

# **Economic Impact of MTEP In-service Projects from 2002-2015**

**July 2015**

## Executive Summary

Construction of electrical transmission, like any infrastructure investment, has local economic impacts including employment and tax revenue. MISO Transmission Expansion Plan (MTEP) projects maintain system reliability, reduce congestion and address policy objectives, but have the additional positive externality of supporting jobs and economic development. MISO studied the economic impacts of in-service transmission projects from 2002 to 2015.

Based on study assumptions, \$9.4 billion of MTEP transmission construction translates into the following range of total impacts:

- 16,700 to 25,800 total jobs in peak year 2014
- \$5 to \$8 billion of labor income from supported jobs from 2002 to 2015
- \$6.7 to \$11.3 billion of value-added impacts (wages, rents, interest and profits) from 2002 to 2015
- \$457 to \$765 million of state and local tax revenue from 2002 to 2015
- \$935 million to \$1.5 billion of federal tax revenue from 2002 to 2015
- 114 to 148 indirect and induced jobs for every 100 new direct jobs in peak year 2014
- 9 to 14 total jobs supported per \$1 million of transmission investment in peak year 2014

**Between 9 and 14 total jobs supported per \$1 million dollars of transmission investment.**

These economic impacts provide a supplemental way of viewing the effects of MTEP transmission construction costs as these projects have employment and economic benefits. These MTEP expenditures not only provide reliability, cost-effectiveness, and policy benefits for MISO but are also an investment in the economy.

## Economic Impact of MTEP In-service Projects from 2002-2015

Construction of electrical transmission, like any infrastructure investment, produces local economic impacts – impacts that extend beyond the initial expenditures.

Using a program called IMPLAN<sup>1</sup>, MISO can estimate the impacts of transmission expansion on economic indicators such as jobs, labor income, value-added and tax revenue. IMPLAN is the industry standard for input-output analysis to model impacts to local economies. Between 2002 and 2015, IMPLAN estimates that the \$9.4 billion of transmission construction in MISO's 15-state region results in:

**MTEP projects are designed to maintain system reliability, reduce congestion, and address policy objectives, but also produce the positive externality of supporting jobs and economic development.**

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- \$6.7 to \$11.3 billion of value-added impacts (wages, rents, interest and profits) from 2002 to 2015
- \$457 to \$765 million of state and local tax revenue from 2002 to 2015
- \$935 million to \$1.5 billion of federal tax revenue from 2002 to 2015
- 114 to 148 indirect and induced jobs for every 100 new direct jobs in peak year 2014
- 9 to 14 total jobs supported per \$1 million of transmission investment in peak year 2014

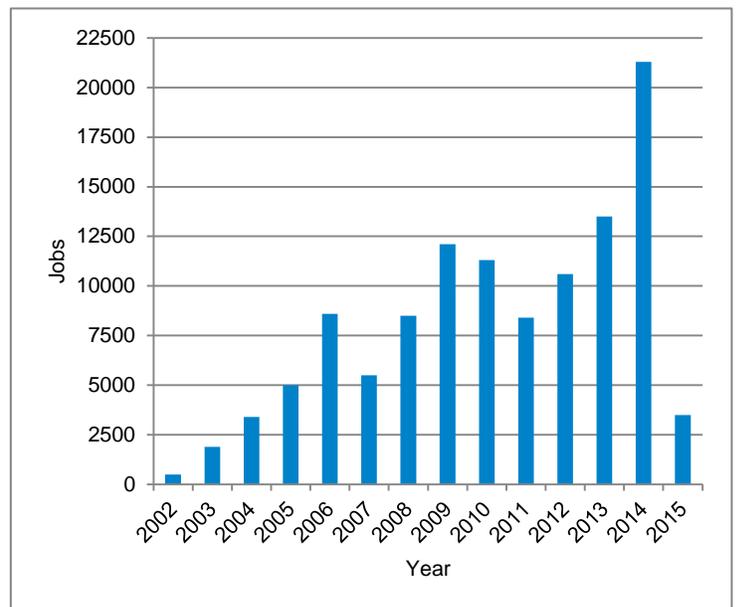
The total cost of transmission construction ranges, annually, from \$27.5 million in 2002 to a high of \$1.8 billion in 2014 (Table 1). The number of jobs supported by these expenditures ranges from 500 in 2002 to 21,300 in 2014 (Figure 1).

**Table 1 – Total cost of MTEP in-service facilities by year**

Year	Total Cost
2002	\$27,596,992
2003	\$115,841,857
2004	\$206,904,567
2005	\$333,880,348
2006	\$629,532,962
2007	\$430,183,595
2008	\$711,351,880
2009	\$1,014,354,484
2010	\$949,876,105
2011	\$714,098,462
2012	\$904,440,054
2013	\$1,208,518,491
2014	\$1,810,134,509
2015	\$339,251,857
<b>Total</b>	<b>\$9,395,966,163</b>



**Figure 1 – Estimate of total jobs supported by MTEP in-service projects by year**



<sup>1</sup> [IMPLAN Version 3 Modeling System](#)

With each annual MTEP cycle, MISO proposes transmission projects for MISO Board consideration, approval and subsequent construction. MTEP projects are designed to maintain system reliability, reduce congestion and address policy objectives, but also produce the positive externality of supporting jobs and economic development.

