Mackenzie Gas Project
US State
Canadian Provincial
PADD-level
Economic Impacts Assessment

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Submitted by:

Integrated Environments
Planning • Integration • Management

CANADIAN ENERGY RESEARCH INSTITUTE

Northwest Territories Industry, Tourism and Investment

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1. Summary

The GNWT asked Integrated Environments and the Canadian Energy Research Institute (CERI) to estimate the economic impact of the Mackenzie Gas Project on the US economy at the state and national level. Earlier estimates on MGP economic effects have been made on the Canadian and NWT economies (Wright Mansell 2007). A broader understanding of the effect on the US economy was commissioned to contribute to the understanding and debate of the effects of transporting petroleum products across the North American natural gas transportation infrastructure.

This report provides estimates of the economic effects of the MGP on:

- Gross Domestic Product (GDP by State, Province and PADD level)
- Employment (Person-years employment by State, Province and PADD level)
- Labour Income (Compensation of Employees by State, Province and PADD level)
- Government Revenue (Canadian Provincial Government tax)

A summary of Case 1A is provided below, based a long run HH price of $6.00/mcf. Estimates (Case 1B) are also provided in the report, based on a long run HH price of $8/mcf.

U.S. Investment and Operations Impacts

- U.S. project investment and operational GDP is forecast at $10,223 million
- 119,000 person-years of employment are forecast
- Overall US employee compensation is $5,165 million with California, Indiana, New York and Texas being key employment centres

US Employment

- Peak US employment will run between 2016 and 2019

Canadian Employment Investment and Operation

- Canadian employment peaks between 2017 and 2019
- 217,000 person-years of employment are forecast
- 26,000 person years of employment are forecast for the NWT
- 120,600 person years employment are forecast for Alberta

Provincial and Territorial Tax for Investment and Operation

- NWT tax effects total $1,384 million following Alberta's tax effect of $4,248 million

Canadian Investment and Operations Impacts

- Canadian project investment and operational GDP is forecast at $36,578 million
- Overall Canadian employee compensation is $10,468 million with close to 12% based in the NWT and over 60% directed to Alberta – based employees

2. Methods and Assumptions

2.1. Methods

The forecasting exercise reviewed secondary sources that have scoped industry forecasts, including:

- ✓ Ellis Consulting Services (May 2007) Estimated Economic Impacts of the Mackenzie Gas Project *Construction and Operations Update with Revised Capital Expenditure.* Prepared for AMEC Earth & Environmental, Calgary.
- ✓ Wright and Mansell Research Ltd. 2007. Extended Analysis and Update – An Evaluation of the Economic Impacts Associated with the Mackenzie Valley Gas Pipeline and Mackenzie Delta Gas Development. Wright Mansell, Calgary Alberta.

Full references are available in the appendices.

Simulations using the Statistics Canada and CERI-derived input–output and other models were developed to estimate:

- Gross Domestic Product (GDP by State, Province and PADD level)
- Employment (Person-years employment by State, Province and PADD level)
- Labour Income (Compensation of Employees by State, Province and PADD level)
- Government Revenue (Canadian Provincial Government tax)

All dollar values presented in this analysis are measured in 2007 Canadian dollars.

All employment for construction is represented as number of jobs.

Model simulations for three cases (varied by gas sales price) provide estimates of the direct and induced impact associated with the three distinct portions of the project:

- The main-line pipeline from Inuvik NWT to Zama Alberta
- The field gathering system
- The three anchor fields

Model sectoral injections were developed by CERI:

For AB, BC, SK, ON, PQ, NS, USA, other

- Capital injection in to Manufacturing Sector 80%
- Capital injection into Construction sector 17%
- Capital injection into Finance, Insurance sector 3%

For NWT

- Capital injection into Oil and Gas sector 47%
- Capital injection into Construction sector 50%
- Capital injection into Finance, Insurance sector 3%

Direct impacts are derived from the employment and production generated by direct project

expenditures. Indirect impacts include the economic activity associated with firms and their workers that are in the production chain, supplying goods and services to the businesses supplying the direct project requirements. Induced impacts result from workers, who are involved in direct and indirect production of consumer goods and services, spending their earnings (after withdrawing a portion for taxes and savings). This spending increases the demand for commodities and production.

