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Enbridge Economic Study (IMPLAN Study)

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April 18, 2017
Research Report

Enbridge Pipeline Construction Economic Impact Study

Prepared for
Area Partnership for Economic Expansion (APEX)

Bureau of Business and
Economic Research

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Enbridge provided the majority of inputs for this report. Where data was not available from Enbridge, the BBER utilized IMPLAN, industry standards, and other secondary data sources. The BBER relied upon the completeness, accuracy, and fair presentation of all data and information obtained from Enbridge and/or their agents. The report is conditional upon the completeness, accuracy, and fair presentation of that data and information. The BBER does not promise or guarantee the outcome of these results but rather is providing projections based upon inputs and outputs using IMPLAN software.

The BBER was asked to supply an economic impact analysis only. This analysis does not consider the social or environmental impacts of the project and should not be viewed as a cost benefit analysis or environmental impact assessment.

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Executive Summary

Enbridge Inc. is proposing replacement of its existing Line 3 pipeline. The pipeline, originally installed in the 1960s, extends more than 1,000 miles from Edmonton, Alberta, to Superior, Wisconsin. The proposed replacement would serve the same purpose as the existing Line 3, which is the transportation of crude oil from Canada to Enbridge's Superior Station and Terminal Facility near Superior, Wisconsin.

APEX, in cooperation with Enbridge, asked the Bureau of Business and Economic Research (BBER), an entity of the University of Minnesota Duluth's Labovitz School of Business and Economics, to assess the economic impact of the construction of the proposed replacement of Line 3 on the affected Minnesota counties, which total 15. The study includes a special focus on the economic impacts to the retail and hospitality industries in the selected region. The BBER used county data and impact models for value added, employment, and output measures.

The economic modeling data and software used was IMPLAN. The study used IMPLAN's economic multiplier analysis and input/output modeling. Data used were the most recent IMPLAN data, which is for year 2015. Results of modeling are reflected in 2017 dollars.

The Line 3 replacement project is estimated to support, directly and indirectly, approximately 8,600 jobs over the two-year period, 2,100 of which are expected to be filled by construction workers from outside the 15-county study area. In total, Enbridge expects to spend more than \$1.5 billion within the study area during the Line 3 replacement project, leading to a total output impact of over \$2.0 billion regionally in combined direct, indirect, and induced spending effects.

The bulk of the economic impacts will come from the company's construction expenditures, including site preparation, procurement, engineering, and environmental costs. At the peak of the construction project (Year 1), replacement of Line 3 is expected to support more than 7,000 jobs in the study region. The project is anticipated to contribute more than \$1.8 billion in new spending during the two-year period.

A smaller, but still significant, portion of the impact from the project will come from spending on the part of the non-local construction workers brought in for the project. Approximately half of the workforce for the construction project will be sourced from outside of the study area, and much of their income will leave the study area. However, these workers will spend some portion of their income on lodging, restaurants, and other incidental expenses. The BBER research team estimated that non-local workers brought on for the Line 3 construction project are expected to spend upwards of \$122 million (\$106 with margining) within the study area over the course of the construction project, supporting roughly 1,660 jobs and leading to about \$162 million in combined direct, indirect, and induced spending.

Finally, this analysis examined the impacts of the Line 3 project on the retail and hospitality sector in the study area. In total, it is expected that the Line 3 replacement project (including impacts from the construction project as well as the non-local workforce) would support nearly 2,800 jobs within that sector. The industries seeing the greatest benefits included various types of retail, accommodations, hotels and motels, and food service businesses.

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Enbridge Pipeline Construction Economic Impact Study

I. Project Description

Enbridge Inc. is proposing replacement of the existing Line 3 pipeline. The pipeline, originally installed in the 1960s, extends more than 1,000 miles from Edmonton, Alberta to Superior, Wisconsin. The proposed replacement would serve the same purpose as the existing Line 3, which is the transportation of crude oil from Canada to Enbridge's Superior Station and Terminal Facility near Superior.

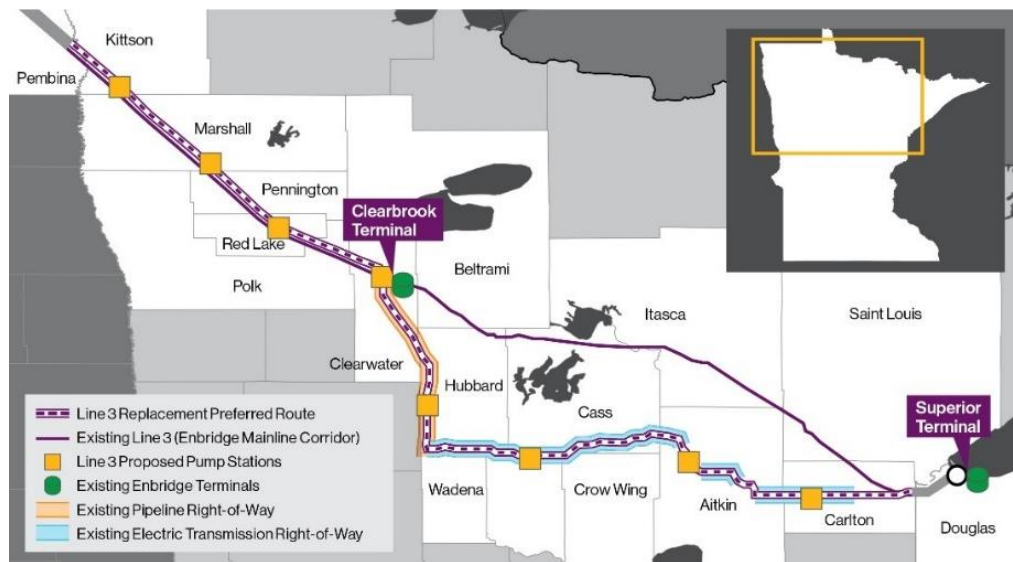
The Area Partnership for Economic Expansion (APEX), in partnership with Enbridge Inc., asked the Bureau of Business and Economic Research (BBER), an entity of the University of Minnesota Duluth's Labovitz School of Business and Economics, to assess the economic impact of the replacement of Line 3 on the affected Minnesota counties. In addition, this study includes a special focus on the economic impacts to the retail and hospitality industries in the selected region as a result of increased economic activity during the project. The BBER used county data and impact models for value added, employment, and output measures.

