum of the state fiscal impacts, but the regional model does not provide a way to accurately allocate the extra taxes among the four states.



After the pipeline is completed, the yearly impact of the operations and maintenance activities will add 160 ongoing jobs to the regional economy, generating \$11 Million in labor income and more than \$23 Million in new production and sales per year.

However, the most significant impact will be the felt by the annual taxes that the pipeline will generate for the state and local governments.

0.2 Impact on North Dakota

The cost to build the 346 mile North Dakota portion of the Dakota Access Pipeline is expected to be \$1.4 Billion. Of that amount, an estimated \$655.9 Million, or 47%, will result in direct purchases within North Dakota. Those direct purchases

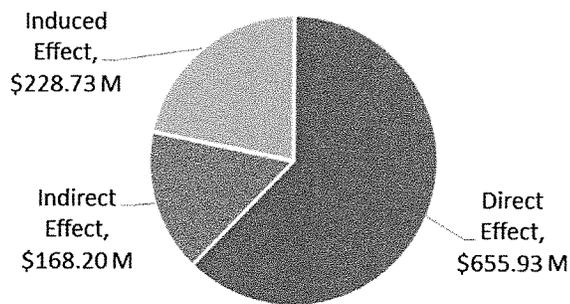
will cause an additional \$397 Million in indirect and induced spending.

The 47% share of local spending that stays within the state is also called the 'local purchase percentage.' It acknowledges that the remaining 53% of the goods and service spending will be purchased from outside of North Dakota. That amount is called the economic 'leakage' and is described in more detail in Chapter 3. The IMPLAN Model local purchase percentages are based on historical data about industrial purchasing patterns and supply chain relationships.

The total impact on spending in North Dakota during the construction stage is expected to

- add nearly 7,700 job-years of employment,
- generate more than \$450 Million in labor income and
- add about \$1.05 Billion to the production and sales within the state.

Figure 3. North Dakota Output - \$1.053 B



on the nation will be more than 51,000 job-years, \$3.1 Billion in labor income and more than \$9.7 Billion in production and sales (output).

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The increased economic activity that results during construction of the pipeline will

- generate additional sales, use, gross receipts, and lodging taxes of \$32.9 Million for state government, plus
- \$1.7 Million for local governments.
- In addition, the state will realize \$5.9 Million more from individual income tax.

Once the pipeline goes into operation North Dakota state and local governments will realize ongoing annual sales, use, gross receipts, and lodging tax increases of about \$158,000 and income tax increases of about \$84,000. Also, during the first full year of operation the pipeline will generate about \$13.1 Million in new property taxes for local governments.

One benefit of the pipeline is to relieve existing and anticipated future transportation capacity problems in the Bakken oil fields area of North Dakota. The production of oil in this area has increased from only 10,295 barrels per day at the beginning of 2007 to almost 1.05 million barrels per day during July 2014. This exceptional growth has taxed the transportation infrastructure of the area to the limit and has impacted grain and soybean farmers.

Oil shipments are currently competing with grain and soybean shipments for the limited rail lines, engines and rail personnel. This has already impacted farm commodity prices and farm income in North Dakota, South Dakota and Minnesota.

Currently, at least 70% of the oil extracted from the Bakken area moves to refineries by rail<sup>4</sup>, which is more expensive than by pipeline. With oil production in the area expected to increase to more than 1.4 million barrels per day by 2017, additional transportation system capacity is needed.

### 0.3 Impact on South Dakota

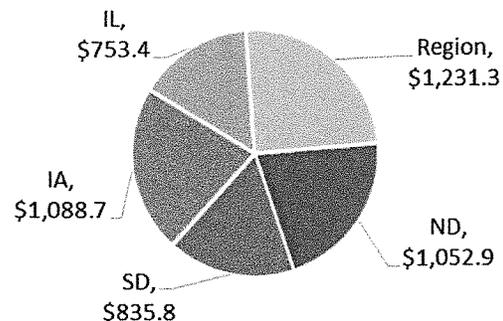
The South Dakota portion of the pipeline will be 267.4 miles long and is expected to cost \$819.6 Million. Of that amount, about 59%, or an estimated \$485.6 Million, will result in direct spending in the South Dakota economy.

The direct spending within the state will cause indirect and induced spending of \$168.2 Million and \$186.2 Million.

The total impact on the South Dakota economy will be

- \$835.8 Million increase in production and sales,
- \$302.8 Million increase in labor income and

Figure 4. DAPL Construction Output (\$Millions)



<sup>4</sup> <http://www.fireengineering.com/articles/2014/07/crude-oil-by-rail-information-and-hazards.html>

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- more than 7,100 additional job-years of employment.

Once the pipeline has been built, the yearly operations and maintenance spending will add 31 permanent jobs, \$1.9 Million in labor income and \$4.2 Million in additional production and sales to the South Dakota economy.

The increased economic activity that results during construction of the pipeline will generate additional sales, use, gross receipts, and lodging taxes of \$35.6 Million for state government, plus \$2.9 Million for local governments.

Once the pipeline goes into operation South Dakota state and local governments will realize ongoing annual sales, use, gross receipts, and lodging tax increases of about \$197,000. Also, during the first full year of operation the pipeline will generate an estimated \$13.5 Million in new property taxes for local governments.

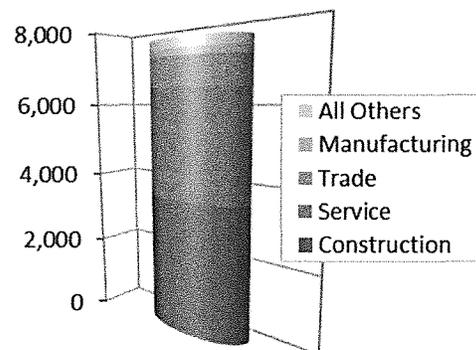
### 0.4 Impact on Iowa

The Iowa portion of the pipeline will extend for 343 miles. The cost to build it will be slightly over \$1.04 Billion, of which \$628.4 Million will circulate within the Iowa economy.

That direct impact will generate

- an estimated \$386.8 Million in additional indirect and induced growth in production and sales
- adding more than a billion dollars to the Iowa economy.
- The pipeline will create an additional 7,623 job-years of employment during the two-year construction period, generating an additional \$390 Million in income.

Figure 5. Pipeline Job-Years Created by Iowa Portion



Once the construction is completed, the Iowa portion of the pipeline will generate 25 permanent jobs, \$1.7 Million in additional income and \$3.7 Million in production and sales each year.

The increased economic activity that results during construction of the pipeline will generate additional Iowa sales, use, gross receipts, and lodging taxes of \$33.1 Million for state government, plus \$2.2 Million for local governments. In addition, the state will realize \$14.6 Million more from individual income tax.

Once the pipeline goes into operation, Iowa state and local governments will realize ongoing annual sales, use, gross receipts, and lodging tax increases of about \$190,000 and income tax increases of about \$85,000. Also, during the first full year of operation the pipeline will generate an estimated \$27.4 Million in new property taxes for local governments.

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0.5 Impact on Illinois

At 177 miles, Illinois has the shortest segment of the pipeline. The cost to build the pipeline and connect it to the trunkline hub in Patoka is expected to be \$515.8 Million. Because Illinois is the most industrialized state of the four in the region, about 71%, or \$366.6 Million, of the construction spending inputs can be provided by manufacturers, vendors and workers within the state. The 71% is an aggregate local purchase percentage and the remaining 29% would be an estimate of how much would be purchased from outside of Illinois.

The construction stage of the pipeline is expected to provide Illinois with

- An estimated \$753.4 Million in additional output, or production and sales,
- \$303.4 Million in additional labor income and
- more than 5,000 additional job-years of employment.

Each year after the pipeline is placed in service, its operation and maintenance will create

- \$3 Million in additional output, or production and sales,
- \$1.5 Million in additional labor income and
- 20 permanent jobs.

The increased economic activity that results during construction of the pipeline segment in Illinois will generate additional sales, use, gross receipts, and lodging taxes of \$16.4 Million for state government, plus \$3.0 Million for local governments. In addition, the state will realize \$7.7 Million more from individual income tax.

Once the pipeline goes into operation, Illinois state and local governments will realize ongoing annual sales, use, gross receipts, and lodging tax increases of about \$50,000 and income tax increases of about \$45,000. About \$747,000 in additional property tax will be generated by the pipeline during its first year of operation because Illinois does not tax below ground infrastructure.

Table 1. Economic Impact of the Construction Stage

Project Area	Output (\$Millions)	Labor Income (\$Millions)	Job-Years
North Dakota	\$1,052.86	\$450.35	7,688
South Dakota	\$835.84	\$302.82	7,137
Iowa	\$1,088.74	\$390.34	7,623
Illinois	\$753.35	\$303.30	5,009
Region	\$4,962.12	\$1,934.39	32,721

Source: Strategic Economics Group

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Table 2. Economic Impact of the Operations & Maintenance Stage

Project Area	Output (\$Millions)	Labor Income (\$Millions)	Jobs
North Dakota	\$8.92	\$4.42	66
South Dakota	\$4.22	\$1.95	32
Iowa	\$3.67	\$1.67	25
Illinois	\$3.09	\$1.51	20
Region	\$23.13	\$11.01	160

Source: Strategic Economics Group, IMPLAN Model

Table 3. State & Local Tax Receipts at the Construction Stage (\$Million)

State	Income Taxes	Sales/Use, Lodging & Gross Receipts Tax	Property Taxes	Total State & Local Taxes
North Dakota	\$5.90	\$34.59	\$0.00	\$40.49
South Dakota	\$0.00	\$38.53	\$0.00	\$38.53
Iowa	\$14.57	\$35.33	\$0.00	\$49.90
Illinois	\$7.68	\$19.42	\$0.00	\$23.10
Total	\$28.15	\$127.86	\$0.00	\$156.01

Source: Strategic Economics Group

Table 4. Annual State/Local Tax Receipts at the Operations & Maintenance Stage (\$Million)

State	Income Taxes	Sales/Use, Lodging & Gross Receipts Tax	Property Taxes	Total State & Local Taxes
North Dakota	\$0.084	\$0.158	\$13.125	\$13.367
South Dakota	\$0.000	\$0.197	\$13.530	\$13.727
Iowa	\$0.085	\$0.190	\$27.409	\$27.684
Illinois	\$0.045	\$0.050	\$0.747	\$0.842
Total	\$0.214	\$0.595	\$54.811	\$55.620

Source: Strategic Economics Group

Beyond the state and regional economic impacts that will result from the construction, operation and maintenance of the proposed Dakota Access Pipeline, there exists other transportation cost, safety, and macroeconomic considerations. Some findings related to these are:

- A large share of Bakken oil is currently being transported by railroad and it is affecting the farm economy in Montana, Minnesota and the Dakotas. Trains carry two-thirds of a million barrels of crude produced each day from the Bakken, where pipelines are scarce to refineries. These train engines, tracks and crews would otherwise be available to transport grain from the Dakotas and Minnesota to markets.

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- The result is that grain transport has been delayed, freight rates have risen and farm revenue has fallen. Two studies have estimated the current farm revenue losses at between \$66 Million in North Dakota and \$99 Million in Minnesota. The rail issue has spread to West Central Iowa farmers. A North Dakota Daily News story concluded that, “creating a pipeline has arisen repeatedly by agricultural officials hoping to lessen the severity of the backlog.”<sup>5</sup>
- The transportation of crude oil is generally less expensive by pipeline than by railroad. The cost of moving oil from the Bakken area of North Dakota to Gulf Coast refineries during 2013 cost between \$1 and \$3 per barrel less by pipeline than by railroad.
- During 2011 through 2013 price differentials between Brent and West Texas Intermediate (WTI) crude made it advantageous to ship oil by railroad to East and West Coast refineries rather than by pipeline to the Gulf Coast. During this period the price differential reached as high as \$29.59 per barrel during September 2011. At least partially in response to this differential, railroad shipments of crude oil jumped by 255.4% during 2011 and by another 74.4% during 2012.
- A major reason for the large spread between Brent and WTI crude prices was a shipping bottleneck that developed in Cushing, OK, which is the largest storage hub for domestically produced oil. From 2009 to 2013 the amount of oil stored in Cushing rose from 34.5 Million to 51.9 Million barrels. This happened because the United States’ pipeline infrastructure was developed to move oil north into Cushing rather than away from Cushing. This problem has now been resolved resulting in Cushing oil inventories dropping to 19.6 Million barrels. Correspondingly the Brent to WTI price differential has dropped to about \$5 per barrel.
- Both pipelines and railroads have experienced some spectacular accidents in recent years. But overall the safety records of both modes of hazardous materials transportation are very good. Over the past five years pipeline spills have averaged only 82,000 barrels per year while delivering an average of 13.7 Billion barrels per year of hazardous liquids. Thus, 99.99% of crude oil transported by pipeline is delivered safely to its destination.
- The growth of domestic oil production has exerted significant downward pressure on world oil prices. As of mid-October both Brent and WTI crude are trading at less than \$90 per barrel. These lower crude oil prices have flowed through to lower motor fuel and diesel fuel prices resulting in an annual savings of about \$33 Billion for households and \$11.2 Billion for businesses at current prices.
- Since 2005 U.S. oil imports have dropped by 27.7% and since 2011 U.S. expenditures on oil imports have dropped by 22.2%. These decreases are benefiting the country through reduced foreign trade deficits, a stronger dollar, and lower inflation.

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<sup>5</sup> Speidel, Karen, “Experts suggest a pipeline to relieve rail issues.” Daily News, September 19,2014

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### 1.0 Introduction

Dakota Access Pipeline, LLC proposes to build a 30-inch diameter crude oil pipeline originating in the Bakken Shale oil field in northwest North Dakota, passing through the states of North Dakota, South Dakota, Iowa and Illinois, and terminating at the trunkline hub in Patoka, Illinois.

#### 1.1 Scope and Purpose of the Study

Dakota Access Pipeline retained Strategic Economics Group to estimate the economic and fiscal impacts associated with the construction of the pipeline on the four-state region and on each individual state. Strategic Economics Group used version 3.0 of the IMPLAN input/output model to estimate the economic impacts. This model and information from state revenue departments were used to estimate the fiscal impacts.

In addition, the analysis addresses the long-term economic and fiscal impacts associated with the operation and maintenance of the pipeline and other associated facilities.

Other issues investigated as part of the study include:

- How crude oil transportation costs differ between railroad and pipeline,
- Accident risks for railroads and pipelines, and
- Spillover economic impacts arising from transportation delays caused by railroads giving priority to crude oil shipments.

#### 1.2 Report Content and Organization

Following this introduction the report consist of seven additional chapters.

- Chapter 2 provides an overall description of the proposed Dakota Access Pipeline project and information on the facilities that will be constructed in each of the four states.
- Chapter 3 explains the methodologies used to estimate the economic and fiscal impacts likely to arise from the construction of the pipeline and its operation. Also, this chapter describes the data sources used for the analysis.
- Chapter 4 presents and explains the estimated pipeline construction economic and fiscal impacts.
- Chapter 5 presents and explains the economic and fiscal impacts expected to arise from the future operation and maintenance of the pipeline.

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- Chapter 6 examines issues associated with the transportation of the Bakken oil to refineries and markets. It discusses the impact that railroad shipments of oil is having on Midwest agriculture and ultimately on food prices.
- Chapter 7 discusses transportation cost, accident risk, and spillover impacts associated with the construction and operation of the Dakota Access Pipeline.
- Chapter 8 summarizes the results of the analysis.

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## 2.0 Project Background

### 2.1 Overview Description of the Pipeline Project

The proposed pipeline will consist of about 991<sup>6</sup> mile 30-inch diameter crude oil trunkline extending from Johnson Corner, North Dakota, through South Dakota and Iowa, to Patoka, Illinois. In addition, in North Dakota a 143 mile in-field pipeline system and six operational storage facilities will be developed. The total estimated cost for the project equals \$3.8 Billion. The following sections describe the pipeline and supporting facilities proposed for each of the four states. The pipeline will have an estimated initial capacity of greater than 450,000 barrels per day with the potential to increase its capacity to 570,000 barrels per day.

#### 2.1.1 North Dakota

The proposed North Bank supply segment will be 142.6 miles long and consist of 12 to 30 inch diameter in-field pipelines plus six operational tank storage facilities located in Stanley, Ramberg, Epping, Trenton, Waterford City and Johnson’s Corner in North Dakota. Table 3 specifies the pipeline segments that will connect these facilities.

Table 3. Dakota Access Supply Segment and North Dakota Portion

State	County	Crossing Length (Miles)
<b>North Bank Supply Segment</b>		
North Dakota	Montrail	23.3
North Dakota	Williams	69.8
North Dakota	McKenzie	49.5
Total (Stanley-Johnson Corner)		142.6
<b>Mainline - North Dakota Segment</b>		
North Dakota	McKenzie	11.1
North Dakota	Dunn	51.3
North Dakota	Mercer	26.1
North Dakota	Morton	71.4
North Dakota	Emmons	43.5
Total (Johnson Corner - ND/SD State Line)		203.4
Total North Dakota		346.0

Source: Dakota Access, LLC

It also presents lengths for each of the five counties in North Dakota that will be traversed by the trunkline portion of the pipeline. The total North Dakota in-field line and trunkline pipeline mileage

<sup>6</sup> The mileage numbers are subject to change.

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equals 346 miles. In addition, one pumping station will be constructed in the state. However, the exact location for the pumping stations has not yet been determined.

The total estimated investment in North Dakota for the crude oil in-field pipelines, operational storage facilities, and construction of the trunkline pipeline, pumping stations, architectural, engineering and real estate services, easement payments and other support services will equal \$1.4 billion. Excluding the cost of the pumping stations and tanks, the construction of the pipeline is expected to be \$2.73 Million per mile.

### 2.1.2 South Dakota

The South Dakota section of the pipeline will extend 267.4 miles through 12 counties and cost about \$819 Million. Table 4 shows the pipeline mileages for each of the 12 South Dakota counties. Excluding the cost of the pumping station, the construction cost of the South Dakota portion of the pipeline is expect to be \$2.91 Million per mile.

Table 4. Dakota Access Mainline - South Dakota

State	County	Crossing Length (Miles)
South Dakota	Campbell	28.7
South Dakota	McPherson	6.6
South Dakota	Edmunds	35.9
South Dakota	Faulk	27.7
South Dakota	Spink	36.1
South Dakota	Beadle	28.5
South Dakota	Kingsbury	21.8
South Dakota	Miner	14.1
South Dakota	Lake	18.2
South Dakota	McCook	1.7
South Dakota	Minnehaha	27.9
South Dakota	Lincoln	20.3
Total (ND/SD State Line to SD/IA State Line)		267.4

Source: Dakota Access, LLC

### 2.1.3 Iowa

The Iowa section will extend through 18 counties for a total of 343.4 miles and this portion of the project is expected to cost \$1.04 billion. Table 5 shows the pipeline mileage for each of the 18 Iowa counties. The expected cost to build the Iowa portion of the pipeline, excluding the cost of the pumping station, is \$2.91 Million per mile.