Impacts are reported on a country level – Canada and the US, a province and state level as well as PADD level.

2.2. Project Case Assumptions

Project Case

The Project Case is based on the Project Application filed by Imperial Oil Resource Ventures Ltd on behalf of the Mackenzie Gas Project and descriptions using the Case 2 flow levels in the Wright Mansell 2007 report - Evaluation of the Economic Impacts Associated with the Mackenzie Valley Gas Pipeline and Mackenzie Delta Gas Development.

The key Project Case assumptions are:

- Project includes the gas and NGL pipeline and anchor fields/discoveries at Taglu, Parsons Lake and Niglingak
- The Project is capable of a marketable gas flow rate of 1,200 mmcf/d for years 1-14 followed by 14% /yr decline
- A long run HH price of $5/mcf (less than $5 creates a negative net back)
- A long run exchange rate of $0.90 (US/CAN$)
- All costs and revenues are 2007$
- Gas Pipeline cost is $8,486 million (all costs from 2010 forward)
- NGL Pipeline costs is $970 million (all costs from 2010 forward ratioed off gas pipeline
- Gas Pipeline additions to NOVA (TCPL) are valued at $250 million
- NGL additions at Norman Wells are valued at $40 million
- Producer fields costs $7,200 million
- Pipeline costs = 40% materials, 60% construction (of pipeline total cost)
- Field Facilities Wells = Rigs 80%, misc 20%
- Field Facilities Gathering and Gas Plant Costs = 70% materials, 30% construction

Project Case 1A

Case 1A is based on the same project description assumptions as the Project Case except it assumes a long run HH price of $6.00/mcf.

Project Case 1B

Case 1A is based on the same project description assumptions as the Project Case except it assumes a long run HH price of $8.00/mcf.

3. Economic Impacts

3.1. Provincial Economic Impacts

3.1.1. Case 1A $6.00/mcf long run gas price - Provincial Economic Impacts

Case 1A is based on the same project description assumptions as the Project Case except it assumes a long run HH price of $6.00/mcf.

Canadian Investment and Operations Impacts

- Canadian project investment and operational GDP is forecast at $36,578 million
- 217,000 person-years of employment are forecast
- Overall Canadian employee compensation is $10,468 million with close to 12% based in the NWT and over 60% directed to Alberta – based employees

Investments and Operations	$CAD Million		Thousand Person Years
	GDP	Compensation of Employees	Employment
Alberta	20,848	6,333	121
British Columbia	984	547	14
Manitoba	133	64	2
New Brunswick	32	14	0
Newfoundland & Labrador	16	5	0
Northwest Territories	10,353	1,239	26
Nova Scotia	88	45	1
Nunavut	10	6	0
Ontario	2,798	1,549	36
Prince Edward Island	3	2	0
Quebec	931	497	13
Saskatchewan	377	164	4
Yukon Territory	6	3	0
Gabd*	0	0	0
Total Canada	**36,578**	**10,468**	**217**

*GABD "Government Abroad" and includes Canadian embassies, Military bases and other Government offices on foreign territory. Is contained within the StatsCan IO table.

