

Economic Impacts from Operation of Canada's Energy Transmission Pipelines

A Special Report Prepared for the
Canadian Energy Pipeline Association

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Introduction

This report summarizes key findings obtained from using the current (2010) version of the Statistics Canada Interregional Input/Output (I-O) Model to estimate the economic impacts from operation of the energy transmission pipelines currently operating in Canada as well as from two proposed but not yet approved crude oil pipelines: The TransCanada Energy East Pipeline and the Kinder Morgan Trans Mountain Expansion. Gerry Angevine of Angevine Economic Consulting Limited undertook the analysis during February and March 2016 on behalf of the Canadian Energy Pipeline Association (CEPA).

The data required to undertake the analysis with respect to existing pipelines, essentially gross operating revenues of crude oil, natural gas liquids (NGLs), refined petroleum product (RPPs) and natural gas transmission pipelines was obtained from annual reports and information filings submitted to regulatory authorities and SEDAR. In the case of private, non-regulated companies CEPA provided some information; in other cases, operating revenue data was estimated. For the most part the data pertains to gross revenues realized during 2015. Where data with respect to the 2015 as a whole were not available data for the full year were estimated on the basis of information for the first three quarters. In the few cases where neither annual nor sufficient quarterly data with respect to 2015 were available, operating revenues data with respect to 2014 were used.

For the two proposed pipeline projects estimates of gross revenues from operations in terms of 2015 dollars were derived from studies undertaken for the respective project proponents by The Conference Board of Canada using an earlier (2009) version of the I-O Model. Both studies were filed with the National Energy Board and are available electronically.¹

Three I-O Model simulation runs were undertaken. The first case examined the impacts from the operation of all pipelines in Canada transmitting liquid hydrocarbons: crude oil, NGLs and RPPs. The second case examined the impacts from operation of the natural gas transmission pipelines. The third and final case examined the impacts from the operation of two proposed crude oil pipeline projects: Energy East and the Trans Mountain Expansion.

Economic Impacts from Operation of Existing Energy Transmission Pipelines

1. Impacts from operation of crude oil, NGL and RPP transmission pipelines

Table 1 summarizes the impacts on GDP, Labour Income and Full-time Equivalent Jobs from operation of liquids transmission pipelines in Canada in 2015².

The direct impacts on GDP were about \$3.7 billion, and the indirect impacts, approximately \$1.2 billion. Induced impacts were about \$0.6 billion, and the total impact on GDP, about \$5.4 billion. Alberta benefitted from about 51% of the total impact on GDP, and Saskatchewan from

¹ See: “The Trans Mountain Expansion Project: Understanding the Economic benefits for Canada and its Regions”. September 2015. Available at: <https://docs.neb-one.gc.ca/lleng/llisapi.dll/fetch/2000/90464/90552/548311/956726/2392873/2451003/2825642/B427-4 - 3a Conference Board of Canada%2C TMEP Understanding the Economic Benefits for Canada and its Regions%2C September 21%2C 2015 Clean - A4T6F0.pdf?nodeid=2825199&vernum=-2>

Also, “The Energy East Pipeline Project: Understanding the Economic Benefits for Canada and its Regions”. October 2015. Available online at: <https://docs.neb-one.gc.ca/ll-eng/llisapi.dll/fetch/2000/90464/90552/2432218/2540913/2543426/2887424/A74779-10 Vol 1 Amend Appendix Vol 1-8 to 1-10 - A4W7I0.pdf?nodeid=2887219&vernum=-2>

² Subject to error on account of data limitations noted earlier

just under one-quarter of the impact. Almost 9% of the GDP impact was in each of British Columbia and Manitoba, and almost 8% in Ontario. In the western provinces and the NWT the direct impacts accounted for more than half of the total GDP impacts, whereas in both Ontario and Quebec the indirect impacts accounted for the largest portions. While less than in the other jurisdictions, total GDP impacts in British Columbia and Quebec were nevertheless quite substantial.

About 47 percent of the estimated \$1.5 billion boost in labour income was realized in Alberta.

Table 1 – Economic Impacts from Operation of Crude Oil, NGL & RPP Transmission Pipelines

Gross Domestic Product -- Millions of 2015 \$

	NWT	BC	AB	SK	MB	ON	QC	Other	Canada
Direct	43.0	127.8	1,979.5	1,009.8	353.6	106.3	35.3	0.0	3,655.3
Indirect	7.5	78.3	545.3	216.2	78.3	193.6	57.0	11.2	1,187.4
Dir. & Indir.	50.5	206.1	2,524.8	1,226.0	431.9	299.9	92.3	11.2	4,842.7
Induced	2.6	49.2	244.3	102.1	34.7	124.9	38.4	7.3	603.5
Total	53.1	255.3	2,769.1	1,328.1	466.6	424.8	130.7	18.5	5,446.2