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Table 5. Dakota Access Mainline - Iowa

State	County	Crossing Length (Miles)
Iowa	Lyon	10.6
Iowa	Sioux	32.7
Iowa	O'Brien	10.9
Iowa	Cherokee	18.2
Iowa	Buena Vista	28.4
Iowa	Sac	0.3
Iowa	Calhoun	30.8
Iowa	Webster	19.1
Iowa	Boone	25.4
Iowa	Story	14.4
Iowa	Polk	8.6
Iowa	Jasper	33.7
Iowa	Mahaska	32.5
Iowa	Keokuk	6.0
Iowa	Wapello	10.9
Iowa	Jefferson	15.0
Iowa	Van Buren	15.9
Iowa	Lee	30.0
Total (SD/IA State Line - IA/IL State Line)		343.4

Source: Dakota Access, LLC

2.1.4 Illinois

Table 6. Dakota Access Mainline - Illinois

State	County	Crossing Length (Miles)
Illinois	Hancock	29.6
Illinois	Adams	4.8
Illinois	Schuyler	3.1
Illinois	Brown	24.3
Illinois	Pike	2.2
Illinois	Morgan	18.0
Illinois	Scott	14.5
Illinois	Macoupin	36.0
Illinois	Montgomery	15.8
Illinois	Bond	12.0
Illinois	Fayette	11.1
Illinois	Marion	5.9
Total (IL State Line - Patoka)		177.2

Source: Dakota Access, LLC

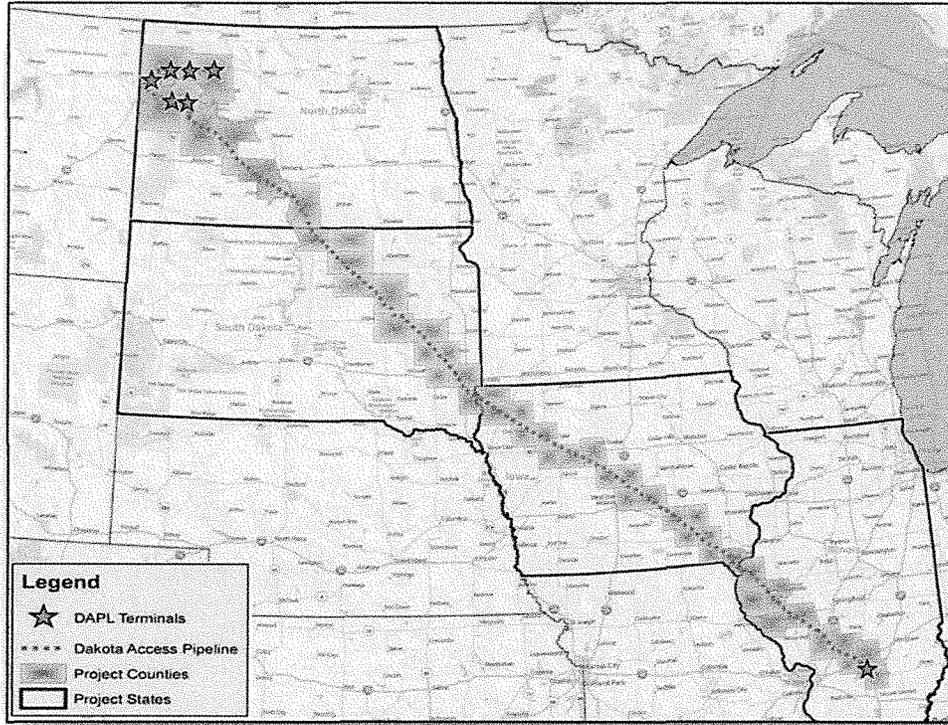
The Illinois section of the pipeline will extend for 177.2 miles through 12 counties and cost an estimated \$515.8 Million. The Illinois section of the pipeline will not require a pump station. The cost to build the

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Illinois portion of the pipeline is expected to be \$2.91 Million per mile. Table 6 shows the pipeline mileage for each of the 12 Illinois counties.

Figure 6 shows the proposed path for the the pipeline from Johnson Corner, North Dakota to Patoka, Illinois.

Figure 6. Map of the Dakota Access Pipeline



Source: Dakota Access Pipeline, LLC

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### 3.0 Economic and Fiscal Analysis Methodology

#### 3.1 Data Sources

The data employed in this report includes the estimated costs to build, operate, and maintain a crude oil trunkline pipeline and in-field facilities that will connect the Bakken/Three Forks oil fields of northwestern North Dakota to the major crude oil terminal hub near Patoka, Illinois. This information was provided by Dakota Access, LLC and its affiliates. It includes estimates of the cost of materials, labor, and right-of-way easements and acquisition.

Additional data used in this analysis came from industry publications and from PennEnergy Research. The PennEnergy data was used to provide a basis for independently confirming the Dakota Access construction cost estimates. Among the data acquired from PennEnergy Research is a file of crude oil on-shore pipeline construction cost statistics that cover the years 1980 through 2013.

The analyses done for this report incorporate numerous assumptions. These are stated and explained in the report. The economic impact estimates are based on financial and other data provided by Dakota Access, LLC and obtained from other independent sources. It is important to remember that the analysis results presented in this report are ex-ante or before-the-event estimates. They are dependent on construction, operating, and maintenance costs estimates provided by Dakota Access, LLC.

#### 3.2 The IMPLAN Input/output Model

The researchers built six economic models for this project:

- one model for the four-state region,
- one for each of the four individual states in the region and
- one model to capture the impact on the entire United States<sup>7</sup>.

A comparison of the regional impacts to the sum of the four state impacts is intended to identify the interactivity of the economies within the region.

The models were built using version 3.0 of the IMPLAN system. IMPLAN is a product of MIG, Inc. (formerly Minnesota IMPLAN Group). The Acronym stands for *IM*ppact analysis for *PLAN*ning.

“The IMPLAN System is a general input-output modeling software and data system that tracks every unique industry group in every level of the regional data, and is designed so almost all the data elements are available for customization. Sources for creation of the background IMPLAN data include BLS [U.S.

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<sup>7</sup> The data generated by the IMPLAN Model for the U.S. was not included in this report but could be available from the authors by request.

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Department of Labor, Bureau of Labor Statistics], BEA [U.S. Department of Commerce, Bureau of Economic Analysis], and Census.

“IMPLAN traces local impacts by looking back through the supply chain. These backward linkages provide IMPLAN with the information required to examine the iterations of local Indirect and Induced impacts until the initial spending is completely removed from the Study Area by leakage.”<sup>8</sup>

### 3.3 The Mechanics of Linkages and Leakages

Economic impact models like IMPLAN are built on economic relationships that can be described by linkages and leakages. Linkages refer to the supply chain relationships for the materials and services employed in a project. The manufacturers and producers of those goods and services purchase their inputs from other manufacturers and service providers that in turn make purchases from other companies. This cycle of purchases continues until all of the initial expenditure dollars leak out of the region's economy.

The input-output model identifies, for a point in time, all of the relationships between the outputs of all producers and inputs that they buy from other producers (linkages). The IMPLAN model identifies the backward supply chain linkages for 528 industries. In a hypothetical closed economy where all of the suppliers within a region only buy from other suppliers within the same region, the spending loop would be infinite as the spending of one firm would be the income of another and the dollars would keep circulating. But, we do not live in a closed loop economy.

As producers purchase from suppliers that are located outside of the region, some of the spending leaks out of the system (leakages). Profits, savings, and net taxes are also part of the leakage. So, the initial infusion of spending will continue to generate economic activity within the region only until it is completely dissipated or leaked from the economy by imports (purchases from outside the region), profits (monies not spent within the region but paid to owners), savings, and net taxes (taxes minus government spending in the region).

Even a region as large as the entire United States will still experience leakages to the world economy. For an economic impact model to be meaningful, it is important to select a region that is small enough to bring the information to the relevant audience but large enough to minimize the amount of leakages.

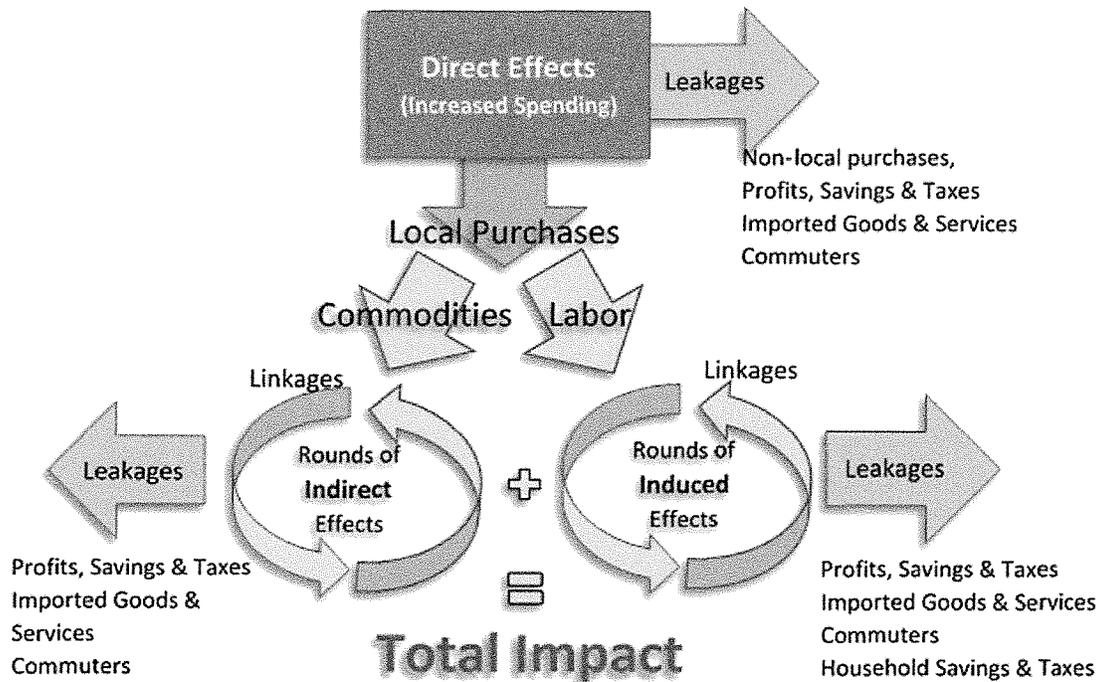
In this analysis, the four-state region will undoubtedly have imports of steel and other materials not manufactured in the four target states. Similarly, many of the project work crews will be from outside of the four states. The researchers chose to use a region consisting of the four states rather than one including just the 50 counties through which the pipeline will pass. At the county level the leakages of spending would be too great to be of any meaningful value. Figure 2 illustrates the structure of the IMPLAN Model.

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<sup>8</sup> Day, Frances, Principles of Impact Analysis and IMPLAN Applications, First Edition, p. 14.

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Figure 7. Economic Impact Circular Flow Chart – Leakages and Linkages



### 3.4 What Will the Economic Analysis Tell Us?

The estimated impacts derived from each of the six economic models (US, region and four states) identify changes to the economy during the construction stage and the operations stage of the project. The economic analyses will include the sum the “consecutive rounds of inter-industry spending traveling back through the supply chain”<sup>9</sup> which we call the *Indirect Effects*. They are called this because they are indirectly stimulated by the initial increase in spending represented by the pipeline construction (or operations).

In addition to purchases of materials and manufactured inputs, there will be an initial increase in employment as a result of the pipeline construction (or operation). Indirect spending will also result in an increase of employment. “The spending of income earned by the employees, resulting from both directly and indirectly affected industries contributes to the *Induced Effect*. The Induced Effect, therefore is a measurement of employee spending of all employees of the directly affected industry, and

<sup>9</sup> Day, Frances, *ibid.* p. 6.

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all the employees of subsequent indirectly impacted industries in the supply chain, as long as these employees live within the defined geography of the study.”<sup>10</sup>

### 3.5 Fiscal Analysis Sources

Fiscal analysis involves the identification and estimation of the tax impacts resulting from Direct, Indirect, and Induced expenditures associated with the pipeline’s construction and operation. The major types of taxes that will be impacted include:

- property taxes,
- state and local sales, use, and excise taxes, and
- income taxes.

The tax systems of the four states exhibit considerable variation. Therefore, the Revenue Departments of each state were contacted to obtain information on the taxes most likely to be impacted by the project. The tax revenue impact estimates are based on the state provided information and output measures derived from the IMPLAN models. The analysis presents separate tax impact estimates for the construction and operations stages of the project. The methodologies followed in estimating the construction stage fiscal impacts are described in Chapter 4 and those used to estimate operations stage fiscal impacts are described in Chapter 5.

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<sup>10</sup> Day, Frances, *ibid.* p. 6.

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4.0 Pipeline Construction Impact Analysis Results

4.1 The Construction Stage Inputs

The Construction stage consists of three parts: the in-field and operational storage facilities in the oil fields of North Dakota, the building of the pipeline through the four states and the construction of pumping stations in North Dakota, South Dakota and Iowa. For each of these parts there are required purchases of materials, equipment and labor. Dakota Access, LLC and its affiliates provided expenditure estimates by major category (i.e., construction, pipe, valves, fittings, bends, etc.), which Strategic Economics Group entered into IMPLAN models built to describe the industrial purchasing relationships of similar pipeline construction projects.

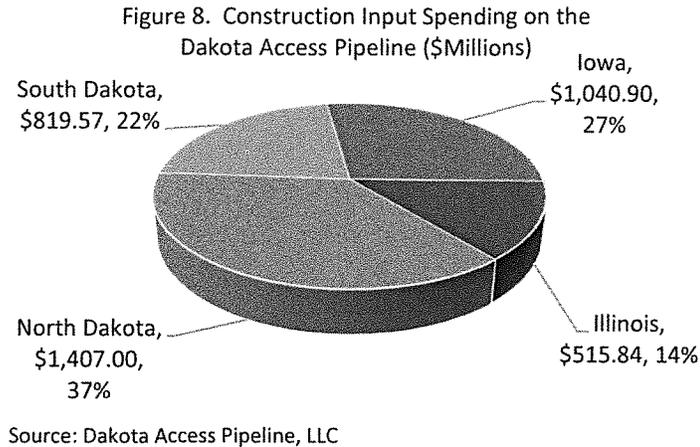
Table 7. IMPLAN Input Spending for the Construction Phase of the Pipeline (\$Millions)

Component	IMPLAN Sector	North Dakota	South Dakota	Iowa	Illinois	Region
<b>Pipeline</b>						
Construction labor and land clearing	29	\$30.62	\$25.22	\$32.39	\$16.71	\$104.95
Construction	36	\$504.67	\$415.68	\$533.87	\$275.46	\$1,729.67
Pipe	171	\$207.91	\$171.25	\$219.94	\$113.49	\$712.60
Valves, Fittings, Bends, etc.	198	\$56.70	\$46.71	\$59.98	\$30.95	\$194.34
ROW Agents	247	\$28.35	\$23.35	\$29.99	\$15.48	\$97.17
Engineering & Environmental	251	\$34.59	\$28.49	\$36.59	\$18.88	\$118.55
Construction and Mill Inspection	360	\$25.52	\$21.02	\$26.99	\$13.93	\$87.46
Easement & Damages	365	\$56.70	\$46.71	\$59.98	\$30.95	\$194.34
<b>Pumping Stations and Tanks</b>						
Construction labor and land clearing	29	\$7.46	\$7.99	\$7.99	\$0.00	\$23.44
Tankage	189	\$422.30	\$0.00	\$0.00	\$0.00	\$422.30
Pumping Station Materials & Equip.	247	\$14.50	\$14.50	\$14.50	\$0.00	\$43.50
Control and monitoring system	251	\$4.70	\$4.70	\$4.70	\$0.00	\$14.10
Construction equipment	365	\$12.92	\$13.91	\$13.91	\$0.00	\$40.74
Easement & Damages	HH	\$0.05	\$0.05	\$0.05	\$0.00	\$0.15
<b>Total Construction Phase</b>		<b>\$1,407.00</b>	<b>\$819.57</b>	<b>\$1,040.90</b>	<b>\$515.84</b>	<b>\$3,783.30</b>

Source: Dakota Access, LLC

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Table 7 shows the values of the spending inputs estimated by Dakota Access, LLC for each state by the appropriate spending categories. Construction spending inputs amounted to nearly \$3.8 Billion for the region with 37% being spent in North Dakota, 27% in Iowa, 22% in South Dakota and 14% in Illinois (Shown in Figure 8).



Estimates of the number of workers necessary to build the pipelines were developed using:

- the amount budgeted for construction of the Dakota Access Pipeline,
- the imputed employee compensation for each state derived from the IMPLAN models, and
- the most recent estimated wage levels for construction and extractive services workers compiled by the U.S. Labor Department, Bureau of Labor Statistics.

The “Easement and Damages” category in Table 7 is treated in the IMPLAN model as direct household payments. These payments represent compensation for damage to and the repair of property associated with construction of the pipeline. In addition, they represent the purchase of a partial ownership interest in the property that provides the pipeline company with the right of access to the pipeline for the purposes of future maintenance and repair.

Table 8 shows the construction spending for which the IMPLAN models generate estimates of employee compensation for each state and for the region. For comparison, the average wage levels for the U.S. Department of Labor, Bureau of Labor Statistics<sup>11</sup> average wage levels for each state for the category “Construction and Extraction Occupations” is included. These estimates are a factor in determining the employee compensation inputs in the IMPLAN model for each state and the region.

<sup>11</sup> Department of Labor, Bureau of Labor Statistics, May 2013 Occupational Employment Statistics (OES) Survey occupation category

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Table 8. Development of the Direct Pipeline Worker Estimates from Construction Spending

Category	North Dakota	South Dakota	Iowa	Illinois	Region
Construction Spending (\$M)	\$504.67	\$415.68	\$533.87	\$275.46	\$1,729.67
IMPLAN Employee Compensation (\$M)	\$127.56	\$156.76	\$196.01	\$59.24	\$603.65
BLS Survey Wages - Construction & Extractive Services (47-0000)	\$47,650	\$34,420	\$41,240	\$57,550	\$46,387
Estimated number of Workers (FTE)	3,788	3,682	3,528	2,100	12,894
Estimated Worker Avg. Wages	\$56,660	\$33,025	\$43,103	\$50,364	\$48,249

Source: Dakota Access, LLC.

Table 9 compares the estimated number of jobs expected to be created by the construction of the Keystone XL Pipeline<sup>12</sup> and the Dakota Access Pipeline. The Keystone project would entail 875 miles of pipeline through the rural areas of Montana, South Dakota and Nebraska. Much of the labor force for the project will need to be brought in from outside of the sparsely-populated worksite areas and housed in work camps.