The study used IMPLAN¹ economic modeling data and software, specifically, IMPLAN's economic multiplier analysis and input/output modeling. Data used were the most recent IMPLAN data, which is for year 2015. Results of modeling are reflected in 2017 dollars and are presented here in a digital, written report.

Study Area

The geographic scope for this economic impact analysis includes the fifteen Minnesota counties of Kittson, Marshall, Pennington, Red Lake, Polk, Clearwater, Beltrami, Hubbard, Wadena, Cass, Crow Wing, Itasca, Aitkin, Carlton, and Saint Louis, according to the map below.

Figure 1. MN Map with Project Study Area Highlighted in White



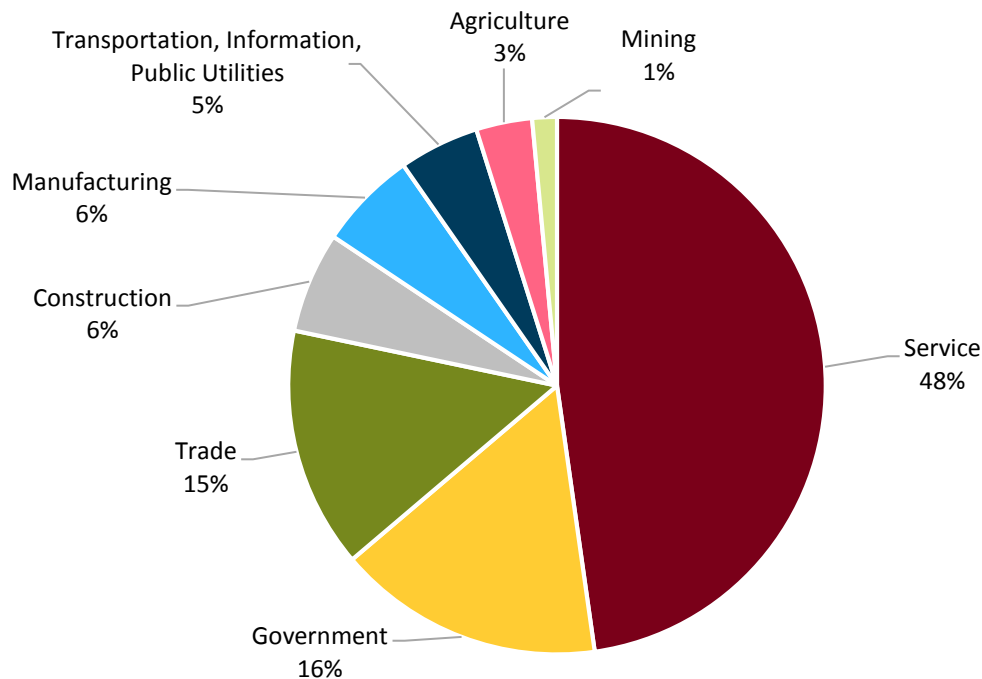
SOURCE: ENBRIDGE

¹ IMPLAN is used by more than 570 clients, including 100 state government agencies and 25 national agencies. IMPLAN Group LLC, 16740 Birkdale Commons Pkwy, Suite 212, Huntersville, NC 28078 www.implan.com

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These counties represent the existing route of Line 3 along with several neighboring counties from which employees, goods, and services are expected to be sourced. Enbridge expects that approximately half of the workforce required for the Line 3 project will come from within this region. The counties included in the study are primarily rural and encompass a significant portion of the northern half of the state of Minnesota. Major cities within the region include Duluth, Hibbing, Bemidji, Brainerd, Cloquet, and Grand Rapids.

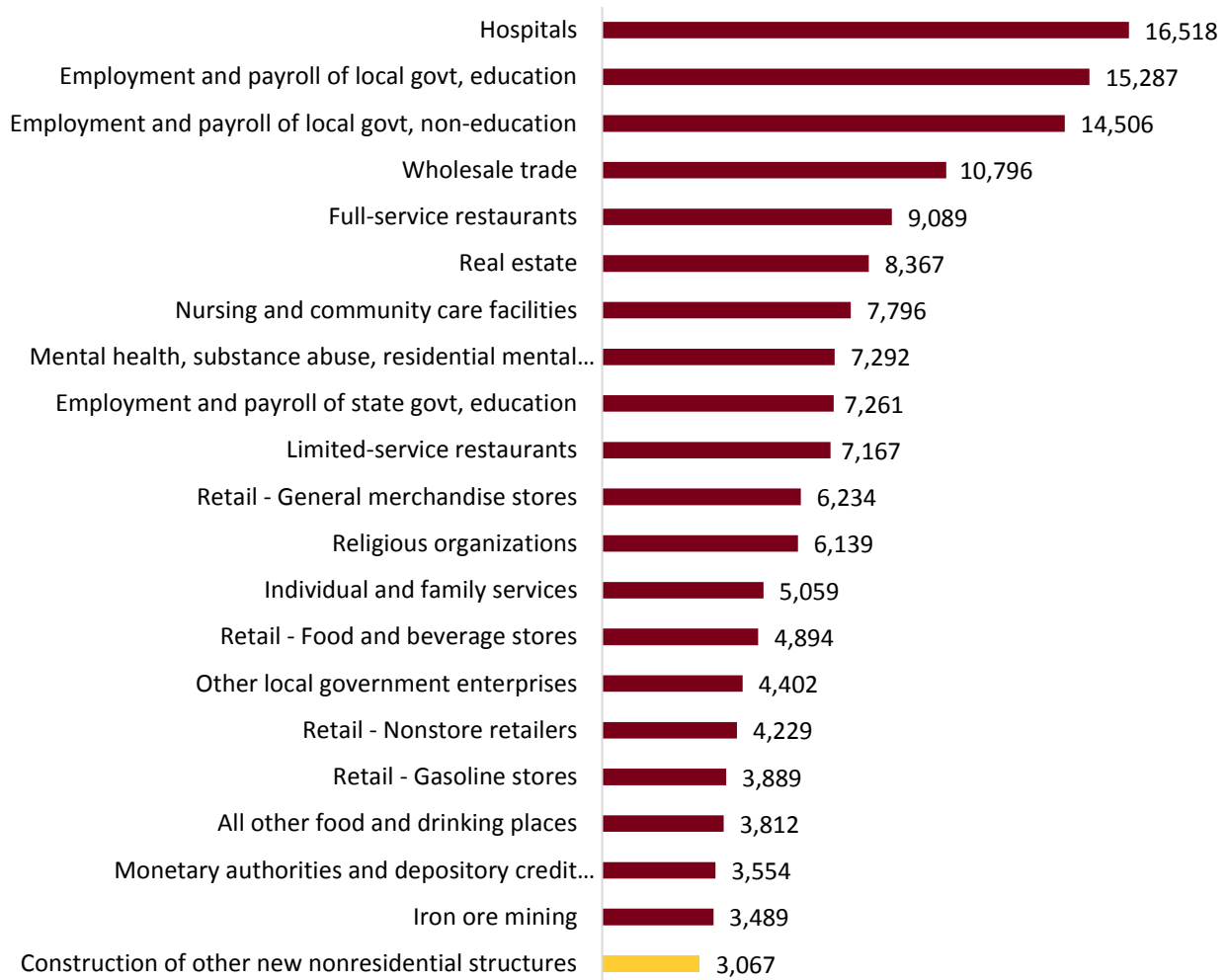
Figure 2. Employment by Sector for Study Area, 2015



