An Economic Analysis of
ITC Midwest Transmission
Multi Value Projects #3 and #4

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Executive Summary

This report presents the results of an analysis of the economic and fiscal impacts associated with two Multi Value Projects ("MVP") proposed by ITC Midwest LLC (ITC Midwest). This work was done by Strategic Economics Group at the request of ITC Midwest. As designated by the Midcontinent Independent System Operator ("MISO") the projects are MVP 3 and MVP 4. These are two of 17 MVP projects proposed in the 2011 MTEP (MISO Transmission Expansion Plan) report. The estimated costs for MVP 3 and MVP 4 equal $506 million and $480 million, respectively.

- Both projects will involve the development of new 345 kV transmission lines with portions of the projects owned by MidAmerican Energy Company and ITC Midwest.

- The ITC Midwest portions of the two projects will traverse three counties in southwest Minnesota and seven counties in north central Iowa. The estimated ITC Midwest shares of the costs for the two projects equal $255.5 million for MVP 3 and $305.3 million for MVP 4.

- The 10-county regional impact of the $561 million investment made in the region will be an increase of economic output of more than $723 million, labor income of more than $208 million and 4,275 job-years[1].

- The statewide impact of the $380 million investment made in just the 7 counties of Iowa (excluding the Minnesota investment) will be an increase in the State of $583 million in output, labor income of $177 million and 3,520 job-years.

- The amount of replacement tax levied each year on the portion of the new transmission lines located in Iowa will equal about $982,000.

- The estimated total State sales and use tax that will be generated by the ITC Midwest MVP investments equals $14.3 million and additional local option sales and services tax could be as much as $2.4 million.

[1] A job-year is one full-time job for one year. The term "jobs" used in this report refers to equivalent job-years.

- The proposed MVP projects will result in an estimated $5.1 million in personal income tax payments to the State of Iowa.

- Estimates of the potential amount of additional wind energy that will be developed in Iowa as a result of the completion of MVP 3 and MVP 4 reflect assumptions made in the Multi Value Portfolio Analysis (January 2010). That report reflects the amount of additional wind generating capacity required in order for states located in the MISO market region, plus Ohio, to satisfy their existing Renewable Portfolio Standards. Using two different scenarios, the additional wind capacity requirement for Iowa used in this analysis equal 1,300 MW and 2,000 megawatts. For each of the scenarios the ITC Midwest segments of MVP 3 and MVP 4 are assumed to provide connections to half of the required new wind capacity.

- For each scenario economic impact estimates were made using the JEDI Model[2], a version of IMPLAN customized for the analysis of economic impacts associated with wind energy projects. For each scenario the JEDI Model was used to estimate economic impacts where the Iowa content for turbines, blades and towers was assumed to equal 0%, 25% or 50%. Output, earnings and job impacts over an assumed 10 year development period are:

Economic Impact of New Wind Capacity Construction

Scenario	Capacity (MW)	Iowa Content	Output ($Millions)	Earnings ($Millions)	Job Years
1A	650	0%	$340.3	$147.8	3,182
1B	650	25%	$701.9	$244.3	4,810
1C	650	50%	$1,055.1	$325.4	6,235
2A	1,000	0%	$523.5	$227.5	4,896
2B	1,000	25%	$1,079.8	$375.9	7,400
2C	1,000	50%	$1,623.2	$500.6	9,591

- The 325 wind turbines assumed under the 650 MW scenarios would yield between $650 thousand and $1.3 million in easement payments per year. Under the 1,000 MW scenarios the 500 wind turbines would yield between $1 million and $2 million in easement payments per year.

[2] JEDI (Jobs and Economic Development Model) was developed for the U.S. Department of Energy National Renewable Energy Laboratory.

- Generally, wind turbines located in utility scale wind facilities are assessed for property tax at a reduced level during their first six years of operation. Beginning in year seven and thereafter such facilities are assessed at a maximum of 30% of their full value. The estimated property taxes that will be generated by 650 MW and 1,000 MW of new wind facilities connected to the ITC Midwest portions of MVP 3 and MVP 4 will equal $6.2 million and $9.6 million per year, respectively.

- Although equipment and materials used to construct wind facilities are exempt from state and local option sales taxes, purchases made by individuals that work on these projects and for suppliers of equipment and services for these projects are subject to sales tax. The estimated amount of additional state sales taxes that will be generated by new wind facilities equals between $2.6 million and $8.7 million over the ten year construction period. The amounts of local option sales tax revenues generated over the period will range between $430,000 and $1.45 million.

- Workers involved in constructing wind facilities, workers involved in the manufacturer of wind turbine components, and workers that provide other goods and services to those involved in the development of wind facilities earn incomes subject to Iowa personal income tax. The estimated additional Iowa personal income tax that will be generated per year during the ten year development period for new wind facilities that would connect to the ITC Midwest segments of MVP 3 and MVP 4 range between $352,000 and $1.1 million.

Introduction

This report presents the results of an analysis of the economic and fiscal impacts associated with two Multi Value Projects ("MVP") proposed by ITC Midwest. As designated by the Midcontinent Independent System Operator ("MISO") the projects are MVP 3 and MVP 4. These are two of 17 MVP projects proposed in the 2011 MTEP (MISO Transmission Expansion Plan) report. These 17 projects have an estimated total cost (in $2011) of $5.2 billion. The estimated costs for MVP 3 and MVP 4 equal $506 million and $480 million, respectively. These two projects will involve the development of new 345 kV transmission lines in Iowa and southern Minnesota. Portions of the lines and certain substations will be owned by MidAmerican Energy Company.[3]

The ITC Midwest portions of the two projects will traverse three counties in southwest Minnesota and seven counties in north central Iowa. The estimated ITC Midwest shares of the costs for the two projects equal $255.5 million for MVP 3 and $305.3 million for MVP 4. The analysis presented in this report addresses only the ITC Midwest portions of the two projects. The analysis of both projects is presented on a combined basis. However, in addition to the overall combined analysis, impact estimates are presented separately for the Iowa and Minnesota portions.

The final section of this report presents an evaluation of the significance of the proposed transmission system improvements for the future growth of wind electricity generation in Iowa and for the Iowa wind energy supply chain.

ITC Holdings Corporation

ITC Holdings is the nation's first, largest, and only publicly-traded independent transmission company. ITC's four transmission company subsidiaries that own transmission assets are International Transmission Company, d/b/a ITC Transmission ("ITCT"), Michigan Electric Transmission Company, LLC ("METC"), ITC Midwest, and ITC Great Plains, LLC ("ITCGP").

[3] MISO Transmission Expansion Plan 2011 (August 27, 2012); Multi Value Project Portfolio: Results and Analysis (January 10, 2012)

In 2001, Detroit Edison organized its transmission business as a separate corporate subsidiary named International Transmission Company. On February 20, 2003, the FERC approved an order authorizing the sale of International Transmission Company to ITC Holdings Corp.[4] Upon the close of that transaction, International Transmission Company (now doing business as ITC*Transmission*) became a fully independent transmission company, operating a transmission system in Southeast Michigan.

ITC Holdings Corp. completed an initial public offering ("***IPO***") in July 2005, and became a publicly traded company listed on the New York Stock Exchange. In October 2006, ITC completed the acquisition of METC.[5] METC owns the former transmission assets of Consumers Energy, which cover the western part of Michigan's Lower Peninsula. Also in 2006, ITC formed ITC Grid Development, LLC to pursue the development of regional transmission projects in new areas. As part of this effort, ITCGP was established that year to partner with local utilities in the construction of needed transmission in the Southwest Power Pool ("SPP") region. Since then, ITCGP has become authorized to conduct business in Kansas and Oklahoma, owns and operates transmission facilities in those states, and is a transmission owning member of SPP.

In December 2007, a new ITC subsidiary named ITC Midwest acquired the transmission assets of Interstate Power and Light Company ("IPL").[6] ITC Midwest's assets are located in parts of Iowa, Minnesota, and Illinois (with a short part of a transmission line that passes through Missouri).

ITC Holdings Corp.'s four transmission company subsidiaries own over 15,000 circuit miles of transmission line rated at voltages at or between 34.5 kV and 345 kV. In addition, the combined systems include 536 stations and substations that interconnect transmission lines owned by ITC operating companies and to generation and distributions facilities owned by other utilities.[7] The four subsidiaries own transmission facilities in Michigan's Lower Peninsula and in portions of Iowa, Minnesota, Illinois, Missouri, Kansas and Oklahoma.

4 102 FERC ¶ 61,182; *Order Denying Rehearing and Accepting Compliance Filing,* 104 FERC ¶ 61,033 (2003).
5 116 FERC ¶61,271 (2006).
6 121 FERC ¶ 61,229 (2007).
7 ITC Holdings Corporation, Form 10-K 2012 Annual SEC Filing, pp. 25-26.

ITC Midwest

ITC Midwest is a wholly owned subsidiary of ITC Holdings which resulted from the acquisition of the IPL transmission system on December 20, 2007 following the IPL transmission system purchase. The Iowa Utilities Board approved the purchase on September 20, 2007.[8] FERC approved the acquisition on December 4, 2007.[9] Additional approvals of the transaction were received from the Minnesota Public Utility Commission, the Illinois Commerce Commission, and the Missouri Public Service Commission, as well as the Securities and Exchange Commission.

The transaction was valued at $783 million.[10]

ITC Midwest is based in Cedar Rapids, Iowa. The company and dedicated contractors maintain operating locations in Cedar Rapids, Dubuque, Iowa City, Mason City, and Perry, Iowa and in Albert Lea and Lakefield, Minnesota. The ITC Midwest transmission system (as of year-end 2012) consisted of 6,604 miles of transmission line located in Iowa, Illinois, Minnesota and Missouri.

In Iowa ITC Midwest's transmission lines are located in 83 of the State's 99 counties. In Illinois and Minnesota ITC Midwest's transmission lines are located in 5 and 22 counties, respectively. ITC Midwest owns eight miles of transmission line in Missouri.

ITC Midwest directly employs 95 workers at six locations in Iowa. Cedar Rapids has the highest concentration of ITC Midwest employees with 67. Transmission line and substation maintenance and construction work on the ITC Midwest system is done primarily by contractors. The primary contractor for this work is Utility Line Construction (ULC) Company with 149 workers dedicated to the ITC Midwest system. The total number of ITC Midwest and contractor employees located in Iowa equals 268.[11]

[8] Iowa Utilities Board, Docket No. SPU-07-11, "Interstate Power and Light Company and ITC Midwest LLC, Order Terminating Docket and Recommending Delineation of Transmission and Local Distribution Facilities," September 20, 2007.
[9] Federal Energy Regulatory Commission, Docket No. EC07-89-000 et al., December 4, 2007.
[10] PRNewswire-FirstCall, "ITC Holdings Signs Agreement to Acquire Transmission Assets of Alliant Energy," January 19, 2007; PRNewswire-FirstCall, "ITC Holdings Corp. Completes Acquisition of Interstate Power and Light Transmission Assets," December 20, 2007.
[11] Source: ITC Midwest email, July 9, 2013.

Analysis Design and Methodology

This study is primarily concerned with analyzing the demand-side effects of ITC Midwest on the regional economy in northern Iowa and southern Minnesota. It investigates the effects on the area based on the various goods and services that ITC Midwest and its contractors and vendors purchased within the region. Those effects are quantifiable. Supply-side effects, or the effects that ITC Midwest has on the area economy based on the resources it offers are also important to evaluate, although more difficult to quantify. Such supply-side effects include business activity attracted to the region due to the increased availability of electric capacity and the ability to transport electricity more efficiently to new markets.

The methodology employed in this study involves examining the two categories of spending:

1. Lines – new 345 kV
2. New substation construction and substation improvement

For each of these components and for the total of all the components, the analysis examines the impact on the area's economy using three metrics or measures of change:

1. **Output Production** – a measure of the increased value of all goods, services, and labor within the service area attributable to ITC Midwest spending. For manufacturers this equals sales plus/ minus inventory changes; for service sectors this equals total sales; and for retail and whole trade this equals gross margins (i.e., sales minus cost of goods sold).
2. **Labor Income** – the measure of increased personal income as a result of the new economic activity. Labor income equals all forms of employment income, including wages and benefits, and proprietor income.
3. **Jobs** – the estimate of the full-time, part-time, and temporary jobs and counts all jobs rather than just the full-time equivalent job-years.

In each case – output, labor income, and jobs – the total impact is the sum of the following factors:

1. **Direct Effect** – the initial economic activity that drives the subsequent effects on other sectors of the economy.
2. **Secondary Effects** – the resulting **indirect** business-related effect on the vendors and employees of ITC-Midwest and the **induced** consumer-related consequences of added payrolls and

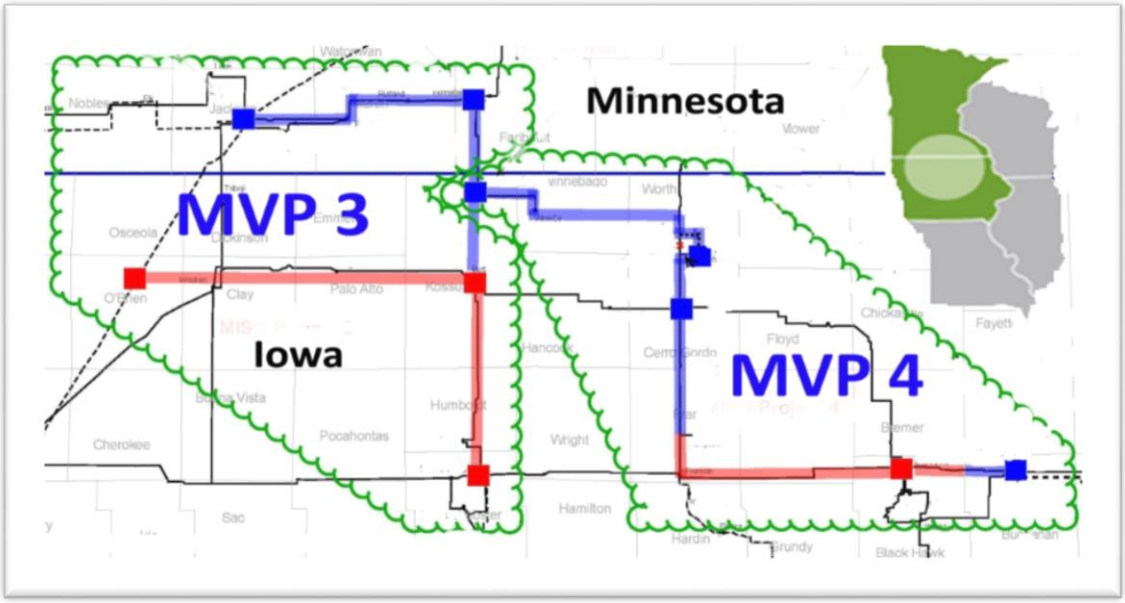
increased vendor purchases on other vendors in the surrounding community as a result of the direct effect.