Table 9. Comparison of Job-Years Impact of Two Projects

Area	Miles	Direct	Indirect & Induced	Total
Keystone Pipeline Project				
Total US Impact		16,100	26,000	42,100
Keystone Project Area	875	5,400	6,600	12,000
Montana	285	1,600	2,300	3,900
South Dakota	316	1,750	1,850	3,600
Nebraska	274	2,050	2,450	4,500
Dakota Access Pipeline Project				
Total US Impact		17,708	33,662	51,370
DAPL Project Area	1,133	15,879	16,843	32,721
North Dakota	346	4,565	3,123	7,688
South Dakota	267	4,199	2,937	7,137
Iowa	343	3,998	3,625	7,623
Illinois	177	2,482	2,527	5,009

Source: Strategic Economics Group, IMPLAN Model, Keystone XL final Report

Only 34% of the jobs created by the Keystone project are expected to be filled by residents of the three-state region. The Dakota Access Pipeline project will cover about 30% more miles than the Keystone project. It will also occur in rural areas, but will be built in more densely-populated states. The IMPLAN

<sup>12</sup> "Final Supplemental Environmental Impact Statement for the Keystone XL Project, Executive Summary", January 2014, United States Department of State, Bureau of Oceans and International Environmental and Scientific Affairs.

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models estimate that the Dakota Access pipeline will result in about 90% of the direct jobs being filled by residents of the four-state region.<sup>13</sup> The indirect and induced impacts will also be greater for the Dakota Access Pipeline project as more material purchases will occur within the more industrialized and densely-populated region.

4.2 The Construction Stage Outputs

Tables 10, 11 and 12 summarize the impacts of the construction spending on each of the four states in the region. Also, they show the impact, separately calculated, on the entire four-state region. The impact on the region is greater than the sum of the impacts on the states within the region (by about 35%). Table 14 also shows this effect. This is because the spending leakages are greater at the state level compared to the region and at the region level compared to that nation as a whole.

Table 10. Production from Construction of the Project (\$Millions)

Project Area	Direct	Indirect	Induced	Total
North Dakota	\$655.93	\$168.20	\$228.73	\$1,052.86
South Dakota	\$485.62	\$164.05	\$186.17	\$835.84
Iowa	\$628.43	\$209.77	\$250.54	\$1,088.74
Illinois	\$366.57	\$164.42	\$222.36	\$753.35
Region	\$2,462.95	\$1,092.11	\$1,407.07	\$4,962.12

Source: Strategic Economics Group, IMPLAN Model

Economists define Output as the value of industry production. In IMPLAN these are annual production estimates for the year of the study and are in producer prices. For manufacturers this would be sales plus/minus change in inventory. For service sectors it is equal to sales. For retail and wholesale trade, output is equal to gross margin. Using the spending inputs for the Dakota Access Pipeline provided by Dakota Access, LLC, the project is expected to generate an estimated \$4.96 Billion for the four-state region including the indirect and induced effects. The amount of production that is expected to occur in Iowa is \$1.09 Billion, in North Dakota is \$1.05 Billion, in South Dakota is \$836 Million and in Illinois is \$753 Million.

Table 11. Labor Income from Construction of the Project (\$Millions)

Project Area	Direct	Indirect	Induced	Total
North Dakota	\$306.14	\$66.93	\$77.27	\$450.35
South Dakota	\$182.65	\$58.59	\$61.57	\$302.82
Iowa	\$229.82	\$79.46	\$81.06	\$390.34
Illinois	\$157.79	\$64.47	\$81.04	\$303.30
Region	\$1,016.83	\$419.47	\$498.10	\$1,934.39

Source: Strategic Economics Group, IMPLAN Model

<sup>13</sup> Dakota Access Pipeline officials have indicated that they intend to fill at least 50% of the construction jobs in each state with residents of that state.

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Labor income includes the value of all of the income received from employment, including employee compensation such as wages, salaries, benefits as well as the income received by sole proprietors. It excludes receipts that are not work related such as dividends, interest or rent.

Table 12. Employment from Construction of the Project (Job Years)

Project Area	Direct	Indirect	Induced	Total
North Dakota	4,565	1,157	1,966	7,688
South Dakota	4,199	1,291	1,646	7,137
Iowa	3,998	1,520	2,104	7,623
Illinois	2,482	919	1,608	5,009
Region	15,879	6,362	10,481	32,721

Source: Strategic Economics Group, IMPLAN Model

Table 12 shows that the employment impact of the pipeline construction will be more than 32,000 job years for the region. Some jobs may exist for more than a single year and that is why the employment impact is measured in job-years. Also, a job does not necessarily equate to an FTE (full-time equivalent) position. Some workers may be employed for less than 40 hours per week. However, for a construction project, like the one that is proposed, it is likely many workers will work a considerable amount of overtime.

Table 13. Top Employment Sectors in the Construction Phase of the Dakota Access Pipeline (Job Years)

IMPLAN Sector	Description	Direct	Indirect	Induced	Total	Share
0	Total	15,879	6,362	10,481	32,721	100%
36	Construction of other new nonresidential structures	12,856	0	0	12,856	39%
369	Architectural, engineering, and related services	827	1,020	21	1,868	6%
413	Food services and drinking places	0	244	1,184	1,428	4%
360	Real estate establishments	450	149	393	992	3%
382	Employment services	0	501	221	722	2%
29	Support activities for oil and gas operations	700	5	0	706	2%
319	Wholesale trade businesses	0	345	322	666	2%
397	Private hospitals	0	0	612	612	2%
394	Offices of physicians, dentists, and other health practitioners	0	0	549	549	2%
356	Securities, commodity contracts, investments, and related activities	0	207	235	442	1%
329	Retail Stores - General merchandise	0	66	372	438	1%
324	Retail Stores - Food and beverage	0	64	349	413	1%
398	Nursing and residential care facilities	0	0	413	413	1%
388	Services to buildings and dwellings	0	226	140	365	1%
189	Metal tank (heavy gauge) manufacturing	319	6	0	325	1%
380	All other miscellaneous professional, scientific, and technical services	261	48	12	321	1%
	All Others	465	3,482	5,659	9,607	29%

Source: Strategic Economics Group, IMPLAN Model

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Table 13 shows that 39% of the estimated job years created in the region will be in the construction field. The table also shows the broad range of job titles associated with the construction stage of the pipeline project. Many of these positions are jobs that are affected by the indirect and induced spending associated with the project.

Table 14 shows a comparison of the employment impacts (in job years), labor income impacts and output impacts. It also illustrates how the size of the analysis area affects the degree of leakages, the multipliers and therefore the magnitude of the numbers.

Table 14. Comparison of Construction Impact on the Region and States

Impact Type	Employment	Labor Income (\$Millions)	Output (\$Millions)
<b>Region</b>			
Direct Effect	15,879	\$1,016.83	\$2,462.95
Indirect Effect	6,362	\$419.47	\$1,092.11
Induced Effect	10,481	\$498.10	\$1,407.07
<b>Total Effect</b>	<b>32,721</b>	<b>\$1,934.39</b>	<b>\$4,962.12</b>
<b>North Dakota</b>			
Direct Effect	4,565	\$306.14	\$655.93
Indirect Effect	1,157	\$66.93	\$168.20
Induced Effect	1,966	\$77.27	\$228.73
<b>Total Effect</b>	<b>7,688</b>	<b>\$450.35</b>	<b>\$1,052.86</b>
<b>South Dakota</b>			
Direct Effect	4,199	\$182.65	\$485.62
Indirect Effect	1,291	\$58.59	\$164.05
Induced Effect	1,646	\$61.57	\$186.17
<b>Total Effect</b>	<b>7,137</b>	<b>\$302.82</b>	<b>\$835.84</b>
<b>Iowa</b>			
Direct Effect	3,998	\$229.82	\$628.43
Indirect Effect	1,520	\$79.46	\$209.77
Induced Effect	2,104	\$81.06	\$250.54
<b>Total Effect</b>	<b>7,623</b>	<b>\$390.34</b>	<b>\$1,088.74</b>
<b>Illinois</b>			
Direct Effect	2,482	\$157.79	\$366.57
Indirect Effect	919	\$64.47	\$164.42
Induced Effect	1,608	\$81.04	\$222.36
<b>Total Effect</b>	<b>5,009</b>	<b>\$303.30</b>	<b>\$753.35</b>

Source: Strategic Economics Group, IMPLAN Model

The construction stage of the Dakota Access Pipeline is expected to generate \$9.6 Billion in total output nationally but only about half of that, or \$4.96 Billion in output (production and sales), will be captured within the four-state region. That is because many of the manufacturers of products that will ultimately be purchased for this project are located outside of the region. Similarly, the \$4.96 Billion in output in the region is substantially greater than the sum of the impacts on the individual states, which adds up to

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\$3.73 Billion. This illustrates the leakages of purchasing dollars for materials and services that are imported from outside of the region and within the region from outside of each individual state. Also, some of the workers will come from other states to work on this project sending all or a portion of their paychecks to their home state.

The estimates of impacts for the region as a whole capture indirect and induced impacts associated with interactions among the economies of the four states, which the impact estimates for the four states individually exclude. For example, valves purchased for use on the pipeline in South Dakota may be manufactured in Iowa. The individual South Dakota model treats this as a leakage. Also, the Iowa model misses this expenditure because it is not generated by pipeline investment in Iowa. But the regional model captures this economic activity. For that reason, this analysis separately tracks each state as well as the region with a total of the five individual IMPLAN models (Region, North Dakota, South Dakota, Iowa and Illinois) developed for this purpose.

Table 15. IMPLAN Local Purchase Percentage (Share of In-Area Purchases)

Component	IMPLAN Sector	Region	North Dakota	South Dakota	Iowa	Illinois
<b>Pipelines</b>						
Construction labor and land clearing	29	99.8%	100.0%	55.3%	22.3%	69.3%
Construction	36	99.7%	100.0%	99.3%	99.9%	99.6%
Pipe	171	26.0%	2.0%	4.5%	9.4%	25.6%
Valves, Fittings, Bends, etc.	198	22.9%	0.5%	5.4%	9.6%	21.8%
ROW Agents	360	81.9%	48.2%	46.6%	68.1%	88.6%
Engineering & Environmental	369	87.6%	68.4%	69.6%	57.8%	98.8%
Construction and Mill Inspection	380	75.5%	75.2%	28.2%	23.4%	89.1%
Easements and Damages	HH	100.0%	100.0%	100.0%	100.0%	100.0%
<b>Pumping Stations and Tanks</b>						
Construction labor and land clearing	29	99.8%	100.0%	55.3%	22.3%	0.0%
Tankage	189	20.4%	11.0%	0.0%	0.0%	0.0%
Pumping Station Materials & Equip.	247	13.1%	4.6%	5.5%	1.5%	0.0%
Control and monitoring system	251	10.6%	4.5%	6.9%	5.0%	0.0%
Construction equipment	365	92.6%	100.0%	47.7%	68.3%	0.0%
Easements and Damages	HH	100.0%	100.0%	100.0%	100.0%	0.0%

Source: Strategic Economics Group, IMPLAN Model

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Table 15 shows the estimated percentage of each input intended to be purchased for each state (or the region) that will actually be produced within that state (or region). For instance, while 26% of the pipe used in the construction of the entire pipeline is expected to be manufactured in the region, only 2% used in North Dakota will be manufactured in North Dakota, 4.5% of what is used in South Dakota will be manufactured in South Dakota, etc.. This table shows the Local Purchase Percentage for each category of construction inputs generated in the IMPLAN models. These factors were based on historical industry research on supply chain relationships.

### 4.3 Fiscal Impact of Pipeline Construction

The taxes impacted during construction of the Dakota Access Pipeline are sales and use tax, gross receipts tax, lodging tax, tourism tax, and individual income tax. Taxes impacted once the pipeline is in operation are sales and use tax, gross receipts tax, individual income tax, and property tax.

Each of the four states in which the pipeline will be constructed was contacted to obtain answers to the following questions:

- Are sales and use taxes owed on just materials used in the construction of the pipeline or on both materials and labor?
- What local option sales and use taxes apply to construction materials and/or labor?
- Under what conditions would non-resident workers have a tax liability in the state where the pipeline construction occurs?
- Under what conditions would pipeline owners have a state income tax liability?
- Are pipelines subject to property tax and how are pipeline valuations and tax levies determined?
- Are there any other taxes that would apply during construction or operation of the pipeline?

Other state tax information, such as tax rates, services subject to sales and use taxes, and withholding tax payment requirements, were obtained from state departments of revenue Internet sites and from the Federation of Tax Administrators Internet site.

#### 4.3.1 Sales, Use, Gross Receipts, and Lodging Taxes

All four of the states impose sales and use taxes. In addition, North Dakota, Iowa, and Illinois impose lodging taxes, while South Dakota imposes a tourism tax. Also, all of the states allow local governments to impose sales taxes, and all the states allow local governments to impose lodging or tourism taxes. Table 16 summarizes these taxes.

The sales and use tax bases for construction related expenditures vary among the four states. Illinois, Iowa, and North Dakota impose these taxes only on materials used in construction projects. South Dakota taxes materials, labor, and equipment. State sales taxes are imposed on materials and on some services acquired from suppliers located within the state where the transaction occurs. State use taxes

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generally are imposed on the same types of transactions as sales taxes but apply to purchases from suppliers located outside the state where the purchaser is located. This distinction means that although a large share of the materials used in the construction of the pipeline will be acquired from suppliers located outside the state where they will be used taxes will be owned on these purchases.

Table 16. State and Local Sales, Use, Gross Receipt, and Lodging Tax Features

State	Sales and Use Taxes			Gross Receipts/ Lodging Taxes		
	State Tax Rate	Maximum Local Tax Rate	Tax Base	State Tax Rate	Maximum Local Tax Rate	Lodging & Tourism Tax Base
North Dakota	5.00%	3.00%*	Only Materials	6.00%	3.00%	Lodging, Restaurants & Bars
South Dakota	4.00%	2.00%	Materials, Labor, & Equipment	0.00%	1% Gross Receipts/1.5% Tourism	Food, Lodging & Amusements
Iowa	6.00%	1.00%	Only Materials	5.00%	7.00%	Lodging
Illinois	6.25%	3.75%**	Only Materials	5.64%**	10.00%	Lodging

Source: Strategic Economics Group

\* Local governments in North Dakota can impose up to 2.0% sales and use tax and up to another 1.0% gross receipts tax. Only four cities have combined rates of over 2.0%.

\*\* Local governments in Illinois can impose up to 3.75% tax on top of the state 6.25% tax. This makes the maximum combined tax rate equal to 10%. The state lodging tax rate is 6% on 94% of gross receipts.

There are a number of differences among the four states as to how state and local sales, use, gross receipts and lodging taxes apply. The major features of each state's taxes are summarized below:

- **North Dakota** imposes statewide sales and use taxes at a rate of 5%. Local governments may impose sales and use taxes of up to 2% on the same transactions covered by the state tax. In addition, cities and counties may impose a 1% gross receipts tax. According to the Tax Foundation, the average local option tax rate in North Dakota equals 1.55% in 2014. However, most unincorporated areas do not impose local option sales taxes, so the amount of local option taxes generated by the pipeline will likely be less than the statewide average. The state tax rate on lodging accommodations equals 6%. Cities may impose up to a 2% tax on lodging and up to an additional 1% tax on lodging, restaurant food, and liquor sales.
- **South Dakota** imposes a statewide sales and use tax at a rate of 4%. South Dakota has a much broader tax base than the other three states to compensate for not having individual or corporate income taxes. A 2% tax is imposed on the gross receipts of construction contractors. For construction projects materials and labor expenditures are both subject to the tax. Also,

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the tax is imposed on equipment used on construction projects even if purchased out-of-state and no older than seven years. A credit is provided for taxes paid on the equipment to other states. In addition, the state imposes a 1.5% tourism tax on lodging, amusement, entertainment, and other tourism related businesses. City governments may impose up to a 2% local option sales tax and up to a 1% gross receipts tax. The Tax Foundation estimates local option taxes average 1.83% in South Dakota.

- **Iowa** imposes a 6% statewide sales and use tax. Iowa exempts food for home consumption and prescription medications from sales and use tax. Also, Iowa exempts residential purchases of electricity, natural gas and other heating fuels. City and county governments may impose up to a 1% local option sales tax. There is no local option use tax. This means in most cases construction materials brought into Iowa from other states are not subject to the local option sales tax. For purchases to which local option sales tax applies the average rate in 2014 equals 0.78% according to the Tax Foundation. In addition the state imposes a 5% lodging tax and local governments may impose up to a 7% lodging tax.
- **Illinois** imposes a 6.25% statewide sales and use tax. Illinois taxes food for home consumption and prescription medications at a rate of only 1%. City and county governments may impose local option retailer's sales tax on businesses located within the jurisdiction at rates up to 3.75%. The Tax Foundation estimates the average local sales tax rate for Illinois equals 1.91%. Illinois imposes a statewide 6% lodging tax on 94% of gross room rental receipts. Municipalities may also impose lodging taxes. The highest local rates appear to be in Chicago at 10% and Galesburg at 9%. It appears that many of the smaller southern Illinois counties through which the pipeline will pass do not impose local lodging taxes. For the southern Illinois counties that have a lodging tax the rate averages about 6%.

Table 17 summarizes the estimated sales, use, gross receipts, and lodging taxes that will be owed to the four states as a result of the construction of the Dakota Access Pipeline and other supporting infrastructure. These estimates reflect taxes on purchases directly associated with construction of the pipeline and purchases associated with indirect and induced purchases arising from the pipeline's construction. The table presents the estimates for state and local taxes separately.

The estimated total amount of these taxes that will be generated by construction of the pipeline equals \$127.9 million. The state and local shares equal \$118.0 Million and \$9.9 Million. Due to differences in the laws of the four states the tax burdens vary. For South Dakota the ratio of these taxes to the direct investment amount equals 4.7%. For North Dakota, Iowa, and Illinois the tax to investment ratios equal 2.5%, 3.4%, and 3.8%, respectively.

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Table 17. Construction Stage Sales, Use, Gross Receipts, and Lodging Taxes (\$ Million)

State	State	Local	Total
North Dakota	\$32.88	\$1.71	\$34.59
South Dakota	\$35.60	\$2.93	\$38.53
Iowa	\$33.09	\$2.24	\$35.33
Illinois	\$16.44	\$2.98	\$19.42
Total	\$118.00	\$9.86	\$127.86

Source: Strategic Economics Group

#### 4.3.2 Individual Income Tax

Illinois, Iowa, and North Dakota impose individual income taxes, but South Dakota does not impose this tax. Generally, individual income taxes are owed in the state where the income is earned. But some states have reciprocal agreements with border states, which means the state of residence has first claim on the tax and the work state only receives tax payments if the work state tax liability is higher than that of the residence state. Then the different between the two states' tax liabilities is owed to the work state.

Iowa and North Dakota have graduated rate structures, while the Illinois tax is imposed at a flat rate. Major features of the individual income tax structures for these three states are described below.

- **North Dakota's** individual income tax has a graduated structure consisting of five income brackets with marginal rates going from 1.22% to 3.22%. The top marginal rate applies to taxable income over \$405,100 in 2014. Different tax brackets apply to single, married joint, married-separate, and head-of-household filers. North Dakota has reciprocal agreements with Minnesota and Montana.
- **Iowa's** individual income tax has a graduated structure consisting of nine income brackets with marginal rates going from 0.36% to 8.98%. The top marginal rate applies at a fairly low taxable income level (\$68,175 in 2014). Iowa marginal tax rates may appear high, but this is because of the large number of credits, deductions, exclusions, and exemptions allowed. For example, Iowa is one of only three states that allow a 100% deduction for federal income tax payments. There is no marriage penalty associated with Iowa's tax. Iowa has a reciprocal agreement with Illinois.
- **Illinois** currently imposes individual income at a rate of 5%, but in 2015 the rate is scheduled to decrease to 3.75%. The definition of income for the Illinois tax is the same as for federal income tax. Illinois has reciprocal agreements with Iowa, Kentucky, Michigan, and Wisconsin. Illinois offers very few adjustments to income, such as credits, deductions,

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exclusions, and exemptions, compared to other states. This mean a high share of gross income is taxable.