SOURCE: IMPLAN

Figures 2 and 3 provide background on the regional economy of the study area as context for the results of the report. Figure 2 shows employment by sector. In 2015, roughly half of the 312,000 jobs in the study area came from the service sector, which includes health care, education, and hospitality. The other largest sectors in the region, measured in employment, included government, trade, and manufacturing. Construction employment represented approximately 6% of the jobs in the region in 2015, with about 19,000 workers in the study area employed in that sector.

Figure 3. Top Industries by Employment for Study Area, 2015



SOURCE: IMPLAN

Figure 3 shows the top industries within the study area as measured by overall employment. This figure provides more detail into the industries that employ the largest numbers. Hospitals, full-service restaurants, nursing and community care facilities, and limited-service restaurants represent a substantial portion of the jobs in the service sector in the study area. The local government industry is another significant local employer. This study will focus primarily on IMPLAN sector 58 – construction of other new nonresidential structures, shown in gold. This industry was ranked 25 in terms of overall employment in 2015, with nearly 3,100 workers. In addition, the study includes a special focus on the impacts of the Line 3 replacement project on retail and hospitality sectors in the region. The largest retail and hospitality industries (as shown in Figure 3) include full-service restaurants, limited-service restaurants, retail – general merchandise stores, retail – food and beverage stores, retail – non-store retailers, retail – gasoline stores, and all other food and drinking places. Combined, they provide roughly 60% of the jobs in retail and hospitality throughout the study area.

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II. Inputs and Assumptions

The following section describes the inputs required for modeling the impacts of the construction project and non-local construction worker spending as well as the assumptions made when developing the models. Inputs used include major construction expenditures, employment estimates, employee compensation, and the percentage of local labor and equipment purchases. Data were provided by Enbridge representatives. The research team worked under the assumption that the company provided good-faith estimates for the project. In instances where data was not provided by Enbridge, the research team relied on IMPLAN estimates and secondary data sources as inputs.

Effects of Construction

Replacement of Line 3 is anticipated to begin in early 2019, with the bulk of the work happening in that year and the project completion expected in 2020. According to Enbridge representatives, roughly 80% of the replacement project will occur in Year 1 with a smaller share (primarily clean up and remediation) happening in Year 2. All modeling and results reflect that distribution.

The replacement of Line 3 will generate a temporary increase in economic activity during the course of the construction project. Throughout the project, increased demand for equipment, labor, and transportation will lead to increased economic activity in the affected counties. After the completion of the project, this additional activity will cease, and the economic impacts will no longer be felt in the region.

Table 1. Line 3 Expenditures (in Millions of Dollars)

<i>Budget item</i>	<i>Total Spending</i>	<i>Year 1 (2019)</i>	<i>Year 2 (2020)</i>	<i>% Spent in Study Area</i>	<i>Direct Spending in Study Area</i>
Site preparation-Construction	\$998.7	\$798.9	\$199.7	100%	\$998.7
Site preparation-Project management	\$376.8	\$301.4	\$75.4	100%	\$376.8
Procurement	\$445.4	\$356.3	\$89.1	10%	\$44.5
Engineering	\$34.7	\$27.8	\$6.9	90%	\$31.3
Environment	\$47.1	\$37.7	\$9.4	32%	\$15.1
Total Costs	\$1,902.9	1,522.1	\$380.5		\$1,466.4

SOURCE: ENBRIDGE, IMPLAN

The budget for the Minnesota portion of the Line 3 replacement is expected to total \$1.9 billion over the 2-year period.² Table 1 shows expenditures for the Line 3 replacement project by major purchase as well as the percentage of each budget item that is expected to be sourced within the study area.

IMPLAN requires that, for construction modeling, the full value of the structure be included in the study area.³ The logic behind this reasoning is that while these inputs may come from outside the study area, they now make up part of the value of the structure. Therefore, 100% of site preparation costs were considered to be spent within the study area.⁴ The percentage spent within the study area on the other budget items