The economic impacts of this analysis are reported as jobs, labor income, value added and tax revenue. These impacts are further broken down as direct, indirect, induced and total impacts. All economic impacts are annual values reported in 2015 dollars and rounded to the nearest million. Job impacts are rounded to the nearest hundred.

This analysis examines three potential scenarios to provide a range of impacts for the MISO region study area. These scenarios differ based on the proportion of initial purchases made from regional manufacturers. Scenario 1 assumes none of the materials are produced locally. Scenario 2 assumes the percentage of materials produced locally is equal to the value set in IMPLAN from its Social Accounting Matrix. Scenario 3 assumes all materials are produced locally. Scenario 2 is considered to provide the more realistic estimates, while Scenarios 1 and 3 are analyzed to provide a range of impacts.

This analysis provides an additional perspective when thinking about transmission investments. This analysis, like any analysis, has limitations. It does not capture all the varied benefits and costs of transmission. No model can. Furthermore, these results are estimates. This report does not mean to imply all these benefits are new net benefits to the study area. Finally, there is no intention by MISO to use these results as criteria to justify new MTEP transmission projects.

## Assumptions

### Total Expenditures

Total expenditures for MTEP projects put into service from 2002 to 2015 were about \$9.4 billion. The source of this value was the “In-Service Facilities” tab from “In-service Project Reports for all previously approved MTEPs” spreadsheet posted on the MISO [MTEP Studies](#) web page. This data was last updated on March 30, 2015. The cost estimates of the MTEP projects are in nominal dollars.

Construction costs are assumed to occur during the year the project was put into service, between 2002 and 2015 (Table 1). Since Ohio is no longer a state in the MISO region, it was not included in the study region, and the costs of MTEP projects in Ohio were removed from the years in which they occurred (2004, 2007 and 2008). Project expenditures in Ohio were minimal and represented only 0.03 percent of total expenditures from 2002 to 2015.

### Study Area

MISO’s IMPLAN model is composed of states. The states can be aggregated to form a multi-state study area. The study area includes the entirety of a state even if only a portion of the state is a MISO member. In this analysis, the study area consists of the 15 MISO states: Arkansas, Iowa, Illinois, Indiana, Kentucky, Louisiana, Michigan, Minnesota, Mississippi, Missouri, Montana, North Dakota, South Dakota, Texas and Wisconsin (Figure 2).

MISO built several configurations of states (study areas) to capture the direct impacts for the years between 2002 and 2015, but analyzed all 15 states for each year by using the multi-regional analysis technique in order to maintain a consistent study area. For each year, MISO built an IMPLAN model consisting of the states with MTEP in-service projects going into service. MISO states without MTEP projects for that year were also included in the analysis with the IMPLAN multi-regional analysis technique. This allowed MISO to assess the indirect and induced impacts that the MTEP expenditures would have in the other MISO states as well. Limiting the states with the direct impact to those with the transmission construction projects going into service in that year is more realistic and provides more conservative results. A complete list of all 15 states and the years in which they had MTEP projects going into service is included in Appendix B.

**Figure 2 – MISO market footprint in the United States, June 2015**



## Sectors

IMPLAN requires direct inputs, typically in the form of changes to relevant industries, in order to calculate impacts. This analysis uses the following IMPLAN sectors to capture the effects of the transmission projects:

- Sector 186 – Plate work and fabricated structural product manufacturing
- Sector 272 – Communications and energy wire and cable manufacturing
- Sector 266 – Power, distribution and specialty transformer manufacturing
- Sector 36 – Construction of other new nonresidential structures

The total cost breakdown percentages for each of these sectors in this analysis are 20 percent, 15 percent, 15 percent and 50 percent, respectively. These sectors and the cost breakdown percentages are based on a review of other transmission studies<sup>2</sup>, a review of output from the National Renewable Energy Laboratory's [Jobs and Economic Development Impacts \(JEDI\) Transmission Line Model](#) cost estimating tool and stakeholder feedback.

Indirect impacts of sector 36 include impacts for sectors 186, 272 and 266, which are already accounted for in the impact calculations for those sectors. To prevent double counting of these impacts, we customized the industry production data for sector 36 by zeroing out the commodities for sectors 186, 272 and 266 that contribute to sector 36.