The project staff analyzed construction data and built economic impact models for each of the two types of investments. The economic impacts are measured in terms of changes in output, labor income, and job-years. The direct and the secondary impacts of the direct spending are identified in terms of the three measures using a customized IMPLAN Input-Output Model. (See Appendix C for a more detailed description of the IMPLAN model).

ITC Midwest Capital Investments in Iowa

ITC Midwest plans to build approximately 198.25 miles of new 345 kV transmission lines and four new substations in northern Iowa and southern Minnesota during the period 2015 through 2016. ITC Midwest will also upgrade an existing substation in southern Minnesota as part of MVP 3. These investments will be part of a network identified as Multi Value Project (MVP) 3 and 4, partnering with MidAmerican Energy Company (MEC) and connecting to Corn Belt Power Cooperative.

Figure 1. MVP 3 and MVP 4



The proposed MVP 3 and 4 projects will involve the construction and maintenance of about 400 miles of 345 kV lines in north central Iowa and southwest Minnesota in order to connect the new generation of wind farms located in Iowa and Minnesota to the national electric grid. The ITC Midwest portion of these projects entails the construction of about 140.25 miles of 345 kV line in Iowa and 58 miles of 345 kV line in Minnesota.

ITC Midwest will build its share of the two projects in three counties in Minnesota (Jackson, Martin and Faribault) and seven counties in Iowa (Kossuth, Winnebago, Worth, Cero Gordo, Franklin, Blackhawk and Buchanan). Tables 2 and 3 list the components of MVP 3 and 4 as defined by ITC Midwest for its portion of the project.

Table 2. Location and Estimated Cost of Substations and Lines, MVP 3

Substation	County	Line	Miles	Line Cost ($Millions)	Substation Cost ($Millions)	Total Cost ($Millions)
Lakefield Junction (Upgrade)	Jackson (MN)	Lakefield to Huntley line	16.60	$39.35	$5.00	$44.35
	Martin (MN)		35.90	$85.10		$85.10
Huntley	Faribault (MN)	Huntley to Ledyard line	5.50	$13.04	$27.36	$40.40
Ledyard	Kossuth (IA)	Ledyard to Kossuth line	31.50	$74.67	$10.98	$85.65
Total			89.50	$212.16	$43.34	$255.50

Table 3. Location and Estimated Cost of Substations and Lines, MVP 4

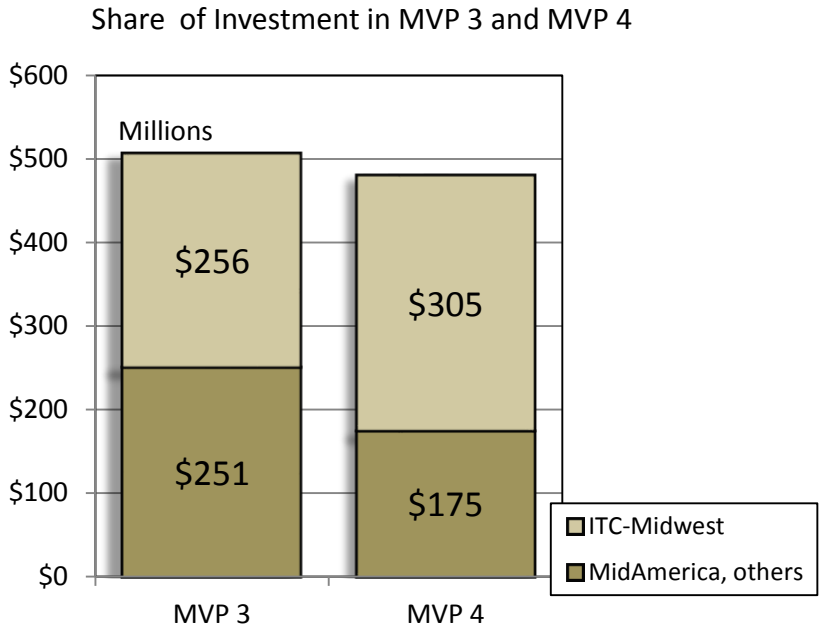
Substation	County		Miles	Line Cost ($Millions)	Substation Cost ($Millions)	Total Cost ($Millions)
Ledyard	Kossuth (IA)	Ledyard to Colby line	6.50	$15.96	Included in MVP 3	$15.96
	Winnebago (IA)		25.00	$61.38		$61.38
Colby	Worth (IA)	Colby to Killdeer line	23.50	$57.69	$18.93	$76.62
Killdeer	Cerro Gordo (IA)	Killdeer to Hampton	26.25	$64.45	$19.38	$83.83
	Franklin (IA)		15.25	$37.44		$37.44
Hazelton (existing)	Black Hawk (IA)	Black Hawk to Hazelton line	2.25	$5.52	Existing	$5.52
	Buchanan (IA)		10.00	$24.55		$24.55
Total			108.75	$266.99	$38.31	$305.30
Totals MVP 3 & 4 Combined			198.25	$479.15	$81.65	$560.80

MVP 3 and MVP 4 are expected to cost ITC Midwest a combined total of approximately $560.8 million to construct.

Our analysis indicates that the 198.25 miles of single circuit 345 kV lines will cost $2.4 million per mile to build in MVP 3 and $2.5 million per mile in MVP 4. The estimate includes line, right of way and overhead costs. The capital cost of the five substations was provided by the planning staff at ITC Midwest. While the direct impact of the spending will occur in the ten counties where the construction will occur, the benefits will be widespread.

MISO, the regional independent transmission operating and planning organization, has projected the total project cost for MVP 3 and 4 to be $506 million and $480 million, respectively. Based on the projections in Tables 2 and 3, ITC will be responsible for providing more than half of the investment for each project – or $560.8 million of the total $986 million that will be spent in the region.

Figure 2.



The ITC line and substation investment will be distributed across ten counties in 2015-2016, however the economic impact will be felt over a much larger area. Table 4 shows the Iowa and Minnesota county share of the ITC Midwest direct spending for MVP 3 and 4.

Table 4. County Share of ITC Midwest Investment in MVP 3 & 4

County	Miles	Investment ($Millions)	Share
Kossuth (IA)	38.00	$104.02	18.5%
Worth (IA)	23.50	$85.32	15.2%
Martin (MN)	35.90	$85.10	15.2%
Winnebago (IA)	25.00	$70.63	12.6%
Cerro Gordo (IA)	26.25	$53.28	9.5%
Jackson (MN)	16.60	$44.35	7.9%
Franklin (IA)	15.25	$43.09	7.7%
Faribault (MN)	5.50	$40.40	7.2%
Buchanan (IA)	10.00	$28.25	5.0%
Black Hawk (IA)	2.25	$6.36	1.1%
Total	198.25	$560.80	100.0%

The Economic Impact of the ITC Midwest Capital Investments

The impact of the $561 million investment in the region will be an increase in economic output of more than $723 million. Table 5 shows that the investment will have the greatest impact on the manufacturing, construction and services sectors in the Iowa and Minnesota region. The model generated projections from $545 million of direct expenditures. This is less than the $561 million of total investment because $16 million represents direct transfer payments for right-of way easements and acquisition made to land owners. The $16 million is treated as transfer payments to households, which do influence the induced impacts.

The IMPLAN Model used the Direct Input amounts to drive the estimation of economic Outputs for the geographic region covered by the analysis.[12] The term Output is defined as "the value of production by industry in a calendar year. Output can be measured from either a demand perspective (as the total value of purchases by intermediate and final consumers), or an industry outlay perspective (as intermediate outlays plus value-added). Output can also be thought of as a value of sales (i.e., revenue) plus or minus changes in inventory." It is the most comprehensive estimate of the impact on an economy.

Table 5. Output Impacts of ITC Midwest MVP3 & 4 Projects ($Millions)

Description	Direct	Indirect	Induced	Total
Construction	$170.4	$0.9	$1.1	$172.4
Manufacturing	$278.8	$3.0	$1.4	$283.1
Trade	$0.0	$13.3	$16.0	$29.3
Transportation-Warehousing	$0.0	$5.3	$1.6	$7.0
Information-Communication	$0.0	$5.6	$3.0	$8.6
Finance, Insurance	$0.0	$7.9	$12.5	$20.4
Real Estate	$0.0	$1.6	$17.3	$18.9
Business Services	$26.9	$14.3	$3.3	$44.5
Professional Services	$68.6	$16.1	$2.5	$87.2
Other Services	$0.0	$5.6	$38.4	$44.1
Government	$0.0	$1.8	$3.0	$4.9
Other	$0.0	$1.3	$1.7	$3.0
Total	$544.7	$76.9	$101.7	$723.2

[12] IMPLAN is a regional input-output model maintained by the IMPLAN Group, LLC, formerly known as the Minnesota IMPLAN Group, LLC.

Table 6 and 7 shows the $208 million projected impact on labor income and the resulting 4,275 increase in job-years in the region. From the Output measure, the IMPLAN Model estimates the impact on Total Labor Income**,** which includes all employee compensation and proprietors' income. That measure is then used by the IMPLAN Model to estimate the impact on job-years.

Table 6. Labor income Impact of ITC Midwest MVP 3 & 4 Projects ($Millions)

Description	Direct	Indirect	Induced	Total
Construction	$55.6	$0.3	$0.4	$56.3
Manufacturing	$40.1	$0.7	$0.2	$40.9
Trade	$0.0	$6.2	$8.3	$14.5
Transportation-Warehousing	$0.0	$1.9	$0.6	$2.5
Information-Communication	$0.0	$1.2	$0.6	$1.8
Finance, Insurance	$0.0	$1.9	$3.0	$4.9
Real Estate	$0.0	$0.2	$0.3	$0.6
Business Services	$14.2	$6.3	$1.4	$22.0
Professional Services	$33.5	$8.0	$1.1	$42.6
Other Services	$0.0	$2.2	$17.1	$19.3
Government	$0.0	$0.8	$0.9	$1.7
Other	$0.0	$0.3	$0.4	$0.7
Total	$143.4	$30.1	$34.3	$207.8

Table 7. Job-Years Impact of ITC Midwest MVP 3 & 4 Projects

Description	Direct	Indirect	Induced	Total
Construction	854	8	10	872
Manufacturing	673	12	4	688
Trade	0	103	250	353
Transportation-Warehousing	0	42	14	56
Information-Communication	0	25	15	40
Finance, Insurance	0	34	55	89
Real Estate	0	6	8	14
Business Services	479	186	45	710
Professional Services	621	143	23	787
Other Services	0	105	531	635
Government	0	11	13	24
Other	0	3	4	7
Total	2,626	678	970	4,275

Table 8 shows the county distribution of the ITC Midwest investment in the MVP 3 and MVP 4 projects.

Table 8. County Share of Economic Impact in MVP 3 & 4

County	Share	Output ($Millions)	Labor Income ($Millions)	Jobs
Kossuth (IA)	18.50%	$133.80	$38.44	791
Worth (IA)	15.20%	$109.93	$31.58	650
Martin (MN)	15.20%	$109.93	$31.58	650
Winnebago (IA)	12.60%	$91.13	$26.18	539
Cerro Gordo (IA)	9.50%	$68.71	$19.74	406
Jackson (MN)	7.90%	$57.14	$16.41	338
Franklin (IA)	7.70%	$55.69	$16.00	329
Faribault (MN)	7.20%	$52.07	$14.96	308
Buchanan (IA)	5.00%	$36.16	$10.39	214
Black Hawk (IA)	1.10%	$7.96	$2.29	47
Total	100.00%	$723.24	$207.77	4,275

Appendix A provides these same tables expanded to include greater detail. Appendix B shows these tables for just the Iowa counties and examines the impact within the entire State of Iowa. The analysis in that set of tables reflects a smaller amount of direct expenditures, omitting the spending in the three Minnesota counties. However, it reflects a larger geographic area (99 counties compared to 10) with greater access to potential supply chain vendors. For those tables the direct impacts are smaller but the indirect and induced impacts are greater than what is shown in tables 5 through 7.

Appendix C has more information about the IMPLAN Model.

Fiscal Impact Analysis

This part of the analysis focuses on the Iowa fiscal impacts of the MVP projects. The three taxes that will be most impacted are the property replacement tax, sales and use tax, and personal income tax.

Property Replacement Tax

In response to the deregulation of the electricity and natural gas industries, in 1998 the Iowa General

Assembly enacted legislation that replaced property tax for electric and natural gas utilities with a set of excise taxes. These taxes are commonly referred to as replacement taxes. Iowa Code Chapter 437A specifies the assessment procedures and the rates at which taxes are imposed on utility property. Section 437A.7 specifies how replacement taxes are levied for electric transmission lines:

- $550 per pole mile for transmission lines not exceeding 100 kV,
- $3,000 per pole mile for transmission lines greater than 100 kV but not exceeding 150 kV,
- $700 per pole mile for transmission lines greater than 150 kV but not exceeding 300 kV, and
- $7,000 per pole mile for transmission lines greater than 300 kV.

The ITC Midwest portion of the two MVP projects will involve the construction of 140.25 miles of 345 kV transmission line in Iowa. When completed the amount of replacement tax levied each year will equal $981,750. Since the tax rate for transmission property is established by statute the tax levy will not be impacted by changes in the value of the property.

Sales and Use Tax

Unlike many industries with operations in Iowa, electric and natural gas utilities pay sales or use tax on their purchases of equipment, materials and supplies used to construct, maintain and repair their system infrastructure. On the other hand, purchases of most business services, such as accounting, engineering, financial and legal services, are exempt from tax.