Labour Income -- Millions of 2015 \$

	NWT	BC	AB	SK	MB	ON	QC	Other	Canada
Direct	5.0	8.8	314.1	210.8	34.5	13.4	2.3	0.0	588.9
Indirect	4.9	47.6	300.3	99.2	48.8	128.3	35.3	6.6	671.0
Dir. & Indir.	9.9	56.4	614.4	310.0	83.3	141.7	37.6	6.6	1,259.9
Induced	1.0	24.9	105.4	40.9	15.9	66.8	20.0	29.4	278.4
Total	10.9	81.3	719.8	350.9	99.2	208.5	57.6	36.0	1,538.3

Number of Full-time Equivalent Jobs

	NWT	BC	AB	SK	MB	ON	QC	Other	Canada
Direct	35	109	1,375	2,126	353	118	15	0	4,130
Indirect	55	822	3,276	1,515	880	2,039	605	125	9,317
Dir. & Indir.	90	931	4,651	3,641	1,233	2,157	620	125	13,447
Induced	15	537	1,830	891	358	1,203	412	79	5,325
Total	105	1,468	6,481	4,532	1,591	3,360	1,032	204	18,772

In total 18,772 full-time job equivalents were associated with operation of the liquids pipelines: 4,130 directly, 9,317 indirectly, and 5,325 as a consequence of induced impacts. About 35% of the job impacts were in Alberta, 24% in Saskatchewan, 18% in Ontario, 9% in Manitoba, 8% in British Columbia, and 5% in Quebec.

There were no direct impacts of any kind in New Brunswick and Nova Scotia because as yet there are no liquids transmission pipelines in those provinces. Indirect and induced impacts in New Brunswick and Nova Scotia were relatively small and are included in the “Other” column.

Table 2 illustrates, for each province, the industries where most of the jobs supported by operation of the liquids transmission pipelines are concentrated.

Table 2 – Full-Time Equivalent Jobs from Crude Oil, NGL and RPP Pipeline Operation

	QC	ON	MB	SK	AB	BC	NWT	Canada
Government education services	4	19	8	23	34	7	0	97
Non-profit institutions serving households	6	16	10	20	38	9	1	101
Crop and animal production	21	37	15	29	42	24	0	170
Other municipal government services	6	29	18	41	59	17	1	172
Arts, entertainment and recreation	15	40	15	36	71	25	0	204
Health care and social assistance	12	42	17	38	75	18	1	206
Mining, quarrying, and oil & gas extraction	2	5	1	47	204	12	0	271
Information and cultural industries	40	129	36	68	131	43	2	456
Utilities	6	25	53	140	253	37	1	517
Other services (except public administration)	36	103	46	125	222	60	1	599
Wholesale trade	54	152	51	96	225	74	1	659
Repair construction	36	61	55	245	279	34	19	731
Accommodation and food services	37	102	55	138	295	109	4	751
Manufacturing	149	284	85	79	260	103	0	987
Retail trade	90	277	107	316	597	144	5	1,551
Admin. & support, waste mgmt., & remediation	92	499	122	210	565	161	5	1,688
Professional, scientific & technical services	134	437	97	206	729	173	4	1,812
Finance, insurance, real estate, rental & leasing	182	684	285	353	683	143	15	2,369
Transportation and warehousing	90	369	491	2,267	1,616	244	43	5,136
All industries including those not shown	1,032	3,360	1,591	4,532	6,481	1,468	105	18,772

Source: Statistics Canada analysis of impact of operation of crude oil, NGL and refined petroleum product pipelines. Table 2.9

****Note: Totals are correct. However, data in rows and columns don't add to totals because some industry categories are not included.**

In Alberta, Saskatchewan, and British Columbia most of the jobs are in the transportation and warehousing industry classification, followed by finance, insurance and real estate; professional and technical services; and administration and support and waste management and remediation. Operation of the natural gas transmission pipelines also supports a large number of positions in the wholesale and retail trade industries, especially in Alberta, Ontario, and Saskatchewan. Most of the manufacturing jobs are in Ontario, Alberta and Quebec. Ontario and Quebec account for 23% of the total number of full-time equivalent job positions.

2. Impacts from operation of natural gas transmission pipelines

Table 3 summarizes the economic impacts in terms of three major economic indicators from operation of natural gas transmission pipelines in Canada.

At about \$6.1 billion, the annual boost to GDP from operation of the natural gas transmission pipelines is about \$0.6 billion greater than that from operation of the liquids transmission pipelines. Alberta realizes about 39 percent of the total GDP impact, or about \$2.3 billion. Ontario benefits to the extent of 24 percent of the total, followed by Saskatchewan, which accounts for almost 16 percent. But Manitoba, British Columbia, Quebec and New Brunswick are also beneficiaries of substantial GDP impacts.