## Local Expenditures

The economic impacts in the region depend on the amount that is produced and purchased in the region. This analysis runs three scenarios that differ based on their percentage of local purchases in order to capture a range of potential values (Tables 2-4). More local purchases support more jobs and generate more revenue in the study region. However, the regional capacity must be able to support these local purchases.

Scenario 1 assumes none of the materials are produced locally. Scenario 2 assumes the percentage of materials produced locally is equal to the value set in IMPLAN from its Social Accounting Matrix. Scenario 3 assumes all materials are produced locally. Construction expenditures are assumed to be 100 percent local in all three scenarios. Scenario 2 is considered to provide the more realistic estimates, while Scenarios 1 and 3 are analyzed to provide a range of impacts. Since the group of states with MTEP projects varied slightly each year, the local purchase percentages in Scenario 2 also varied a bit each year based on the resources available in that group of states. The average local purchase percentages for each sector are listed in Table 3, and the local purchase percentages for each sector in each year are listed in Appendix C.

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<sup>2</sup> [Employment and Economic Benefits of Transmission Infrastructure Investment in the US and Canada Economic Impact Study of the Proposed Rock Island Clean Line Job and Economic Benefits of Transmission and Wind Generation Investments in the SPP Region](#)

**Table 2 – Scenario 1: No local purchases for materials**

Sector	IMPLAN Sector Code	IMPLAN Sector Description	Total Initial Expenditure	Percent of Total Initial Expenditure	Local Purchase Percentage	Initial Value of Local Purchases
<b>Towers</b>	186	Plate work and fabricated structural product manufacturing	\$1,879,193,233	20%	0%	-
<b>Wire</b>	272	Communications and energy wire and cable manufacturing	\$1,409,394,924	15%	0%	-
<b>Transformers</b>	266	Power, distribution, and specialty transformer manufacturing	\$1,409,394,924	15%	0%	-
<b>Construction</b>	36	Construction of new non-residential structures	\$4,697,983,082	50%	100%	\$4,697,983,082
<b>Total</b>			\$9,395,966,163			\$4,697,983,082

**Table 3 – Scenario 2: Average IMPLAN local purchase percentages for materials**

Sector	IMPLAN Sector Code	IMPLAN Sector Description	Total Initial Expenditure	Percent of Total Initial Expenditure	Average Local Purchase Percentage	Initial Value of Local Purchases
<b>Towers</b>	186	Plate work and fabricated structural product manufacturing	\$1,879,193,233	20%	52%	\$983,891,885
<b>Wire</b>	272	Communications and energy wire and cable manufacturing	\$1,409,394,924	15%	20%	\$286,912,538
<b>Transformers</b>	266	Power, distribution, and specialty transformer manufacturing	\$1,409,394,924	15%	28%	\$392,617,158
<b>Construction</b>	36	Construction of new non-residential structures	\$4,697,983,082	50%	100%	\$4,697,983,082
<b>Total</b>			\$9,395,966,163			\$6,361,404,663

**Table 4 – Scenario 3: All local purchases for materials**

Sector	IMPLAN Sector Code	IMPLAN Sector Description	Total Initial Expenditure	Percent of Total Initial Expenditure	Local Purchase Percentage	Initial Value of Local Purchases
<b>Towers</b>	186	Plate work and fabricated structural product manufacturing	\$1,879,193,233	20%	100%	\$1,879,193,233
<b>Wire</b>	272	Communications and energy wire and cable manufacturing	\$1,409,394,924	15%	100%	\$1,409,394,924
<b>Transformers</b>	266	Power, distribution, and specialty transformer manufacturing	\$1,409,394,924	15%	100%	\$1,409,394,924
<b>Construction</b>	36	Construction of new non-residential structures	\$4,697,983,082	50%	100%	\$4,697,983,082
<b>Total</b>			\$9,395,966,163			\$9,395,966,163

## Multipliers

Multipliers allow IMPLAN to capture the indirect and induced impacts resulting from a direct change to the economy. This study included State/Local Government Education and State/Local Government Noneducation multipliers in addition to the default multiplier specifications. These two specifications are not included in IMPLAN's default multiplier settings because when state and local institutions are internalized in the model, the model assumes that the money collected by these institutions is re-spent within the institution. Models created in IMPLAN might not be created at the state level, thus these multipliers should not be internalized for more localized models. However, since this study model is built upon 15 states, we assumed that the state institutions would re-spend the dollars collected within the state.

## Employment

IMPLAN jobs are not necessarily full-time equivalent (FTE) employees (2,080 hours per year). A job in IMPLAN represents a year's worth of work, which varies by industry. Most IMPLAN jobs are 90 to 98 percent of an FTE, though some sectors with high part-time work the percentage can fall below that. For example, if IMPLAN reports 10 jobs, that means 10 jobs working the entire year. Another example: if 10 people work 200 hours on a project, and the average number of hours worked in that industry is 2,000 hours per year, those 10 people would count as one job. Further, if the project takes six months, the job count would be 20; if the work took five years, the job count would be two. Job impacts in multi-year projects cannot be summed without risking double-counting or misrepresenting the impact; therefore, jobs are reported by year.