The Iowa statewide tax rate equals 6 percent. Also, a 1 percent local option tax is imposed in most counties. Based on the IMPLAN analysis the Iowa portion of the proposed ITC Midwest MVP investments will require the purchase of $195.5 million of manufactured goods, such as wood poles, steel poles, wire, concrete, transformers, circuit breakers, and other electronics. These purchases will generate an estimated $11.7 million in State sales and use taxes, plus as much as $2.0 million in local option sales taxes. However, since local option taxes often do not apply to out-of-state purchases, the local option amount may be less than $2.0 million. Whether or not local option tax is imposed on out-of-state purchases depends on where delivery is taken and other sourcing rules.[13]

[13] Delivery of purchased goods in company owned vehicles or the use of vendor company personnel in machinery or equipment installation can result in local option taxes applying to out-of-state purchases.

The indirect purchases made by ITC Midwest vendors of materials and services used in the investment projects likely will generate little or no state sales or use tax revenues or local option tax revenues. This is because most intermediate purchases of physical goods for resale or goods that get incorporated into finished manufactured products are exempt from sales and use tax in Iowa.

The induced purchases – consumer purchases made by ITC Midwest and contractor employees and by employees of other vendors – are also partially subject to sales and use tax. Most physical goods – such as clothing, home furnishings, household supplies, tobacco products, reading materials, etc. – are subject to tax. Also, some personal services – such as automobile repairs, telephone service, and food purchased in restaurants – are subject to tax. However, there are some major exceptions that include food purchased for home consumption, medical care, motor fuel, education services, and residential electric and natural gas utility services.

Based on an analysis of Consumer Expenditure Survey statistics for 2011 for the Midwest region of the United States the estimated share of household purchases of physical goods subject to Iowa sales and use tax equals 53.9%. Similarly, the estimated share of personal service purchases subject to taxation equals 33.2%. Applying these percentages to the induced output effect of the IMPLAN analysis yields an additional $2.5 million in state sales and use tax and up to $423 thousand in local option tax.
The estimated total State sales and use tax that will be generated by the ITC Midwest MVP investments equals $14.3 million and additional local option sales and services tax could be as much as $2.4 million.

Personal Income Tax

The methodology used to estimate the personal income tax liabilities of employees involved in the ITC Midwest investment projects (direct employees), employees of companies that provide inputs to ITC Midwest and ITC Midwest vendors (indirect employees), and employees of businesses that sell goods and services to the direct and indirect employees (induced employees) consists of five steps. First, the labor income and jobs estimates generated by IMPLAN are used to compute average compensation amounts by type of effect and by economic sector.

Second, the average compensation amounts are reduced by 25 percent to account for the share of compensation assumed to equal non-taxable benefits.

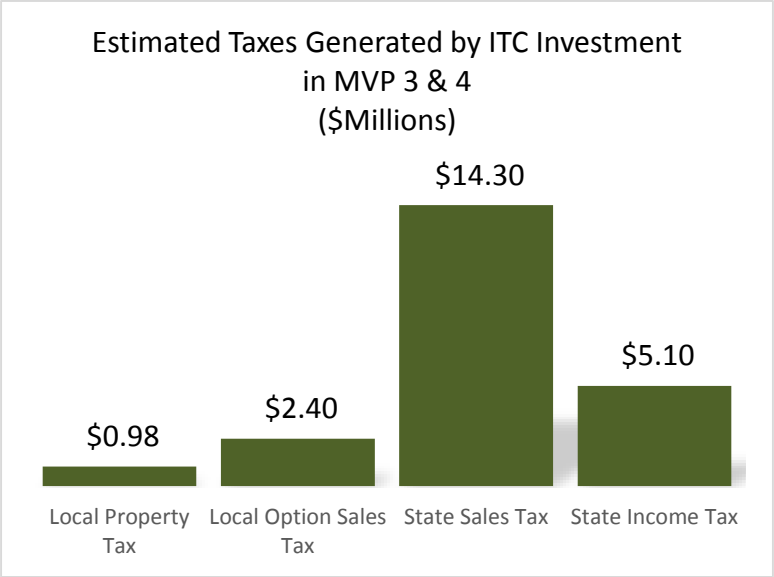
Third, the average wage and salary amounts computed in the previous step are reduced again to convert these gross income amounts to taxable income amounts. These adjustments reflect the fact that income used for certain purposes, such as mortgage interest payments, charitable contributions, federal income taxes, etc., is not subject to Iowa personal income tax. Fourth, taxes for the average taxable income amounts for each economic sector and impact effect are derived from the 2012 State of Iowa tax tables. Finally, the total tax liability amounts for each economic sector and impact effect are computed by multiplying the number of jobs by the per individual tax amount by economic sector and impact effect. The estimated personal income tax liability by economic sector and impact effect are summarized in Table 9.

Table 9. Estimated Iowa Personal Income Taxes ($Thousands)

Description	Direct	Indirect	Induced	Total
Agriculture	$0.0	$1.6	$4.2	$5.8
Mining	$0.0	$1.0	$0.0	$1.0
Utilities	$0.0	$16.2	$15.4	$31.7
Construction	$1,162.2	$11.8	$12.4	$1,186.3
Non-Durable Manufacturing	$0.0	$40.3	$26.8	$67.2
Durable Manufacturing	$1,190.6	$70.5	$11.0	$1,272.1
Trade	$0.0	$186.6	$192.5	$379.2
Transportation-Warehousing	$0.0	$62.3	$20.9	$83.2
Information-Communication	$0.0	$25.2	$15.5	$40.6
Finance, Insurance	$0.0	$51.4	$88.0	$139.5
Real Estate	$0.0	$8.8	$13.9	$22.7
Business Services	$191.1	$151.5	$40.0	$382.5
Professional Services	$746.9	$227.5	$38.0	$1,012.4
Education	$0.0	$0.2	$21.0	$21.2
Health Services	$0.0	$0.0	$287.5	$287.5
Community And Civic Services	$0.0	$5.7	$35.8	$41.4
Arts And Entertainment	$0.0	$2.1	$8.9	$11.0
Lodging	$0.0	$7.0	$6.5	$13.5
Restaurants	$0.0	$11.4	$33.1	$44.5
Personal Services	$0.0	$20.7	$30.6	$51.4
Government	$0.0	$22.5	$27.1	$49.5
Total	$3,290.7	$924.4	$929.1	$5,144.2

There is the potential that these projects will generate other types of tax revenues and fees. However, these are difficult to estimate. For example, it is possible that suppliers of materials and services for the projects will earn increased profits. To the extent companies providing goods and services to ITC Midwest are organized as S-corporations, limited liability companies, simple partnerships, and sole proprietorships, their potential increased income tax liabilities have been captured through the personal income tax analysis. For suppliers organized as C-corporations, information needed to estimate potential increases in their corporate income tax liability is not available. Figure 3 summarizes the total tax impacts that can be quantified for the two proposed MVP projects.

Figure 3.



Potential Iowa Wind Energy and Wind Energy Supply Chain Impacts

Wind Energy Development in Iowa

Iowa leads the nation in the share of electricity generated by wind power. During 2012 the share of the State's electricity produced by wind generators rose to 24.5%. Iowa has experienced dramatic growth in the amount of installed wind capacity. From 2000 through 2012 wind generating capacity in the State increased from 242.4 MW to 5,137 MW, an increase of over 2,000 percent. Table 10 shows the growth

of wind generating capacity in the United States and Iowa from 2000 through 2012. At the end of 2012 Iowa accounted for almost 8.6% of total wind generating capacity in the United States.

Table 10. US and Iowa Wind Generating Capacity (MW)

	United States		Iowa		Iowa Shares	
Year	Additions	Total	Additions	Total	Additions	Total
2000	66.8	2,539.3	0.0	242.4	0.00%	9.55%
2001	1,692.5	4,231.8	81.8	324.2	4.83%	7.66%
2002	455.6	4,687.4	98.5	422.7	21.62%	9.02%
2003	1,662.6	6,349.9	49.2	471.8	2.96%	7.43%
2004	373.2	6,723.1	162.2	634.0	43.46%	9.43%
2005	2,423.9	9,147.1	202.3	836.3	8.35%	9.14%
2006	2,427.4	11,574.5	95.9	932.2	3.95%	8.05%
2007	5,332.5	16,907.0	340.7	1,272.9	6.39%	7.53%
2008	8,503.0	25,410.0	1,518.3	2,791.2	17.86%	10.98%
2009	9,453.3	34,863.4	812.8	3,603.9	8.60%	10.34%
2010	5,403.6	40,267.0	71.0	3,674.9	1.31%	9.13%
2011	6,649.1	46,916.1	647.1	4,322.0	9.73%	9.21%
2012	13,093.0	60,009.1	815.0	5,137.0	6.22%	8.56%

Over the same period the amount of electricity generated by wind in Iowa increased from 493.8 GWh (gigawatts-hours) to 13,945.0 GWh, or by over 2,700 percent. Figure 11 presents a comparison of the growth in total and wind generated electricity from 2000 through 2012 for the United States and Iowa.

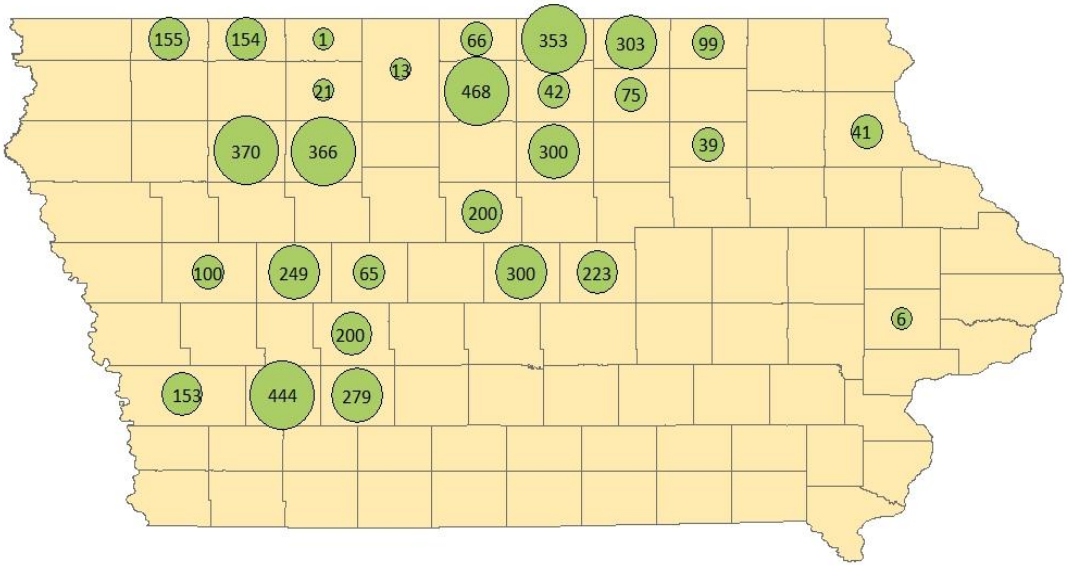
By the end of 2012 there were 66 utility scale wind generation facilities consisting of 3,168 wind turbines located in 28 Iowa counties.[14] The counties with the highest concentrations of wind generators are Hancock (468.0 MW), Cass (443.9 MW), Buena Vista (369.6 MW), Pocahontas (366.4 MW), and Worth (352.9 MW). Figure 3 shows the distribution of wind generating capacity by county across Iowa.

[14] U.S. Energy Information Administration, "2012 Form EIA-860 Data – Schedule 3, Generator Data," early release June 20, 2013.

Table 11. US and Iowa Electricity Generation (GWh)

	United States			Iowa		
Year	Total	Wind	Wind Share	Total	Wind	Wind Share
2000	3,802,105	5,593.3	0.15%	41,542	493.8	1.19%
2001	3,736,644	6,737.3	0.18%	40,659	487.9	1.20%
2002	3,858,452	10,354.3	0.27%	42,528	918.8	2.16%
2003	3,883,185	11,187.5	0.29%	42,116	982.0	2.33%
2004	3,970,555	14,143.7	0.36%	43,248	1,050.0	2.43%
2005	4,055,423	17,810.5	0.44%	44,156	1,647.1	3.73%
2006	4,064,702	26,589.1	0.65%	45,483	2,317.8	5.10%
2007	4,156,745	34,449.9	0.83%	49,789	2,756.7	5.54%
2008	4,119,388	55,363.1	1.34%	53,087	4,083.8	7.69%
2009	3,950,331	73,886.1	1.87%	51,860	7,420.5	14.31%
2010	4,125,060	94,652.2	2.29%	57,509	9,170.3	15.95%
2011	4,100,656	120,176.6	2.93%	56,372	10,709.2	19.00%
2012	4,054,485	140,089.0	3.46%	56,919	13,945.0	24.50%

Figure 3. Iowa Wind Generating Megawatt Capacity by County, 2012



Potential for Future Growth of Wind Energy

Based on analysis done by the National Renewable Energy Laboratory, Iowa has the fifth highest percentage of its area suitable for wind generation at 78.3%. The four states with higher percentages of their areas suitable for wind generation are Nebraska (91.6%), Kansas (89.4%), South Dakota (88.4%), and North Dakota (84.1%).