Table 3 – Economic Impacts from Natural Gas Transmission

Gross Domestic Product – Millions of 2015 \$										
	B.C.	AB	SK	MB	ON	QC	NB	NS	Other	Canada
Direct	359.2	2,006.9	801.6	428.0	1,090.6	86.5	114.1	37.0	0.0	4,923.9
Indirect	65.4	180.4	80.4	45.9	209.3	41.6	11.7	3.8	2.9	641.4
Dir. & Indir	424.6	2,187.3	882.0	473.9	1,299.9	128.1	125.8	40.8	2.9	5,565.3
Induced	48.6	148.6	63.2	28.8	156.7	33.0	4.9	4.5	2.2	490.5
Total	473.2	2,335.9	945.2	502.7	1,456.6	161.1	130.7	45.3	5.1	6,055.8

Labour Income – Millions of 2015 \$										
	B.C.	AB	SK	MB	ON	QC	NB	NS	Other	Canada
Direct	34.7	297.7	169.2	49.2	164.3	7.5	9.0	6.3	0.0	737.9
Indirect	43.0	104.4	42.5	28.2	135.1	26.1	2.9	2.0	1.5	385.7
Dir. & Indir.	77.7	402.1	211.7	77.4	299.4	33.6	11.9	8.3	1.5	1,123.6
Induced	23.0	64.4	25.2	13.0	79.7	17.2	2.3	2.2	1.2	228.2
Total	100.7	466.5	236.9	90.4	379.1	50.8	14.2	10.5	2.7	1,351.8

Number of Full-Time Equivalent Jobs										
	B.C.	AB	SK	MB	ON	QC	NB	NS	Other	Canada
Direct	252	1,249	1,437	340	1,216	79	97	68	0	4,738
Indirect	698	1,214	704	510	2,056	448	157	67	21	5,875
Dir. & Indir.	950	2,463	2,141	850	3,272	527	254	135	21	10,613
Induced	501	1,110	550	292	1,484	357	55	52	17	4,418
Total	1,451	3,573	2,691	1,142	4,756	884	309	187	38	15,031

Labour Income is boosted by nearly \$1.4 billion a year through operation of the natural gas transmission pipelines, with the direct impacts accounting for slightly more than half the total, and the indirect effects about 29 percent. Almost thirty-five percent of the total impact falls in Alberta, but as much as 28 percent of the impact is felt in Ontario where, as with GDP, the indirect and induced impacts are greater than in any of the other provinces.

Operation of the natural gas transmission pipelines is associated with 15,031 full-time equivalent jobs. Because of the boost from indirect and induced effects almost 32% of the full-time equivalent jobs fall in Ontario compared with 24% in Alberta, 18% in Saskatchewan, 10% in British Columbia, 8% in Manitoba and 6% in Quebec.

As with the liquids transmission pipelines, the I-O Model simulation results shine some light on the industries where jobs supported by operation of the natural gas transmission lines would be concentrated. The industries most affected are indicated by the summary provided in Table 4.

Table 4 – Full Time Equivalent Jobs from Operation of Natural Gas Transmission Pipelines

	NS	NB	QC	ON	MB	SK	AB	BC	Canada
Educational services	1	1	3	20	3	3	14	9	52
Government education services	1	1	4	26	6	13	19	8	79
Non-profit institutions serving households	1	1	5	26	7	11	21	9	83
Utilities	1	2	4	47	12	8	19	9	102
Mining, quarrying, and oil & gas extraction	1	0	1	4	0	8	87	5	106
Crop and animal production	1	1	16	32	11	18	25	16	121
Arts, entertainment and recreation	1	1	13	45	10	21	37	21	151
Other municipal government services	2	4	8	60	19	20	42	21	178
Health care and social assistance	3	4	11	70	14	23	43	21	189
Information and cultural industries	5	9	31	135	21	35	59	41	337
Wholesale trade	4	4	38	126	25	40	98	47	383
Other services (except public administration)	5	6	29	138	30	65	126	56	457
Accommodation and food services	6	7	31	128	35	75	148	71	506
Manufacturing	10	10	90	186	32	29	99	58	517
Repair construction	25	11	47	134	45	146	148	72	628
Retail trade	14	16	64	304	72	173	322	117	1,086
Professional, scientific & technical services	22	26	102	452	64	102	272	166	1,211
Admin. & support, waste mgmt. & remediation	20	42	83	495	84	114	233	140	1,216
Finance, insurance, real estate, rental & leasing	21	41	143	785	225	258	321	167	1,968
Transportation and warehousing	38	115	149	1,510	412	1,498	1,406	375	5,509
All Industries including those not shown	187	309	884	4,756	1,142	2,691	3,573	1,451	15,031

Source: Statistics Canada analysis of impacts from operation of natural gas transmission pipelines. Table 2.9

****Note: Totals are correct. However, data in rows and columns don't add to totals because some industry categories are not included.**

Similar to the liquids transmission case, the transportation and warehousing; finance, insurance and real estate; professional and technical services; administration, waste management and remediation industries; and wholesale and retail trade industries benefit the most. The manufacturing jobs are mostly in Ontario, Alberta and Quebec. Three-eighths of the

total number of full-time equivalent jobs associated with natural gas transmission operations are in Ontario and Quebec.