IMPLAN assumes labor is available. The degree to which these employment estimates represent a net increase to the study area depends on the state of the current labor market. If the study region has a high degree of available labor, or can readily import labor, these employment estimates largely represent a net increase in total jobs. But if the study region does not have a high degree of available labor, the estimated job impacts could partially displace other work, and the net effect on total area employment would be smaller than the gross impacts reported in this analysis.

## Methodology

This study uses the IMPLAN Version 3 Modeling System to calculate economic impacts. The IMPLAN system is a software and database program used by economists, consultants, local governments, economic developers and academics throughout the nation to model impacts to local economies. Introduced for commercial use in 1993 after a decade of development at the University of Minnesota, it is the industry standard for input-output analysis. A timeline of the analysis, review and milestones of MISO's IMPLAN work is in Appendix A. A list of other transmission related studies using IMPLAN is found in Appendix D and benchmarks of other studies' IMPLAN results are in Appendix E.

IMPLAN provides an input-output mathematical representation of a region's economy. IMPLAN allows users to build models composed of different geographic configurations (counties, states, etc.). The theory behind input-output is that one industry's output is another industry's input, and vice versa. IMPLAN compiles multiple sources of economic data to create matrices of inter-industry relationships. It has detailed Social Accounting Matrices and Multiplier Models of local economies, combined with region-specific data. IMPLAN uses these Multiplier Models to calculate impacts. Derived mathematically, these models estimate the magnitude and distribution of economic impact, and measure three types of effects:

- Direct Effects: impacts from the initial event as defined by the user, usually in terms of output or job changes (in this case, the cost of new transmission)
- Indirect Effects: impacts from the iterations of business-to-business purchases spent within the study region on supplies, services, labor and taxes in response to the initial event
- Induced Effects: impacts from the wages supported by the increased direct and indirect activity as that money is spent and re-spent in the study area

For example, as part of a construction project, the builder might use \$1,000 of bolts during construction (direct effect). The bolt manufacturer needs to increase purchases of steel and additional inputs to produce those bolts (indirect). Because of these direct and indirect purchases, local employees spend additional income on local goods and services, like groceries, haircuts and dental care (induced). The grocer, barber and dentist, in turn, spend some of that money locally, resulting in still more cycles of purchases (induced). The overall result is that the total impact exceeds the original \$1,000.

Only locally purchased goods and services count in indirect and induced impacts. Purchases made outside the study region are referred to as leakages. Eventually leakages stop the multiplier effect.

Impacts for this report are measured in terms of:

- Jobs: the number of jobs (one job represents one year's worth of work by industry)
- Labor Income: all forms of employment income, including employee compensation (wages and benefits) and proprietor income
- Value Added: the amount of wages, rents, interest and profits

IMPLAN derives its database from various sources, primarily public government data. IMPLAN converts the data to a consistent format, and estimates any missing elements. IMPLAN adds value to the available data by:

- Providing estimates for non-disclosed data
- Providing estimates for non-census years
- Providing estimates at a finer geographic scale
- Providing additional trade flow data
  - Impedances by transportation mode from Oak Ridge National Laboratory
  - Econometric equation for econometric regional purchase coefficients

- Reconciling multiple data sources
- Bringing it all together in a consistent format

IMPLAN also provides regional purchase coefficients (percent of commodities or industries purchased locally) estimated in-house and other trade flow data not otherwise available. Some of the major data sources include:

- Bureau of Economic Analysis (BEA) Regional Economic Accounts (REA)
- BEA's National Income and Product Accounts (NIPA)
- Bureau of Labor Statistics (BLS) Census of Employment and Wages (CEW)
- U.S. Census Bureau's County Business Patterns (CBP)
- BEA Annual Survey of Manufacturers
- BEA National Household Personal Consumption Expenditures (PCE)
- BLS Consumer Expenditure Survey
- Department of Commerce import and export trade

IMPLAN data is disaggregated into 440 sectors. The model has data files for each year from 1996 to 2011. Updated IMPLAN data is released annually, and the IMPLAN model year data for this study was 2011.

Many economic impacts of the MTEP transmission projects are expressed in the tables below. Although the IMPLAN analysis effectively analyzes the effects of these MTEP transmission project expenditures on jobs, total income, value added and tax revenue throughout the many sectors of the economy, there are still many costs and benefits that the IMPLAN analysis does not take into account. This type of analysis does not capture the following types of benefits and costs:

#### Benefits not captured

- Reduced transmission congestion
- Increased reliability (reduced or avoided cost of outages)
- Economic development of other industries enabled by new transmission that would not otherwise be able to develop (e.g., renewable generation or mining)
- Reduced energy line losses
- Deferral of new generation investments due to improved ability to access electricity region-wide
- Reduced CO<sub>2</sub> emissions due to improved access to renewable generation
- Benefits that spill over into states outside study area

#### Costs not captured

- Recovering the cost of transmission expansion through higher utility rates, and their corresponding ripple effects
  - This analysis assumes that approved transmission projects do not increase rates because they were approved based on reliability and congestion relief justifications. Without these transmission expansions and upgrades, the system would be at greater risks for outages and the resulting costs, and would be less able to access lower cost energy.