Table 18 presents individual income tax liability estimates for wage and salary income and for proprietors' income. Tax liability estimates for these two sources of income are based on estimates of wage and salary income and proprietors' income derived from IMPLAN models developed for each state.

The estimates for taxes associated with wage and salary income involved a four step process. First, for each state the total wage and salary income estimates were divided by the total job creation estimates derived by the IMPLAN models by economic sector. Second, these average wage and salary income amounts were multiplied by taxable income percentages derived from U.S. Internal Revenue Service Statistics of Income data for each state. Third, the average tax amounts were derived by applying the state specific marginal tax rates to the average taxable income amounts. Last, the average tax liability estimates were multiplied by the estimated number of jobs created in each economic sector and then summed over all sectors.

The IMPLAN models provide estimates of proprietors' income for each state. The tax liability estimates for proprietors' income assume all of this income represents incremental growth over existing income. As such the tax liability is computed at the marginal tax rate that applies to the average level of proprietors' income for the state.

Table 18. Construction Stage Individual Income Tax (\$Million)

State	Wage & Salary Income	Proprietors' Income	Total
North Dakota	\$4.16	\$1.74	\$5.90
South Dakota	\$0.00	\$0.00	\$0.00
Iowa	\$7.98	\$6.59	\$14.57
Illinois	\$5.81	\$1.89	\$7.68
Total	\$17.95	\$10.20	\$28.15

Source: Strategic Economics Group

Additional income taxes may be generated from construction of the Dakota Access Pipeline. In at least some of the states, easement payments made to land owners may be treated as ordinary income. Also, some of the businesses involved in the construction of the pipeline and some businesses that provide goods and services to workers that received income as a result of the construction of the pipeline may be organized as C-corporations. Since corporate income tax marginal rates are greater than individual income tax rates in the three states with income taxes, the above estimates likely somewhat underestimate the state tax impacts. Finally, the above estimates do not reflect economic interactions among the four states arising from the project.

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5.0 Operations and Maintenance Impact Analysis Results

5.1 The Operations and Maintenance Stage Inputs

The operations and maintenance stage consists of the on-going activities that will begin near the end of 2016. These activities will require some purchases of materials and equipment and the hiring of a relatively small pool of labor. Dakota Access, LLC provided expenditure estimates by major category (i.e., construction, pipe, valves, fittings, bends, etc.), which Strategic Economics Group entered into an additional set of IMPLAN models built to describe the industrial purchasing relationships similar to the pipeline construction projects. While the expenditures will be divided between project employees and contracted work, the impact on the economy will be the same.

Table 19 shows the values of the spending inputs estimated by Dakota Access, LLC for each state by the appropriate spending categories. Operations and maintenance spending inputs will amount to nearly \$13 Million each year for the region with 48% being spent in North Dakota, 21% in South Dakota, 18% in Iowa and 13% in Illinois (shown in Figure 9).

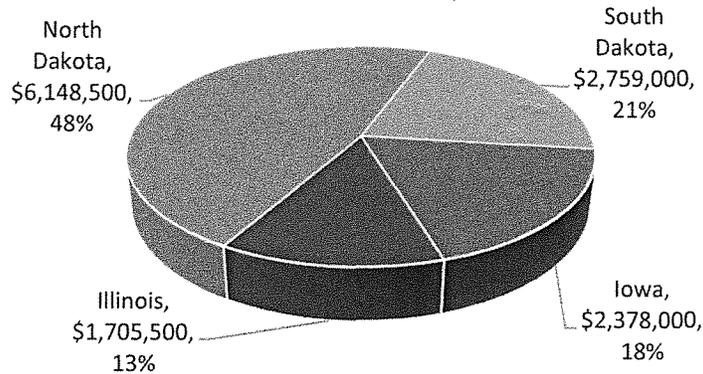
Table 19. IMPLAN Operations & Maintenance Stage Inputs for the Pipeline

Component	IMPLAN Sector	North Dakota	South Dakota	Iowa	Illinois	Region
DAPL Employees						
Number of Workers		27	12	8	6	53
Materials & Equipment (\$Millions)	417	\$3.45	\$1.56	\$1.18	\$0.81	\$6.99
Contracted Work						
Number of Workers		16	7	7	5	36
Materials & Equipment (\$Millions)	417	\$2.70	\$1.20	\$1.20	\$0.90	\$6.00
Total Operations & Maintenance						
Number of Workers		43	19	15	11	89
Materials & Equipment (\$Millions)	417	\$6.15	\$2.76	\$2.38	\$1.71	\$12.99

Source: Dakota Access, LLC

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Figure 9. Operations & Maintenance Input Spending on the Dakota Access Pipeline



Source: Strategic Economics Group

### 5.2 The Operations and Maintenance Stage Outputs

Tables 20, 21 and 22 summarize the impacts of the operations and maintenance spending on each of the four states in the region. Also, they show the impact, separately calculated, on the entire four-state region. The impact on the region is greater than the sum of the state impacts within the region (by about 1.16 times). Just as in the construction stage, the reason for this is that spending leakages are greater at the state level compared to the region as a whole.

Table 20. Production Resulting from Operations of the Project (\$Millions)

Project Area	Direct	Indirect	Induced	Total
North Dakota	\$6.148	\$0.792	\$1.979	\$8.920
South Dakota	\$2.759	\$0.432	\$1.025	\$4.217
Iowa	\$2.378	\$0.373	\$0.916	\$3.667
Illinois	\$1.705	\$0.399	\$0.985	\$3.090
Region	\$12.991	\$2.976	\$7.164	\$23.131

Source: Strategic Economics Group, IMPLAN Model

The estimated operations and maintenance spending inputs provided by Dakota Access, LLC are expected to generate an estimated \$23.13 Million in additional output for the four-state region. The annual amount of additional production that is expected to occur in North Dakota is \$8.92 Million, in South Dakota is \$4.22 Million, in Iowa is \$3.67 Million and in Illinois is \$3.09 Million.

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Table 21. Labor Income Resulting from Operations of the Project (\$Millions)

Project Area	Direct	Indirect	Induced	Total
North Dakota	\$3.478	\$0.275	\$0.669	\$4.422
South Dakota	\$1.469	\$0.141	\$0.339	\$1.950
Iowa	\$1.250	\$0.127	\$0.296	\$1.673
Illinois	\$0.995	\$0.154	\$0.359	\$1.508
Region	\$7.358	\$1.114	\$2.535	\$11.007

Source: Strategic Economics Group, IMPLAN Model

Table 22. Employment from Operations of the Project (Jobs)

Project Area	Direct	Indirect	Induced	Total
North Dakota	43	6	17	66
South Dakota	19	7	6	32
Iowa	15	5	5	25
Illinois	11	2	7	20
Region	89	18	53	160

Source: Strategic Economics Group, IMPLAN Model

Table 22 shows that the employment impact of the pipeline's operations and maintenance will be 160 jobs per year for the region. Some workers may be employed for less than 40 hours per week and some workers may work a considerable amount of overtime.

Table 23 shows that about 56% of the annual jobs created in the region during the operations and maintenance stage will be machinery and equipment repair jobs. Just like Table 13, displayed for the construction stage, this table also shows the broad range of job titles directly or indirectly associated with the this stage of the pipeline project.

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Table 23. Top Employment Sectors During the Operations & Maintenance Phase of the Pipeline

IMPLAN Sector	Description	Direct	Indirect	Induced	Total	Share
	Total	89	18	53	160	100%
417	Commercial and industrial machinery and equipment repair and maintenance	89	0	0	89	56%
413	Food services and drinking places	0	1	6	7	5%
382	Employment services	0	2	1	3	2%
397	Private hospitals	0	0	3	3	2%
360	Real estate establishments	0	1	2	3	2%
394	Offices of physicians, dentists, and other health practitioners	0	0	3	3	2%
319	Wholesale trade businesses	0	1	2	3	2%
398	Nursing and residential care facilities	0	0	2	2	1%
329	Retail Stores - General merchandise	0	0	2	2	1%
324	Retail Stores - Food and beverage	0	0	2	2	1%
	All Others	0	12	31	43	31%

Source: Strategic Economics Group, IMPLAN Model

Table 24 shows a comparison of the employment impacts (annual jobs), labor income impacts and output impacts. It also illustrates how the size of the analysis area affects the degree of leakages, the multipliers and the magnitude of the numbers.

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Table 24. Comparison of Operations Impact on the Region and States

Impact Type	Employment	Labor Income (\$Millions)	Output (\$Millions)
<b>Region</b>			
Direct Effect	89	\$7.358	\$12.991
Indirect Effect	18	\$1.114	\$2.976
Induced Effect	53	\$2.535	\$7.164
<b>Total Effect</b>	<b>160</b>	<b>\$11.007</b>	<b>\$23.131</b>
<b>North Dakota</b>			
Direct Effect	43	\$3.478	\$6.148
Indirect Effect	6	\$0.275	\$0.792
Induced Effect	17	\$0.669	\$1.979
<b>Total Effect</b>	<b>66</b>	<b>\$4.422</b>	<b>\$8.920</b>
<b>South Dakota</b>			
Direct Effect	19	\$1.469	\$2.759
Indirect Effect	3	\$0.141	\$0.432
Induced Effect	9	\$0.339	\$1.025
<b>Total Effect</b>	<b>31</b>	<b>\$1.950</b>	<b>\$4.217</b>
<b>Iowa</b>			
Direct Effect	15	\$1.250	\$2.378
Indirect Effect	3	\$0.127	\$0.373
Induced Effect	8	\$0.296	\$0.916
<b>Total Effect</b>	<b>25</b>	<b>\$1.673</b>	<b>\$3.667</b>
<b>Illinois</b>			
Direct Effect	11	\$0.995	\$1.705
Indirect Effect	2	\$0.154	\$0.399
Induced Effect	7	\$0.359	\$0.985
<b>Total Effect</b>	<b>20</b>	<b>\$1.508</b>	<b>\$3.090</b>

Source: Strategic Economics Group, IMPLAN Model

### 5.3 Fiscal Impacts of Pipeline Operations and Maintenance

The operation and maintenance of the Dakota Access Pipeline will result in increases in state and local sales and use tax, state income tax, and local property tax collections in the four states through which it passes. All four of the states impose sales and use taxes, but not all in the same way. Illinois, Iowa, and North Dakota impose state individual income taxes. Local governments in Iowa, North Dakota, and South Dakota impose property taxes on all pipeline infrastructure. In Illinois property tax only applies to pipeline infrastructure that is above ground.

#### 5.3.1 Sales, Use, and Gross Receipts Taxes

The basic features of sales, use, and gross receipts taxes for the four states are described in section 4.3.1. The only major difference between how these taxes apply to construction and to operation and

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maintenance activities occurs in Iowa. In Iowa only materials are subject to tax for new construction, but for maintenance and repair activities both materials and labor are subject to taxation.

Table 25 summarizes estimates the annual amounts of state and local sales, use, and gross receipts taxes that will be generated as a result of pipeline operation and maintenance activities and the indirect and induced expenditures arising from these activities.

Table 25. Annual Operations Sales, Use, and Gross Receipts Taxes (\$Million)

State	State Tax	Local Tax	Total
North Dakota	\$0.113	\$0.045	\$0.158
South Dakota	\$0.135	\$0.062	\$0.197
Iowa	\$0.163	\$0.027	\$0.190
Illinois	\$0.038	\$0.012	\$0.050
Total	\$0.449	\$0.146	\$0.595

Source: Strategic Economics Group

As these estimates show the amount of ongoing sales, use, and gross receipt tax receipts generated by the operation and maintenance of the Dakota Access Pipeline will likely average only about \$0.6 million per year. This is because once the pipeline is placed in operation expenditures on taxable material and service purchases will be small unless significant repairs and upgrading of the pipeline or pumping station infrastructure are required. Such major expenditures are not anticipated for a considerable period of time after the pipeline goes into operation.

### 5.3.2 Individual Income Tax

The major features of the individual income taxes of Illinois, Iowa, and North Dakota are described in section 4.3.2. Estimates of the amounts of income tax that will be owed to these states on wages and salaries paid to workers hired for the operation and maintenance of the pipeline were made using two approaches. The income tax estimates for the workers that will be directly employed by Dakota Access or its contractors follow the same four step procedure used for all of the workers engaged both directly and indirectly in the construction of the pipeline.

For the additional wage and salary income that will result from indirect and induced expenditures arising from pipeline operations and maintenance taxes were computed by simply applying marginal tax rates assumed to be most appropriate. This second approach reflects the assumption that the income associated with indirect and induced activities represents incremental additions on top of other income.

All of the estimated growth in proprietors' income derived from the state IMPLAN models is assumed to be incremental income. Therefore, the margin tax rate applied to this income reflects the average proprietor's income for the state. The marginal tax rates used for these estimates are 3.75% for Illinois, 7.92% for Iowa, and 3.13% for North Dakota.

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Table 26 presents annual estimates of additional individual income tax that Illinois, Iowa, and North Dakota may expect to collect as a result of the future operation and maintenance of the Dakota Access Pipeline. Because the future costs of hiring workers to operate and maintain the pipeline will be relatively low, these activities are not expected to generate much additional income tax revenue for these states. South Dakota will derive no additional revenue from this source because it does not impose an individual income tax.

One potential source of additional individual income tax revenue involves tax payments by the pipeline’s owners. Because both the Dakota Access Pipeline and its parent, Energy Transfer Partners, are organized as “pass-through” entities, individuals with ownership interests in either entity may owe additional individual income tax. However, these potential additional tax revenues cannot be estimated at this time.

Table 26. Annual Operations Individual Income Tax (\$Million)

State	Wage & Salary Income	Proprietors' Income	Total
North Dakota	\$0.043	\$0.041	\$0.084
South Dakota	\$0.000	\$0.000	\$0.000
Iowa	\$0.043	\$0.042	\$0.085
Illinois	\$0.022	\$0.023	\$0.045
Total	\$0.108	\$0.106	\$0.214

Source: Strategic Economics Group

### 5.3.3 Property Tax

Property taxes represent the largest source of ongoing tax payments that will be received by governments in Iowa, North Dakota, and South Dakota. Because Illinois exempts pipeline infrastructure below ground from property tax, this is not expected to be a significant source of additional tax revenue for local governments.

Although Iowa, North Dakota, and South Dakota all impose property tax on pipeline infrastructure, the manner in which pipelines are assessed and taxes levied varies among the three states. The main features of the administration of the property tax systems of the three states as they apply to pipelines are described below:

- In **North Dakota** the state’s Department of Revenue centrally assesses pipelines. The department computes a unitary assessed value for the entire pipeline company and then North Dakota’s share of the unitary value is computed by taking the ratio of the value located in the state to the total value. For pipelines that have been in existence for more than three years valuations are determined by averaging the results of three approaches – replacement cost,

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cost adjusted for economic obsolescence, and income. However, during the first three years of a new pipeline's existence the valuation is determined giving precedence to the replacement cost approach. By statute the assessed value for pipelines equals 50% of the total valuation. Also, by statute the taxable value for pipelines equals 10% of assessed value. Local governments set the tax levy rates. For FY 2013 and FY 2014 a 12% credit against taxes was in place. No decision has been made regarding extension of the credit. For FY 2012 the average tax levy equaled 19.98% of taxable value or 2.00% of assessed value.

- In **South Dakota** the state Department of Revenue centrally assesses pipeline property. The department uses three methods to determine the property's value – cost approach, market approach, and income approach. However, by necessity the cost approach takes precedence during the first few years of a new pipeline's existence. Within the state assessed valuations for each jurisdiction are based on the value of assets located within the jurisdiction rather than being determined by pipeline mileage located within each jurisdiction. This means the value of a pump station will be allocated to the jurisdiction where it is located rather than spread over all jurisdictions where the pipeline is located. The taxable value of pipeline property equals 85% of the total assessed value. For FY 2012 the average tax levy equaled 2.08% of taxable value.
- In **Iowa** the state Department of Revenue centrally assesses pipeline property. Pipelines are valued as a unit using three approaches – original cost less depreciation, income, and stock and debt. Valuing pipelines as a unit means the entire value of the operating property both inside and outside Iowa is taken into consideration and then Iowa's share of the total value of the property is determined. All assets, including pump stations, are included in the unit value. Iowa's share of the unit value is computed as a weighted average of the ratios of Iowa's share of gross operating property value to the total value and barrel miles of product transported through Iowa to the total for the entire pipeline. In Iowa pipelines are subject to tax on 100% of their assessed value. The levy rates are set by local governments. For assessment year 2013 the average tax levy for pipelines equaled 2.82% of assessed value.
- In **Illinois** most pipeline property is exempt from tax. Only property located above ground is taxable. The assessed value of taxable property in Illinois is set by statute at 33-1/3% of market value. The average tax rate for industrial property for 2012 equaled 2.80% of fair market value.

The estimation of the amounts of property tax the proposed pipeline will generate presents a dilemma due to the different methods used to estimate pipeline valuations. For the three states that impose property tax on all pipeline assets the preferred valuation method is the income approach. However, because income can fluctuate from year-to-year and reliable income data will not be available for several years after the pipeline goes into operation early year valuations by default rely on the cost method. In order to derive reasonable estimates of property taxes that the proposed pipeline will likely generate both construction cost based and income based estimates are presented below for the years 2017 through 2021.

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The cost based assessed value estimates reflect construction costs for each of the three states and reflect statutory valuation language for each state. North Dakota and South Dakota have both indicated that assessments based on these cost may be somewhat high, but no written guidance was provided on the amounts by which cost based valuations may be reduced. Iowa did not provide any verbal or written guidance. Effective tax rates were derived using either published pipeline valuation and tax levy statistics or data provided by the state revenue departments.

Table 27 summarizes the cost based property tax estimates for the years 2017 through 2021. The estimates assume the value of the property will depreciate by 2% per year following the initial year of operation. The effect tax rates applied for each state are: North Dakota (2.00%), South Dakota (2.08%), Iowa (2.82%), and Illinois (2.80%).

Table 27. Annual Cost-Based Property Tax Liabilities, 2017 - 2021 (\$ Million)

State	2017	2018	2019	2020	2021
North Dakota	\$13.775	\$13.494	\$13.213	\$12.931	\$12.650
South Dakota	\$14.200	\$13.910	\$13.621	\$13.331	\$13.041
Iowa	\$28.766	\$28.179	\$27.592	\$27.005	\$26.418
Illinois	\$0.851	\$0.834	\$0.817	\$0.799	\$0.782
Total	\$57.592	\$56.417	\$55.242	\$54.066	\$52.891

Source: Strategic Economics Group

Table 28 summarizes the income based property tax estimates for the years 2017 through 2021. These estimates incorporate the following assumptions:

- The value of the pipeline will depreciate at a rate of 2% per year,
- The debt share of financing equals 62.4% of total cost,
- The interest rate paid on borrowed funds equals 6.5% per year,
- Beginning with the third year assessed values are computed using 3-year moving averages of company financial results,
- Assessed values assume a 9.5% capitalization rate, and
- The effective tax rates are the same as used in the cost based estimates.