3. Impacts from operation of all existing energy transmission pipelines: crude oil, NGLs, RPPs and natural gas

As indicated in Table 5, operation of all of the energy transmission pipelines in Canada contributed \$11.5 billion to GDP in 2015 according to the I-O Model simulation -- \$5.1 billion (44%) in Alberta, \$2.3 billion (20%) in Saskatchewan, and \$2.2 billion (19%) in Ontario and Quebec. Alberta and Ontario were also beneficiaries of large indirect impacts. But Saskatchewan, British Columbia, Manitoba and Quebec were also boosted by significant indirect impacts on GDP. The greatest induced impacts fell in Alberta and Ontario.

Labour Income was elevated by energy pipeline transmission operations to the extent of nearly \$2.9 billion. This was concentrated in Alberta (41%), Ontario (20%) and Saskatchewan (20%).

Table 5 – Impacts from Crude Oil, NGLs, RPPs and Natural Gas Transmission

Gross Domestic Product – Millions of 2015 \$											
	NWT	BC	AB	SK	MB	ON	QC	NB	NS	Other	Canada
Direct	43.0	487.0	3,986.4	1,811.4	781.6	1,196.9	121.8	114.1	37.0	0.0	8,579.2
Indirect	7.5	143.7	725.7	296.6	124.2	402.9	98.6	11.7	3.8	14.1	1,828.8
Dir. & Indir.	50.5	630.7	4,712.1	2,108.0	905.8	1,599.8	220.4	125.8	40.8	14.1	10,408.0
Induced	2.6	97.8	392.9	165.3	63.5	281.6	71.4	4.9	4.5	9.5	1,094.0
Total	53.1	728.5	5,105.0	2,273.3	969.3	1,881.4	291.8	130.7	45.3	23.6	11,502.0

Labour Income – Millions of 2015 \$											
	NWT	BC	AB	SK	MB	ON	QC	NB	NS	Other	Canada
Direct	5.0	43.5	611.8	380	83.7	177.7	9.8	9.0	6.3	0.0	1,326.8
Indirect	4.9	90.6	404.7	141.7	77.0	263.4	61.4	2.9	2.0	8.1	1,056.7
Dir. & Indir.	9.9	134.1	1016.5	521.7	160.7	441.1	71.2	11.9	8.3	8.1	2,383.5
Induced	1.0	47.9	169.8	66.1	28.9	146.5	37.2	2.3	2.2	30.6	506.6
Total	10.9	182.0	1,186.3	587.8	189.6	587.6	108.4	14.2	10.5	38.7	2,890.1

Number of Full-time Equivalent Jobs											
	NWT	BC	AB	SK	MB	ON	QC	NB	NS	Other	Canada
Direct	35	361	2,624	3,563	693	1,334	94	97	68	0	8,868
Indirect	55	1,520	4,490	2,219	1,390	4,095	1,053	157	67	146	15,192
Dir. & Indir.	90	1,881	7,114	5,782	2,083	5,429	1,147	254	135	146	24,060
Induced	15	1,038	2,940	1,441	650	2,687	769	55	52	96	9,743
Total	105	2,919	10,054	7,223	2,733	8,116	1,916	309	187	242	33,803

Operation of all of the energy transmission pipelines sustained an estimated 33,803 full-time equivalent jobs in Canada in 2015, thereby supporting many households. Approximately half of the full-time equivalent jobs supported by the industry were in Alberta and Saskatchewan. But other provinces also benefited considerably, especially Ontario (24%), British Columbia (9%), Manitoba, (8%) and Quebec (6%).

As already noted, about \$11.5 billion in terms of 2015 dollars is being added to Canada's GDP through operation of the existing liquids and natural gas transmission pipelines every year. Over the next 30 years approximately \$175 billion will be added to GDP in terms of 2015 dollars assuming that gross revenue from operations increases at an annual rate of 2.5 percent during the period and that a discount rate of 7.5 percent is appropriate for calculating the present value of the stream of additions to GDP. This also assumes that the coefficients in the current version of the I-O Model continue to be valid which, of course, won't be the case. In the overly simplistic case where the revenue growth rate and the discount rate are assumed to be identical, the contributions to GDP over the 30-year period would simply sum to \$11.5 billion x 30 or about \$345 billion in terms of 2015 dollars.