## Results

Job impacts are reported for a single year (peak year 2014) in Table 5 to avoid double-counting. Tables 6 and 7 show the cumulative totals of labor income and value added from 2002 through 2015.

**Table 5 – Job impacts by scenario and impact type (Peak year, 2014)**

	Direct	Indirect	Induced	Total
<b>Scenario 1</b>	7,800	2,600	6,300	16,700
<b>Scenario 2</b>	9,200	3,900	8,200	21,300
<b>Scenario 3</b>	10,400	5,100	10,300	25,800

A job in IMPLAN represents a year's worth of work. It equals the annual average of monthly jobs in that industry.

**Table 6 – Labor income impacts by scenario and impact type (2002-2015)**

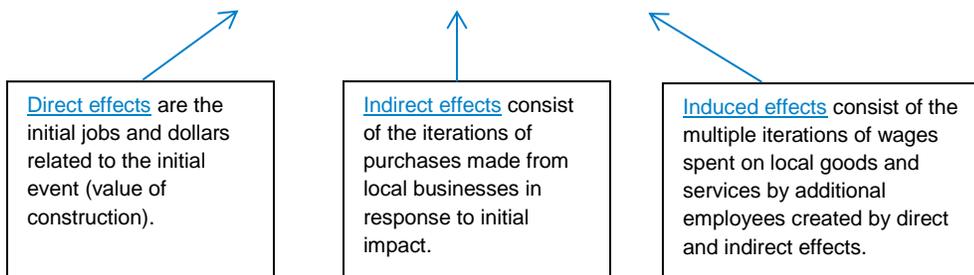
	Direct	Indirect	Induced	Total
<b>Scenario 1</b>	\$2,546,000,000	\$864,000,000	\$1,611,000,000	\$5,020,000,000
<b>Scenario 2</b>	\$2,992,000,000	\$1,193,000,000	\$2,010,000,000	\$6,195,000,000
<b>Scenario 3</b>	\$3,674,000,000	\$1,688,000,000	\$2,618,000,000	\$7,979,000,000

Labor income includes all forms of employment income, including employee compensation (wages and benefits) and proprietor income.

**Table 7 – Value added impacts by scenario and impact type (2002-2015)**

	Direct	Indirect	Induced	Total
<b>Scenario 1</b>	\$2,681,000,000	\$1,292,000,000	\$2,742,000,000	\$6,715,000,000
<b>Scenario 2</b>	\$3,267,000,000	\$1,819,000,000	\$3,418,000,000	\$8,504,000,000
<b>Scenario 3</b>	\$4,199,000,000	\$2,617,000,000	\$4,448,000,000	\$11,264,000,000

Value added impacts are composed of wages, rents, interest and profits.



Job, labor income, and value-added impacts are broken out by year for Scenario 2 in Tables 8 through 10.

**Table 8 – Jobs by year and impact type, Scenario 2**

	Direct Effect	Indirect Effect	Induced Effect	Total Effect
2002	200	100	200	500
2003	900	300	700	1,900
2004	1,500	600	1,300	3,400
2005	2,200	900	1,900	5,000
2006	3,800	1,500	3,300	8,600
2007	2,400	1,000	2,100	5,500
2008	3,800	1,500	3,300	8,500
2009	5,300	2,100	4,700	12,100
2010	5,000	2,000	4,400	11,300
2011	3,700	1,500	3,200	8,400
2012	4,700	1,800	4,000	10,600
2013	6,100	2,300	5,100	13,500
2014	9,200	3,900	8,200	21,300
2015	1,700	600	1,200	3,500