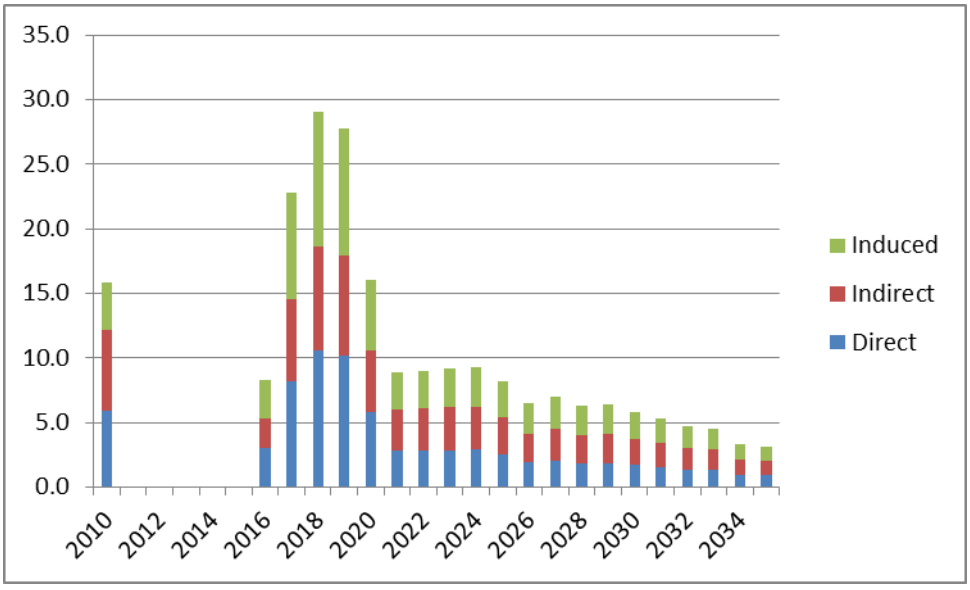
Provincial and Territorial Tax for Investment and Operation

- NWT tax effects total $1,384 million following Alberta's tax effect of $4,248 million

CAD Million	Indirect Tax	Personal Income Tax	Corporate Tax	Sum
Alberta	1,275	1,990	982	4,248
British Columbia	123	107	24	255
Manitoba	18	15	2	35
New Brunswick	4	4	1	8
Newfoundland & Labrador	1	1	1	3
Northwest Territories	314	549	522	1,384
Nova Scotia	12	11	3	25
Nunavut	1	1	0	1
Ontario	380	334	139	853
Prince Edward Island	0	0	0	1
Quebec	141	134	39	314
Saskatchewan	52	35	21	108
Yukon Territory	1	1	0	1

Canadian Employment Investment and Operation Impacts

- Canadian employment peaks between 2017 and 2019



Canadian Employment, Investment and Operation Impacts

- 26,000 person years of employment are forecast for the NWT
- 120,600 person years employment are forecast for Alberta

Thousand Person Years	Direct	Indirect	Induced	Sum
Alberta	44.2	37.7	38.6	120.6
British Columbia	2.1	4.9	6.6	13.6
Manitoba	0.0	0.8	1.0	1.8
New Brunswick	0.0	0.1	0.2	0.4
Newfoundland & Labrador	0.0	0.1	0.1	0.1
Northwest Territories	14.5	8.3	3.2	26.0
Nova Scotia	0.3	0.4	0.5	1.2
Nunavut	0.0	0.1	0.0	0.1
Ontario	7.3	12.0	16.7	35.9
Prince Edward Island	0.0	0.0	0.0	0.0
Quebec	2.8	4.4	5.8	13.0
Saskatchewan	1.5	1.2	1.6	4.2
Yukon Territory	0.0	0.0	0.0	0.1

3.1.2. Case 1B $8.00/mcf long run gas price - Provincial Economic Impacts

Case 1B is based on the same project description assumptions as the Project Case except it assumes a long run HH price of $8.00/mcf.

Canadian Investment and Operations Impacts

Canadian Investment and Operations Impacts

- Canadian project investment and operational GDP is forecast at $53,039 million
- 280,000 person-years of employment are forecast
- Overall Canadian employee compensation is $13,849 million with close to 9% based in the NWT and over 65% directed to Alberta – based employees

Investments and Operations	$CAD Million		Thousand Person Years
	GDP	Compensation of Employees	Employment
Alberta	32,679	9,336	174
British Columbia	1,164	639	16
Manitoba	163	79	2
New Brunswick	38	16	0
Newfoundland & Labrador	18	6	0
Northwest Territories	14,259	1,239	26
Nova Scotia	94	47	1
Nunavut	10	6	0
Ontario	3,175	1,754	41
Prince Edward Island	3	2	0
Quebec	1,020	543	14
Saskatchewan	410	178	5
Yukon Territory	7	3	0
Gabd*	0	0	0
Total Canada	**53,039**	**13,849**	**280**