As more transmission pipelines are added, as with planned and anticipated pipelines to transport oil to the west and east coasts, and natural gas from northeast British Columbia to liquefied natural gas processing and export facilities in the vicinity of Kitimat and Prince Rupert, the overall annual contributions from operation of the pipeline system to GDP, Labour Income and jobs in a wide range of industries will mount.

The Impact of Two Proposed Pipelines

In this section the impacts from operation of the proposed TransCanada Energy East Pipeline (Energy East) and the Trans Mountain Pipeline Expansion (TMX) are examined. The impact that their operation would have on the total economic impacts emanating from operation of energy pipelines in Canada is then discussed.

1. Impacts from operation of the Energy East Pipeline and the Trans Mountain Expansion

Table 6 summarizes the impacts from operation of the Energy East and TMX projects. The I-O Model simulation indicates that if these projects were operational there would be an annual boost to GDP in the order of \$3.2 billion comprised of direct impacts totaling \$2.2 billion (70%), indirect impacts of \$0.7 billion (21%), and induced impacts of \$0.3 billion (9%). The direct impacts on GDP would fall mainly in Quebec (20%) and New Brunswick (23%); Ontario and Alberta (each with 16%); and B.C. (14%).

Table 6 – Impacts from Operation of Energy East Pipeline & Trans Mountain Expansion

Gross Domestic Product – Millions of 2015 \$

	BC	AB	SK	MB	ON	QC	NB	Other	Canada
Direct	323.0	365.2	91.5	148.8	359.5	454.5	505.5	0.0	2,248.0
Indirect	84.3	114.9	23.3	32.1	171.3	137.1	118.7	8.7	690.4
Dir. & Indir.	407.3	480.1	114.8	180.9	530.8	591.6	624.2	8.7	2,938.4
Induced	39.6	53.5	11.7	13.7	89.6	50.9	16.0	4.6	279.6
Total	446.9	533.6	126.5	194.6	620.4	642.5	640.2	13.3	3,218.0

Labour Income – Millions of 2015 \$

	BC	AB	SK	MB	ON	QC	NB	Other	Canada
Direct	22.2	58.0	19.1	14.5	45.4	29.5	28.0	0.0	216.7
Indirect	52.9	62.8	10.8	19.8	114.3	83.1	24.8	4.6	373.1
Dir. & Indir.	75.1	120.8	29.9	34.3	159.7	112.6	52.8	4.6	589.8
Induced	17.9	23.3	4.7	6.1	45.7	24.9	6.8	2.1	131.5
Total	93.0	144.1	34.6	40.4	205.4	137.5	59.6	6.7	721.3

Number of Full-time Equivalent Jobs

	BC	AB	SK	MB	ON	QC	NB	Other	Canada
Direct	277	254	193	148	398	194	284	0	1,748
Indirect	862	697	168	355	1,827	1,497	850	85	6,341
Dir. & Indir.	1,139	951	361	503	2,225	1,691	1,134	85	8,089
Induced	382	400	103	138	853	549	171	48	2,644
Total	1,521	1,351	464	641	3,078	2,240	1,305	133	10,733

There would be no direct impacts of any kind in the Northwest Territories or Nova Scotia because the Trans Mountain Expansion and Energy East Pipeline would not extend to those jurisdictions. Indirect and induced impacts in the Northwest Territories and in Nova Scotia are relatively small and are included in the “Other” column in Table 6.

Ontario and Quebec would be the main beneficiaries of the indirect impacts on GDP if the proposed pipelines were operating (together, about \$0.3 billion or 45% of the annual total). New Brunswick, Ontario and British Columbia would also benefit significantly from indirect impacts. About half of the benefits emanating from consumer spending triggered by the direct and indirect impacts (i.e. the so-called induced effects) would be realized in Ontario and Quebec, while Alberta and British Columbia would be host to one-third of the induced impacts.

The two projects would generate approximately \$721 million in Labour Income on an annual basis in terms of 2015 dollars with Ontario (28%), Alberta (20%) and Quebec (19%) accounting for two-thirds of the total impact.

Operation of the proposed crude oil pipelines would provide an estimated 10,733 full-time equivalent jobs. Of these, most (59%) would be the consequence of indirect impacts. Induced impacts would account for 25% of the total. The 1,748 full-time equivalent positions resulting from direct impacts, accounting for 16% of the total, would be greatest in Ontario,

British Columbia, New Brunswick, and Alberta. But Quebec, Saskatchewan, and Manitoba would also be significant beneficiaries.

Fifty-two percent of the 6,341 jobs created via indirect impacts are in Ontario and Quebec. British Columbia (14%), New Brunswick (13%) and Alberta (11%) account for 38% of the full-time equivalent job positions generated by indirect impacts.