**Table 9 – Labor income by year and impact type, Scenario 2**

	Direct Effect	Indirect Effect	Induced Effect	Total Effect
2002	\$13,000,000	\$5,000,000	\$8,000,000	\$25,000,000
2003	\$50,000,000	\$18,000,000	\$29,000,000	\$96,000,000
2004	\$88,000,000	\$35,000,000	\$60,000,000	\$182,000,000
2005	\$130,000,000	\$52,000,000	\$88,000,000	\$270,000,000
2006	\$227,000,000	\$90,000,000	\$154,000,000	\$470,000,000
2007	\$143,000,000	\$57,000,000	\$97,000,000	\$298,000,000
2008	\$223,000,000	\$88,000,000	\$151,000,000	\$462,000,000
2009	\$316,000,000	\$127,000,000	\$215,000,000	\$658,000,000
2010	\$297,000,000	\$118,000,000	\$202,000,000	\$617,000,000
2011	\$220,000,000	\$88,000,000	\$150,000,000	\$458,000,000
2012	\$274,000,000	\$109,000,000	\$185,000,000	\$568,000,000
2013	\$358,000,000	\$137,000,000	\$235,000,000	\$730,000,000
2014	\$558,000,000	\$239,000,000	\$384,000,000	\$1,181,000,000
2015	\$94,000,000	\$32,000,000	\$53,000,000	\$179,000,000
<b>Totals</b>	<b>\$2,992,000,000</b>	<b>\$1,193,000,000</b>	<b>\$2,010,000,000</b>	<b>\$6,195,000,000</b>

**Table 10 – Value added by year and impact type, Scenario 2**

	Direct Effect	Indirect Effect	Induced Effect	Total Effect
<b>2002</b>	\$14,000,000	\$7,000,000	\$14,000,000	\$34,000,000
<b>2003</b>	\$53,000,000	\$26,000,000	\$49,000,000	\$128,000,000
<b>2004</b>	\$96,000,000	\$52,000,000	\$101,000,000	\$249,000,000
<b>2005</b>	\$142,000,000	\$78,000,000	\$150,000,000	\$369,000,000
<b>2006</b>	\$247,000,000	\$135,000,000	\$261,000,000	\$642,000,000
<b>2007</b>	\$156,000,000	\$86,000,000	\$165,000,000	\$407,000,000
<b>2008</b>	\$243,000,000	\$132,000,000	\$256,000,000	\$631,000,000
<b>2009</b>	\$344,000,000	\$190,000,000	\$365,000,000	\$899,000,000
<b>2010</b>	\$324,000,000	\$177,000,000	\$342,000,000	\$843,000,000
<b>2011</b>	\$240,000,000	\$132,000,000	\$254,000,000	\$625,000,000
<b>2012</b>	\$299,000,000	\$165,000,000	\$315,000,000	\$779,000,000
<b>2013</b>	\$390,000,000	\$213,000,000	\$401,000,000	\$1,004,000,000
<b>2014</b>	\$621,000,000	\$379,000,000	\$655,000,000	\$1,655,000,000
<b>2015</b>	\$100,000,000	\$48,000,000	\$91,000,000	\$239,000,000
<b>Totals</b>	<b>\$3,267,000,000</b>	<b>\$1,819,000,000</b>	<b>\$3,418,000,000</b>	<b>\$8,504,000,000</b>

Tax revenue is generated from this transmission construction at both the state and local and federal levels. In Scenario 2, about \$580 million of state and local tax revenue is supported between 2002 and 2015, while about \$1.2 billion of federal tax revenue is supported. The impacts estimated by IMPLAN include individual and corporate income taxes, payroll, sales, property and fees (Tables 11 and 12).

**Table 11 – Local and state tax impact, Scenario 2**

Description	Employee Compensation	Proprietor Income	Tax on Production and Imports	Households	Corporations
Dividends					\$1,000,000
Social Ins Tax- Employee Contribution	\$4,000,000				
Social Ins Tax- Employer Contribution	\$7,000,000				
Tax on Production and Imports: Sales Tax			\$184,000,000		
Tax on Production and Imports: Property Tax			\$179,000,000		
Tax on Production and Imports: Motor Vehicle Lic			\$5,000,000		
Tax on Production and Imports: Severance Tax			\$5,000,000		
Tax on Production and Imports: Other Taxes			\$16,000,000		
Tax on Production and Imports: S/L NonTaxes			\$20,000,000		
Corporate Profits Tax					\$12,000,000
Personal Tax: Income Tax				\$109,000,000	
Personal Tax: NonTaxes (Fines- Fees)				\$22,000,000	
Personal Tax: Motor Vehicle License				\$9,000,000	
Personal Tax: Property Taxes				\$3,000,000	
Personal Tax: Other Tax (Fish/Hunt)				\$4,000,000	
<b>Total State and Local Tax</b>	<b>\$11,000,000</b>	<b>\$0</b>	<b>\$409,000,000</b>	<b>\$146,000,000</b>	<b>\$13,000,000</b>

**Table 12 – Federal tax impacts, Scenario 2**

Description	Employee Compensation	Proprietor Income	Tax on Production and Imports	Households	Corporations
Social Ins Tax- Employee Contribution	\$244,000,000	\$38,000,000			
Social Ins Tax- Employer Contribution	\$317,000,000				
Tax on Production and Imports: Excise Taxes			\$30,000,000		
Tax on Production and Imports: Custom Duty			\$13,000,000		
Tax on Production and Imports: Fed NonTaxes			\$3,000,000		
Corporate Profits Tax					\$118,000,000
Personal Tax: Income Tax				\$411,000,000	
<b>Total Federal Tax</b>	<b>\$561,000,000</b>	<b>\$38,000,000</b>	<b>\$45,000,000</b>	<b>\$411,000,000</b>	<b>\$118,000,000</b>

The indirect and induced impacts of these expenditures move through the economy into many industries, even those unrelated to the construction of transmission. Table 13 provides the top 15 most impacted industries by total jobs in peak year 2014, and breaks down these jobs between direct, indirect and induced. Table 14 provides the top 15 most-impacted industries by labor income from 2002-2015 and breaks down this labor income between direct, indirect and induced.