One significance difference between the estimates derived by the two methods is the growth trends. The cost-based estimate reflects a reduction in the value of the pipeline over time due to straight line depreciation relative to a fixed amount of initial investment. The income-based approach incorporates revenue growth each of the first five years of the pipeline's operation. Similar to what is done by the states in computing assessed values for pipelines and other commercial property, Table 29 presents averages of the two estimation methods.

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Table 28. Annual Income-Based Property Tax Liabilities, 2017 - 2021 (\$ Million)

State	2017	2018	2019	2020	2021
North Dakota	\$12.475	\$12.706	\$12.939	\$13.430	\$13.898
South Dakota	\$12.860	\$13.099	\$13.339	\$13.845	\$14.327
Iowa	\$26.052	\$26.535	\$27.021	\$28.047	\$29.023
Illinois	\$0.642	\$0.654	\$0.666	\$0.692	\$0.716
Total	\$52.029	\$52.994	\$53.965	\$56.014	\$57.964

Source: Strategic Economics Group

Table 29. Annual Property Tax Liabilities, 2017 - 2021 (\$ Million)

State	2017	2018	2019	2020	2021
North Dakota	\$13.125	\$13.100	\$13.076	\$13.181	\$13.274
South Dakota	\$13.530	\$13.505	\$13.480	\$13.588	\$13.684
Iowa	\$27.409	\$27.357	\$27.307	\$27.526	\$27.721
Illinois	\$0.747	\$0.744	\$0.742	\$0.746	\$0.749
Total	\$54.811	\$54.706	\$54.604	\$55.040	\$55.428

Source: Strategic Economics Group

There exist a variety of factors that may result in actual tax liabilities being either higher or lower than the estimates presented in Table 29. Some state revenue departments have indicated they may discount assessments based on the cost approach the first few years until several years of actual income data become available in order to not overvalue the property or to cause significant year-to-year variation in assessed values for the property. Neither approach incorporates any factor that recognizes that oil production from the Bakken area will likely only be maintained at peak levels for a short period of time supporting a shorter depreciable life. Some states may allow an adjustment to income to reflect such "economic obsolescence" on top of normal depreciation.

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### 6.0 Transportation Issues that Impact the Regional Economy

A large share of Bakken oil is currently being transported by railroad and it is affecting the farm economy in Montana, Minnesota and the Dakotas. A Reuters story in May focused on the cause: "U.S. rail shipments of crude oil have surged 44-fold since 2008, much of them crisscrossing the heart of the High Plains wheat belt from North Dakota's Bakken oil fields to coastal refiners. Trains carry two-thirds of 1 million barrels of crude produced each day from the Bakken, where pipelines are scarce."<sup>14</sup>

In Tacoma, Washington, the destination for much of that oil, an editorial in the News Tribune reported that "about three trains of Bakken crude oil move through Pierce County every week. Each train consists of 90 to 120 tank cars; each car carries about 28,000 gallons. The amount could more than double by 2020."<sup>15</sup>

As a result: "the delays have contributed to an accumulation of huge stocks of grain, with North Dakota's corn stocks hitting a record of more than 192 million bushels on March 1 and wheat stocks at their largest in three years, government data showed."<sup>16</sup>

In early August, Shales Play Media reported that "the price to transport a bushel of wheat to the west coast ten years ago was about a dollar a bushel. Today that cost has nearly tripled. Market fluctuations and an increase in oil price over the past few years have driven the price up some, but competition from oil trains has been the main driver of the increased freight rates." And "the high wages paid by oil companies also forces elevator operators to increase their wages so that they can retain employees, further increasing freight prices."<sup>17</sup>

Minnesota Public Radio reported in March that "train delays have been chronic all winter at Agassiz Valley and across the Midwest. Engines are running five to 10 days late, creating an increasingly costly backup. Farmers can't haul grain from their farm storage to the elevator because the grain can't move to market."<sup>18</sup> Not only were farmers and grain elevators impacted, but also producers like General Mills, whose supply of grains were bottlenecked and whose commodity costs were rising.

In May, North Dakota U.S. Senator Heidi Heitkamp asked North Dakota State University (NDSU) to examine the impact that rail delays were having on the state's agricultural industry.<sup>19</sup> The assignment landed on the desk of NDSU crop economist and marketing specialist Frayne Olson. Olson applied an innovative method for preparing an estimate of the impact using changes in the basis of the three major commodities: corn, soybeans and hard red spring wheat.

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<sup>14</sup> Plume, Karl, "Trains for grain scarce on the U.S. Plains", Reuters New Service, May 14, 2014.

<sup>15</sup> Cronin, Mike, "Crops shouldn't take a back seat to oil shipments", The News Tribune, August 6, 2014

<sup>16</sup> *Ibid.*

<sup>17</sup> Deede, John, "Balancing oil and agriculture". Bakken.com, Shale Plays Media, August 1, 2014.

<sup>18</sup> Gunderson, Dan, "Farmers, elevators fume at costly train delays; oil trains to blame". March 26, 2014.

<sup>19</sup> Olson, Frayne, "Effects of 2013/14 rail transportation problems on North Dakota farm income",

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Olson compared the basis from terminals to nearby markets for the agricultural commodities and compared current levels to a reference period to determine the revenue loss to North Dakota farmers.

According to Olson, "there has been an approximately \$66.6 million dollar loss in North Dakota farm level revenue for crops that were sold from January through April, 2014." He projected "the potential for an additional \$95.4 million dollars in lost farm revenue, from the sale of on-farm grain stocks, if crop basis levels remain at current levels."<sup>20</sup>

Olson compared the historical basis levels to a base year (2009-2010). The basis is the difference between the cash price at the local terminals and elevators and the future contracts prices at nearby markets. He then estimated how much of the difference could be due to the inventory buildups that resulted from rail delays or higher rail costs.<sup>21</sup>

Olson's report was cited on September 4, 2014 by North Dakota Governor Jack Dalrymple addressing the National Surface Transportation Board in Fargo regarding the rail situation. Governor Dalrymple told the members of the Board that corn, soybeans and wheat acres are at record levels in the Dakotas and Minnesota, but there's no place to move it. In North Dakota alone, more than 15 percent of the 2013 grain is still in storage.

The Associated Press coverage of the hearings indicated that "farmers and some politicians believe that increased crude oil and freight shipments from North Dakota's western oil fields are largely the cause of shipping delays."<sup>22</sup> A representative of the railroads denied that they favor one sector over another.

On September 12, 2014, the University withdrew the Olson report as an official publication. NDSU Professor William Wilson was quoted as stating that the conclusions in the Olson study was done too hastily and was "probably not appropriate or defensible."<sup>23</sup> However, Wilson said, "There was nothing radically wrong with the study, but this is a study that should have taken six or 12 months. It's a serious question, it's a serious issue, and it's probably deserving of a serious study."<sup>24</sup> Two weeks later, additional farm price and income data substantiated the Olson conclusions.

On September 25, 2014, Professor Olson indicated that he still stands by the conclusions of his study, given the assumptions and the timing.<sup>25</sup> The issues of rail delays, the buildup of grain inventories at terminals, erratic farm prices and farm revenue losses are complex. According to Professor Olson, the issue is driven by the rail infrastructure.

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<sup>20</sup> Olson, Frayne, "Effects of 2013/14 rail transportation problems on North Dakota farm Income."

<sup>21</sup> Knutson, Jonathan, "NDSU Economist defends withdrawn rail impact study." Inforum, September 21, 2014.

<sup>22</sup> Kolpack, Dave, "Officials ask federal board to help on rail delays." Associated Press, September 4, 2014.

<sup>23</sup> Kolpack, Dave, "NDSU withdraws study cited by public officials in hearings on the impacts of rail delays on ag." Daily Reporter, September 12, 2014.

<sup>24</sup> Ibid.

<sup>25</sup> Telephone conversation with Dr. Frayne Olson, September 25, 2014.

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The rail system in Montana and the Dakotas is characterized by four factors:

1. a shortage of grain hopper rail cars
2. the lack of sufficient crews - drawn down during the recession years
3. competition for power units (engines) between the oil shippers and the grain producers
4. the limitation of track time in sparsely-populated states

While Bakken oil does not compete with the grain terminals for rail cars because grain hopper cars cannot be used to haul oil, they do compete for the limited number of rail crews, power units and track capacity. Two major rail carriers serve those states, Burlington Northern Santa Fe (BNSF) and Canadian Pacific (CP). Since the Olson study was released and hearings were held by the federal Surface Transportation Board, backlogs have been reduced.

“Dakota Mill & Grain, and the other shippers in the state — accustomed to timely arrivals of hopper cars — saw deliveries last winter fall behind, with rail car backlogs swelling to more than three months at their peak. The impact was immediate: Purchases were delayed because elevators ran out of room to store the commodity, leaving farmers to hold onto crops longer than expected. The cost to ship grain by rail soared, and farmers received less money.”<sup>26</sup>

In the short run, rail carriers can hire more crews and in the intermediate term can order the purchase of more power units. However, the available track capacity will continue to be an infrastructure impediment.

“BNSF has been the most active in trying to relieve the problem, working towards adding railways and hiring more workers. However, it is unclear if additional rail capacity will be available this year. The huge backlog of shipments combined with what is expected to be a plentiful harvest in North Dakota makes another winter with strained rails seem likely.”<sup>27</sup>

In July, 2014 University of Minnesota economist Edward Usset used the same methodology as Olson to estimate the impact of railroad service delays on farm income.<sup>28</sup> Usset employed the Basis-based analysis to identify the impact that the recent rail transportation bottleneck had on Minnesota grain farmers. Table 30 shows the comparable measures for the Olson and Usset studies.

While Olson estimated the loss to North Dakota grain farmers at \$66.6 Million for the previous crop and \$95.4 Million for the crop still on the ground, Usset estimated the same measures for Minnesota at \$99.3 Million and \$147.7 Million.

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<sup>26</sup> Doering, Christopher, “Ag bracing for railroad delays as record harvest looms.” [www.Argusleader.com](http://www.Argusleader.com), September 15, 2014.

<sup>27</sup> Deede, John, “Crop shipments still stranded in North Dakota as oil-by-rail dominates”, [Bakken.com](http://Bakken.com), August 26, 2014.

<sup>28</sup> Usset, Edward, “Minnesota Basis Analysis”. University of Minnesota Center for Farm Financial Management, July 10, 2014.

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Table 30. Farm Revenue Loss on Basis in 2014

Commodity	Location	
	North Dakota	Minnesota
Soybeans		
Est. Basis Difference (\$/bu.)	\$0.37	\$0.405
Est. Farm Revenue Loss	\$11,746,350	\$18,830,000
Est. Farm loss On-Farm Inv.	\$911,310	\$23,895,000
Corn		
Est. Basis Difference (\$/bu.)	\$0.41	\$0.37
Est. Farm Revenue Loss	\$17,344,800	\$72,000,000
Est. Farm loss On-Farm Inv.	\$36,170,200	\$122,100,000
Hard Red Spring Wheat		
Est. Basis Difference (\$/bu.)	\$0.81	\$0.41
Est. Farm Revenue Loss	\$37,544,813	\$8,500,000
Est. Farm loss On-Farm Inv.	\$58,274,438	\$1,700,000
Total Farm Revenue Loss		
Previous Crop	\$66,635,963	\$99,330,000
On-Farm Inventory	\$95,355,948	\$147,695,000

Source: Frayne Olson, North Dakota State University, Edward Usset, University of Minnesota.

Even in western Iowa, farmer-owned cooperatives have begun to feel the pressure. In a Des Moines Register story, “the Corn Belt was pummeled by a brutal winter, and competing demands among coal, oil, grain and other commodities for space on the country's clogged rail network left railroads such as Canadian Pacific Railway and BNSF Railway struggling to ferry cars around the region.”<sup>29</sup> Author Doering wrote, “West Central [a farmer-owned cooperative] – accustomed to waiting a few days to receive hopper cars - had to wait a week, with delays extending to more than six weeks.” The cost to lease a rail car this year nearly doubled to more than \$12,500. This will likely get worse with the 2014 bumper crop of corn and soybeans.

In Minnesota, the Star Tribune reported in August that, “the Canadian Pacific Railway, one of two key railroads that serve Minnesota farmers, isn’t making enough progress in shipping a huge backlog of grain.”<sup>30</sup> The USDA reported that, “Grain elevators in some locations, such as South Dakota and Minnesota, could run out of storage capacity during the upcoming harvest, requiring grain be stored on the ground and running the risk of spoiling. The projected size of the upcoming harvest creates a high potential for loss in the affected states.”<sup>31</sup>

<sup>29</sup> Doering, Christopher, “Farmers, ag businesses brace for rail delays” Des Moines Register, September 13, 2014

<sup>30</sup> Hughlett, Mike, “Grain shipments from Midwest remain slow.” StarTribune, August 11, 2014.

<sup>31</sup> *Ibid.*

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Farmers and grain elevators in Illinois are watching the rail buildup of inventories this year. The Decatur newspaper reported in early September that, “the 2014 grain crop will exceed U.S. grain storage capacity by 694 million bushels. That is based on current USDA yield projections.” USDA Deputy Administrator Arthur Neal said, “South Dakota will not have any storage space for 20 percent of its 2014 corn, soybean and wheat crops.”<sup>32</sup>

According to the Neal, South Dakota isn't the only state with a storage shortage. Illinois is one of five other states where grain will be piled on the ground this fall because there is more than can be stored in grain bins either on the farm or at elevators. In fact, 3 percent of the Illinois crop will be in temporary storage on the ground, in a state that is a leader in having grain bins. Indiana and Missouri will be short of storage for 15 percent of their crops. Ohio, Michigan and Kentucky all will be putting 6 percent to 7 percent of their grain on the ground because of insufficient storage space.”

One solution to this growing problem is to build refineries near the oil fields, but that would only change the need from transporting crude oil to transporting processed oil. Another possible solution would be to expand the rail infrastructure. A third solution would be to build a pipeline to carry much of the Bakken oil to the refineries and free up rail system.

The Wahpeton, North Dakota Daily News story on September 9, 2012 pointed out that, “Some within the ag industry are calling for a pipeline to be built to take the stress off the overburdened rail lines. Last Thursday the Surface Transportation Board held a public hearing in Fargo to provide the opportunity for people and businesses to report on service problems within the U.S. rail network. The question of creating a pipeline has arisen repeatedly by agricultural officials hoping to lessen the severity of the backlog.”<sup>33</sup>

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<sup>32</sup> Ellis, Stu, “Farmers’ loss is foreign market’s gain.” Herald and Review, September 17, 2014.

<sup>33</sup> Speidel, Karen, “Experts suggest a pipeline to relieve rail issues.” Daily News, September 19, 2014

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### 7.0 Transportation Cost, Accident Risk, and Other Considerations

#### 7.1 Transportation Cost Differences between Pipeline and Railroad

The rapid pace at which oil production ramped up in North Dakota rising from only 10,297 barrels per day at the beginning of 2007 to over a million barrels per day by June 2014 has put a great strain on the state's transportation infrastructure.<sup>34</sup> Existing pipeline capacity equaled only 583,000 barrels per day at the end of 2013.<sup>35</sup> This has forced oil producers to rely on rail to handle over 60% of shipments out of the state.<sup>36</sup>

Also, only limited refinery capacity exists in North Dakota at the present time, and this is not likely to change for the foreseeable future. The Tesoro Mandan refinery located near Bismarck can process up to 60,000 barrels per day. Two new 20,000 barrels per day capacity refineries are planned at Trenton and Dakota Prairie, but these are intended to produce only diesel and kerosene to satisfy local demands.<sup>37</sup> Generally, the transportation of crude oil by pipeline is less expensive than by railroad on a per barrel mile basis. But market opportunities as well as cost and capacity constraints influence transportation choices made by oil producers in the Bakken region.

According to transportation cost information included in a February 2014 investors' presentation by Kodiak Oil & Gas, it costs \$5 per barrel to transport crude oil from North Dakota to Cushing, OK by pipeline and from Cushing to the Gulf it cost another \$4 per barrel via the Seaway pipeline. At the same time it cost between \$10 and \$12 per barrel to move oil by railroad from North Dakota to the Gulf. So, last February pipeline offered a \$1 to \$3 per barrel savings over railroad for this particular movement of oil.<sup>38</sup>

Other information included in this presentation shows that rail transport from North Dakota to Anacortes, WA costs \$9 to \$10 per barrel, from North Dakota to the East Coast cost \$14 to \$17 per barrel, and North Dakota to California cost between \$13 and \$15 per barrel. Beyond the shipping costs oil movements by railroad incur additional costs associated with terminal charges (\$2 per barrel), tank car leases (\$2 per barrel), and shrinkage (\$1 per barrel).<sup>39</sup>

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<sup>34</sup> North Dakota Industrial Commission, Oil and Gas Division, historical monthly oil production statistics (accessed on October 17, 2014 at <https://www.dmr.nd.gov/oilgas/stats/statisticsvw.asp>)

<sup>35</sup> North Dakota Pipeline Authority, US Williston Basin Crude Oil Export Options (accessed on October 17, 2014 at <http://northdakotapipelines.com/datastatistics/>)

<sup>36</sup> Energy Information Administration, "Rail deliveries of U.S. oil to increase in 2014" (August 28, 2014).

<sup>37</sup> Energy Information Administration, "Rising North Dakota oil production and demand spur two new refineries" (March 27, 2013).

<sup>38</sup> Kodiak Oil & Gas, Investor presentation (February 2014), p. 15; Callum Turcan, "Is a major derailment looming for our nation's railroads," The Motley Fool (April 12, 2014)

<sup>39</sup> Sandy Fielden, "Crude loves rock'n'rail – Brent, WTI and the impact on Bakken netbacks," RBN Energy (May 5, 2013).