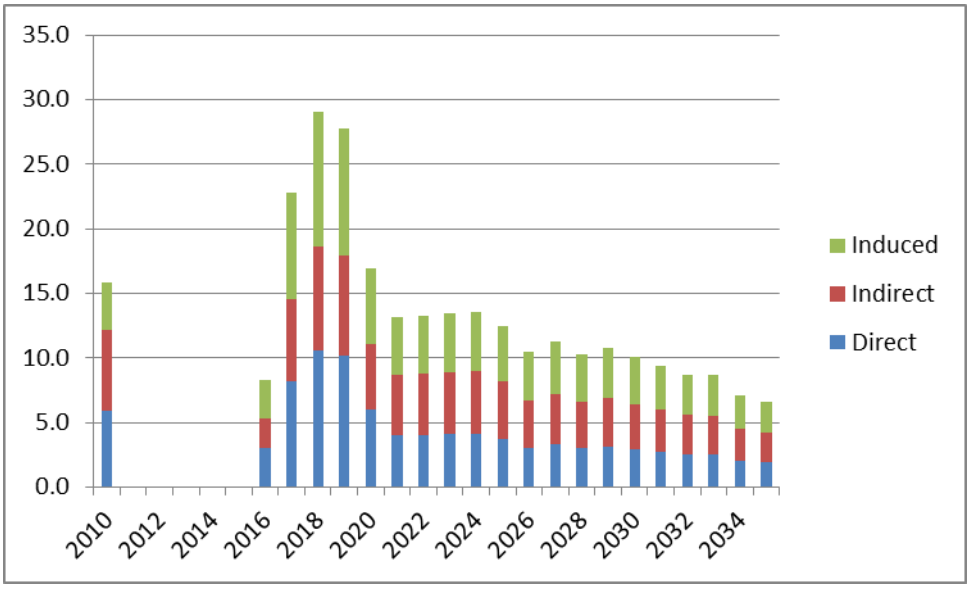
Provincial and Territorial Tax for Investment and Operation

- NWT tax effects total $1,879 million following Alberta's tax effect of $6,624 million

CAD Million	Indirect Tax	Personal Income Tax	Corporate Tax	Sum
Alberta	1,964	3,120	1,540	6,624
British Columbia	146	127	29	302
Manitoba	23	18	3	43
New Brunswick	5	4	1	10
Newfoundland & Labrador	2	1	1	3
Northwest Territories	405	755	719	1,879
Nova Scotia	13	12	3	27
Nunavut	1	1	0	1
Ontario	436	379	157	973
Prince Edward Island	1	0	0	1
Quebec	157	147	43	346
Saskatchewan	57	38	23	118
Yukon Territory	1	1	0	1

Canadian Employment Investment and Operation Impacts

- Canadian employment peaks between 2017 and 2019



Canadian Employment, Investment and Operation Impacts

- 26,000 person years of employment are forecast for the NWT
- 173,800 person years employment are forecast for Alberta

Thousand Person Years	Direct	Indirect	Induced	Sum
Alberta	62.4	55.7	55.7	173.8
British Columbia	2.1	5.9	8.1	16.1
Manitoba	0.0	1.0	1.2	2.2
New Brunswick	0.0	0.2	0.3	0.4
Newfoundland & Labrador	0.0	0.1	0.1	0.2
Northwest Territories	14.5	8.3	3.2	26.0
Nova Scotia	0.3	0.4	0.5	1.2
Nunavut	0.0	0.1	0.0	0.1
Ontario	7.3	14.0	19.5	40.8
Prince Edward Island	0.0	0.0	0.0	0.1
Quebec	2.8	4.9	6.6	14.2
Saskatchewan	1.5	1.4	1.7	4.6
Yukon Territory	0.0	0.0	0.0	0.1

3.2. US State Economic Impacts

3.2.1. Case 1A $6.00/mcf long run gas price - State Economic Impacts

Case 1A is based on the same project description assumptions as the Project Case except it assumes a long run HH price of $6.00/mcf.