The same analysis estimates that Iowa has the potential for the development of as much as 570,714 MW of wind generating capacity and producing as much as 2,026.3 TWh (terawatt-hours) of electricity from wind each year. These estimates take into consideration both prevailing wind speeds and the availability of land for development.[15] To put this in perspective, all United States wind generators produced only 140.1 TWh of electricity last year and the total amount of electricity from all sources produced in the United States during 2012 equaled 4,054.5 TWh.[16]

Factors Influencing Iowa's Leadership in Wind Energy Development

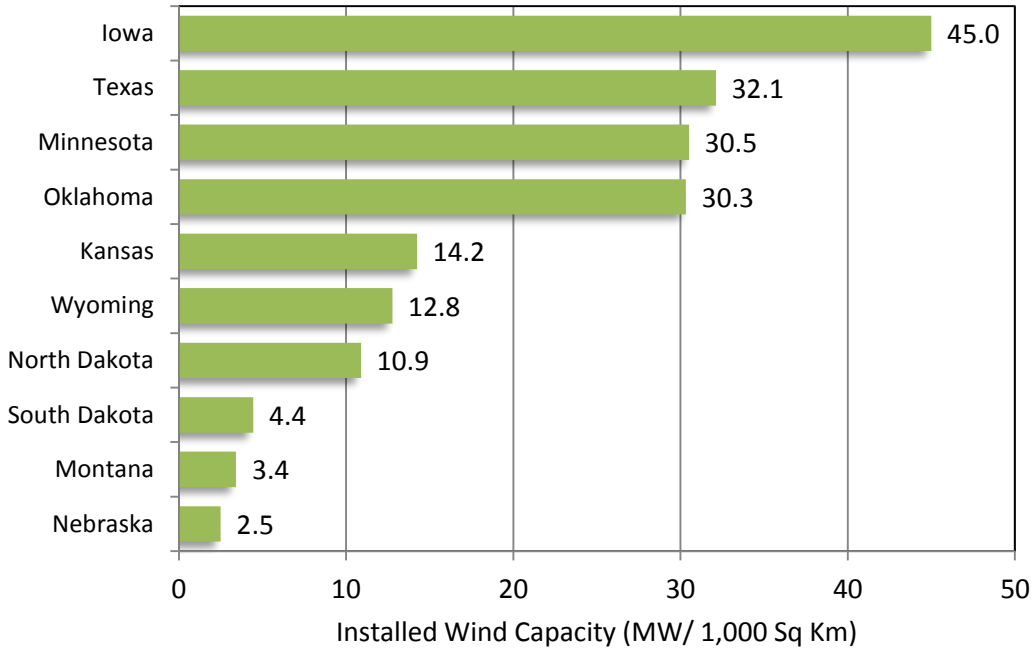
The quality of Iowa's wind resources and the availability of land for the development of these resources only partially explain why Iowa is a leader in the wind generation of electricity. Other states with higher average wind speeds and more available land for development lag Iowa in the development of wind energy. As shown in Figure 5, Iowa has 45 MW of installed wind generating capacity per thousand square kilometers of area suitable for commercial wind generation. The state with the next highest relative amount of installed wind generating capacity is Texas with 32.1 MW per 1,000 square kilometers. The four states with the largest shares of their areas suitable for wind generation – Nebraska (91.6%), Kansas (89.4%), South Dakota (88.4%) and North Dakota (84.1%) – have relatively low amounts of installed wind generation capacity.

In Iowa, government support for renewable energy has played a significant role in the growth of wind energy. Through various public policy initiatives State government has encouraged the development of renewable energy resources. During 2007, then Governor Culver proposed, and the General Assembly enacted legislation, creating the Office of Energy Independence and the Iowa Power Fund.[17] Among

[15] National Renewable Energy Laboratory, "Estimates of Windy Land Area and Wind Energy Potential, by State, for Areas >= 30% Capacity Factor at 80 Meters," April 13, 2011.
[16] U.S. Department of Energy, Energy Information Administration, "Electricity Data Browser," http://www.eia.gov/electricity/data/browser/
[17] House File 918, 82nd General Assembly (2007)

other public sector actions, Iowa State University created the Wind Energy Initiative, which provides interdisciplinary support to companies that populate the Iowa wind energy supply chain.

Figure 5. Relative Amount of Installed Wind Capacity for Ten Highest Wind Potential States



Another form of government support for wind energy takes the form of tax incentives. For utility scale wind facilities Iowa provides a production tax credit (PTC) of 1.5-cent per kilowatt-hour for ten years. This production tax credit was established in 2005. An individual facility's capacity eligibility is limited to 2.5 MW per qualifying owner and facility owners may not have an ownership interest in more than two eligible facilities. However, this limitation has been circumvented through the establishment of multiple limited liability companies for the same wind facility.[18]

Other forms of renewable energy qualify for the credit, but developers of wind energy facilities have been major recipients. But overall awards are limited to 363 MW of installed capacity and through the end of 2012 the amount of capacity awarded has reached 360.8 MW. One particularly attractive feature

[18] See list of approved renewable energy tax credit applications at http://www.state.ia.us/government/com/util/energy/renewable_tax_credits.html

of this credit is that recipients are allowed to sell the credits to generate startup capital.[19] [20]

In addition to the Iowa PTC, purchases of renewable energy equipment and materials used in the development of renewable energy facilities qualify for a complete exemption from the State's 6 percent sales and use tax. Also, local governments may reduce the assessed value of wind generation facilities for property taxes for six years.[21]

Compared to other Midwest states, Iowa provides some of the most generous tax incentives for renewable energy and particularly for wind energy. A summary of tax incentives provided by Iowa and the other Midwest states is provided in Appendix E.

On the other hand, among the 29 states that have established renewable portfolio standards (RPS), Iowa's standard is among the weakest. Established in 1978, the Iowa RPS required public utilities to only generate 105 MW of electricity from renewable sources by 2000. A new voluntary goal of 1,000 MW was established by Governor Vilsack in 2001 with a target date of 2010. The State achieved this higher goal by the end of 2007.[22] The fact that Iowa utilities do not face the threat of fines or other sanctions for not achieving a statutory RPS and yet continue to plan for the development of additional wind generating capacity stands as testament to the attractiveness of the State for this industry. In addition, it provides an opportunity for Iowa-based wind generators to market excess electricity in other states.

Iowa's Wind Energy Supply Chain

Beyond direct incentives provided for wind and other sources of renewable energy, other State economic development incentives have been used to aggressively court a broad range of manufacturers of wind generator components. Iowa provides investment tax credits and research activities credits to a wide variety of new and expanding businesses. Another feature of Iowa's tax law attractive to manufacturers are sales and use tax exemptions for most intermediate goods and for machinery,

[19] Iowa Department of Revenue, "Tax Credits Users' Manual," updated August 2012, pp. 44 – 45; Amy Harris, Research Administrator, Iowa Department of Revenue, email dated July 31, 2013.
[20] The federal government provides a 2.3-cent/kWh production tax credit for ten years, but since this credit is available to all states it does not explain differences in wind energy development among the states.
[21] Database of State Incentives for Renewable Energy (DSIRE), "Iowa Renewable Energy Equipment Exemption," updated May 22, 2013; DSIRE, "Iowa Local Option Special Assessment of Wind Energy Devices," updated August 13, 2012.
[22] DSIRE, "Iowa Alternative Energy Law," updated December 3, 2012.

equipment and computers used in manufacturing processes. Also, corporations that produce manufactured goods for export from the State are favored by the structure of Iowa's corporate income tax and individual income tax treatment of S-corporations. C and S corporations with manufacturing facilities in Iowa only incur an income tax liability on the portion of their production sold in Iowa.

Using a study completed in 2010 by the Environmental Law and Policy Center (ELPC) and other sources, about 80 businesses have been identified as product or service providers to wind energy generation facilities.[23] This report classifies wind supply chain firms into six categories – blade and tower manufacturers, components manufacturers, major wind facility developers and operators, mid-size wind facility developers, service providers, and turbine assembly companies. The ELPC report provides only a limited amount of information on the employment levels of the supply chain companies. So, estimates of total and dedicated wind energy employees were developed by consulting company and business directory Internet sites.[24]

Table 12 presents a summary of employment estimates for the supply chain companies. This summary includes information for 13 wind facility developers and for 73 other components, equipment, and service providers. The estimated total employment for these firms is between about 8,150 and 9,600. Recognizing that many firms in the supply chain, particularly those in existence before 2000, likely also serve customers outside the wind energy industry, an attempt has been made to estimate an employment range for only the workers in the wind energy industry. These employment estimates range between about 2,150 and 2,700.

[23] Environmental Law and Policy Center, "The Wind Energy Supply Chain in Iowa," November 2010.
[24] Beyond the Internet sites of companies identified by the Environmental Law and Policy Center report, Manta.com, an on-line business directory, served as a primary source for employment estimates.

Table 12. Iowa Wind Energy Supply Chain Firms and Employment Estimates

		Total Employment		Wind Only Employment	
Company Type	Number Of Firms	Maximum	Minimum	Maximum	Minimum
Blades and Towers	4	967	560	817	490
Components	45	3,010	2,601	654	533
Major Wind Developers	5	4,059	4,056	927	924
Mid-Size Wind Developers	8	126	66	35	20
Services	22	1,397	801	177	110
Turbine Assembly	2	70	70	70	70
Total Employment	86	9,629	8,154	2,680	2,146

Due to uncertainties related to the federal production tax credit, a significant decrease in the cost of natural gas, and both cyclical and structural changes in the Iowa and national economies, employment estimates for the wind energy supply chain are problematic. For example, during 2012 Siemens Energy in Fort Madison, which manufactures wind turbine blades, laid off over 400 workers.[25] Similarly, TPI Composites located in Newton, which also manufactures wind turbine blades, laid off 150 workers at the end of 2011 but then early in 2012 recalled these workers.[26] Also, Clipper Windpower, which assembles wind turbines in Cedar Rapids, laid off about 75 workers during 2012.[27] A recent article about increases in wind tower production and orders indicates that, at least for the next year or two, business activity for wind energy supply chain firms should remain healthy.[28]

Wind Electricity Generation Grid Improvement Needs

Several news articles and studies cite transmission system age and capacity constraints as limiting factors facing the continued growth of wind generation in the United States and Iowa.[29] In particular, transmission infrastructure improvements will be needed to move excess electricity that wind generators are capable of producing in the Plains states to eastern and southern states where the

[25] David Pitt, "Siemens to Lay Off 615 in Iowa, Kansas, Florida," *Bloomberg Businessweek* (September 18, 2012).
[26] "Layoff Ends for 152 TPI Employees," *Radio Iowa* (March 27, 2012).
[27] "People Leave Clipper Windpower on Monday," *Cedar Rapids Gazette* (August 20, 2012).
[28] "Trinity Industries Reports an Increase in Tower Orders with PTC Extension," *North American Windpower* (August 15, 2013).
[29] "Transmission Constraints Pose Greatest Barrier to Wind Development per Industry Poll," NRG Systems, Inc. (May 28, 2009); National Renewable Energy Laboratory, "Eastern Wind Integration and Transmission Study," (February 2011); Loren Gaylord Flaugh, "Invenergy to Build O'Brien County Wind Farm," *Cherokee Chronicle Times (June 27, 2013).*

potential for wind generation and other renewable energy resources are limited. In addition, transmission network improvements are needed to provide connections to new wind generation facilities.

In Iowa, the dominant power source for electricity generation has been coal. As recently as 2000, coal accounted for over 84% of electricity production in Iowa. The State's coal fired power plants are located primarily along the Mississippi and Missouri Rivers. Much of the State's existing transmission infrastructure was developed to move electricity from these coal generators to utility customers. Wind generators are locating primarily in the northern and west central areas of the State. Consequently, these new sources of electricity generation require significant transmission system upgrades.
Taking a broader look at the entire MISO region, a number of studies have been undertaken to address alternatives for the integration of renewable resources into the grid. One such study is the Upper Midwest Transmission Development Initiative (UMTDI).[30] Two of the self-identified accomplishments that resulted from this study include:

- Designating regional renewable energy zones that have been adopted by the Midwest ISO as optimal areas for further wind development as part of broader transmission planning efforts, and
- The UMTDI Executive Committee's identification of six renewable transmission corridors that could be considered primary paths for the first stage of future transmission analysis and development in the region in an effort to advance energy, economic, and environmental progress in the five states.[31]

Another finding was that in order for the five states covered by the study to satisfy their Renewable Portfolio Standards, adequate transmission capacity would be needed to accommodate more than 21,000 MW of wind capacity, or 15,000 MW more than what existed at the time of the study.[32] The potential for the development of wind energy facilities in the overall MISO region likely far exceeds the estimate presented in the 2010 UMTDI report. The MISO market area includes all or part of eleven

[30] Upper Midwest Transmission Development Initiative, "Executive Committee Final Report," September 29, 2010.
[31] The five states that participated in the UMTDI are Iowa, Minnesota, North Dakota, South Dakota and Wisconsin.
[32] Upper Midwest Transmission Development Initiative, "Executive Committee Final Report," September 29, 2010, p. 6.

states. Beyond the five states covered by the UMTDI study, the MISO market area includes most of Illinois, Michigan and Indiana, plus parts of Missouri, Montana, and Kentucky.

A 2012 analysis by Synapse Energy Economics, Inc. found that making improvements to the MISO region transmission system adequate to accommodate the addition of 20 GW of new wind capacity would lower wholesale electricity costs by 25% by 2020. This translates into between a $3 and $10 per MWh reduction in wholesale electricity costs. Even taking the additional transmission system investment into consideration the estimated net cost savings by 2020 would equal between $3 billion and $6.9 billion per year. Looking out to 2030 the study projects that the transmission system improvements proposed by MISO could accommodate the addition of 40 GW of wind capacity beyond what currently exists. These improvements would translate into a net electricity costs savings of between $3.3 billion and $9.4 billion per year.[33]

Converting the Synapse study finding to the household level, the 2020 scenario would mean a $63 to $147 per year reduction in the average residential utility bill. The average household savings associated with the 2030 scenario equals between $71 and $200 per year.

Two other studies that analyze future transmission improvement needs associated with the development of renewable energy generation capacity in the MISO region are the Regional Generation Outlet Study (RGOS) and the Multi Value Project Portfolio Analysis (MVPPA).[34] Both of these studies address transmission system improvements needed to support the achievement of Renewable Portfolio Standards of states located within the MISO region and Ohio. The MVPPA study finds that the proposed investments in Iowa would yield benefits 1.6 to 2.8 times their costs and in Minnesota the benefit-cost ratio is between 1.6 and 2.9.[35]

The estimated wind generation forecasts used as the basis for the MVPPA serve as the basis for estimating the impact of completing the Iowa portions of MVP 3 and MVP 4 on the wind energy supply chain in Iowa.

[33] Synapse Energy Economics, Inc., "The Potential Effects of Wind Energy and Transmission in the Midwest ISO Region," May 22, 2012, p. 3.
[34] Midwest ISO, "Regional Generation Outlet Study," December 2009; MISO, "Multi Value Project Portfolio: Results and Analysis," January 10, 2012.
[35] MISO, "Multi Value Project Portfolio: Results and Analysis," January 10, 2012, p. 6.