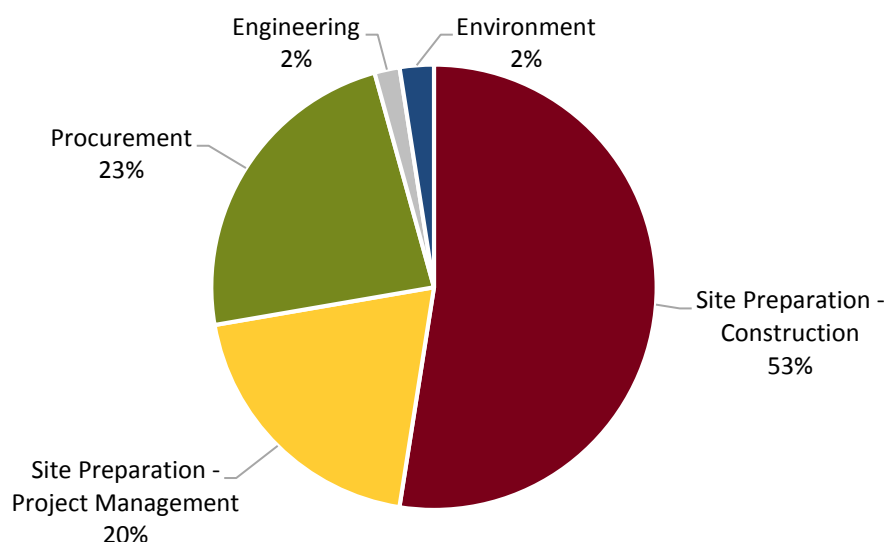
² Includes all construction expenses with the exception of land acquisition costs, which are not used in economic impact modeling.

³ IMPLAN Support Forum https://implan.com/index.php?option=com_kunena&view=category&Itemid=1841&layout=list

⁴ The estimate of 100% only affects the first round of direct spending. Indirect and induced spending estimates were based on IMPLAN spending patterns.

(procurement, engineering, and environment) were modified based on the estimates provided by Enbridge or by using IMPLAN's average local purchase percentages.⁵ As this project has not yet begun, Enbridge representatives used information from previous projects to estimate expenditures and purchases within the study area.

Figure 4. Line 3 Replacement - Construction Spending by Major Expenditure



SOURCE: ENBRIDGE

More than half of the costs for the project are in site preparation – construction. Procurement costs (equipment, purchases) represent about one quarter (23%) of the total project budget. Site preparation – project management (20%), environmental consulting (2%), and engineering (2%) costs make up the remainder of the expenditures (see Figure 4).

Enbridge estimates that the replacement of the Minnesota portion of Line 3 will require 4,200 workers, with approximately half of those coming from within the study area (2,100). To account for this, employee compensation for the construction project was reduced by approximately 50% to represent the leakage from non-local workers' spending outside of the study area.⁶ The economic activity generated as a result of per diem spending by non-local workers is analyzed separately.

⁵ The share of environmental costs sourced locally was not provided by the company, therefore, the IMPLAN average for the study area (23%) was used instead.

⁶ Local employee compensation was calculated using the following equation: Local Employee Compensation = Total Employee Compensation * [(1- expected commuting rate)/(1- typical commuting rate)]

Table 2. IMPLAN Sectors Used in Modeling

Sector	Description
58	Construction of other new nonresidential structures
395	Wholesale trade
449	Architectural, engineering, and related services
455	Environmental and other technical consulting services

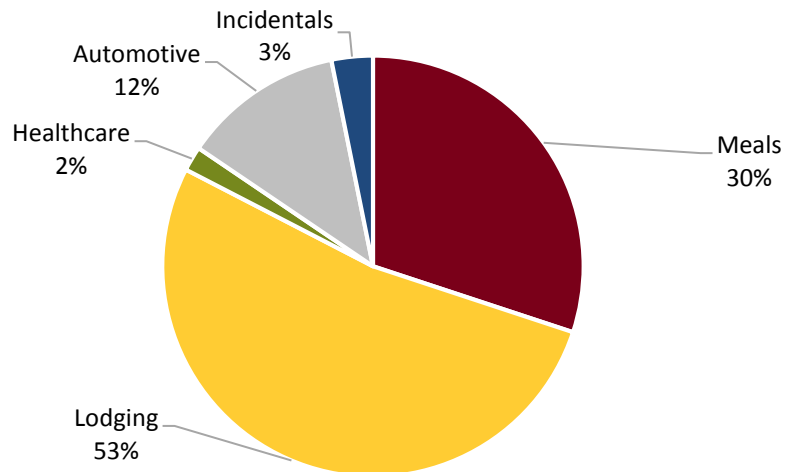
SOURCE: IMPLAN

Table 2 shows the IMPLAN sectors used in modeling the construction impacts for the Line 3 project. The site preparation costs (including construction and project management) were modeled in sector 58 using a method called analysis by parts, which is the process of splitting or parsing an impact analysis issue into smaller and more specific parts. This technique allows the user to specify the amount of commodity inputs, the proportion of local labor income, and the proportion of local purchases. The remaining budget items (procurement, engineering, and environment) were modeled in sectors 395 (wholesale trade), 449 (architectural, engineering, and related services), and 455 (environmental and other technical consulting services), respectively.

Non-Local Worker Spending

Approximately half of the workers employed during the construction of the Line 3 pipeline are expected to come from outside the study area. During the project, these workers will spend a per diem allowance on expenses, such as lodging, meals, and incidentals. They will also be spending additionally on automotive costs and healthcare over the two-year project timeframe. To determine the economic impacts of this spending, the research team first estimated the total amount spent by non-local workers, using the number of workers, their average length of stay, and their per diem spending allowance. Figure 5 shows the non-local worker spending pattern developed for this analysis.

Figure 5. Line 3 Non-Local Worker Spending Pattern



SOURCE: GSA, RELEVANT LITERATURE

Enbridge did not provide the research team with specific per diem totals, therefore, estimates for meals, lodging, and incidentals were calculated using FY2016 Per Diem Standard Rates for Minnesota, provided by

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the General Service Administration (GSA).⁷ The GSA rates are \$91 for lodging expenses and \$51 for meals and incidentals per day.⁸ In total, the amount spent per non-local worker on these expenses was estimated to be \$735 each week for a six-day work week. Assuming an average length of employment for each non-local worker of 1.3 years,⁹ or 68 weeks, the total per diem spent on these items in the study area for each non-local worker was estimated to equal nearly \$50,000. Assuming 2,100 non-local workers, this would equal roughly \$105 million in spending on meals, lodging, and incidentals in the study area over the life of the project.