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Truck transportation plays a limited but important role in moving crude oil from production areas to rail terminals. During 2013 trucks handled about 64% of this gathering function, while pipelines handled the remaining 36%. These truck movements cost about \$3 per barrel compared to \$2 per barrel for pipeline.<sup>40</sup>

One reason railroads became an attractive transportation alternative for North Dakota oil producers has to do with differences in the prices of West Texas Intermediate (WTI) and Brent crude. Due to transportation bottlenecks at Cushing, OK a large differential existed between the Brent and WTI prices from the beginning of 2011 through the first quarter of 2013.<sup>41</sup> For example, during all of 2012 the differential equaled \$17.61 per barrel and reached as high as \$24.87 per barrel during October of that year. Nationwide railroad carloads of crude oil jumped from 65,751 during 2011 to 233,698 (a 255.4% increase) during 2012 and to 407,761 (another 74.4% increase) during 2013.<sup>42</sup>

From December 2009 to January 2013 inventories of crude stored at Cushing, OK rose from 34.5 million barrels to 51.9 million barrels. Over the same period the differential between Brent and WTI (Brent minus WTI price) crude went from -\$1.48 per barrel to \$23.19 per barrel. Since peaking Cushing, OK crude inventories have dropped to about 21 million barrels at the end of October 2014, and the Brent to WTI price differential has dropped to around \$5 per barrel.<sup>43</sup>

One major reason for the changes is the completion of the repurposing of the Seaway crude pipeline from Cushing to Freeport, Texas. Previously this pipeline moved oil into Cushing. Now it moves oil away from Cushing. This repurposed pipeline went into service in June 2012 with a capacity of 150,000 barrels per day. Following pumping station additions and modifications the capacity increased to 400,000 barrels per day at the beginning of 2013. Further improvements will raise capacity to about 850,000 barrels per day.<sup>44</sup> Another pipeline project by TransCanada (Gulf Coast Pipeline) will add up to an additional 830,000 barrels per day of capacity for moving crude from Cushing, OK to Nederland, Texas.<sup>45</sup> These improvements should reduce the likelihood of future shipping bottlenecks at Cushing and minimize this as a factor for growth in the Brent – WTI price differential.

When the Brent – WTI price differential falls below \$5 per barrel, East and West Coast refineries served

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<sup>40</sup> Sandy Fielden, "Crude loves rock'n'rail – Brent, WTI and the Impact on Bakken netbacks," RBN Energy (May 5, 2013)

<sup>41</sup> Cushing, OK serves as the pricing location for West Texas Intermediate (WTI) crude. This is because Cushing hosts that largest amount of oil storage facilities in the county totaling 46.3 million barrels. For this reason Cushing is a major transportation hub for oil shipments, particularly for pipelines.

<sup>42</sup> Association of American Railroads, "Moving crude oil by rail," (September 2014), p. 4.

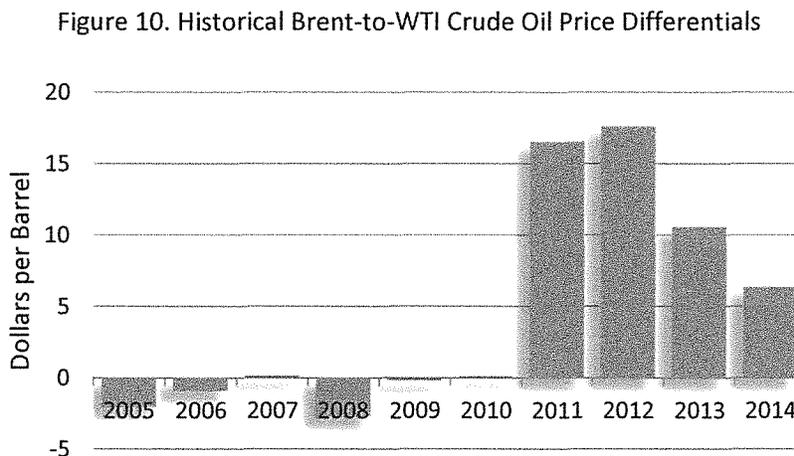
<sup>43</sup> Brent and WTI prices are from the Federal Reserve Bank of St. Louis FRED Economic data internet site accessed November 9, 2014 (<http://research.stlouisfed.org/fred2/>); Cushing, OK crude oil inventory data are from the Energy Information Administration Internet site accessed November 9, 2014 ([http://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=PET&s=W\\_EPCO\\_SAX\\_YCUOK\\_MBBL&f=W](http://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=PET&s=W_EPCO_SAX_YCUOK_MBBL&f=W)).

<sup>44</sup> "About Seaway," accessed on October 18, 2014 (<http://www.seawaypipeline.com/>)

<sup>45</sup> TransCanada, "About Gulf Coast Pipeline Project," accessed November 9, 2014 (<http://www.gulf-coast-pipeline.com/about/the-projects/>)

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by railroad become less attractive to Bakken oil producers than do Gulf Coast refineries served by pipeline.<sup>46</sup> Figure 10 shows the historical Brent – WTI price differential from 2005 through 2014 year-to-date.



Source: Energy Information Administration, Strategic Economics Group

## 7.2 Pipeline and Railroad Accident Risk

Both pipelines and railroads have experienced major accidents involving large spills of crude oil in recent years. The most damaging pipeline accident in recent years occurred in Marshall, MI during July 2010 when a 30-inch pipeline owned by Enbridge Energy ruptured spilling 843,000 gallons of heavy crude (diluted bitumen). Cleanup costs associated with this spill totaled approximately \$1 Billion.<sup>47</sup> The most spectacular of the railroad accidents involving crude oil occurred on July 6, 2013 on Lac-Megantic, Quebec. This accident involved 72 tanks cars each loaded with 30,000 gallons of Bakken crude oil. The accident claimed 47 lives and destroyed 30 buildings. The cleanup from this accident is expected to take 5 years.<sup>48</sup>

In spite of some catastrophic accidents both pipelines and railroads generally have good records carrying hazardous materials. The Association of American Railroads on its Internet site states that 99.997% of hazardous materials shipments reach their destinations without incident.<sup>49</sup> Similarly, the American

<sup>46</sup> Sandy Fielden, "Crude Loves Rock'n' Rail – Brent, WTI and the Impact on Bakken Netbacks," (<http://rbnenergy.com/taxonomy/term/107/feed>).

<sup>47</sup> Rosemary Parker, "Enbridge oil cleanup on Kalamazoo River finished, all sections of the river open for public use," MLive.com (October 9, 2014).

<sup>48</sup> Wikipedia, "Lac-Megantic derailment" accessed October 19, 2014 ([http://en.wikipedia.org/wiki/Lac-M%C3%A9gantic\\_derailment](http://en.wikipedia.org/wiki/Lac-M%C3%A9gantic_derailment)).

<sup>49</sup> Association of American Railroads, Internet site accessed on October 19, 2014 (<https://www.aar.org/safety/Pages/default.aspx>).

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Pipeline Institute states that during 2013 99.999% of the 14 billion barrels of crude oil and petroleum products transported reached their destinations safely.<sup>50</sup> Accident rates involving crude oil have increased as domestic oil production has increased in recent years. But relative to the amount of product being moved, safety has improved.

Comparing the two modes of transportation, pipelines appear to be the safer mode. For example, statistics revealed by the U.S. Pipeline and Hazardous Materials Safety Administration shows that during 2013 the number of gallons of oil spilled by railroads exceeded the 800,000 gallons spilled during all the years from 1975 to 2010 in the railroad industry.<sup>51</sup> Federal regulators have proposed new standards for railroad tank cars to make them less likely to rupture in an accident. These regulations would raise railroad rates for crude oil movements from 2.2% to 3.6%.<sup>52</sup>

For pipelines the U.S. Pipeline and Hazardous Materials Safety Administration reports that during 2013 there were 401 reported incidents that involved 119,290 barrels of hazardous liquids and caused property damage totaling \$266.7 million and resulted in one fatality and 5 injuries. Based on Federal Energy Regulatory Commission annual statistical reports hazardous liquid pipelines carried 8.1 Billion barrels of crude oil and 6.5 Billion barrels of petroleum products during 2013 and collected \$15.7 billion in operating revenues on these shipments. Over the past five years (2009 to 2013) the number of pipeline incidents involving hazardous liquids equaled 361 resulting in spills averaging 81,971 barrels and damages of \$348.3 Million. So, pipeline accidents involved a very small amount of the product moved.

Comparing accidents for pipelines and railroads finds that accident rates for both are low. With a few notable exceptions the average spill amounts for each incident are small. However, when catastrophic failures occur for pipelines the size of the spill can be large. However, monitoring equipment installed on newer pipelines makes the detection of leaks sooner than for older facilities. On the other hand, because railroads pass through cities and catastrophic accidents generally happen due to derailments while trains are in motion, property damage as well as fatality and injury counts are much greater than those that occur for pipeline accidents.

### 7.3 Other Economic Impacts

Beyond the localized impacts in areas where the extraction of oil has dramatically increased, the growth in domestic oil production is having significant impacts on the nation's overall economy. Since 2005 average monthly crude oil imports have dropped by 85.4 million barrels (27.7%). During 2005 crude oil imports averaged 308.0 Million barrel per month. Through the first seven months of 2014 the average

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<sup>50</sup> American Pipeline Institute, Internet site accessed October 19, 2014 (<http://www.pipeline101.com/are-pipelines-safe/what-is-the-safety-record>).

<sup>51</sup> "US railroad oil spills in 2013 surpassed previous four decades combined," RT.com (January 23, 2014).

<sup>52</sup> Tom Bokowy, "DOT impact on crude by rail," Cost & Capital (July 2014), p. 4.

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was down to 222.6 Million barrels per month.<sup>53</sup>

As the volume of oil imports has declined so has the flow of dollars out of the United States to pay for oil. Comparing the first eight months of 2011 and 2014 the cost of imported oil has dropped from \$220.7 Billion to \$171.7 Billion, which equals a decrease of \$49.0 Billion (22.2%). This decrease has positive spillover impacts on the value of the dollar, domestic purchases of other goods and services, and on the rate of inflation.<sup>54</sup>

Increased pipeline capacity in the Bakken area of North Dakota will provide support for these positive trends associated with the growth of domestic oil production. For example, over the past year the average price of a gallon of regular gasoline has dropped from \$3.31 to \$3.07, and the price is likely to drop further. This current year-over-year drop in price means households are saving about \$33 billion per year on motor fuel purchases. Similarly, businesses are benefiting from a 29-cent per gallon drop in the price of diesel fuel, which translates to about an \$11.2 billion savings nationwide.

As additional pipeline capacity comes online in North Dakota increased market options and lower transportation costs will mean about another 10-cents per gallon decrease in motor fuel and diesel prices. At current levels of motor fuel sales (135.6 Billion gallons/year) and diesel fuel sales (38.5 Billion gallons/year) the additional savings will equal about \$17.4 Billion nationally per year. Drivers in all states will benefit. These potential annual savings to the four states through which the Dakota Access Pipeline will pass equal \$84.6 Million for North Dakota, \$67.1 Million for South Dakota, \$230.8 Million for Iowa, and \$613.2 Million for Illinois.

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<sup>53</sup> Energy Information Administration

<sup>54</sup> U.S. Census Bureau

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## 8.0 Brief Summary of Findings

### 8.1 Construction Stage

During the two-year construction stage of the project the four-state region will experience an increase in production and sales of more than \$4.9 Billion, an increase in personal income more than \$1.9 Billion and an increase of nearly 33,000 job-years. The fiscal impact on the four states will collectively be about \$128 Million in sales, use, gross receipts and lodging taxes and an increase in income taxes of nearly \$28 Million.

Table 31. Summary Economic & Fiscal Impact Measures - Construction Stage

Measure	Region	North Dakota	South Dakota	Iowa	Illinois
<b>Economic Measures</b>					
Production and Sales (\$Millions)	\$4,962.12	\$1,052.86	\$835.84	\$1,088.74	\$753.35
Income (\$Millions)	\$1,934.39	\$450.35	\$302.82	\$390.34	\$303.30
Employment (Job-Years)	32,721	7,688	7,137	7,623	5,009
<b>Fiscal Measures</b>					
Sales, Gross Receipts and Lodging Taxes (\$Millions)	\$127.86	\$34.59	\$38.53	\$35.33	\$19.42
Individual Income Taxes (\$Millions)	\$28.15	\$5.90	\$0.00	\$14.57	\$7.68
Property Taxes (\$Millions)	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00

Source: Strategic Economics Group

### 8.2 Operations and Maintenance Stage

Once the pipeline is in operation, after 2016, the economic impact will be small. The total impact on the four-state region will be an increase in production and sales of about \$140 Million, generating an increase in personal income of about \$11 Million and 160 permanent operations and maintenance jobs. However, the pipeline will generate considerable ongoing tax revenues. North Dakota, South Dakota and Iowa will see an increase in local property taxes. During the first year of operation these revenues are estimated at \$13.1 Million, \$13.5 Million and \$27.4 Million, respectively. Illinois will realize less than \$1 million per year in additional property taxes because it does not tax most pipeline infrastructure. Collectively, the four states will see an increase each year in sales, use, gross receipts and lodging taxes of about \$595,000 and \$214,000 in income taxes.<sup>55</sup>

<sup>55</sup> Except South Dakota which does have an income tax.

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Table 32. Summary Economic & Fiscal Impact Measures - Operations & Maintenance Stage

Measure	Region	North Dakota	South Dakota	Iowa	Illinois
<b>Economic Measures</b>					
Production and Sales (\$Millions)	\$140.28	\$29.53	\$53.63	\$44.08	\$13.05
Income (\$Millions)	\$11.01	\$4.42	\$1.95	\$1.67	\$1.51
Employment (Jobs)	160	66	31	25	20
<b>Fiscal Measures</b>					
Sales, Gross Receipts and Lodging Taxes	\$595,000	\$158,000	\$197,000	\$190,000	\$50,000
Individual Income Taxes	\$214,000	\$84,000	\$0	\$85,000	\$45,000
Property Taxes (\$Millions)	\$55.62	\$13.37	\$13.73	\$27.68	\$0.84

Source: Strategic Economics Group

### 8.3 Other Factors that Will Be Impacted By the Pipeline

Transportation issues have created a substantial need for this pipeline.

- Currently, a large share of oil from the Bakken area is transported to refineries by railroad, causing a bottleneck in the Dakotas and Minnesota for farmers who need the same tracks and engines to take their crops to markets. As a result farm commodities have exceeded the local storage capacity, causing grain and soybean storage prices to rise or farm income to fall.
- Railroad bottlenecks have also been reflected in a price reduction for Bakken oil to account for the added transportation cost.
- The transportation of crude oil by is generally less expensive by pipeline than by railroad. The cost of moving oil from the Bakken area of North Dakota to Gulf Coast refineries during 2013 cost between \$1 and \$3 per barrel less by pipeline than by railroad.
- Both pipelines and railroads have experienced some spectacular accidents in recent years. But overall the safety records of both modes of hazardous materials transportation are very good. Over the past five years pipeline spills have averaged only about 82,000 barrels per year while delivering an average of 13.7 Billion barrels per year of hazardous liquids.
- The growth of domestic oil production has exerted significant downward pressure on world oil prices. As of mid-October both Brent and WTI crude are trading at less than \$90 per barrel.

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- Since 2005 U.S. oil imports of oil have dropped by 27.7% and since 2011 U.S. expenditures on oil imports have dropped by 22.2%. These decreases are benefiting the country through reduced foreign trade deficits, a stronger dollar, and lower inflation.
- As additional pipeline capacity comes online in North Dakota increased market options and lower transportation costs will mean additional decreases in motor fuel and diesel prices.

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Appendix 1 – Glossary of Terms

Term	Definition
Backward linkage	The interconnection of an industry to other industries from which it purchases its inputs in order to produce its output. An industry has significant backward linkages when its production of output requires substantial intermediate inputs from many other industries. (BEA)
Compensation of employees	Compensation of employees is the total remuneration, in cash or in kind, payable by enterprises to employees in return for work done by the latter during the accounting period. (SNA) See Employee Compensation.
Direct effects	It is a series of production changes or expenditures made by producers/consumers as a result of an activity or policy. Applying these initial changes to the multipliers in an IMPLAN model will then display how the region will respond, economically to these initial changes.
Employee Compensation	Employee Compensation in IMPLAN is the total payroll cost of the employee paid by the employer. This includes wage and salary, all benefits (e.g., health, retirement) and payroll taxes (both sides of social security, unemployment taxes, etc.)
Employment multipliers	I-O multipliers used to estimate the total number of jobs (both full-time and part-time) throughout the economy that are needed, directly and indirectly, to deliver \$1 million of final demand for a specific commodity. (BEA)
Earnings multipliers	I-O ratios that measure earnings paid to households by employment throughout the economy, directly and indirectly, in connection with delivery of \$1 million of final demand for a specific commodity. (BEA)
Excise taxes	Taxes that are levied by units of government on the manufacture, sale, or consumption of specific items, usually on a per-unit basis rather than a percentage basis. For example, cigarettes are taxed by the pack or carton, alcoholic beverages are taxed by the bottle, and gasoline is taxed by the gallon. Excise taxes are a type of commodity tax. (BEA)
Final Demand	The value of goods & services produced and sold to final users (institutions) during the calendar year. This value is also equivalent to the Direct Effect of the impact.
Forward linkage	The interconnection of an industry to other industries to which it sells its outputs. It is measured as the row sum of the direct requirements table (direct forward linkage) or as the row sum of the total requirements table (total forward linkage). An industry has significant forward linkages when a substantial amount of its output is used by other industries as intermediate inputs to their production. (BEA)

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Term	Definition
Indirect business taxes (IBT)	In general terms, IBT can currently be considered the combination of excise, sales and property taxes, as well as, fees, fines, licenses and permits.
Indirect effects	The impact of local industries buying goods and services from other local industries. The cycle of spending works its way backward through the supply chain until all money leaks from the local economy, either through imports or by payments to value added.
Induced effects	The response by an economy to an initial change (direct effect) that occurs through re-spending of income received by a component of value added. IMPLAN's default multiplier recognizes that labor income (employee compensation and proprietor income components of value added) is not a leakage to the regional economy. This money is recirculated through the household spending patterns causing further local economic activity.
I-O analysis	A type of applied economic analysis that tracks the interdependence among various producing and consuming sectors of an economy. More particularly, it measures the relationship between a given set of demands for final goods and services and the inputs required to satisfy those demands. (BEA)
Jobs	A job in IMPLAN = the annual average of monthly jobs in that industry (this is the same definition used by QCEW, BLS, and BEA nationally). Thus, 1 job lasting 12 months = 2 jobs lasting 6 months each = 3 jobs lasting 4 months each. A job can be either full-time or part-time.
Job-Year	Equals one full-time job lasting for one year.
Labor Income	All forms of employment income, including Employee Compensation (wages and benefits) and Proprietor Income.
Multipliers	It is the ratio of Total Production to initial Direct Inputs. Multipliers may be constructed for output, employment, and every component of Value Added.
Multi-regional Analysis	A method for determining economic impacts in two or more regions caused by sales to Final Demand in one region.
Output	Output represents the value of industry production. In IMPLAN these are annual production estimates for the year of the data set and are in producer prices. For manufacturers this would be sales plus/minus change in inventory. For service sectors production = sales. For Retail and wholesale trade, output = gross margin and not gross sales.