2. Impacts from operation of the natural gas transmission pipelines and existing and proposed liquids transmission pipelines

Table 7 presents the economic impacts emanating from operation of all of the existing liquids and natural gas transmission pipelines in Canada and from the proposed Energy East Pipeline and Trans Mountain Expansion.

In this case the contribution to Canada's GDP would be \$14.7 billion. This is comprised of direct impacts of \$10.8 billion (74%), indirect impacts totaling \$2.5 billion (17%), and induced impacts in the order of \$1.4 billion (9%). Thirty-eight percent of the total impacts on GDP would be in Alberta, 17% in Ontario and 16% in Saskatchewan. Ontario and Quebec would enjoy 32% of the indirect impacts, and Alberta, 33%. The distribution of induced effects would be similar but the lion's share (36%) would be felt in Ontario and Quebec.

Table 7 – Impacts from Crude Oil, NGL, RPP & Natural Gas Transmission Including Energy East and Trans Mountain Expansion

Gross Domestic Product – Millions of 2015 \$

	NWT	BC	AB	SK	MB	ON	QC	NB	NS	Other	Canada
Direct	43.0	810.0	4,351.6	1,902.9	930.4	1,556.4	576.3	619.6	37.0	0.0	10,827.2
Indirect	7.5	228.0	840.6	319.9	156.3	574.2	235.7	130.4	3.8	22.8	2,519.2
Dir. & Indir.	50.5	1,038.0	5,192.2	2,222.8	1,086.7	2,130.6	812.0	750.0	40.8	22.8	13,346.4
Induced	2.6	137.4	446.4	177.0	77.2	371.2	122.3	20.9	4.5	14.1	1,373.6
Total	53.1	1,175.4	5,638.6	2,399.8	1,163.9	2,501.8	934.3	770.9	45.3	36.9	14,720.0

Labour Income – Millions of 2015 \$

	NWT	BC	AB	SK	MB	ON	QC	NB	NS	Other	Canada
Direct	5.0	65.7	669.8	399.1	98.2	223.1	39.3	37.0	6.3	0.0	1,543.5
Indirect	4.9	143.5	467.5	152.5	96.8	377.7	144.5	27.7	2.0	12.7	1,429.8
Dir. & Indir.	9.9	209.2	1,137.3	551.6	195.0	600.8	183.8	64.7	8.3	12.7	2,973.3
Induced	1.0	65.8	193.1	70.8	35.0	192.2	62.1	9.1	2.2	6.8	638.1
Total	10.9	275.0	1,330.4	622.4	230.0	793.0	245.9	73.8	10.5	19.5	3,611.4

Number of Full-time Equivalent Jobs

	NWT	BC	AB	SK	MB	ON	QC	NB	NS	Other	Canada
Direct	35	638	2,878	3,756	841	1,732	288	381	68	0	10,616
Indirect	55	2,382	5,187	2,387	1,745	5,922	2,550	1,007	67	231	21,533
Dir. & Indir.	90	3,020	8,065	6,143	2,586	7,654	2,838	1,388	135	231	32,149
Induced	15	1,420	3,340	1,544	788	3,540	1,318	226	52	144	12,387
Total	105	4,440	11,405	7,687	3,374	11,194	4,156	1,614	187	375	44,536

Operation of the existing and proposed transmission lines would boost Labour Income by \$3.6 billion. The direct and indirect impacts on Labour Income would be about the same: \$1.5 billion and \$1.4 billion, respectively. The percentage composition of the three kinds of impacts is indicated as follows: direct (42.7%), indirect (39.6%) and induced (17.7%). Thirty-seven percent of the impacts on Labour Income are in Alberta, and 29% in Ontario and Quebec.

Operation of the existing and proposed pipelines would generate 44,536 full-time equivalent jobs. Most of these, 21,533 (48%) would be the consequence of indirect impacts. Direct job impacts would constitute 24% of the total and induced impacts, 28%. About the same number of jobs would be generated in Ontario as in Alberta. But the four western provinces benefit from 61% of the total number of jobs created compared with 34% in Ontario and Quebec.

Summary

Table 8 provides a summary of the economic impacts from operation of existing energy transmission pipelines and the two proposed pipelines on Canada's GDP, Labor Income and Full-time Equivalent Jobs as presented in the previous sections.