Estimated Economic Impact of Potential New Wind Facilities

A small number of case studies of the economic impacts associated with wind facility construction and operation have been completed. Most of these studies use IMPLAN or a version of IMPLAN customized to specifically address the economic impacts associated with wind energy projects called the JEDI (Jobs and Economic Development Impacts) Model. Marshall Goldberg, MRG & Associates, developed the JEDI Model for the National Renewable Energy Laboratory (NREL) in 2004. Documentation for the model can be found on the NREL Internet site and in a paper published by Marshall Goldberg, Karin Sinclair, and Michael Milligan.[36]

The most recent version of the model is release W1.10.03. The model requires a variety of inputs related to the local content of major wind project components, labor supply and services, plus several cost factors. The model supplies national default values for all of the required inputs. However, to assess impacts for a specific state or to assess impacts associated with a specific wind facility project, user provided data is preferred. However, actual cost and components supplier information for Iowa wind facilities is not publicly available.[37]

In the absence of component sourcing information for wind facilities located in Iowa, three scenarios have been used to estimate economic impacts associated with future wind facility development. These scenarios reflect the fact that there are wind turbine assemblers, blade manufacturers, and tower manufacturers located in Iowa, as well as numerous other component manufacturers that provide materials and parts to the manufacturers of the primary wind turbine components.

The three scenarios for which economic impact estimates are presented assume (1) the JEDI model defaults (0% Iowa content for major components), (2) 25% of turbines, blades and towers are manufactured in Iowa and (3) 50% of turbines, blades and towers are manufactured in Iowa. The assumptions for these scenarios as summarized in Table 13.[38]

[36] NREL, "About the JEDI Model," available at http://www.nrel.gov/analysis/jedi/about_jedi.html ; Marshall Goldberg, Karin Sinclair, and Michael Milligan, "Job and Economic Development Model: A User-Friendly Tool to Calculate Economic Impacts from Wind Projects," (2004)

[37] Iowa Economic Development Authority, Iowa Utilities Association, MidAmerican Energy, Iowa State University Wind Energy Initiative, Iowa Wind Energy Association, American Wind Energy Association and RPM Access were contacted for information without success.

[38] The U.S. default dollar amounts are for a 100 MW wind facility.

Table 13. JEDI Model Inputs for Wind Facility Economic Impact Analysis

Model Inputs	U.S. Defaults		Iowa Content Shares	
	Amounts	Shares	25% Scenario	50% Scenario
Equipment Costs				
Turbines	$89,483,518	0.0%	25.0%	25.0%
Blades	$20,949,318	0.0%	25.0%	25.0%
Towers	$23,193,888	0.0%	25.0%	25.0%
Transportation Services	$16,011,265	0.0%	25.0%	25.0%
Other Materials				
Construction	$21,622,690	90.0%	90.0%	90.0%
Transforms	$2,445,974	0.0%	0.0%	0.0%
Electrical	$2,578,222	100.0%	100.0%	100.0%
High Voltage Extension	$4,709,552	70.0%	70.0%	70.0%
Labor				
Foundation	$1,266,243	95.0%	95.0%	95.0%
Erection	$1,434,200	75.0%	75.0%	75.0%
Electrical	$2,090,061	70.0%	70.0%	70.0%
Management/ Supervision	$1,084,537	0.0%	50.0%	50.0%
Miscellaneous	$7,600,000	50.0%	50.0%	50.0%
Development and Other Costs				
High Voltage Substation/ Interconnection				
Materials	$1,486,045	90.0%	25.0%	25.0%
Labor	$455,205	10.0%	70.0%	70.0%
Engineering	$2,022,135	0.0%	50.0%	50.0%
Legal Services	$1,102,064	100.0%	100.0%	100.0%
Site Certification	$515,644	100.0%	100.0%	100.0%

Forecasting the amount of additional wind generating capacity that will be developed either nationally or in Iowa present a number of challenges. Federal tax and environmental policy will certainly impact growth of the industry. For example, the year-to-year renewal of the federal production tax credit adversely affects both wind facility developers and companies that manufacture wind generation equipment. On the other hand, the likelihood that new coal powered electricity generators will have to install carbon capture and sequestration technology will open increased opportunities for renewable

energy.[39] Another positive influence includes efforts by MISO to treat wind generated electricity as a dispatchable resource.[40]

Confronted with these uncertainties, the analysis of potential wind energy related economic and fiscal impacts associated with the completion of MVP 3 and MVP 4 follows the approach adopted by the Multi Value Project Portfolio Study. That study assumed that the Renewable Portfolio Standards adopted by the states included in the MISO market region plus in Ohio will be achieved. Achieving these standards in aggregate requires the addition of about 7,500 MW of wind capacity by 2026.[41] As allocated in the MVP Portfolio Study, Iowa's share of the required wind capacity additions equals about 1,300 MW. Under an alternative scenario, one in which Iowa continues to account for its current 27% share of total wind capacity in the eleven state region, about 2,000 MW of new wind capacity would be added in the State. Both of these scenarios are analyzed using the JEDI Model.

Since it is likely that only some of the new wind facilities will be connected to the ITC Midwest transmission system, the JEDI analysis assumes only half of the RPS required additions of new wind capacity in Iowa. Tables 14 – 16 summarize the economic impacts under the three Iowa content assumptions associated with the connection of 650 MW of new wind capacity to the ITC Midwest segments of MVP 3 and MVP 4. Tables 17 – 19 summarize the economic impacts under the three Iowa content assumptions associated with the connection of 1,000 MW of new wind capacity to the ITC Midwest segments of MVP 3 and MVP 4.

Since the model is sensitive to the scale of wind facility developments, each scenario assumes a 100 MW facility consisting of fifty 2.0 MW generators. All of the estimates adopt the model defaults of installed costs of $2,000 per kilowatt and annual maintenance costs of $20 per kilowatt. All estimates are computed in terms of 2013 dollars. The period over which the new wind capacity would be developed equals 10 years spanning from 2016 through 2025.

[39] Keith Johnson, "Plan to Curb New Coal Plants," *Wall Street Journal* (September 12, 2013), p. A1.
[40] "MISO Helps Wind Integration into Market," Renewable Energy Focus.com (June 8, 2011)
[41] The MVP Portfolio Study actually estimated about 11,000 MW of additional capacity would be needed to satisfy the RPSs. That amount has been adjusted downward for capacity added during 2012.

Table 14. Economic Impacts of 650 MW of New Wind Capacity (National Defaults)

Impact Categories	Output ($Millions)	Earnings ($Millions)	Job Years	Average Earnings
During Construction Period				
Project Development and Onsite Labor Impacts	$25.8	$22.0	439	$50,000
Construction and Interconnection Labor		$18.5	390	$47,436
Construction Related Services		$3.5	50	$69,000
Turbine and Supply Chain Impacts	$260.2	$86.4	1,845	$46,808
Induced Impacts	$54.4	$17.6	458	$38,384
Total Construction Period Impacts	$340.3	$147.8	3,182	$46,461
During Operation Years (Annual)				
Onsite Labor Impacts	$2.0	$2.0	39	$51,795
Local Revenue and Supply Chain Impacts	$9.5	$1.9	44	$44,091
Induced Impacts	$2.9	$0.9	24	$38,333
Total Annual Operation Impacts	$14.3	$4.9	107	$45,607

Table 15. Economic Impacts of 650 MW of New Wind Capacity (25% Iowa Content)

Impact Categories	Output ($Millions)	Earnings ($Millions)	Job Years	Average Earnings
During Construction Period				
Project Development and Onsite Labor Impacts	$36.8	$29.4	530	$55,547
Construction and Interconnection Labor		$22.7	434	$52,396
Construction Related Services		$6.7	97	$68,969
Turbine and Supply Chain Impacts	$568.2	$154.1	2,933	$52,554
Induced Impacts	$96.9	$31.3	816	$38,358
Total Construction Period Impacts	$701.9	$244.3	4,810	$50,792
During Operation Years (Annual)				
Onsite Labor Impacts	$2.0	$2.0	39	$51,795
Local Revenue and Supply Chain Impacts	$9.5	$1.9	44	$44,091
Induced Impacts	$2.9	$0.9	24	$38,333
Total Annual Operation Impacts	$14.3	$4.9	107	$45,607

Table 16. Economic Impacts of 650 MW of New Wind Capacity (50% Iowa Content)

Impact Categories	Output ($Millions)	Earnings ($Millions)	Job Years	Average Earnings
During Construction Period				
Project Development and Onsite Labor Impacts	$36.8	$29.4	530	$55,547
Construction and Interconnection Labor		$22.7	434	$52,396
Construction Related Services		$6.7	97	$68,969
Turbine and Supply Chain Impacts	$881.3	$222.3	4,020	$55,289
Induced Impacts	$137.0	$44.3	1,154	$38,354
Total Construction Period Impacts	$1,055.1	$325.4	6,235	$52,188
During Operation Years (Annual)				
Onsite Labor Impacts	$2.0	$2.0	39	$51,795
Local Revenue and Supply Chain Impacts	$9.5	$1.9	44	$44,091
Induced Impacts	$2.9	$0.9	24	$38,333
Total Annual Operation Impacts	$14.3	$4.9	107	$45,607

The three scenarios show that as the level of Iowa content for turbines, blades and towers increases, the construction period impacts on the State grow. Most notably, output associated with turbine assembly and other supply chain businesses increases from $260.2 million ($26.0 million per year) when none of the major wind generator components are manufactured in Iowa to $881.3 million ($88.1 million per year) when the Iowa content share rises to 50 percent. Similarly, the turbine and supply chain increase in job-years goes from 1,845 (185 jobs per year average) under the national default scenario to 4,020 job-years (402 jobs per year average) under the 50 percent Iowa content scenario.

For all three scenarios, the estimated annual impacts, once the new wind facilities are in operation, are equal. The additional 650 MW (325 turbines) of new capacity would only directly increase the employment of wind facility operators by 39 jobs, increase employment of other supply chain companies by 44 jobs, and induced jobs by 24.

The extent to which the economic benefits associated with wind facility operations represent a net gain to the State depends on the extent to which the electricity generated from the new wind facilities is sold outside of Iowa. Otherwise the economic activity arising from the operation of these new facilities may just replace output, income and jobs associated with other Iowa electric utility generators.

Table 17. Economic Impacts of 1,000 MW of New Wind Capacity (National Defaults)

Impact Categories	Output ($Millions)	Earnings ($Millions)	Job Years	Average Earnings
During Construction Period				
Project Development and Onsite Labor Impacts	$39.6	$33.8	676	$49,956
Construction and Interconnection Labor		$28.5	599	$47,513
Construction Related Services		$5.3	77	$68,961
Turbine and Supply Chain Impacts	$400.2	$132.9	2,839	$46,802
Induced Impacts	$83.7	$27.0	705	$38,355
Total Construction Period Impacts	$523.5	$227.5	4,896	$46,456
During Operation Years (Annual)				
Onsite Labor Impacts	$3.1	$3.1	60	$51,833
Local Revenue and Supply Chain Impacts	$14.6	$3.0	68	$43,971
Induced Impacts	$4.4	$1.4	37	$38,378
Total Annual Operation Impacts	$22.1	$7.5	165	$45,576

Table 18. Economic Impacts of 1,000 MW of New Wind Capacity (25% Iowa Content)

Impact Categories	Output ($Millions)	Earnings ($Millions)	Job Years	Average Earnings
During Construction Period				
Project Development and Onsite Labor Impacts	$56.6	$45.3	816	$55,490
Construction and Interconnection Labor		$35.0	667	$52,459
Construction Related Services		$10.3	149	$69,128
Turbine and Supply Chain Impacts	$874.2	$237.1	4,513	$52,544
Induced Impacts	$149.0	$48.2	1,255	$38,375
Total Construction Period Impacts	$1,079.8	$375.9	7,400	$50,792
During Operation Years (Annual)				
Onsite Labor Impacts	$3.1	$3.1	60	$51,833
Local Revenue and Supply Chain Impacts	$14.6	$3.0	68	$43,971
Induced Impacts	$4.4	$1.4	37	$38,378
Total Annual Operation Impacts	$22.1	$7.5	165	$45,576

Table 19. Economic Impacts of 1,000 MW of New Wind Capacity (50% Iowa Content)

Impact Categories	Output ($Millions)	Earnings ($Millions)	Job Years	Average Earnings
During Construction Period				
Project Development and Onsite Labor Impacts	$56.6	$45.3	816	$55,490
Construction and Interconnection Labor		$35.0	667	$52,459
Construction Related Services		$10.3	149	$69,128
Turbine and Supply Chain Impacts	$1,355.9	$341.9	6,184	$55,294
Induced Impacts	$210.7	$68.1	1,775	$38,361
Total Construction Period Impacts	$1,623.2	$500.6	9,591	$52,195
During Operation Years (Annual)				
Onsite Labor Impacts	$3.1	$3.1	60	$51,833
Local Revenue and Supply Chain Impacts	$14.6	$3.0	68	$43,971
Induced Impacts	$4.4	$1.4	37	$38,378
Total Annual Operation Impacts	$22.1	$7.5	165	$45,576

The estimated economic impacts associated with the 1,000 MW (500 turbine) scenarios are simply proportional increases of the 650 MW scenarios. The JEDI Model estimates the total cost of developing 650 MW of new wind capacity equals $1.3 billion and the total cost of developing 1,000 MW of new wind capacity equals $2.0 billion. Using the JEDI Model defaults results in an estimate of Iowa's share of the total investment under both scenarios of 17.6%. When the Iowa produced shares for turbines, blades and towers are assumed to equal 25% and 50% the model estimates Iowa's shares of the total projects' costs equal 36.8% and 55.6%, respectively.

Estimated Potential Wind Facility Easement Payments

One of the contributions wind facilities make to their local economies is the easement payments to landowners. Easement payments vary depending on the location of wind facilities. The default value used by the JEDI Model equals $6,000 per turbine per year. This amount is likely high for Iowa.

A study of wind projects located in southern Minnesota and northern Iowa found easement payments ranged between $2,000 and $4,000 per turbine per year.[42] Assuming this range, the 325 wind turbines assumed under the 650 MW scenarios would yield between $650 thousand and $1.3 million in

[42] Jay Haley, "Landowners' Frequently Asked Questions about Wind Development," available at www.windpoweringamerica.gov.

payments per year. Under the 1,000 MW scenarios the 500 wind turbines would yield between $1 million and $2 million in easement payments per year.