Another major part of non-local worker spending is on gasoline and automotive maintenance. The average spending of each worker was modeled using the GSA rates for POV (privately owned vehicle) mileage. This rate (\$0.535 per mile) includes both the price for fuel, as well as typical repairs and maintenance. The spending pattern developed for this analysis assumes that each non-local worker is traveling approximately 200 miles¹⁰ from their homes to the job site and then returning home once each week. Assuming each worker purchases half of their gasoline and automotive expenses within the study area, this would equate to roughly \$15 million in local spending on those items over the life of the project.

Finally, the spending pattern was then supplemented with additional medical expenditures that may be necessary for workers, especially those on extended employment. The estimates for the medical expenditures (offices of physicians, other ambulatory health care services, and hospitals sectors) were calculated using the ratios from IMPLAN's household spending pattern and were not based on estimates from Enbridge.¹¹ Using these ratios, it is expected that non-local workers would spend just over \$2 million in the study area on healthcare costs.

Table 3. Sectors and Direct Effects Used in Modeling Non-Local Worker Spending (in Millions of Dollars)

<i>Spending Category</i>	<i>IMPLAN Sector</i>	<i>Direct Effects, in Millions</i>
Meals	Retail - Food and beverage stores	\$9.2
	Full-service restaurants	\$9.2
	Limited-service restaurants	\$9.2
	All other food and drinking places	\$9.2
Lodging	Hotels and motels, including casino hotels	\$32.3
	Other accommodations	\$32.3
Healthcare	Offices of physicians	\$0.7
	Other ambulatory health care services	\$0.04
	Hospitals	\$1.6
Automotive	Retail - Gasoline stores	\$7.6
	Automotive repair and maintenance	\$7.6
Incidentals	Retail - General merchandise stores	\$2.0
	Dry-cleaning and laundry services	\$2.0
Total		\$123.0

SOURCE: GSA, IMPLAN, RELEVANT LITERATURE

⁷ <http://www.gsa.gov/portal/category/100120>

⁸ 75% of meals and incidentals are provided for the first and last day of travel.

⁹ Source: Enbridge representatives

¹⁰ This 200-mile estimate was calculated by taking equidistant averages of major cities along the Line 3 pipeline and calculating their distance to the Minneapolis-St. Paul region, where it is assumed the majority of non-local workers might reside.

¹¹ It is assumed that non-local workers would spend roughly 25% of their annual household medical expenses within the study area.

Table 3 on the previous page contains a complete list of the categories used for modeling the impacts of non-local worker spending and the direct effects modeled in each IMPLAN sector as a result of non-local construction worker spending. In total, the non-local worker spending pattern estimates that more than \$120 million in direct spending on food, lodging, and other expenses would be added to the study area as a result of non-local workers employed on the Line 3 project. To align with the project timeline, roughly 80% of this total was modeled in 2019 and the remaining amount was modeled in 2020.

III. Findings

This section provides the direct, indirect, and induced economic impacts of construction activities for the Line 3 project, measured in employment, output, and value added. The total impacts of the Line 3 replacement project are shown first, followed by results of the construction project and non-local worker spending, modeled individually. In addition, a special section on the retail and hospitality industries affected by the project are included. All results are shown in 2017 dollars.

These findings summarize the effects of the Line 3 replacement project on the northern Minnesota study area. These results use the direct expenditures provided by Enbridge as well as per diem spending by non-local construction workers as the original input for the model. Like any construction project, the replacement of Line 3 will generate a temporary increase in economic activity during the course of the construction project. Throughout the project, increased demand for equipment, labor, and transportation will lead to increased economic activity in the affected counties. After the completion of the project, this additional activity will cease, and the economic impacts will no longer be felt in the region.

Table 4. Total Line 3 Replacement Impact Summary, by Year (in Millions of Dollars)

<i>Total Effects</i>	<i>Employment</i>	<i>Labor Income</i>	<i>Value Added</i>	<i>Output</i>
Year 1 (2019)	8,670	\$227.2	\$529.0	\$1,572.2
Year 2 (2020)	5,728	\$131.1	\$215.9	\$452.5
Project Total	8,670	\$358.4	\$744.9	\$2,024.8

SOURCE: IMPLAN

Table 4 shows the total economic impacts of the two-year Line 3 replacement project by year. The left-most column of Table 4, labeled employment, indicates the number of jobs that the Line 3 replacement project is estimated to support directly and indirectly. Employment estimates are in terms of jobs, not in terms of full-time equivalent employees. For construction projects, these jobs are typically short-term and temporary, meaning the effects will be felt during the project and will cease upon its completion. According to the results of this analysis, it is estimated that the replacement of the Line 3 pipeline will support approximately 8,700 jobs in the region during the two-year period, 2,100 of which are expected to be filled by construction workers from outside the study area.¹² It should be noted that employment for the project, shown here and throughout the findings, represents the peak of the two years (Year 1), not the sum. Employment numbers cannot be summed because it is assumed that most of the jobs carry over from one year to the next and will be filled by the same individuals.

The second column, labor income, is an estimate of all employee compensation, including wages, benefits, and proprietor income. It is estimated that the Line 3 replacement would contribute to roughly \$358 million in employee wages and benefits in the study area over the life of the project. Column three, labeled value

¹² In IMPLAN modeling, employment is defined as “at the site,” so all employees hired for the project are considered part of direct employment, even though we know that some will be hired from outside the study area.

added, shows the economic impacts of the expenditures that the Line 3 replacement would put specifically towards wages, rents, interest, and profits related to its construction. Value added represents the contribution to GDP made by an individual producer, industry, or sector. The Line 3 replacement is estimated to have a total value added impact of nearly \$745 million in the study area during the two-year period (2019-20). The last column, output, is the value of all local production required to sustain activities. In total, the Line 3 replacement project is estimated to add just over \$2 billion in new spending regionally, through the combined direct, indirect, and induced effects.