Table 8 – Summary of Economic Impacts from Operation of Energy Transmission Pipelines in Canada (2015)

	I-O Model Version	GDP (\$ billions)	Labour Income (\$ billions)	Full-time Equiv. Jobs
Crude Oil, NGL and Refined Petroleum Product (RPP) Transmission	open*	4,842.7	1,259.9	13,447
	closed	5,446.2	1,538.3	18,772
Natural Gas Transmission	open*	5,565.3	1,123.6	10,613
	closed	6,055.8	1,351.8	15,031
Subtotal:- Crude Oil, NGL, RPP and Natural Gas Transmission	open*	10,408.0	2,383.5	24,060
	closed	11,502.0	2,890.1	33,803
Proposed TransMountain Expansion and Energy East Pipeline Projects	open*	2,938.4	589.8	8,089
	closed	3,218.0	721.3	10,733
Existing Liquids and Natural Gas Transmission Pipelines + TMX and EE	open*	13,346.4	2,973.3	32,149
	closed	14,720.0	3,611.4	44,536

*excludes induced consumption effects

The estimated annual impact on GDP that would be realized if the Energy East Pipeline and the Trans Mountain Expansion were operational would increase the total impact on GDP from the \$11.5 billion provided by the existing transmission system to \$14.7 billion, an increase of

\$3.2 billion.³ Disregarding the contribution from induced impacts, the increase would be about \$2.9 billion.

The two proposed pipelines would contribute an additional \$721 million to Labour Income each year. Consequently, the overall impact on Labour Income would be elevated from the \$2.9 billion generated by the existing pipelines to \$3.6 billion.

If the proposed pipelines were operational the number of full-time equivalent jobs would be 10,733 (nearly 32%) greater according to the “closed” version of the model. The total number of full-time equivalent positions would be 44,536 compared with the 33,803 positions arising from operation of the existing transmission system. Ignoring the induced effects, 8,089 additional full-time equivalent jobs would be created, bringing the total to 32,149 positions compared with 24,060 positions – an increase of almost 34%.

Detailed Methodology

For the purpose of the analysis reported here, the statistical relationships embedded in the 2010 version of the Statistics Canada Inter-Regional Input-Output Model were used to estimate the direct, indirect and induced impacts from energy pipeline operations on Canadian Gross Domestic Product (GDP), labour income and employment (full-time equivalent jobs). Essentially, the I-O framework is a data accounting structure that is consistent with Canada’s national income and expenditure system of accounts. The coefficients in the 2010 version of the I-O Model are based on the 2010 national income and expenditure accounts data. Statistics Canada plans to update the I-O Model framework to reflect 2012 national income and expenditure data later this year.

Total annual gross revenues from the operation of energy liquids (crude oil, NGL and RPP) pipelines and from operating natural gas transmission pipelines were assigned, separately, to the appropriate industry classifications in the Model on a provincial/territorial basis. For pipelines that had segments in more than one province or territory, allocations of their annual revenue equivalent to the percentage share of “head office” administrative expenses of total expenses were assigned to the province where the company was headquartered. The remaining revenue was allocated to each of the provinces in which the pipeline in question operated. Such allocations were based on estimated throughput-distance in the case of the major trunk lines. In other cases, as with the smaller pipelines or pipelines through which all of the throughput was earmarked for export via connections at US border points, provincial allocations were based on pipeline distances in the various provinces involved.

Because the Input-Output Model was shocked according to the annual gross revenue of pipelines, if operating revenues were unusually high or low as the result of special, non-recurring circumstances then the impacts reported here are too high or low, accordingly. In any case the *estimates* generated by the Model are simply that. That is, the numbers presented in the results tables provided in this report cannot be taken to imply exact measures. Rather, they are indicative only of general levels of magnitude subject, of course, to the limitations of the methodology.

The I-O Model simulations provide information according to each of three kinds of impacts: direct, indirect and induced. Direct impacts measure the initial requirements of additional

³ According to the closed version of the Model that includes induced consumption.

output. The direct impact on the output of an industry is the change in output required to meet a one-dollar change in final demand. Associated with this change, there will be direct impacts on GDP, jobs, and imports.

Indirect impacts arise from inter-industry purchases as other industries respond to the increased demands arising from the industry that is “shocked” in the model. This includes all the chain reactions to output along the production stream since each of the products purchased will require, in turn, the production of various inputs.

The induced impacts measure the changes in the production of goods and services in response to consumer expenditures induced by the increase in households’ incomes (i.e., wages) generated by the production of the direct and indirect requirements. However, no attempt is made to estimate the response of the business sector to changes in sales and profits arising from the changes in consumer spending.

For confidentiality reasons Statistics Canada is unable to break out the direct and indirect impacts for provinces in which there are only one or two pipelines of a particular kind (e.g. gas transmission) unless the pipelines consent to allow this. For this reason, direct and indirect impacts were not available, separately, for gas transmission in the case of New Brunswick and Nova Scotia, or for crude oil pipeline operations in New Brunswick.