The direct effects represent the initial direct change or impact (construction, towers, wires, transformers). The IMPLAN model uses these direct impacts to calculate the cascading indirect and induced effects on the study area. The indirect effects represent business-to-business purchases resulting from the initial impacts (architectural, wholesale trade, etc). Induced effects represent the industries affected by wages spent by workers that are created by direct and indirect activity (food services, hospitals, etc).

**Table 13 – Fifteen most-impacted sectors by total jobs, Scenario 2 (2014)**

Description	Direct	Indirect	Induced	Total
<b>Total</b>	9,200	3,900	8,200	21,300
<b>Construction of other new nonresidential structures</b>	7,800	0	0	7,800
<b>Plate work and fabricated structural product manufacturing</b>	1,000	0	0	1,000
<b>Food services and drinking places</b>	0	100	800	900
<b>Architectural, engineering, and related services</b>	0	600	0	600
<b>* Employment and payroll only (state &amp; local govt, education)</b>	0	0	500	500
<b>Wholesale trade businesses</b>	0	200	300	400
<b>Employment services</b>	0	300	200	400
<b>Real estate establishments</b>	0	100	300	400
<b>Private hospitals</b>	0	0	400	400
<b>Offices of physicians, dentists, and other health practitioners</b>	0	0	400	400
<b>* Employment and payroll only (state &amp; local govt, non-education)</b>	0	0	300	300
<b>Retail Stores - General merchandise</b>	0	0	200	200
<b>Securities, commodity contracts, investments, and related activities</b>	0	100	200	300
<b>Nursing and residential care facilities</b>	0	0	200	200
<b>Retail Stores - Food and beverage</b>	0	0	200	200

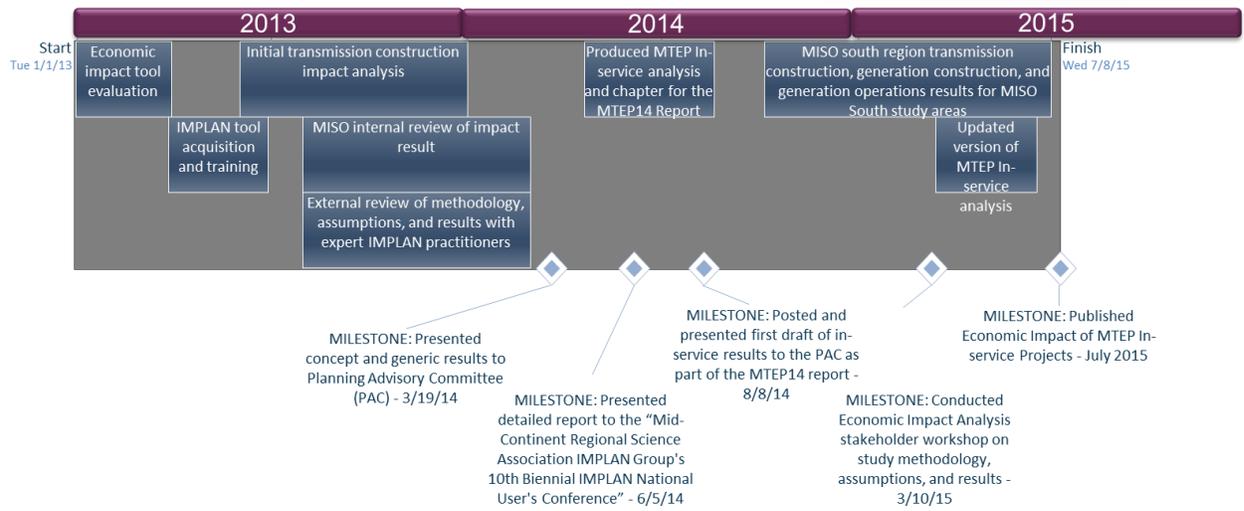
**Table 14 – Fifteen most-impacted sectors by labor income, Scenario 2 (2002-2015)**