Estimated Property Tax from Potential New Wind Facilities

Unlike other types of electricity generators, wind turbines are not subject to the utility replacement tax. Instead, wind turbines are assessed locally and property taxes are levied based on the local assessments. Wind turbines are classified as industrial property under Iowa law.

As indicated previously, local governments are allowed to partially reduce assessed values for wind turbines during their first six years of operation. Under this arrangement the first year wind turbines are assessed at 0% of full value. The second year the assessment increases to 5%. For the third through seventh years the share of value subject to assessment increases by 5% per year until wind turbines are assessed at 30% of their full value. This is the maximum level at which "wind conversion property" is assessed for property tax purposes in Iowa.

As a basis for determining an average value for wind turbines, assessment and tax levy information was obtained for two wind turbines located in Story County – one each in the Story County Wind Farm and the Garden Wind Farm. NextEra Energy owns both facilities, which together consist of 200 1.5MW General Electric turbines. The Story County Wind Farm started operations in 2009 and the Garden Wind Farm started operations in 2010. Based on the partial assessment data obtained from the Story County Assessor's Internet site the full value of the Story County Wind Farm turbine equals $2,532,000 and the full value for the Garden Wind Farm turbine equals $2,380,000.

Neither of these wind farms has yet been in operation seven years, so the property located in these facilities are currently assessed at below the 30% maximum. Assuming that these wind turbines have both reached the seven year point the taxable value for the Story County Wind Farm turbine would equal $759,600 and for the Garden Wind Farm turbine the taxable value would equal $714,000.

Since both of these wind turbines are located in the same taxing district the tax levy rate used to determine their property tax levies for fiscal year 2013 is $26.05046 per $1,000 of taxable value. This means that at the 30% maximum taxable valuation level the Story County Wind Farm turbine would yield $19,788 and the Garden Wind Farm turbine would yield $18,600 in property tax.

Even though wind turbines with higher capacity than the 1.5MW turbines installed at the two Story County wind facilities may be of higher value, the property tax yields for these two wind turbines provide a reasonable basis for making an estimate of the property tax yield for the turbines assumed to be connected to the ITC Midwest segments of MVP 3 and MVP 4. Applying the average property tax yield for the two Story County wind turbines ($19,194), the estimated property tax yield once the reduced assessment periods expire equals about $6.2 million per year for the 650 MW scenarios and about $9.6 million per year for the 1,000 MW scenarios.[43]

Estimated Sales and Use Tax from Potential New Wind Facilities

Components and materials used to construct wind facilities are exempt from State sales and use tax and local option sales tax. However, the consumer purchases of workers do generate additional sales and use tax revenue for the State and for local governments. Based on Consumer Expenditure Survey data for the Midwest region of the United States, an analysis of consumer purchases made by households reveals that about of 38.5% of such purchases are subject to state and local option sales taxes.

Table 20 presents estimates of the amount of tax revenues that would be paid on purchases made both during the construction and operating periods for new wind facilities under the six different sets of assumptions. The construction period estimates represent the total amount of tax payments over a ten year development period. The operating period estimates represent annual tax payments. In all cases only 75% of labor earnings are assumed to be available for consumer purchases. The remaining 25% of labor earnings represent benefits, such as social security taxes and health insurance premiums, and are not available for consumer purchases.

[43] The property tax generated by wind turbines is likely not a net gain in property tax paid on a statewide basis. This is because the amount of replacement tax paid by other electricity generators would be less. The extent of the gain would depend on the extent to which the new wind turbines generate electricity for markets outside Iowa.

Table 20. Wind Facility Estimated State and Local Option Sales Tax ($Millions)

Scenario	Wind Capacity MW	Iowa Content	Labor Earnings		State Sales-Use Tax		Local Option Tax	
			Constr. Period	Oper. Period	Constr. Period	Oper. Period	Constr. Period	Oper. Period
1A	650	0%	$147.84	$4.88	$2.56	$0.08	$0.43	$0.01
1B	650	25%	$244.31	$4.88	$4.23	$0.08	$0.71	$0.01
1C	650	50%	$325.39	$4.88	$5.64	$0.08	$0.94	$0.01
2A	1000	0%	$227.45	$7.52	$3.94	$0.13	$0.66	$0.02
2B	1000	25%	$375.86	$7.52	$6.51	$0.13	$1.09	$0.02
2C	1000	50%	$500.60	$7.52	$8.67	$0.13	$1.45	$0.02

Estimated Personal Income Tax from Potential New Wind Facilities

Workers involved in constructing wind facilities, workers involved in the manufacturer of wind turbine components, and workers that provide other goods and services to those involved in the development of wind facilities earn incomes subject to Iowa personal income tax. Average incomes and estimated employment levels derived by the JEDI Model provide the basis for estimating Iowa personal income taxes that would be generated as a result of future wind facility development associated with the proposed MVP 3 and MVP 4 ITC Midwest transmission system improvements.

Annual personal income tax payments are estimated for each of the six wind facility development scenarios. To account for the share of compensation attributable to non-taxable benefits the labor earnings estimates are reduced by 25 percent. Also, depending on the average income level, a second reduction is made to reflect the portion of wage and salary income exempt from taxation. This second adjustment accounts for deductible expenditures, such as for home mortgage payments, charitable contributions, and federal income taxes. All of the estimates are expressed in 2013 dollars.

Table 21. Annual Personal Income Tax Estimates ($Thousands)

Scenario	1A	1B	1C	2A	2B	2C
Wind Capacity	650 MW	650 MW	650 MW	1000 MW	1000 MW	1000 MW
Iowa Content Share	0%	25%	50%	0%	25%	50%
During construction period						
Project Development and Onsite Labor Impacts						
Construction and Interconnect Labor	$52.3	$58.2	$58.2	$80.4	$89.5	$89.5
Construction Related Services	$10.8	$20.9	$20.9	$16.6	$32.1	$32.1
Turbine and Supply Chain Impacts	$242.8	$386.0	$529.0	$373.6	$593.9	$813.8
Induced Impacts	$45.6	$81.2	$114.8	$70.1	$124.9	$176.6
Total Impacts	$351.5	$546.3	$723.0	$540.8	$840.4	$1,112.1
During operating years						
Onsite Labor Impacts	$59.0	$59.0	$59.0	$90.8	$90.8	$90.8
Local Revenue and Supply Chain Impacts	$53.4	$53.4	$53.4	$82.5	$82.5	$82.5
Induced Impacts	$23.9	$23.9	$23.9	$36.8	$36.8	$36.8
Total Impacts	$136.3	$136.3	$136.3	$210.1	$210.1	$210.1

Finally, there is the possibility that the construction and operation of new wind facilities will result in some additional corporate income tax for the State of Iowa. However, because many wind facilities are organized as limited liability companies that are owned by out-of-state corporations, it is not possible to make an estimate of the amount of this potential additional revenue. What can be said is that, based on extensive knowledge of the Iowa corporate income tax system and payment experiences for different industries, it is likely the amount of additional corporate income tax yielded by wind facilities is small.

Appendix A: IMPLAN Regional Economic Impact Tables

Table A1. Output Impacts of ITC Midwest Lines MVP 3 & 4 Projects ($Millions)

Description	Direct	Indirect	Induced	Total
Agriculture	$0.0	$0.1	$0.3	$0.3
Mining	$0.0	$0.0	$0.0	$0.0
Utilities	$0.0	$1.0	$1.1	$2.2
Construction	$134.0	$0.8	$0.9	$135.6
Non-Durable Manufacturing	$0.0	$1.1	$1.0	$2.0
Durable Manufacturing	$248.5	$1.4	$0.2	$250.1
Trade	$0.0	$10.8	$13.6	$24.4
Transportation-Warehousing	$0.0	$4.5	$1.4	$5.9
Information-Communication	$0.0	$4.7	$2.5	$7.2
Finance, Insurance	$0.0	$6.8	$10.6	$17.4
Real Estate	$0.0	$1.4	$14.6	$16.0
Business Services	$17.5	$12.2	$2.8	$32.4
Professional Services	$63.4	$13.4	$2.2	$78.9
Education	$0.0	$0.0	$1.2	$1.2
Health Services	$0.0	$0.0	$18.9	$18.9
Community And Civic Services	$0.0	$0.7	$3.5	$4.3
Arts And Entertainment	$0.0	$0.2	$1.2	$1.4
Lodging	$0.0	$0.0	$0.1	$0.1
Restaurants	$0.0	$2.2	$5.5	$7.7
Personal Services	$0.0	$1.6	$2.3	$3.9
Government	$0.0	$1.5	$2.6	$4.1
Total	$463.3	$64.4	$86.3	$614.1

Table A2. Labor Income Impact of ITC Midwest Lines MVP 3 & 4 Projects ($Millions)

Description	Direct	Indirect	Induced	Total
Agriculture	$0.0	$0.0	$0.1	$0.1
Mining	$0.0	$0.0	$0.0	$0.0
Utilities	$0.0	$0.2	$0.2	$0.4
Construction	$42.8	$0.3	$0.3	$43.5
Non-Durable Manufacturing	$0.0	$0.2	$0.1	$0.3
Durable Manufacturing	$36.5	$0.3	$0.0	$36.8
Trade	$0.0	$5.0	$7.0	$12.0
Transportation-Warehousing	$0.0	$1.6	$0.5	$2.2
Information-Communication	$0.0	$1.0	$0.5	$1.5
Finance, Insurance	$0.0	$1.7	$2.5	$4.2
Real Estate	$0.0	$0.2	$0.3	$0.5
Business Services	$9.2	$5.4	$1.2	$15.8
Professional Services	$30.9	$6.6	$1.0	$38.5
Education	$0.0	$0.0	$0.5	$0.5
Health Services	$0.0	$0.0	$9.2	$9.2
Community And Civic Services	$0.0	$0.3	$1.5	$1.8
Arts And Entertainment	$0.0	$0.1	$0.3	$0.4
Lodging	$0.0	$0.0	$0.0	$0.0
Restaurants	$0.0	$0.7	$1.7	$2.4
Personal Services	$0.0	$0.8	$1.2	$2.1
Government	$0.0	$0.6	$0.8	$1.4
Total	$119.4	$25.1	$29.1	$173.6

Table A3. Job-Years Impact of ITC Midwest Lines MVP 3 & 4 Projects

Description	Direct	Indirect	Induced	Total
Agriculture	0	0	1	2
Mining	0	0	0	0
Utilities	0	2	2	4
Construction	683	7	8	698
Non-Durable Manufacturing	0	4	2	7
Durable Manufacturing	600	6	1	606
Trade	0	83	212	295
Transportation-Warehousing	0	35	12	48
Information-Communication	0	21	12	33
Finance, Insurance	0	30	47	76
Real Estate	0	5	7	12
Business Services	320	161	38	519
Professional Services	579	119	20	718
Education	0	0	28	28
Health Services	0	0	162	162
Community And Civic Services	0	15	86	101
Arts And Entertainment	0	5	18	23
Lodging	0	0	1	1
Restaurants	0	44	110	154
Personal Services	0	24	47	71
Government	0	9	11	20
Total	2,181	571	824	3,576

Table A4. Output Impacts of ITC Midwest Substations MVP 3 & 4 Projects
($Millions)

Description	Direct	Indirect	Induced	Total
Agriculture	$0.0	$0.0	$0.0	$0.1
Mining	$0.0	$0.0	$0.0	$0.0
Utilities	$0.0	$0.2	$0.2	$0.4
Construction	$36.4	$0.1	$0.2	$36.7
Non-Durable Manufacturing	$0.0	$0.3	$0.2	$0.4
Durable Manufacturing	$30.3	$0.2	$0.0	$30.6
Trade	$0.0	$2.5	$2.4	$4.9
Transportation-Warehousing	$0.0	$0.8	$0.2	$1.0
Information-Communication	$0.0	$0.9	$0.4	$1.4
Finance, Insurance	$0.0	$1.1	$1.9	$3.0
Real Estate	$0.0	$0.3	$2.6	$2.9
Business Services	$9.4	$2.2	$0.5	$12.1
Professional Services	$5.2	$2.7	$0.4	$8.3
Education	$0.0	$0.0	$0.2	$0.2
Health Services	$0.0	$0.0	$3.3	$3.3
Community And Civic Services	$0.0	$0.1	$0.6	$0.8
Arts And Entertainment	$0.0	$0.0	$0.2	$0.2
Lodging	$0.0	$0.0	$0.0	$0.0
Restaurants	$0.0	$0.3	$1.0	$1.3
Personal Services	$0.0	$0.4	$0.4	$0.8
Government	$0.0	$0.3	$0.5	$0.8
Total	$81.4	$12.5	$15.3	$109.2

Table A5. Labor income Impact of ITC Midwest Substations MVP 3 & 4 Projects ($Millions)

Description	Direct	Indirect	Induced	Total
Agriculture	$0.0	$0.0	$0.0	$0.0
Mining	$0.0	$0.0	$0.0	$0.0
Utilities	$0.0	$0.0	$0.0	$0.1
Construction	$12.8	$0.0	$0.1	$12.9
Non-Durable Manufacturing	$0.0	$0.1	$0.0	$0.1
Durable Manufacturing	$3.6	$0.1	$0.0	$3.7
Trade	$0.0	$1.2	$1.3	$2.4
Transportation-Warehousing	$0.0	$0.3	$0.1	$0.4
Information-Communication	$0.0	$0.2	$0.1	$0.3
Finance, Insurance	$0.0	$0.3	$0.4	$0.7
Real Estate	$0.0	$0.0	$0.0	$0.1
Business Services	$5.0	$1.0	$0.2	$6.1
Professional Services	$2.6	$1.4	$0.2	$4.2
Education	$0.0	$0.0	$0.1	$0.1
Health Services	$0.0	$0.0	$1.6	$1.6
Community And Civic Services	$0.0	$0.0	$0.3	$0.3
Arts And Entertainment	$0.0	$0.0	$0.1	$0.1
Lodging	$0.0	$0.0	$0.0	$0.0
Restaurants	$0.0	$0.1	$0.3	$0.4
Personal Services	$0.0	$0.2	$0.2	$0.4
Government	$0.0	$0.1	$0.1	$0.3
Total	$24.0	$5.0	$5.2	$34.1