In these cases, it was assumed that with respect to both GDP and Labour Income the direct and indirect impacts in both New Brunswick and Nova Scotia bear the same relationship (in ratio terms) to the sum of the direct and indirect impacts as the average of the same ratios in Saskatchewan and Manitoba. With regard to FTEs it was assumed that the ratio of the direct impact on FTEs to the direct impact on Labour Income was the same as the average of that ratio in Saskatchewan and Manitoba. Depending on these assumptions, the direct and indirect impacts from natural gas transmission operations in New Brunswick and Nova Scotia, and from crude oil pipeline operations in New Brunswick could be greater or less than indicated in the respective results tables. However, the sum of the direct and indirect impacts in those provinces is as reported in the respective I-O Model simulation results.

Because as yet there is no crude oil transmission pipelines in New Brunswick, in order to estimate the impacts of crude oil transmission operations in that province Statistics Canada applied the I-O Model coefficients pertaining to *natural gas* transmission in New Brunswick. For this reason, the estimated impacts from energy liquids transmission operations in New Brunswick are likely somewhat less reliable than for provinces which already enjoy the benefits of crude oil transmission.

All dollar values used in the analysis were in terms of 2015 constant dollars. No adjustments were needed to accommodate inflation because the I/O Model elements are structural coefficients that rather than income or expenditure components.

Input-Output Models utilize fixed coefficients that do not take economies of scale, technological changes, externalities, or price changes into account. Because firms typically adjust production technologies in time (during which the I-O technological coefficients become outdated) impact analyses based on I-O Models may overestimate the effects. For example, as production technologies are introduced to improve operating efficiencies, the annual economic impacts of operations on final demand will tend to be reduced from those indicated by the Model. For this reason, one must exercise considerable caution when projecting I-O Model results. The fact that I-O Model analysis is inherently static (zero adjustment period)

and there is no way to account for negative (i.e. offsetting) impacts as workers leave one job to go to another (pipeline construction instead of farming, for example), or for the consequences of higher prices arising from increased final demand, also suggests that the impacts are at risk of being overstated.

It is generally considered that the “open” version of the Model, which does not address the induced (consumption) effects, underestimates the economic impacts and that the “closed” version, which does, overestimates the total impacts because of the assumption of constant consumption behavior and fixed expenditure relative to income. For this reason, the two measures are often considered as indicating the lower and upper bounds of the impacts, respectively. For this reason, results are provided both for the sum of the direct and indirect impacts and for the direct, indirect and induced impacts combined.

Energy Pipelines Included in the Analysis

The major energy pipelines in the business of transmitting crude oil, natural gas, RPPs and natural gas that were included in the analysis are listed below. Where a pipeline or pipeline system extends into the United States, only revenues with respect to operations in Canada were included.

Crude oil transmission (including diluent and, in some cases, NGLs and/or RPPs)

Access Pipeline
Enbridge Norman Wells to Zama
Enbridge Athabasca and Waupisoo Pipelines
Enbridge Mainline
Enbridge Southern Lights
Enbridge Bakken Pipeline
Enbridge Westpur Pipeline
Inter Pipeline Fund (3 oil sands lines)
Kinder Morgan Canada Inc. – Trans Mountain Pipeline
Pembina Pipeline (bitumen and conventional heavy oil pipeline business)
Plains Midstream Canada’s Aurora, Bodo, Milk River, Wapella, Wascana, Rangeland and Rainbow pipelines
Portland-Montreal Pipeline
TransCanada Keystone Pipeline
Spectra (Express) Pipeline
Suncor Oil Sands Pipeline

Natural gas liquids and RPP transmission⁴

AltaGas Ltd. (applicable portion)
Enbridge Line 8
Enbridge Line 9
Keyera Fort Saskatchewan to Edmonton terminal pipeline
Kinder Morgan Canada Cochin Pipeline
Kinder Morgan Trans Mountain Jet Fuel System
Pembina Prairie (formerly Vantage) Pipeline
Plains Midstream Canada’s Windsor-Sarnia and Sarnia Downstream Pipelines, and

⁴ Revenues with respect to NGLs and/or RPPs transported on the Kinder Morgan Trans Mountain Pipeline and the Enbridge Mainline are included with those lines.

Eastern Delivery System
Spectra NGL line from Alberta to Manitoba⁵
Trans Northern Pipeline's Edmonton to Calgary RPP pipeline and Ontario NGL/RPP pipeline

Natural gas transmission

Alliance
AltaGas Ltd. (applicable portion)
ATCO Pipelines
Centra Gas MB (transmission component)
Emera Brunswick Pipeline
Many Islands Pipeline
PNG West (part only: rest considered to be distribution)
Spectra Westcoast Transmission
Spectra Maritimes & Northeast
Spectra Union Gas Limited (transmission and storage component)
TransCanada Mainline
TransCanada TQM
TransCanada Alberta System (NGTL, but ex. gathering portion)
TransCanada Foothills Zones 6, 7, 8 and 9
TransGas (except gathering)

⁵ Data with respect to this line was not available.