Description	Direct	Indirect	Induced	Total
<b>Total</b>	\$2,992,000,000	\$1,193,000,000	\$2,010,000,000	\$6,195,000,000
<b>Construction of other new nonresidential structures</b>	\$2,546,000,000	\$0	\$0	\$2,546,000,000
<b>Plate work and fabricated structural product manufacturing</b>	\$288,000,000	\$8,000,000	\$0	\$297,000,000
<b>Architectural, engineering, and related services</b>	\$0	\$244,000,000	\$12,000,000	\$256,000,000
<b>Wholesale trade businesses</b>	\$0	\$78,000,000	\$109,000,000	\$188,000,000
<b>Offices of physicians, dentists, and other health practitioners</b>	\$0	\$0	\$159,000,000	\$159,000,000
<b>* Employment and payroll only (state &amp; local govt, education)</b>	\$0	\$0	\$136,000,000	\$136,000,000
<b>Private hospitals</b>	\$0	\$0	\$135,000,000	\$135,000,000
<b>* Employment and payroll only (state &amp; local govt, non-education)</b>	\$0	\$0	\$107,000,000	\$107,000,000
<b>Power, distribution, and specialty transformer manufacturing</b>	\$103,000,000	\$0	\$0	\$103,000,000
<b>Food services and drinking places</b>	\$0	\$14,000,000	\$86,000,000	\$99,000,000
<b>Management of companies and enterprises</b>	\$0	\$49,000,000	\$29,000,000	\$78,000,000
<b>Monetary authorities and depository credit intermediation activities</b>	\$0	\$24,000,000	\$46,000,000	\$70,000,000
<b>Legal services</b>	\$0	\$33,000,000	\$36,000,000	\$69,000,000
<b>Employment services</b>	\$0	\$39,000,000	\$30,000,000	\$69,000,000
<b>Transport by truck</b>	\$0	\$40,000,000	\$20,000,000	\$60,000,000

## Acknowledgements

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# Appendix A – Timeline of MISO IMPLAN Analysis, Review, and Milestones



## Appendix B – MISO States with MTEP In-service Projects by Year

	02	03	04	05	06	07	08	09	10	11	12	13	14	15
<b>Arkansas</b>													X	
<b>Iowa</b>	X	X	X	X	X	X	X	X	X	X	X	X	X	X
<b>Illinois</b>	X		X	X	X	X	X	X	X	X	X	X	X	
<b>Indiana</b>		X	X	X	X	X	X	X	X	X	X	X	X	X
<b>Kentucky</b>											X	X		
<b>Louisiana</b>												X	X	
<b>Michigan</b>	X	X	X	X	X	X	X	X	X	X	X	X	X	X
<b>Minnesota</b>	X	X	X	X	X	X	X	X	X	X	X	X	X	X
<b>Mississippi</b>														
<b>Missouri</b>		X	X	X	X	X	X	X	X	X	X	X	X	
<b>Montana</b>						X								
<b>North Dakota</b>	X		X	X	X	X	X	X	X	X	X	X	X	
<b>South Dakota</b>			X	X		X				X	X	X		X
<b>Texas</b>													X	
<b>Wisconsin</b>	X	X	X	X	X	X	X	X	X	X	X	X	X	X

## Appendix C – Local Purchase Percentages in Scenario 2 by Year

	<b>Towers</b>	<b>Wire</b>	<b>Transformers</b>
<b>2002</b>	48%	19%	23%
<b>2003</b>	42%	14%	24%
<b>2004</b>	54%	21%	29%
<b>2005</b>	54%	21%	29%
<b>2006</b>	53%	21%	29%
<b>2007</b>	54%	21%	29%
<b>2008</b>	53%	21%	29%
<b>2009</b>	53%	21%	29%
<b>2010</b>	53%	21%	29%
<b>2011</b>	54%	21%	29%
<b>2012</b>	54%	23%	30%
<b>2013</b>	48%	21%	30%
<b>2014</b>	71%	26%	31%
<b>2015</b>	42%	14%	20%

## Appendix D – Bibliography

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## Appendix E – Comparisons with Other Studies

<b>Study Sponsor</b>	<b>Study Region</b>	<b>Project Description</b>	<b><u>Transmission Cost (\$mil) modeled</u></b>	<b><u>Total Jobs</u></b>	<b><u>Total Output (\$mil)</u></b>	<b><u>Jobs per \$ mil const cost</u></b>
SPP - Brattle	SPP Region	Group 2 - High in-region spending	1,136	9,345	962	8.2
CapX2020 - UMD	MN, ND, SD, WI	5 CapX transmission projects	1,773	23,542	3,400	13.3
Rock Island Clean Line	Iowa, Illinois	500 mile HVDC	1,500	12,510	1,951	8.3
Grain Belt Clean Line	Kansas, Missouri, Illinois, Indiana	700 mile HVDC	2,224	15,429	2,502	6.9
N/A	MN	Generic JEDI tool using MN MVP values	813	4,927	541	6.1
MISO	15 state MISO region	In-service MTEP projects – Scenario 2 ( Jobs are summed across years here in order to provide a total figure for comparison.)	9,396	113,900	16,330	12.1