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Output multipliers	Derived from the I-O total requirements tables, the output multipliers show the amount of output required to satisfy a given level of final-use expenditures. For the commodity-by-commodity total requirements table, it is the production required both directly and indirectly of the commodity at the beginning of each row per dollar of delivery to final use of the commodity at the top of the column. For the industry-by-commodity total requirements table, it is the industry output required to deliver a dollar of a commodity to final users. For the industry-by-industry total requirements table, it is the industry output required to deliver a dollar of industry output to final users. (BEA)
Proprietor income	Proprietor income consists of payments received by self-employed individuals and unincorporated business owners. This income also includes the capital consumption allowance and is recorded on Federal Tax form 1040C.
Regional Purchase Coefficient	A Regional Purchase Coefficient (RPC) is the proportion of the total demand for a commodity by all users in the Study Area that is supplied by producers located within the Study Area. For example, if the RPC for the commodity fish is 0.8, then 80% of the demand by local fish processors, fish wholesalers, and other fish consumers are met by local fish producers. Conversely, 20% (1.0-RPC) of the demand for fish is satisfied by imports. (IMPLAN)
Trade Flow	The flow of goods & services between or within counties, or user-defined study areas within the U.S.
Value added	The difference between total output of an industry or establishment and the cost of its intermediate inputs.

Source: IMPLAN Group LLC

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Appendix 2 – Detailed Tables for the Four-State Region

The first four tables identify the economic impacts of the Dakota Access Pipeline project spending during the two-year construction stage and shows the effect within the region. All dollar amounts are in 2016 dollars.

Table 2.1 Pipeline Construction Economic Impact on the Region

Description	Employment (Job Years)	Labor Income (\$Millions)	Output (\$Millions)
<b>Impact Type</b>			
Direct Effect	15,879	\$1,016.83	\$2,462.95
Indirect Effect	6,362	\$419.47	\$1,092.11
Induced Effect	10,481	\$498.10	\$1,407.07
<b>Total Effect</b>	<b>32,721</b>	<b>\$1,934.39</b>	<b>\$4,962.12</b>
<b>Sector</b>			
Agriculture	37	\$3.20	\$10.10
Mining	778	\$76.25	\$145.29
Construction	13,030	\$786.49	\$1,747.87
Manufacturing	1,455	\$109.61	\$688.92
TIPU	651	\$43.78	\$141.85
Trade	2,995	\$135.17	\$306.26
Service	13,593	\$764.95	\$1,896.17
Government	182	\$14.94	\$25.65
<b>Total</b>	<b>32,721</b>	<b>\$1,934.39</b>	<b>\$4,962.12</b>

Source: Strategic Economics Group, IMPLAN Model

Table 2.2 Impact on Employment of Pipeline Construction in the Region

Description	Direct	Indirect	Induced	Total
<b>Total</b>	<b>15,879</b>	<b>6,362</b>	<b>10,481</b>	<b>32,721</b>
Agriculture	0	6	31	37
Mining	700	72	5	778
Construction	12,856	108	67	13,030
Manufacturing	666	619	171	1,455
TIPU	0	350	301	651
Trade	0	708	2,287	2,995
Service	1,657	4,444	7,492	13,593
Government	0	55	127	182

Source: Strategic Economics Group, IMPLAN Model

An Assessment of the Economic Impact of the Dakota Access Pipeline, 2014

Table 2.3 Impact on Labor Income of Pipeline Construction in the Region (\$Millions)

Description	Direct	Indirect	Induced	Total
Total	\$1,016.83	\$419.47	\$498.10	\$1,934.39
Agriculture	\$0.00	\$0.65	\$2.55	\$3.20
Mining	\$71.12	\$4.91	\$0.22	\$76.25
Construction	\$774.78	\$6.79	\$4.93	\$786.49
Manufacturing	\$49.59	\$46.88	\$13.14	\$109.61
TIPU	\$0.00	\$23.30	\$20.48	\$43.78
Trade	\$0.00	\$43.03	\$92.14	\$135.17
Service	\$121.34	\$289.50	\$354.11	\$764.95
Government	\$0.00	\$4.40	\$10.53	\$14.94

Source: Strategic Economics Group, IMPLAN Model

Table 2.4 Impact on Output of Pipeline Construction in the Region (\$Millions)

Description	Direct	Indirect	Induced	Total
Total	\$2,462.95	\$1,092.11	\$1,407.07	\$4,962.12
Agriculture	\$0.00	\$1.58	\$8.52	\$10.10
Mining	\$128.09	\$15.83	\$1.38	\$145.29
Construction	\$1,724.53	\$13.07	\$10.27	\$1,747.87
Manufacturing	\$323.16	\$265.42	\$100.35	\$688.92
TIPU	\$0.00	\$73.26	\$68.60	\$141.85
Trade	\$0.00	\$101.25	\$205.01	\$306.26
Service	\$287.17	\$614.51	\$994.49	\$1,896.17
Government	\$0.00	\$7.19	\$18.46	\$25.65

Source: Strategic Economics Group, IMPLAN Model

The next four tables identify the economic impact of the operations and maintenance of the pipeline after it has been put in service in 2016 and beyond. The dollars identified in these tables are also in 2016 dollars.

An Assessment of the Economic Impact of the Dakota Access Pipeline, 2014

Table 2.5 Pipeline Operations Economic Impact of the Region

Description	Employment (Jobs)	Labor Income (\$Millions)	Output (\$Millions)
<b>Impact Type</b>			
Direct Effect	89	\$7.358	\$12.991
Indirect Effect	18	\$1.114	\$2.976
Induced Effect	53	\$2.535	\$7.164
<b>Total Effect</b>	<b>160</b>	<b>\$11.007</b>	<b>\$23.131</b>
<b>Sector</b>			
Agriculture	0	\$0.014	\$0.047
Mining	0	\$0.002	\$0.010
Construction	1	\$0.046	\$0.093
Manufacturing	2	\$0.162	\$1.009
TIPU	3	\$0.172	\$0.564
Trade	13	\$0.563	\$1.274
Service	141	\$9.962	\$19.983
Government	1	\$0.087	\$0.150
<b>Total</b>	<b>160</b>	<b>\$11.007</b>	<b>\$23.131</b>

Source: Strategic Economics Group, IMPLAN Model

Table 2.6 Employment Impact of the Pipeline Operations in the Region

Description	Direct	Indirect	Induced	Total
<b>Total</b>	<b>89</b>	<b>18</b>	<b>53</b>	<b>160</b>
Agriculture	0	0	0	0
Mining	0	0	0	0
Construction	0	0	0	1
Manufacturing	0	1	1	2
TIPU	0	1	2	3
Trade	0	1	12	13
Service	89	14	38	141
Government	0	0	1	1

Source: Strategic Economics Group, IMPLAN Model

Table 2.7 Labor Income of the Pipeline Operations in the Region

Description	Direct	Indirect	Induced	Total
<b>Total</b>	<b>\$7,358,042</b>	<b>\$1,114,003</b>	<b>\$2,535,443</b>	<b>\$11,007,488</b>
Agriculture	\$0	\$1,012	\$12,995	\$14,007
Mining	\$0	\$626	\$1,113	\$1,739
Construction	\$0	\$21,327	\$25,093	\$46,420
Manufacturing	\$0	\$94,921	\$66,890	\$161,811
TIPU	\$0	\$67,257	\$104,479	\$171,736
Trade	\$0	\$93,473	\$469,404	\$562,878
Service	\$7,358,042	\$801,870	\$1,801,750	\$9,961,662
Government	\$0	\$33,516	\$53,718	\$87,235

Source: Strategic Economics Group, IMPLAN Model

An Assessment of the Economic Impact of the Dakota Access Pipeline, 2014

Table 2.8 Output Impact of the Pipeline Operations in the Region

Description	Direct	Indirect	Induced	Total
Total	\$12,990,999	\$2,975,933	\$7,164,021	\$23,130,953
Agriculture	\$0	\$3,310	\$43,305	\$46,615
Mining	\$0	\$3,349	\$7,010	\$10,359
Construction	\$0	\$40,995	\$52,314	\$93,309
Manufacturing	\$0	\$498,281	\$510,809	\$1,009,090
TIPU	\$0	\$213,956	\$350,275	\$564,231
Trade	\$0	\$229,640	\$1,044,842	\$1,274,482
Service	\$12,990,999	\$1,930,791	\$5,061,240	\$19,983,030
Government	\$0	\$55,612	\$94,226	\$149,837

Source: Strategic Economics Group, IMPLAN Model

An Assessment of the Economic Impact of the Dakota Access Pipeline, 2014

Appendix 3 - Detail Tables for North Dakota

The first four tables identify the economic impact of the Dakota Access Pipeline project spending during the two-year construction stage and shows the effect within the state of North Dakota. All dollar amounts are in 2016 dollars.

Table 3.1 Pipeline Construction Economic Impact on North Dakota

Description	Employment (Job Years)	Labor Income (\$Millions)	Output (\$Millions)
<b>Impact Type</b>			
Direct Effect	4,565	\$306.14	\$655.93
Indirect Effect	1,157	\$66.93	\$168.20
Induced Effect	1,966	\$77.27	\$228.73
<b>Total Effect</b>	<b>7,688</b>	<b>\$450.35</b>	<b>\$1,052.86</b>
<b>Sector</b>			
Agriculture	6	\$0.62	\$1.39
Mining	212	\$22.46	\$39.58
Construction	3,828	\$248.70	\$509.95
Manufacturing	269	\$17.18	\$78.36
TIPU	105	\$8.07	\$24.21
Trade	663	\$28.25	\$66.26
Service	2,562	\$122.58	\$327.45
Government	44	\$2.48	\$5.65
<b>Total</b>	<b>7,688</b>	<b>\$450.35</b>	<b>\$1,052.86</b>

Source: Strategic Economics Group, IMPLAN Model

Table 3.2 Impact on Employment of Pipeline Construction in North Dakota

Description	Direct	Indirect	Induced	Total
<b>Total</b>	<b>4,565</b>	<b>1,157</b>	<b>1,966</b>	<b>7,688</b>
Agriculture	0	0	5	6
Mining	205	7	0	212
Construction	3,788	24	15	3,828
Manufacturing	179	78	12	269
TIPU	0	59	46	105
Trade	0	176	487	663
Service	393	800	1,369	2,562
Government	0	13	30	44

Source: Strategic Economics Group, IMPLAN Model

An Assessment of the Economic Impact of the Dakota Access Pipeline, 2014

Table 3.3 Impact on Labor Income of Pipeline Construction in North Dakota (\$Millions)

Description	Direct	Indirect	Induced	Total
Total	\$306.14	\$66.93	\$77.27	\$450.35
Agriculture	\$0.00	\$0.04	\$0.58	\$0.62
Mining	\$21.80	\$0.64	\$0.02	\$22.46
Construction	\$245.69	\$1.68	\$1.33	\$248.70
Manufacturing	\$11.84	\$4.71	\$0.63	\$17.18
TIPU	\$0.00	\$4.67	\$3.40	\$8.07
Trade	\$0.00	\$9.60	\$18.65	\$28.25
Service	\$26.81	\$44.86	\$50.91	\$122.58
Government	\$0.00	\$0.73	\$1.74	\$2.48

Source: Strategic Economics Group, IMPLAN Model

Table 3.4 Impact on Output of Pipeline Construction in North Dakota (\$Millions)

Description	Direct	Indirect	Induced	Total
Total	\$655.93	\$168.20	\$228.73	\$1,052.86
Agriculture	\$0.00	\$0.12	\$1.28	\$1.39
Mining	\$38.08	\$1.44	\$0.07	\$39.58
Construction	\$504.67	\$2.95	\$2.33	\$509.95
Manufacturing	\$51.53	\$21.26	\$5.57	\$78.36
TIPU	\$0.00	\$13.32	\$10.90	\$24.21
Trade	\$0.00	\$23.35	\$42.91	\$66.26
Service	\$61.66	\$104.20	\$161.59	\$327.45
Government	\$0.00	\$1.57	\$4.08	\$5.65

Source: Strategic Economics Group, IMPLAN Model

The next four tables identify the economic impact of the operations and maintenance of the pipeline after it has been put in service in 2016 and beyond. The dollars identified in these tables are also in 2016 dollars.

An Assessment of the Economic Impact of the Dakota Access Pipeline, 2014

Table 3.5 Pipeline Operations Economic Impact on North Dakota

Description	Employment (Jobs)	Labor Income (\$Millions)	Output (\$Millions)
<b>Impact Type</b>			
Direct Effect	43	\$3.478	\$6.148
Indirect Effect	6	\$0.275	\$0.792
Induced Effect	17	\$0.669	\$1.979
<b>Total Effect</b>	<b>66</b>	<b>\$4.422</b>	<b>\$8.920</b>
<b>Sector</b>			
Agriculture	0	\$0.005	\$0.012
Mining	0	\$0.000	\$0.001
Construction	0	\$0.024	\$0.041
Manufacturing	0	\$0.009	\$0.069
TIPU	1	\$0.051	\$0.163
Trade	5	\$0.201	\$0.474
Service	59	\$4.104	\$8.098
Government	0	\$0.028	\$0.061
<b>Total</b>	<b>66</b>	<b>\$4.422</b>	<b>\$8.920</b>

Source: Strategic Economics Group, IMPLAN Model

Table 3.6 Employment Impact of the Pipeline Operations in North Dakota

Description	Direct	Indirect	Induced	Total
<b>Total</b>	<b>43</b>	<b>6</b>	<b>17</b>	<b>66</b>
Agriculture	0	0	0	0
Mining	0	0	0	0
Construction	0	0	0	0
Manufacturing	0	0	0	0
TIPU	0	0	0	1
Trade	0	1	4	5
Service	43	5	12	59
Government	0	0	0	0

Source: Strategic Economics Group, IMPLAN Model

An Assessment of the Economic Impact of the Dakota Access Pipeline, 2014

Table 3.7 Labor Income of the Pipeline Operations in North Dakota

Description	Direct	Indirect	Induced	Total
Total	\$3,478,018	\$275,468	\$668,639	\$4,422,125
Agriculture	\$0	\$212	\$4,998	\$5,210
Mining	\$0	\$185	\$171	\$357
Construction	\$0	\$11,969	\$11,550	\$23,519
Manufacturing	\$0	\$3,840	\$5,446	\$9,287
TIPU	\$0	\$21,433	\$29,487	\$50,919
Trade	\$0	\$39,409	\$161,590	\$201,000
Service	\$3,478,018	\$185,785	\$440,260	\$4,104,063
Government	\$0	\$12,634	\$15,136	\$27,770

Source: Strategic Economics Group, IMPLAN Model

Table 3.8 Output Impact of the Pipeline Operations in North Dakota

Description	Direct	Indirect	Induced	Total
Total	\$6,148,500	\$792,352	\$1,978,792	\$8,919,644
Agriculture	\$0	\$619	\$11,048	\$11,668
Mining	\$0	\$497	\$591	\$1,088
Construction	\$0	\$21,082	\$20,212	\$41,294
Manufacturing	\$0	\$21,256	\$48,136	\$69,392
TIPU	\$0	\$68,794	\$94,679	\$163,473
Trade	\$0	\$101,581	\$371,984	\$473,566
Service	\$6,148,500	\$552,538	\$1,396,700	\$8,097,738
Government	\$0	\$25,983	\$35,442	\$61,425

Source: Strategic Economics Group, IMPLAN Model

An Assessment of the Economic Impact of the Dakota Access Pipeline, 2014

Appendix 4 – Detail Tables for South Dakota

The first four tables identify the economic impact of the Dakota Access Pipeline project spending during the two-year construction stage and shows the effect within the state of South Dakota. All dollar amounts are in 2016 dollars.

Table 4.1. Pipeline Construction Economic Impact on South Dakota

Description	Employment (Job Years)	Labor Income (\$Millions)	Output (\$Millions)
<b>Impact Type</b>			
Direct Effect	4,199	\$182.65	\$485.62
Indirect Effect	1,291	\$58.59	\$164.05
Induced Effect	1,646	\$61.57	\$186.17
<b>Total Effect</b>	<b>7,137</b>	<b>\$302.82</b>	<b>\$835.84</b>
<b>Sector</b>			
Agriculture	6	\$0.79	\$1.80
Mining	161	\$4.20	\$21.16
Construction	3,694	\$163.71	\$416.83
Manufacturing	135	\$7.42	\$41.26
TIPU	103	\$5.82	\$20.69
Trade	562	\$21.61	\$53.31
Service	2,425	\$97.03	\$275.90
Government	50	\$2.23	\$4.90
<b>Total</b>	<b>7,137</b>	<b>\$302.82</b>	<b>\$835.84</b>

Source: Strategic Economics Group, IMPLAN Model

Table 4.2 Impact on Employment of Pipeline Construction in South Dakota

Description	Direct	Indirect	Induced	Total
<b>Total</b>	<b>4,199</b>	<b>1,291</b>	<b>1,646</b>	<b>7,137</b>
Agriculture	0	2	4	6
Mining	147	14	1	161
Construction	3,656	25	14	3,694
Manufacturing	21	98	16	135
TIPU	0	64	39	103
Trade	0	173	389	562
Service	376	898	1,151	2,425
Government	0	17	33	50

Source: Strategic Economics Group, IMPLAN Model

An Assessment of the Economic Impact of the Dakota Access Pipeline, 2014

Table 4.3 Impact on Labor Income of Pipeline Construction in South Dakota (Millions)

Description	Direct	Indirect	Induced	Total
Total	\$182.65	\$58.59	\$61.57	\$302.82
Agriculture	\$0.00	\$0.28	\$0.51	\$0.79
Mining	\$3.53	\$0.66	\$0.01	\$4.20
Construction	\$161.73	\$1.16	\$0.82	\$163.71
Manufacturing	\$1.26	\$5.31	\$0.85	\$7.42
TIPU	\$0.00	\$3.61	\$2.22	\$5.82
Trade	\$0.00	\$8.12	\$13.48	\$21.61
Service	\$16.12	\$38.65	\$42.25	\$97.03
Government	\$0.00	\$0.80	\$1.43	\$2.23

Source: Strategic Economics Group, IMPLAN Model

Table 4.4 Impact on Output of Pipeline Construction in South Dakota (Millions)

Description	Direct	Indirect	Induced	Total
Total	\$485.62	\$164.05	\$186.17	\$835.84
Agriculture	\$0.00	\$0.53	\$1.26	\$1.80
Mining	\$18.36	\$2.68	\$0.11	\$21.16
Construction	\$412.71	\$2.48	\$1.64	\$416.83
Manufacturing	\$11.27	\$24.37	\$5.62	\$41.26
TIPU	\$0.00	\$11.97	\$8.72	\$20.69
Trade	\$0.00	\$20.89	\$32.41	\$53.31
Service	\$43.26	\$99.50	\$133.15	\$275.90
Government	\$0.00	\$1.63	\$3.26	\$4.90

Source: Strategic Economics Group, IMPLAN Model

The next four tables identify the economic impact of the operations and maintenance of the pipeline after it has been put in service in 2016 and beyond. The dollars identified in these tables are also in 2016 dollars.