Table 5. Total Line 3 Replacement Impact Detail (in Millions of Dollars)

Impact Type	Employment	Labor Income	Value Added	Output
Direct Effect	5,524	\$204.9	\$487.6	\$1,520.6
Indirect Effect	2,135	\$94.1	\$150.7	\$307.1
Induced Effect	1,011	\$59.4	\$106.5	\$197.1
Total Effect	8,670	\$358.4	\$744.9	\$2,024.8

SOURCE: IMPLAN

Further details of the Line 3 replacement impacts are shown in Table 5. In this table, the total effects for the two-year project are broken out by impact type: direct, indirect, and induced effect. Direct employment and expenditures provided by Enbridge were combined with the direct effects of non-local construction workers' spending for a total direct effect in the study area of \$1.5 billion in spending and roughly 5,500 supported jobs. The indirect effect shows the measurement of increased spending between commercial, government, and service industries as a result of the direct effects (\$307 million in industry spending and 2,135 supported jobs). Induced effect measures the amount of increased spending by residential households as a result of the direct effects (\$197 million in household spending and more than 1,000 supported jobs). Total effect is the sum of direct, indirect, and induced effects.

Table 6. Line 3 Construction Impact Detail (in Millions of Dollars)

Impact Type	Employment	Labor Income	Value Added	Output
Direct Effect	4,200	\$162.0	\$424.2	\$1,414.6
Indirect Effect	2,003	\$87.3	\$140.0	\$283.6
Induced Effect	803	\$49.4	\$88.7	\$164.0
Total Effect	7,006	\$298.7	\$652.9	\$1,862.2

SOURCE: IMPLAN

Tables 6 and 7 show how construction and non-local worker spending contribute to the total impacts for the Line 3 replacement project. Table 6 includes detailed impacts for the Line 3 construction spending, and Table 7 highlights the impacts of non-local worker spending. The majority of the impacts of the project will come from the company's construction expenditures (Table 6), totaling \$1.4 billion¹³ in direct spending on site preparation, procurement, engineering, and environmental costs. To complete the project, Enbridge expects to directly employ 4,200 workers, half of whom are expected to be from within the study area. The construction will result in an estimated total payroll of \$334 million, of which half (\$162 million) will go to

¹³ Enbridge's procurement spending is subject to margining and is the reason that the total direct spending shown in Table 12 is slightly smaller than what was originally seen in Table 1. For more information on margins, see the explanation on page 10 and the definition of margins in Appendix B.

local workers. As a result of local input purchases and the spending of labor income, the two-year construction project is expected to support more than 7,000 jobs in the region and will lead to more than \$1.8 billion in new spending during the two-year period.

Table 7. Line 3 Non-Local Worker Spending Impact Detail (in Millions of Dollars)

<i>Impact Type</i>	<i>Employment</i>	<i>Labor Income</i>	<i>Value Added</i>	<i>Output</i>
Direct Effect	1,323	\$42.9	\$63.4	\$106.0
Indirect Effect	132	\$6.8	\$10.8	\$23.5
Induced Effect	208	\$10.0	\$17.9	\$33.1
Total Effect	1,664	\$59.7	\$92.0	\$162.6

SOURCE: IMPLAN

Spending by non-local workers will also provide an injection of spending to the region, as shown in Table 7. Using the GSA's per diem estimates, the BBER research team estimated that non-local workers would spend roughly \$123 million over the course of the construction project (see Table 3, page 7). However, it should be noted that the direct effects shown in Table 7 are only \$106 million. This discrepancy is because the retail industries have margins on their goods, and only a portion of each sale is actually being introduced into the local economy. Regardless, this new spending would support 1,660 jobs throughout the region and add about \$162 million in direct, indirect, and induced spending.

Throughout the life of the project, it is expected that the retail and hospitality sectors in the region will experience an increase in economic activity as a result of direct spending on the part of non-local workers as well as indirect and induced spending from the construction project itself. Table 8, on the next page, shows all of the retail and hospitality sectors impacted by the project and the number of jobs supported in each as a result of the Line 3 project. In total, it is expected that the workers of the project will directly support more than 1,300 jobs and in total create more than 2,800 jobs in retail and hospitality sector during the two-year period. Non-store retailers are expected to see the largest employment gains as a result of the project, followed by other accommodations (e.g. resorts, campgrounds, RV parks), hotels and motels, and full-service restaurants.

Table 8. Top Retail and Hospitality Industries Impacted by Line 3 Replacement Project, 2019-2020

	<i>Direct</i>	<i>Indirect</i>	<i>Induced</i>	<i>Total</i>
Retail - Nonstore retailers	487	0.1	0	487
Retail - Miscellaneous store retailers	0	303	28	330
Retail - Clothing and clothing accessories stores	250	2	1	253
Other accommodations	154	36	61	250
Full-service restaurants	195	18	26	239
Retail - General merchandise stores	0	159	17	176
Retail - Gasoline stores	13	103	12	127
Retail - Health and personal care stores	90	12	50	151
All other food and drinking places	13	103	12	127
Limited-service restaurants	6	82	38	126
Automotive repair and maintenance, except car washes	62	22	18	102
Hotels and motels, including casino hotels	0	87	11	98
Retail - Building material and garden equipment and supplies stores	32	17	36	85
Retail - Sporting goods, hobby, musical instrument and book stores	0	53	15	68
Retail - Food and beverage stores	0	49	8	58
Retail - Motor vehicle and parts dealers	0	33	16	50
Dry-cleaning and laundry services	25	2	1	29
Independent artists, writers, and performers	0	14	6	20
Retail - Furniture and home furnishings stores	0	7	4	11
Other amusement and recreation industries	0	4	7	11
Retail - Electronics and appliance stores	0	5	4	9
Commercial Sports Except Racing	0	5	2	7
Gambling industries (except casino hotels)	0	0	5	5
Promoters of performing arts and sports and agents for public figures	0	2	3	5
Fitness and recreational sports centers	0	1	2	3
Performing arts companies	0	1	2	3
Museums, historical sites, zoos and parks	0	0	2	2
Total	1,326	1,119	388	2,832

SOURCE: IMPLAN

IV. Conclusions

The Line 3 replacement project is estimated to support, directly and indirectly, approximately 8,600 jobs over the two-year period, 2,100 of which are expected to be filled by construction workers from outside the study area.¹⁴ In total, Enbridge is expected to spend more than \$1.5 billion within the study area during the Line 3 replacement project, leading to a total output impact of \$2.0 billion regionally, in combined direct, indirect and induced spending effects.