Table A6. Job-Years Impact of ITC Midwest Substations MVP 3 & 4 Projects

Description	Direct	Indirect	Induced	Total
Agriculture	0	0	0	0
Mining	0	0	0	0
Utilities	0	0	0	1
Construction	171	1	1	174
Non-Durable Manufacturing	0	1	0	1
Durable Manufacturing	73	1	0	74
Trade	0	20	38	58
Transportation-Warehousing	0	7	2	9
Information-Communication	0	4	2	7
Finance, Insurance	0	5	8	13
Real Estate	0	1	1	2
Business Services	159	25	7	191
Professional Services	42	24	3	70
Education	0	0	5	5
Health Services	0	0	29	29
Community And Civic Services	0	3	15	18
Arts And Entertainment	0	1	3	4
Lodging	0	0	0	0
Restaurants	0	7	19	26
Personal Services	0	5	8	14
Government	0	2	2	4
Total	445	107	147	699

Table A7. Output Impacts of ITC Midwest MVP 3 & 4 Projects ($Millions)

Description	Direct	Indirect	Induced	Total
Agriculture	$0.0	$0.1	$0.3	$0.4
Mining	$0.0	$0.0	$0.0	$0.0
Utilities	$0.0	$1.2	$1.3	$2.6
Construction	$170.4	$0.9	$1.1	$172.4
Non-Durable Manufacturing	$0.0	$1.3	$1.1	$2.5
Durable Manufacturing	$278.8	$1.7	$0.2	$280.6
Trade	$0.0	$13.3	$16.0	$29.3
Transportation-Warehousing	$0.0	$5.3	$1.6	$7.0
Information-Communication	$0.0	$5.6	$3.0	$8.6
Finance, Insurance	$0.0	$7.9	$12.5	$20.4
Real Estate	$0.0	$1.6	$17.3	$18.9
Business Services	$26.9	$14.3	$3.3	$44.5
Professional Services	$68.6	$16.1	$2.5	$87.2
Education	$0.0	$0.0	$1.4	$1.4
Health Services	$0.0	$0.0	$22.2	$22.2
Community And Civic Services	$0.0	$0.8	$4.2	$5.0
Arts And Entertainment	$0.0	$0.2	$1.4	$1.6
Lodging	$0.0	$0.0	$0.1	$0.1
Restaurants	$0.0	$2.5	$6.4	$9.0
Personal Services	$0.0	$2.0	$2.7	$4.7
Government	$0.0	$1.8	$3.0	$4.9
Total	$544.7	$76.9	$101.7	$723.2

Table A8. Labor Income Impact of ITC Midwest MVP 3 & 4 Projects ($Millions)

Description	Direct	Indirect	Induced	Total
Agriculture	$0.0	$0.0	$0.1	$0.2
Mining	$0.0	$0.0	$0.0	$0.0
Utilities	$0.0	$0.2	$0.3	$0.5
Construction	$55.6	$0.3	$0.4	$56.3
Non-Durable Manufacturing	$0.0	$0.3	$0.1	$0.4
Durable Manufacturing	$40.1	$0.4	$0.0	$40.5
Trade	$0.0	$6.2	$8.3	$14.5
Transportation-Warehousing	$0.0	$1.9	$0.6	$2.5
Information-Communication	$0.0	$1.2	$0.6	$1.8
Finance, Insurance	$0.0	$1.9	$3.0	$4.9
Real Estate	$0.0	$0.2	$0.3	$0.6
Business Services	$14.2	$6.3	$1.4	$22.0
Professional Services	$33.5	$8.0	$1.1	$42.6
Education	$0.0	$0.0	$0.6	$0.6
Health Services	$0.0	$0.0	$10.8	$10.8
Community And Civic Services	$0.0	$0.3	$1.8	$2.1
Arts And Entertainment	$0.0	$0.1	$0.4	$0.5
Lodging	$0.0	$0.0	$0.0	$0.0
Restaurants	$0.0	$0.8	$2.0	$2.8
Personal Services	$0.0	$1.0	$1.5	$2.5
Government	$0.0	$0.8	$0.9	$1.7
Total	$143.4	$30.1	$34.3	$207.8

Table A9. Job-Years Impact of ITC Midwest MVP 3 & 4 Projects

Description	Direct	Indirect	Induced	Total
Agriculture	$0	$0	$1	2
Mining	$0	$0	$0	0
Utilities	$0	$3	$3	5
Construction	$854	$8	$10	872
Non-Durable Manufacturing	$0	$5	$3	8
Durable Manufacturing	$673	$7	$1	680
Trade	$0	$103	$250	353
Transportation-Warehousing	$0	$42	$14	56
Information-Communication	$0	$25	$15	40
Finance, Insurance	$0	$34	$55	89
Real Estate	$0	$6	$8	14
Business Services	$479	$186	$45	710
Professional Services	$621	$143	$23	787
Education	$0	$0	$33	33
Health Services	$0	$0	$190	190
Community And Civic Services	$0	$18	$101	119
Arts And Entertainment	$0	$6	$21	27
Lodging	$0	$1	$1	1
Restaurants	$0	$51	$129	180
Personal Services	$0	$29	$55	85
Government	$0	$11	$13	24
Total	2,626	678	970	4,275

Appendix B: IMPLAN Iowa-only Economic Impact Tables

Table B1. Iowa Output Impacts of ITC Midwest Lines MVP 3 & 4 Projects
($Millions)

Description	Direct	Indirect	Induced	Total
Agriculture	$0.0	$0.2	$0.9	$1.1
Mining	$0.0	$0.3	$0.1	$0.4
Utilities	$0.0	$2.0	$1.9	$3.9
Construction	$95.5	$0.9	$1.0	$97.4
Non-Durable Manufacturing	$0.0	$7.1	$6.5	$13.6
Durable Manufacturing	$177.2	$9.2	$1.5	$187.8
Trade	$0.0	$11.3	$13.6	$24.9
Transportation-Warehousing	$0.0	$5.3	$1.8	$7.1
Information-Communication	$0.0	$3.4	$2.1	$5.5
Finance, Insurance	$0.0	$5.9	$10.7	$16.6
Real Estate	$0.0	$2.1	$14.9	$17.0
Business Services	$12.5	$11.8	$3.2	$27.5
Professional Services	$45.2	$12.7	$2.5	$60.3
Education	$0.0	$0.0	$1.9	$2.0
Health Services	$0.0	$0.0	$17.1	$17.2
Community And Civic Services	$0.0	$0.4	$3.4	$3.8
Arts And Entertainment	$0.0	$0.3	$1.5	$1.8
Lodging	$0.0	$1.0	$0.9	$1.9
Restaurants	$0.0	$1.9	$5.5	$7.4
Personal Services	$0.0	$1.4	$2.2	$3.6
Government	$0.0	$1.4	$2.5	$3.9
Total	$330.4	$78.6	$95.9	$504.8

Table B2. Iowa Labor Income Impact of ITC Midwest Lines MVP 3 & 4 Projects
($Millions)

Description	Direct	Indirect	Induced	Total
Agriculture	$0.0	$0.0	$0.1	$0.2
Mining	$0.0	$0.0	$0.0	$0.0
Utilities	$0.0	$0.4	$0.4	$0.8
Construction	$29.7	$0.4	$0.4	$30.5
Non-Durable Manufacturing	$0.0	$1.1	$0.8	$1.9
Durable Manufacturing	$34.0	$2.0	$0.3	$36.3
Trade	$0.0	$5.2	$7.0	$12.1
Transportation-Warehousing	$0.0	$1.9	$0.6	$2.5
Information-Communication	$0.0	$0.7	$0.5	$1.2
Finance, Insurance	$0.0	$1.5	$2.6	$4.0
Real Estate	$0.0	$0.3	$0.5	$0.7
Business Services	$6.2	$5.1	$1.4	$12.7
Professional Services	$22.5	$6.3	$1.1	$29.9
Education	$0.0	$0.0	$0.9	$0.9
Health Services	$0.0	$0.0	$8.3	$8.3
Community And Civic Services	$0.0	$0.2	$1.6	$1.9
Arts And Entertainment	$0.0	$0.1	$0.5	$0.6
Lodging	$0.0	$0.3	$0.3	$0.5
Restaurants	$0.0	$0.6	$1.8	$2.4
Personal Services	$0.0	$0.7	$1.3	$2.0
Government	$0.0	$0.6	$0.7	$1.3
Total	$92.3	$27.4	$30.9	$150.6

Table B3. Iowa Job-Years Impact of ITC Midwest Lines MVP 3 & 4 Projects

Description	Direct	Indirect	Induced	Total
Agriculture	0	1	4	5
Mining	0	1	0	2
Utilities	0	3	3	7
Construction	455	8	9	472
Non-Durable Manufacturing	0	16	13	30
Durable Manufacturing	516	33	6	555
Trade	0	94	219	313
Transportation-Warehousing	0	39	14	53
Information-Communication	0	13	9	22
Finance, Insurance	0	25	45	70
Real Estate	0	7	11	18
Business Services	234	141	42	417
Professional Services	350	104	20	475
Education	0	0	33	33
Health Services	0	0	146	146
Community And Civic Services	0	8	71	78
Arts And Entertainment	0	9	24	33
Lodging	0	11	10	20
Restaurants	0	37	103	140
Personal Services	0	19	48	68
Government	0	8	10	18
Total	1,555	576	841	2,972

Table B4. Iowa Output Impacts of ITC Midwest Substations MVP 3 & 4 Projects
($Millions)

Description	Direct	Indirect	Induced	Total
Agriculture	$0.0	$0.0	$0.1	$0.2
Mining	$0.0	$0.1	$0.0	$0.1
Utilities	$0.0	$0.3	$0.3	$0.6
Construction	$22.0	$0.1	$0.2	$22.3
Non-Durable Manufacturing	$0.0	$1.4	$1.0	$2.4
Durable Manufacturing	$18.3	$1.5	$0.2	$20.1
Trade	$0.0	$2.6	$2.2	$4.7
Transportation-Warehousing	$0.0	$0.9	$0.3	$1.2
Information-Communication	$0.0	$0.6	$0.3	$1.0
Finance, Insurance	$0.0	$0.9	$1.7	$2.6
Real Estate	$0.0	$0.4	$2.4	$2.7
Business Services	$5.7	$2.1	$0.5	$8.3
Professional Services	$3.1	$2.2	$0.4	$5.7
Education	$0.0	$0.0	$0.3	$0.3
Health Services	$0.0	$0.0	$2.7	$2.7
Community And Civic Services	$0.0	$0.1	$0.5	$0.6
Arts And Entertainment	$0.0	$0.0	$0.2	$0.3
Lodging	$0.0	$0.1	$0.1	$0.3
Restaurants	$0.0	$0.3	$0.9	$1.1
Personal Services	$0.0	$0.3	$0.4	$0.6
Government	$0.0	$0.3	$0.4	$0.7
Total	$49.1	$14.1	$15.4	$78.6

Table B5. Iowa Labor Income Impact of ITC Midwest Substations MVP 3 & 4 Projects ($Millions)

Description	Direct	Indirect	Induced	Total
Agriculture	$0.0	$0.0	$0.0	$0.0
Mining	$0.0	$0.0	$0.0	$0.0
Utilities	$0.0	$0.1	$0.1	$0.1
Construction	$7.4	$0.1	$0.1	$7.5
Non-Durable Manufacturing	$0.0	$0.2	$0.1	$0.3
Durable Manufacturing	$4.4	$0.3	$0.1	$4.8
Trade	$0.0	$1.2	$1.1	$2.3
Transportation-Warehousing	$0.0	$0.3	$0.1	$0.4
Information-Communication	$0.0	$0.1	$0.1	$0.2
Finance, Insurance	$0.0	$0.2	$0.4	$0.6
Real Estate	$0.0	$0.0	$0.1	$0.1
Business Services	$2.8	$0.9	$0.2	$4.0
Professional Services	$1.6	$1.1	$0.2	$2.9
Education	$0.0	$0.0	$0.1	$0.1
Health Services	$0.0	$0.0	$1.3	$1.3
Community And Civic Services	$0.0	$0.0	$0.3	$0.3
Arts And Entertainment	$0.0	$0.0	$0.1	$0.1
Lodging	$0.0	$0.0	$0.0	$0.1
Restaurants	$0.0	$0.1	$0.3	$0.4
Personal Services	$0.0	$0.1	$0.2	$0.3
Government	$0.0	$0.1	$0.1	$0.2
Total	$16.3	$5.0	$5.0	$26.3

Table B6. Iowa Job-Years Impact of ITC Midwest Substations MVP 3 & 4 Projects

Description	Direct	Indirect	Induced	Total
Agriculture	0	0	1	1
Mining	0	0	0	0
Utilities	0	1	1	1
Construction	105	1	1	107
Non-Durable Manufacturing	0	3	2	5
Durable Manufacturing	78	6	1	85
Trade	0	21	35	57
Transportation-Warehousing	0	7	2	9
Information-Communication	0	3	1	4
Finance, Insurance	0	4	7	11
Real Estate	0	1	2	3
Business Services	107	21	7	135
Professional Services	24	18	3	45
Education	0	0	5	5
Health Services	0	0	23	23
Community And Civic Services	0	1	11	13
Arts And Entertainment	0	1	4	5
Lodging	0	1	2	3
Restaurants	0	5	17	22
Personal Services	0	4	8	12
Government	0	2	2	3
Total	314	99	135	548

Table B7. Iowa Output Impacts of ITC Midwest MVP3 & 4 Projects ($Millions)