An Assessment of the Economic Impact of the Dakota Access Pipeline, 2014

Table 4.5 Pipeline Operations Economic Impact on South Dakota

Description	Employment (Jobs)	Labor Income (\$Millions)	Output (\$Millions)
<b>Impact Type</b>			
Direct Effect	19	\$1.469	\$2.759
Indirect Effect	3	\$0.141	\$0.432
Induced Effect	9	\$0.339	\$1.025
<b>Total Effect</b>	<b>31</b>	<b>\$1.950</b>	<b>\$4.217</b>
<b>Sector</b>			
Agriculture	0	\$0.003	\$0.007
Mining	0	\$0.000	\$0.001
Construction	0	\$0.009	\$0.019
Manufacturing	0	\$0.009	\$0.051
TIPU	0	\$0.022	\$0.086
Trade	2	\$0.092	\$0.229
Service	28	\$1.799	\$3.791
Government	0	\$0.015	\$0.032
<b>Total</b>	<b>31</b>	<b>\$1.950</b>	<b>\$4.217</b>

Source: Strategic Economics Group, IMPLAN Model

Table 4.6 Employment Impact of the Pipeline Operations in South Dakota

Description	Direct	Indirect	Induced	Total
<b>Total</b>	<b>19</b>	<b>3</b>	<b>9</b>	<b>31</b>
Agriculture	0	0	0	0
Mining	0	0	0	0
Construction	0	0	0	0
Manufacturing	0	0	0	0
TIPU	0	0	0	0
Trade	0	0	2	2
Service	19	3	6	28
Government	0	0	0	0

Source: Strategic Economics Group, IMPLAN Model

An Assessment of the Economic Impact of the Dakota Access Pipeline, 2014

Table 4.7 Labor Income of the Pipeline Operations in South Dakota

Description	Direct	Indirect	Induced	Total
Total	\$1,469,452	\$141,228	\$339,219	\$1,949,899
Agriculture	\$0	\$213	\$2,805	\$3,018
Mining	\$0	\$52	\$77	\$129
Construction	\$0	\$4,543	\$4,496	\$9,039
Manufacturing	\$0	\$4,205	\$4,692	\$8,898
TIPU	\$0	\$10,132	\$12,234	\$22,367
Trade	\$0	\$17,953	\$74,391	\$92,344
Service	\$1,469,452	\$97,296	\$232,640	\$1,799,388
Government	\$0	\$6,833	\$7,884	\$14,717

Source: Strategic Economics Group, IMPLAN Model

Table 4.8 Output Impact of the Pipeline Operations in South Dakota

Description	Direct	Indirect	Induced	Total
Total	\$2,759,000	\$432,305	\$1,025,303	\$4,216,608
Agriculture	\$0	\$500	\$6,954	\$7,454
Mining	\$0	\$412	\$619	\$1,031
Construction	\$0	\$9,749	\$9,038	\$18,787
Manufacturing	\$0	\$20,368	\$30,923	\$51,290
TIPU	\$0	\$37,766	\$48,280	\$86,046
Trade	\$0	\$49,917	\$178,998	\$228,915
Service	\$2,759,000	\$300,058	\$732,433	\$3,791,491
Government	\$0	\$13,535	\$18,058	\$31,593

Source: Strategic Economics Group, IMPLAN Model

An Assessment of the Economic Impact of the Dakota Access Pipeline, 2014

Appendix 5 – Detail Tables for Iowa

The first four tables identify the economic impact of the Dakota Access Pipeline project spending during the two-year construction stage and shows the effect within the state of Iowa. All dollar amounts are in 2016 dollars.

Table 5.1 Pipeline Construction Economic Impact on Iowa

Description	Employment (Job Years)	Labor Income (\$Millions)	Output (\$Millions)
<b>Impact Type</b>			
Direct Effect	3,998	\$229.82	\$628.43
Indirect Effect	1,520	\$79.46	\$209.77
Induced Effect	2,104	\$81.06	\$250.54
<b>Total Effect</b>	<b>7,623</b>	<b>\$390.34</b>	<b>\$1,088.74</b>
<b>Sector</b>			
Agriculture	8	\$0.63	\$2.28
Mining	89	\$3.77	\$12.84
Construction	3,564	\$206.80	\$539.50
Manufacturing	185	\$12.54	\$76.26
TIPU	130	\$7.50	\$26.02
Trade	743	\$28.66	\$65.83
Service	2,866	\$127.77	\$360.51
Government	37	\$2.66	\$5.49
<b>Total</b>	<b>7,623</b>	<b>\$390.34</b>	<b>\$1,088.74</b>

Source: Strategic Economics Group, IMPLAN Model

Table 5.2 Impact on Employment of Pipeline Construction in Iowa

Description	Direct	Indirect	Induced	Total
<b>Total</b>	<b>3,998</b>	<b>1,520</b>	<b>2,104</b>	<b>7,623</b>
Agriculture	0	2	6	8
Mining	60	28	0	89
Construction	3,524	26	14	3,564
Manufacturing	39	121	25	185
TIPU	0	82	49	130
Trade	0	219	524	743
Service	374	1,030	1,461	2,866
Government	0	13	25	37

Source: Strategic Economics Group, IMPLAN Model

An Assessment of the Economic Impact of the Dakota Access Pipeline, 2014

Table 5.3 Impact on Labor Income of Pipeline Construction in Iowa (\$Millions)

Description	Direct	Indirect	Induced	Total
Total	\$229.82	\$79.46	\$81.06	\$390.34
Agriculture	\$0.00	\$0.14	\$0.49	\$0.63
Mining	\$2.07	\$1.67	\$0.02	\$3.77
Construction	\$204.45	\$1.51	\$0.85	\$206.80
Manufacturing	\$3.21	\$7.80	\$1.53	\$12.54
TIPU	\$0.00	\$4.64	\$2.87	\$7.50
Trade	\$0.00	\$10.39	\$18.27	\$28.66
Service	\$20.09	\$52.39	\$55.29	\$127.77
Government	\$0.00	\$0.92	\$1.73	\$2.66

Source: Strategic Economics Group, IMPLAN Model

Table 5.4 Impact on Output of Pipeline Construction in Iowa (\$Millions)

Description	Direct	Indirect	Induced	Total
Total	\$628.43	\$209.77	\$250.54	\$1,088.74
Agriculture	\$0.00	\$0.42	\$1.87	\$2.28
Mining	\$8.99	\$3.78	\$0.06	\$12.84
Construction	\$533.38	\$3.50	\$2.63	\$539.50
Manufacturing	\$26.84	\$37.10	\$12.32	\$76.26
TIPU	\$0.00	\$15.36	\$10.66	\$26.02
Trade	\$0.00	\$24.92	\$40.92	\$65.83
Service	\$59.22	\$122.93	\$178.36	\$360.51
Government	\$0.00	\$1.77	\$3.72	\$5.49

Source: Strategic Economics Group, IMPLAN Model

The next four tables identify the economic impact of the operations and maintenance of the pipeline after it has been put in service in 2016 and beyond. The dollars identified in these tables are also in 2016 dollars.

An Assessment of the Economic Impact of the Dakota Access Pipeline, 2014

Table 5.5 Pipeline Operations Economic Impact on Iowa

Description	Employment (Jobs)	Labor Income (\$Millions)	Output (\$Millions)
<b>Impact Type</b>			
Direct Effect	15	\$1.250	\$2.378
Indirect Effect	3	\$0.127	\$0.373
Induced Effect	8	\$0.296	\$0.916
<b>Total Effect</b>	<b>25</b>	<b>\$1.673</b>	<b>\$3.667</b>
<b>Sector</b>			
Agriculture	0	\$0.002	\$0.007
Mining	0	\$0.000	\$0.000
Construction	0	\$0.007	\$0.018
Manufacturing	0	\$0.012	\$0.081
TIPU	0	\$0.019	\$0.069
Trade	2	\$0.080	\$0.184
Service	22	\$1.542	\$3.284
Government	0	\$0.012	\$0.024
<b>Total</b>	<b>25</b>	<b>\$1.673</b>	<b>\$3.667</b>

Source: Strategic Economics Group, IMPLAN Model

Table 5.6 Employment Impact of the Pipeline Operations in Iowa

Description	Direct	Indirect	Induced	Total
<b>Total</b>	<b>15</b>	<b>3</b>	<b>8</b>	<b>25</b>
Agriculture	0	0	0	0
Mining	0	0	0	0
Construction	0	0	0	0
Manufacturing	0	0	0	0
TIPU	0	0	0	0
Trade	0	0	2	2
Service	15	2	5	22
Government	0	0	0	0

Source: Strategic Economics Group, IMPLAN Model

An Assessment of the Economic Impact of the Dakota Access Pipeline, 2014

Table 5.7 Labor Income of the Pipeline Operations in Iowa

Description	Direct	Indirect	Induced	Total
Total	\$1,250,133	\$126,574	\$296,129	\$1,672,836
Agriculture	\$0	\$128	\$1,789	\$1,917
Mining	\$0	\$61	\$87	\$148
Construction	\$0	\$3,606	\$3,120	\$6,726
Manufacturing	\$0	\$6,090	\$5,600	\$11,690
TIPU	\$0	\$8,818	\$10,503	\$19,320
Trade	\$0	\$12,927	\$66,835	\$79,763
Service	\$1,250,133	\$89,553	\$201,841	\$1,541,527
Government	\$0	\$5,391	\$6,354	\$11,745

Source: Strategic Economics Group, IMPLAN Model

Table 5.8 Output Impact of the Pipeline Operations in Iowa

Description	Direct	Indirect	Induced	Total
Total	\$2,378,000	\$373,384	\$915,701	\$3,667,085
Agriculture	\$0	\$458	\$6,820	\$7,278
Mining	\$0	\$148	\$235	\$384
Construction	\$0	\$8,316	\$9,613	\$17,929
Manufacturing	\$0	\$35,990	\$45,022	\$81,012
TIPU	\$0	\$30,158	\$39,181	\$69,338
Trade	\$0	\$33,773	\$149,797	\$183,570
Service	\$2,378,000	\$254,579	\$651,356	\$3,283,935
Government	\$0	\$9,961	\$13,677	\$23,638

An Assessment of the Economic Impact of the Dakota Access Pipeline, 2014

Appendix 6 – Detail Tables for Illinois

The first four tables identify the economic impact of the Dakota Access Pipeline project spending during the two-year construction stage and shows the effect within the state of Illinois. All dollar amounts are in 2016 dollars.

Table 6.1 Pipeline Construction Economic Impact on Illinois

Description	Employment (Job Years)	Labor Income (\$Millions)	Output (\$Millions)
<b>Impact Type</b>			
Direct Effect	2,482	\$157.79	\$366.57
Indirect Effect	919	\$64.47	\$164.42
Induced Effect	1,608	\$81.04	\$222.36
<b>Total Effect</b>	<b>5,009</b>	<b>\$303.30</b>	<b>\$753.35</b>
<b>Sector</b>			
Agriculture	3	\$0.25	\$0.74
Mining	86	\$4.66	\$14.34
Construction	2,115	\$131.46	\$277.39
Manufacturing	158	\$13.24	\$91.79
TIPU	97	\$6.65	\$21.44
Trade	431	\$20.20	\$45.18
Service	2,094	\$124.50	\$298.70
Government	25	\$2.34	\$3.77
<b>Total</b>	<b>5,009</b>	<b>\$303.30</b>	<b>\$753.35</b>

Source: Strategic Economics Group, IMPLAN Model

Table 6.2 Impact on Employment of Pipeline Construction in Illinois

Description	Direct	Indirect	Induced	Total
<b>Total</b>	<b>2,482</b>	<b>919</b>	<b>1,608</b>	<b>5,009</b>
Agriculture	0	1	3	3
Mining	76	9	1	86
Construction	2,092	14	9	2,115
Manufacturing	48	85	24	158
TIPU	0	49	47	97
Trade	0	96	335	431
Service	266	657	1,170	2,094
Government	0	7	18	25

Source: Strategic Economics Group, IMPLAN Model

An Assessment of the Economic Impact of the Dakota Access Pipeline, 2014

Table 6.3 Impact on Labor Income of Pipeline Construction in Illinois (\$Millions)

Description	Direct	Indirect	Induced	Total
Total	\$157.79	\$64.47	\$81.04	\$303.30
Agriculture	\$0.00	\$0.05	\$0.20	\$0.25
Mining	\$4.01	\$0.62	\$0.03	\$4.66
Construction	\$129.81	\$0.94	\$0.71	\$131.46
Manufacturing	\$4.23	\$6.96	\$2.04	\$13.24
TIPU	\$0.00	\$3.34	\$3.31	\$6.65
Trade	\$0.00	\$6.06	\$14.14	\$20.20
Service	\$19.74	\$45.86	\$58.90	\$124.50
Government	\$0.00	\$0.64	\$1.70	\$2.34

Source: Strategic Economics Group, IMPLAN Model

Table 6.4 Impact on Output of Pipeline Construction in Illinois (\$Millions)

Description	Direct	Indirect	Induced	Total
Total	\$366.57	\$164.42	\$222.36	\$753.35
Agriculture	\$0.00	\$0.16	\$0.58	\$0.74
Mining	\$11.59	\$2.50	\$0.25	\$14.34
Construction	\$274.43	\$1.70	\$1.26	\$277.39
Manufacturing	\$35.79	\$40.49	\$15.51	\$91.79
TIPU	\$0.00	\$10.45	\$10.99	\$21.44
Trade	\$0.00	\$13.98	\$31.19	\$45.18
Service	\$44.77	\$94.16	\$159.78	\$298.70
Government	\$0.00	\$0.98	\$2.79	\$3.77

Source: Strategic Economics Group, IMPLAN Model

The next four tables identify the economic impact of the operations and maintenance of the pipeline after it has been put in service in 2016 and beyond. The dollars identified in these tables are also in 2016 dollars.

An Assessment of the Economic Impact of the Dakota Access Pipeline, 2014

Table 6.5 Pipeline Operations Economic Impact on Illinois

Description	Employment (Jobs)	Labor Income (\$Millions)	Output (\$Millions)
<b>Impact Type</b>			
Direct Effect	11	\$0.995	\$1.705
Indirect Effect	2	\$0.154	\$0.399
Induced Effect	7	\$0.359	\$0.985
<b>Total Effect</b>	<b>20</b>	<b>\$1.508</b>	<b>\$3.090</b>
<b>Sector</b>			
Agriculture	0	\$0.001	\$0.003
Mining	0	\$0.000	\$0.002
Construction	0	\$0.006	\$0.010
Manufacturing	0	\$0.022	\$0.136
TIPU	0	\$0.024	\$0.077
Trade	2	\$0.075	\$0.168
Service	18	\$1.369	\$2.675
Government	0	\$0.012	\$0.019
<b>Total</b>	<b>20</b>	<b>\$1.508</b>	<b>\$3.090</b>

Source: Strategic Economics Group, IMPLAN Model

Table 6.6 Employment Impact of the Pipeline Operations in Illinois

Description	Direct	Indirect	Induced	Total
<b>Total</b>	<b>11</b>	<b>2</b>	<b>7</b>	<b>20</b>
Agriculture	0	0	0	0
Mining	0	0	0	0
Construction	0	0	0	0
Manufacturing	0	0	0	0
TIPU	0	0	0	0
Trade	0	0	1	2
Service	11	2	5	18
Government	0	0	0	0

Source: Strategic Economics Group, IMPLAN Model

An Assessment of the Economic Impact of the Dakota Access Pipeline, 2014

Table 6.7 Labor Income of the Pipeline Operations in Illinois

Description	Direct	Indirect	Induced	Total
Total	\$995,394	\$154,090	\$359,010	\$1,508,493
Agriculture	\$0	\$60	\$891	\$952
Mining	\$0	\$66	\$126	\$192
Construction	\$0	\$2,630	\$3,161	\$5,791
Manufacturing	\$0	\$13,019	\$9,049	\$22,068
TIPU	\$0	\$8,979	\$14,700	\$23,679
Trade	\$0	\$12,262	\$62,698	\$74,960
Service	\$995,394	\$112,686	\$260,833	\$1,368,913
Government	\$0	\$4,387	\$7,551	\$11,939

Source: Strategic Economics Group, IMPLAN Model

Table 6.8 Output Impact of the Pipeline Operations in Illinois

Description	Direct	Indirect	Induced	Total
Total	\$1,705,500	\$399,022	\$985,350	\$3,089,873
Agriculture	\$0	\$223	\$2,587	\$2,810
Mining	\$0	\$473	\$1,097	\$1,570
Construction	\$0	\$4,768	\$5,571	\$10,339
Manufacturing	\$0	\$67,156	\$68,721	\$135,876
TIPU	\$0	\$28,251	\$48,843	\$77,094
Trade	\$0	\$29,474	\$138,362	\$167,836
Service	\$1,705,500	\$261,739	\$707,770	\$2,675,009
Government	\$0	\$6,939	\$12,400	\$19,338

Source: Strategic Economics Group, IMPLAN Model

## Appendix 7 - Description of the IMPLAN Model<sup>56</sup>

IMPLAN is a widely-accepted and utilized software model. At the heart of the model is an input-output dollar flow table. For a specified region, the input-output table accounts for all dollar flows between different sectors of the economy. Using this information, IMPLAN models the way a dollar injected into one sector is spent and re-spent in other sectors of the economy, generating waves of economic activity, or so-called “economic multiplier” effects.

The model uses national industry data and county-level economic data to generate a series of multipliers which in turn estimate the total economic implications of economic activity. At the heart of the model is a national input-output dollar flow table called the Social Accounting Matrix (SAM). Unlike other static input-output models, which just measure the purchasing relationships between industry and household sectors, SAM also measures the economic relationships between government, industry, and household sectors, allowing IMPLAN to model transfer payments such as unemployment insurance. Thus, for the specified region, the input-output table accounts for all the dollar flows between the different sectors within the economy.

For this study, Strategic Economics Group used the most recent IMPLAN datasets for North Dakota, South Dakota, Iowa, Illinois and the United States.

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<sup>56</sup> IMPLAN Pro User’s Guide, 2000

## Appendix 8 - About the Strategic Economics Group Research Team

**Strategic Economics Group (SEG)** is the region's only locally-owned economic research consulting firm. It has served businesses and government clients in Iowa and the Midwest since 2001. The SEG team develops economic impact studies, fiscal impact estimates, cost-benefit models, management information systems and forensic projections.

**Harvey Siegelman** is the President of Strategic Economics Group. In 2001, Mr. Siegelman retired as Iowa's longest-serving State Economist (1982-2001). He was also Adjunct Professor of Economics at Drake University. Siegelman earned his Master of Arts in Economics degree from Wichita State University. Prior to his appointment as State Economist, he was a professor of economics at University of Wisconsin-Whitewater Campus, University of Findlay (Ohio) and visiting professor at Wichita State University.

**Michael Lipsman** is a Senior Economic Analyst with Strategic Economics Group. Lipsman has earned a Masters in Community and Regional Planning and a Doctorate in Economics from Iowa State University. Over the course of a 31 year professional career in Iowa State government he has worked as a transportation planner, senior legislative analyst, and tax research analyst. From 2000 to 2011 he managed the Tax Research and Program Analysis Section of the Iowa Department of Revenue.

**Daniel Otto** is a Senior Economic Analyst with Strategic Economics Group. Otto is Emeritus Professor of Economics at Iowa State University. He received his doctorate in economics from Virginia Polytechnic Institute in 1981 and joined Iowa State University that same year as an Associate Professor and Extension Economist. His research areas include Community and Regional Economic Modeling and Policy Analysis, Economic and Fiscal Impact Analysis and Project Evaluation.

Additional details and contact information can be found on their website: [www.economicsgroup.com](http://www.economicsgroup.com).