The bulk of the economic impacts from the project will come from the company's construction expenditures,

¹⁴ In IMPLAN modeling, employment is defined as "at the site," so all employees hired for the project are considered part of direct employment, even though we know that some will be hired from outside the study area.

including site preparation, procurement, engineering, and environmental costs. It is estimated that the project will directly employ 4,200 workers, half of which are expected to be from within the study area. The construction will result in an estimated total payroll of \$334 million, of which half (\$162 million) will go to local workers. As a result of local input purchases and the spending of labor income, the two-year construction project is expected to support more than 7,000 jobs in the region and will lead to more than \$1.8 billion in new spending during the two-year period.

Spending by non-local workers will also provide an injection of new spending to the region. The BBER research team estimated that non-local workers would spend upwards of \$122 (\$106 with margining) million over the course of the construction project. This new spending is expected to support 1,660 jobs throughout the region and lead to about \$162 million in combined direct, indirect, and induced spending.

It is expected that the retail and hospitality sector in the region will experience an increase in economic activity as a result of direct spending on the part of non-local workers as well as indirect and induced spending from the construction project itself. In total, it is expected that the project will support more than 2,800 jobs in the retail and hospitality sector during the two-year period. Other accommodations (e.g. resorts, campgrounds, RV parks) are expected to see the largest employment gains as a result of the project, followed by non-store Retailers, hotels and motels, and full-service restaurants.

NOTE - Readers are encouraged to remember the UMD Labovitz School's BBER was asked to supply an economic impact analysis only. This analysis does not consider the social or environmental impacts of the project and should not be viewed as a cost benefit analysis or environmental impact assessment. Any subsequent policy recommendations should be based on the "big picture" of total impact.

Appendix A: Model Assumptions

Construction Activity

The IMPLAN industries selected for sectoring these impact activities are:

<i>Sector</i>	<i>Description</i>
58	Construction of other new nonresidential structures
395	Wholesale trade
449	Architectural, engineering, and related services
455	Environmental and other technical consulting services

SOURCE: IMPLAN

1. Land acquisition costs, or easements, were not included in the analysis.
2. Construction years are assumed to be 2019 and 2020.
3. It is assumed that half of the required workforce for the project will live within the study area. This equates to 2,100 local workers for the Line 3 replacement project. Therefore, labor income was reduced by approximately half to reflect the local employee compensation, using the following equation: Local Employee Compensation = Total Employee Compensation * [(1- expected commuting rate)/(1- typical commuting rate)]
4. Line 3 construction costs are estimated to be \$1.9 billion in total, distributed as follows:

<i>Budget item</i>	<i>Total Spending</i>	<i>Year 1 (2019)</i>	<i>Year 2 (2020)</i>	<i>% Spent in Study Area</i>	<i>Direct Spending in Study Area</i>
Site preparation-Construction	\$998.7	\$798.9	\$199.7	100%	\$998.7
Site preparation-Project management	\$376.8	\$301.4	\$75.4	100%	\$376.8
Procurement	\$445.4	\$356.3	\$89.1	10%	\$44.5
Engineering	\$34.7	\$27.8	\$6.9	90%	\$31.3
Environment	\$47.1	\$37.7	\$9.4	32%	\$15.1
Total Costs	\$1,902.9	1,522.1	\$380.5		\$1,466.4

SOURCE: ENBRIDGE, IMPLAN

Non-Local Worker Spending

1. Non-local construction worker spending estimates were calculated using FY2016 Per Diem Standard Rates for Minnesota, provided by the General Service Administration (GSA).¹⁵ The rates are \$91 for lodging expenses and \$51 for meals and incidentals, with 75% meals and incidentals on the first and last travel days (e.g. Monday and Saturday).

¹⁵ <http://www.gsa.gov/portal/category/100120>

2. For each worker, we assume a 1.3 year length of employment and a six-day work week. Therefore, per-diem spending per non-local worker is estimated to be \$735.50 per worker per week, or \$49,720 per worker for the life of the project.
3. It is assumed that half of the required workforce for the project will come from outside the study area. This equates to 2,100 non-local workers for the Line 3 replacement project.
4. Non-local construction worker spending includes lodging, meals, incidentals and automotive costs. In addition, it is assumed that some personal expenses will go to medical costs. All other worker income will leave the region. The IMPLAN industries used for modeling these impacts and the direct effects for the project are shown below.

<i>Spending Category</i>	<i>IMPLAN Sector</i>	<i>Direct Effects, in Millions</i>
Meals	Retail - Food and beverage stores	\$9.2
	Full-service restaurants	\$9.2
	Limited-service restaurants	\$9.2
	All other food and drinking places	\$9.2
Lodging	Hotels and motels, including casino hotels	\$32.3
	Other accommodations	\$32.3
Healthcare	Offices of physicians	\$0.7
	Other ambulatory health care services	\$0.04
Automotive	Hospitals	\$1.6
	Retail - Gasoline stores	\$7.6
	Automotive repair and maintenance	\$7.6
Incidentals	Retail - General merchandise stores	\$2.0
	Dry-cleaning and laundry services	\$2.0
Total		\$123.0

SOURCE: GSA, IMPLAN, RELEVANT LITERATURE

Appendix B. Economic Impact Procedures and Data Sources

Input-Output Modeling

This study uses the IMPLAN Group's input-output modeling data and software (IMPLAN version 3.1). The IMPLAN database contains county, state, zip code, and federal economic statistics, which are specialized by region, not estimated from national averages. Using classic input-output analysis in combination with region-specific Social Accounting Matrices and Multiplier Models, IMPLAN provides a highly accurate and adaptable model for its users. IMPLAN data files use the following federal government data sources:

- U.S. Bureau of Economic Analysis Benchmark Input-Output Accounts of the U.S.
- U.S. Bureau of Economic Analysis Output Estimates
- U.S. Bureau of Economic Analysis Regional Economic Information Systems (REIS) Program
- U.S. Bureau of Labor Statistics Covered Employment and Wages (CEW) Program
- U.S. Bureau of Labor Statistics Consumer Expenditure Survey
- U.S. Census Bureau County Business Patterns
- U.S. Census Bureau Decennial Census and Population Surveys
- U.S. Census Bureau Economic Censuses and Surveys
- U.S. Department of Agriculture Census

IMPLAN data files consist of the following components: employment, industry output, value added, institutional demands, national structural matrices, and inter-institutional transfers. Economic impacts are made up of direct, indirect, and induced impacts. The data used was the most recent IMPLAN data available, which is for the year 2015. All results are reported in 2017 dollars.