Description	Direct	Indirect	Induced	Total
Agriculture	$0.0	$0.2	$1.0	$1.2
Mining	$0.0	$0.4	$0.1	$0.5
Utilities	$0.0	$2.3	$2.2	$4.6
Construction	$117.5	$1.0	$1.2	$119.7
Non-Durable Manufacturing	$0.0	$8.4	$7.6	$16.0
Durable Manufacturing	$195.5	$10.8	$1.7	$207.9
Trade	$0.0	$13.9	$15.8	$29.7
Transportation-Warehousing	$0.0	$6.2	$2.1	$8.3
Information-Communication	$0.0	$4.0	$2.5	$6.5
Finance, Insurance	$0.0	$6.8	$12.5	$19.2
Real Estate	$0.0	$2.4	$17.3	$19.8
Business Services	$18.2	$13.9	$3.8	$35.9
Professional Services	$48.3	$14.9	$2.9	$66.1
Education	$0.0	$0.0	$2.2	$2.3
Health Services	$0.0	$0.0	$19.9	$19.9
Community And Civic Services	$0.0	$0.5	$3.9	$4.4
Arts And Entertainment	$0.0	$0.4	$1.7	$2.1
Lodging	$0.0	$1.2	$1.0	$2.2
Restaurants	$0.0	$2.2	$6.3	$8.5
Personal Services	$0.0	$1.6	$2.6	$4.2
Government	$0.0	$1.7	$2.9	$4.6
Total	$379.5	$92.7	$111.2	$583.4

Table B8. Iowa Labor Income Impact of ITC Midwest MVP 3 & 4 Projects
($Millions)

Description	Direct	Indirect	Induced	Total
Agriculture	$0.0	$0.1	$0.2	$0.2
Mining	$0.0	$0.0	$0.0	$0.0
Utilities	$0.0	$0.5	$0.4	$0.9
Construction	$37.1	$0.4	$0.4	$38.0
Non-Durable Manufacturing	$0.0	$1.3	$0.9	$2.2
Durable Manufacturing	$38.4	$2.3	$0.4	$41.1
Trade	$0.0	$6.3	$8.1	$14.4
Transportation-Warehousing	$0.0	$2.2	$0.7	$2.9
Information-Communication	$0.0	$0.9	$0.5	$1.4
Finance, Insurance	$0.0	$1.7	$3.0	$4.7
Real Estate	$0.0	$0.3	$0.5	$0.9
Business Services	$9.0	$6.0	$1.6	$16.6
Professional Services	$24.1	$7.5	$1.3	$32.8
Education	$0.0	$0.0	$1.0	$1.0
Health Services	$0.0	$0.0	$9.6	$9.6
Community And Civic Services	$0.0	$0.3	$1.9	$2.2
Arts And Entertainment	$0.0	$0.1	$0.5	$0.7
Lodging	$0.0	$0.3	$0.3	$0.6
Restaurants	$0.0	$0.7	$2.1	$2.8
Personal Services	$0.0	$0.8	$1.5	$2.3
Government	$0.0	$0.7	$0.9	$1.6
Total	$108.6	$32.4	$35.9	$176.9

Table B9. Iowa Job-Years Impact of ITC Midwest MVP 3 & 4 Projects

Description	Direct	Indirect	Induced	Total
Agriculture	$0	$1	$5	6
Mining	$0	$1	$1	2
Utilities	$0	$4	$4	8
Construction	$559	$9	$10	579
Non-Durable Manufacturing	$0	$19	$16	34
Durable Manufacturing	$595	$39	$7	641
Trade	$0	$115	$255	369
Transportation-Warehousing	$0	$45	$16	62
Information-Communication	$0	$16	$10	26
Finance, Insurance	$0	$28	$53	81
Real Estate	$0	$8	$13	21
Business Services	$340	$162	$49	552
Professional Services	$374	$122	$24	520
Education	$0	$1	$38	39
Health Services	$0	$0	$169	169
Community And Civic Services	$0	$9	$82	91
Arts And Entertainment	$0	$10	$28	38
Lodging	$0	$12	$11	23
Restaurants	$0	$42	$120	162
Personal Services	$0	$23	$56	79
Government	$0	$9	$12	21
Total	1,868	675	977	3,520

Appendix C – IMPLAN Input-Output Model

The traditional indicators which economists use for measuring the economic importance of an activity include the size of its workforce and payroll, its capital investment, and its local purchase of goods and services. Economists call these the 'direct expenditures' or 'direct effects'.

Direct effects refer to the operational characteristics (employment, payroll, sales) of the activities that we studied. The secondary effects include two components: indirect effects and induced effects. Indirect effects measure the value of supplies and services that were purchased as inputs by ITC Midwest from businesses and firms within the region.

Induced effects occur when workers in the direct and indirect industries spend their earnings on goods and services from other vendors and businesses within the region. Induced effects are also often called 'household effects'. The total economic impact is the aggregate of the direct, indirect, and induced effects. For this study, it is the total effect on the economy of transactions that are attributable to the initial direct economic activity of ITC Midwest.

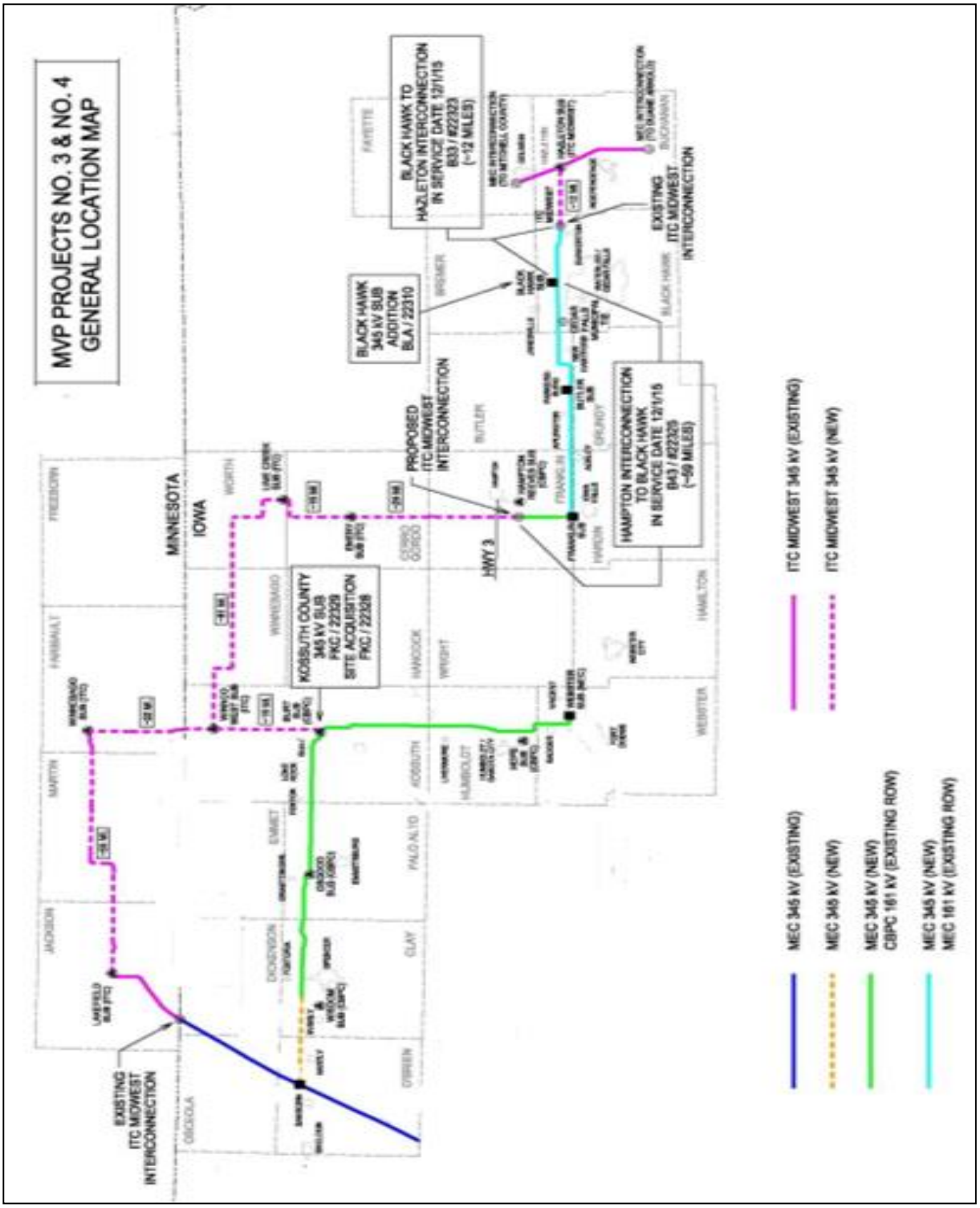
But the workers and the vendors who receive those indirect and induced expenditures don't bury them in a mattress. They will spend some of the money, save some of it and thus begins the journey by which the dollars travel through many hands before they finally leave the economic region. Economists call this phenomenon the 'multiplier effect'. The multiplier factor is calculated by dividing the sum of the direct, indirect, and induced effects by the direct effect.

The multiplier effect for any economy or industry is examined using an 'input-output analysis'. The tool was devised by the 1973 Nobel Prize winning economist Wassily Leontief. It uses a matrix that measures inter-industry relations in an economy and shows how the output (sales) of one industry becomes the input (purchases) for another. One widely used regional input-output economic impact tool is the IMPLAN Model developed and distributed by IMPLAN Group, LLC (formerly known as Minnesota IMPLAN Group, Inc.).

The project staff for this study employed the IMPLAN Model to determine the total impact of the direct expenditures made by ITC Midwest for the period 2008 - 2012.

The project team started by developing the spending profile of the project, as identified in financial documents and reports provided by ITC Midwest as well as public documents. The team used the investment made by specific spending categories as the direct effect variable for the modeling of output, labor income, and jobs.

Appendix D – Project Map MVP 3 and MVP 4



Appendix E – Midwest States Wind Energy Tax Incentives

State	Income Tax Credits	Sales/Use Tax Exemption	Property Tax Exemption
Iowa	Renewable Energy PTC 1.5¢/kWh 10-years overall limit 363MW; Wind Energy PTC 1.0¢/kWh 10-years overall limit 50MW	Renewable energy equipment exemption 100% of State tax	Exemption 100% 5 years (limited facilities that produce electricity for personal use); Local option Partial abatement 6 years
Illinois	None	Retailers' Occupation Tax Exemption 100% materials	Wind turbines assessed at $360K/MW with taxable value equal to 1/3 assessed value ($120K/MW); Up to 70% of value depreciable over 25 years
Indiana	None	Electricity generating equipment exemption 100% of State tax	Renewable energy generating equipment exemption 100%
Kansas	None	None	Renewable energy generating equipment exemption 100%
Michigan	None	None	Alternative energy personal property tax exemption 100% (expired December 31, 2012)
Minnesota	None	Wind energy sales tax exemption 100% of State tax	Wind and solar real and personal property tax exemption 100%
Missouri	None	None for wind	Renewable energy generation zone property tax abatement 50% mandatory up to 100% optional for up to 25 years
Nebraska	Renewable energy tax credit $0.0005/kWh after January 1, 2013 up to 10 years, max overall credits $50K	Renewable energy equipment exemption 100% of State tax, min investment $20 M	Wind energy generation facilities exemption 100%

State	Income Tax Credits	Sales/Use Tax Exemption	Property Tax Exemption
North Dakota	Renewable energy corporate tax credit 3%/ year for 5 years (expires December 31, 2014)	Electrical generation equipment exemption 100% (expires for wind December 31, 2016)	Large wind property tax reduction 70% or 85% for centrally assessed property constructed prior to January 1, 2015; Renewable energy property tax exemption for locally assessed property 100% for 5 years
Ohio	None	Energy conservation and thermal efficiency exemption 100%	Qualified energy property tax exemption for systems > 250kW 100%, PILOT required
South Dakota	None	Wind energy facility sales and use tax reimbursement up 100%	Large commercial wind exemption for wind farms 5MW and over alternative assessment $3/ kW plus 25 gross receipts; small renewable energy incentive up to $50K or 70% assessment value for facilities up to 5MW
Wisconsin	None	Renewable energy equipment exemption 100%	Solar and wind energy equipment exemption 100%

Appendix F – About the Research Team

Strategic Economics Group (SEG) is an Iowa based economic research consulting firm. It has served businesses and government clients in Iowa and the Midwest since 2001. SEG is a consortium of independent economic researchers and policy analysts. SEG serves as the umbrella organization for teams of researchers and analysts that are brought together on a project-specific basis. The SEG team develops economic impact studies, cost-benefit models, public policy analyses, management information systems, and forensic projections. The project team includes Daniel Otto, Harvey Siegelman and Michael Lipsman.

Daniel Otto, Project Manager and Economist

From 1981 through 2012 he served as a professor of Economics and Extension Economist at Iowa State University. His areas of specialization include community and rural economic development, impact analysis, rural employment, and the economics of public services and facilities. In addition, he has extensive experience in input-output modeling using IMPLAN. His education includes a Doctorate in agricultural economics from Virginia Tech, a Master of Science degree in agricultural economics from the University of Minnesota, and a Bachelor of Arts degree in economics from the University of Minnesota.

Harvey Siegelman, President and Economist

Since founding SEG in 2002 he has been project manager for and participated in over 20 studies involving a wide variety of topics. One of these efforts involved the development of the economic feasibility model for the Iowa Values Fund, which was Iowa's main economic development initiative under Governor Thomas Vilsack. Prior to founding SEG he served as Iowa's State Economist for 20 years. In this capacity he served as the main economic advisor for three Iowa Governors, the Office of the State Treasurer, and other state government departments.

In addition, during 1973 he served as an economic advisor in the Finance Ministry of the State of Israel. From 1978 to 1982 he served as a health planner with the Iowa Department of Public Health, and from 1977 to 1978 he served as a labor market economist with the Iowa Department of Job Services. Also, over various periods he has taught economics courses either as a full-time or part-time professor of economics at the University of Wisconsin – Whitewater, Findlay University, Wichita State University, and

Drake University. His education includes a Masters in economics from Wichita State University and a Bachelor of Science degree in economics from Ohio State University.

Michael A. Lipsman, Economist

From May 2000 through October 2011 he served as Manager, Tax Research and Program Analysis Section, Iowa Department of Revenue (IowaDOR). In this capacity he was responsible for managing revenue forecasting, fiscal impact estimation, tax policy research, statistical reporting, and tax policy data system development and maintenance of the IowaDOR.

Prior to joining the IowaDOR he served as a Senior Legislative Analyst with the Legislative Fiscal Bureau of the Iowa General Assembly and as a transportation planner with the Iowa Department of Transportation (Iowa DOT). His education includes a Doctorate in economics and a Masters in community and regional planning from Iowa State University and a Bachelor of Arts degree from Grinnell College.