Economic impacts are made up of direct, indirect, and induced impacts. The following are suggested assumptions for accepting the impact model: IMPLAN input/output is a production-based model, and employment numbers (from U.S. Department of Commerce secondary data) treat both full- and part-time individuals as being employed.

Regional data for the impact models for value added, employment, and output are supplied by IMPLAN for this impact. Employment assumptions were provided to the model to enable construction of the impact model. From these data, social accounts, production, absorption, and byproducts information were generated from the national level data and was incorporated into the model. All region study definitions and impact model assumptions were agreed on before work with the models began.

Modeling Issues

There are some IMPLAN modeling issues that should be considered when interpreting the results of this study.

A study area that is actually part of a larger functional economic region will likely miss some important backward linkages. For example, linkages with the labor force may be missing. Workers who live and spend outside the study area may actually hold local jobs.

Regional indirect and induced effects are driven by assumptions in the model. With some models, one problem is that the assumptions can mask the true multiplier. This is especially true of the assumption of constant returns to scale. This assumption most affects induced effects and says that, for example, if I drink

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coffee, and my income increases, I will drink proportionally more coffee than before. The amount of weight placed on the induced effects (the percentage of the total induced effect you would want to use) can be further analyzed with an in-depth impact study, involving much more specific data collection and more detailed analysis, but that is beyond the scope of this analysis.

Finally, and most importantly, the relationship of output to employment has been set for the model by data provided by Enbridge to the BBER based on the best estimates of engineers and managers involved in the project. It can be noted that, for purposes of research and with more resources, the modeling methodology can be driven by data collected from surveys and post-construction values. This survey data can provide greater accuracy in regional impact assessments for the linkage between core and peripheral labor market areas and deliver better estimates of local vs. regional purchases.

Appendix C: IMPLAN Assumptions

The following are suggested assumptions for accepting the impact model:¹⁶

Backward-Linkages: IMPLAN is a backward-linkage model, meaning that it measures the increased demand on industries that produce intermediate inputs as a result of increases in production. However, if an industry increases production, there will also be an increased supply of output for other industries to use in their production. Models that measure this type of relationship are called forward-linkage models. To highlight this concept, consider the example of a new sawmill beginning its operations in a state. The increased production as a result of the sawmill's operations will increase the demand for lumber, creating an increase in activity in the logging industry, as well as other supporting industries, such as electric transmission and distribution. IMPLAN's results will include those impacts, but will exclude effects on any wood product manufacturers located nearby that might be impacted by the newly available supply of lumber.

Employment: IMPLAN input-output is a production-based model, and employment numbers (from U.S. Department of Commerce secondary data) treat both full- and part-time individuals as employed.

Fixed Prices and No Supply Constraints: IMPLAN is a fixed-price model. This means that the modeling software assumes no price adjustment in response to supply constraints or other factors. In other words, the model assumes that firms can increase their production as needed and are not limited by availability of labor or inputs and that firms in the local economy are not operating at full capacity.

Fixed Production Patterns: Input-output (I-O) models assume inputs are used in fixed proportion, without any substitution of inputs, across a wide range of production levels. This assumption assumes that an industry must double its inputs (including both purchases and employment) to double its output. In many instances, an industry will increase output by offering overtime, improving productivity, or improvements in technology.

Industry Homogeneity: I-O models typically assume that all firms within an industry have similar production processes. Any industries that fall outside the typical spending pattern for an industry should be adjusted using IMPLAN's analysis-by-parts technique.

Leakages: A small area can have a high level of leakage. Leakages are any payments made to imports or value added sectors, which do not in turn re-spend the dollars within the region. What's more, a study area that is actually part of a larger functional economic region will likely miss some important linkages. For example, workers who live and spend outside the study area may actually hold local jobs.

¹⁶ Bureau of Economic Analysis https://www.bea.gov/papers/pdf/WP_IOMIA_RIMSII_020612.pdf

Definitions Used in This Report

Analysis by Parts: The process of splitting or parsing an impact analysis issue into smaller and more specific parts. This technique allows the user to specify the amount of commodity inputs, the proportion of local labor income, and the proportion of local purchases.

Backward Linkages: The interconnection of an industry to other industries from which it purchases its inputs in order to produce its output. It is measured as the proportion of intermediate consumption to the total output of the sector (direct backward linkage) or to the total output multiplier (total backward linkage). An industry has significant backward linkages when its production of output requires substantial intermediate inputs from many other industries.¹⁷

Deflators: Deflators are used by the IMPLAN software whenever the event year is set to a year that differs from the model data year. The output deflator converts the industry sales value to the year of the dataset, while the GDP deflator converts the value-added values to the year of the dataset. Output deflators are specific to each industry, while the GDP deflators are the same across industries.

Direct Effect: Initial new spending in the study area resulting from the project.

Employment: Estimates (from U.S. Department of Commerce secondary data) are in terms of jobs, not in terms of full-time equivalent employees. Therefore, these jobs may be temporary, part-time, or short-term.

Gross Output: The value of local production required to sustain activities.

Indirect Effect: The additional inter-industry spending from the direct impact.

Induced Effect: The impact of additional household expenditures resulting from the direct and indirect impact.

Labor Income: All forms of employment income, including employee compensation (wages and benefits) and proprietor income.

Leakages: Any payments made to imports or value added sectors that do not in turn re-spend the dollars within the region.

Margins: The value of wholesale and retail trade services provided in delivering commodities from producers' establishments to purchasers. Margin is calculated as sales receipts less the cost of the goods sold. It consists of the trade margin plus sales taxes and excise taxes that are collected by the trade establishment. (BEA)

Multipliers: Total production requirements within the study area for every unit of production sold to final demand. Total production will vary depending on whether induced effects are included and the method of inclusion. Multipliers may be constructed for output, employment, and every component of value added.

Value Added: A measure of the impacting industry's contribution to the local community; it includes wages, rents, interest, and profits.

¹⁷ IMPLAN