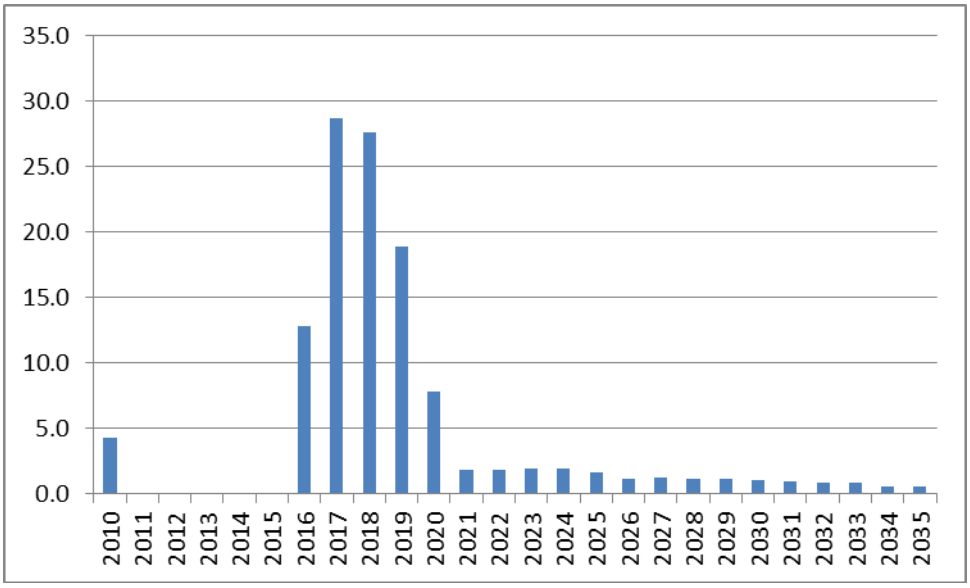
U.S. Investment and Operations Impacts

- U.S. project investment and operational GDP is forecast at $10,223 million
- 119,000 person-years of employment are forecast
- Overall US employee compensation is $5,165 million with California, Indiana, New York and Texas being key employment centres.

	$CAD Million		Thousand Person Years
	GDP	Compensation of Employees	Employment
Alabama	117	61	2
Alaska	31	7	0
Arizona	150	76	2
Arkansas	66	32	1
California	1,277	626	13
Colorado	144	71	2
Connecticut	163	82	2
Delaware	32	13	0
District of Columbia	31	19	0
Florida	398	197	5
Georgia	226	119	3
Hawaii	26	12	0
Idaho	44	23	1
Illinois	461	241	5
Indiana	942	558	11
Iowa	121	57	2
Kansas	76	39	1
Kentucky	113	57	2
Louisiana	159	50	1
Maine	33	17	1
Maryland	137	72	2
Massachusetts	266	147	3
Michigan	369	202	5
Minnesota	215	112	3
Mississippi	58	30	1
Missouri	149	80	2
Montana	19	9	0
Nebraska	52	25	1
Nevada	61	29	1
New Hampshire	48	26	1
New Jersey	260	134	3
New Mexico	49	19	1
New York	596	307	6
North Carolina	283	131	3
North Dakota	23	11	0
Ohio	376	201	5
Oklahoma	107	48	1
Oregon	202	99	2
Pennsylvania	337	177	4
Rhode Island	37	18	0
South Carolina	106	57	2
South Dakota	29	12	0
Tennessee	180	93	2
Texas	869	371	9
Utah	63	32	1
Vermont	17	9	0
Virginia	202	103	2
Washington	217	110	2
West Virginia	31	15	0
Wisconsin	235	124	3
Wyoming	21	6	0
Total US	**10,223**	**5,165**	**119**

US Employment

- Peak US Employment will run between 2016 and 2019



3.2.2. Case 1B $8.00/mcf long run gas price - State Economic Impacts

Case 1B is based on the same project description assumptions as the Project Case except it assumes a long run HH price of $8.00/mcf.

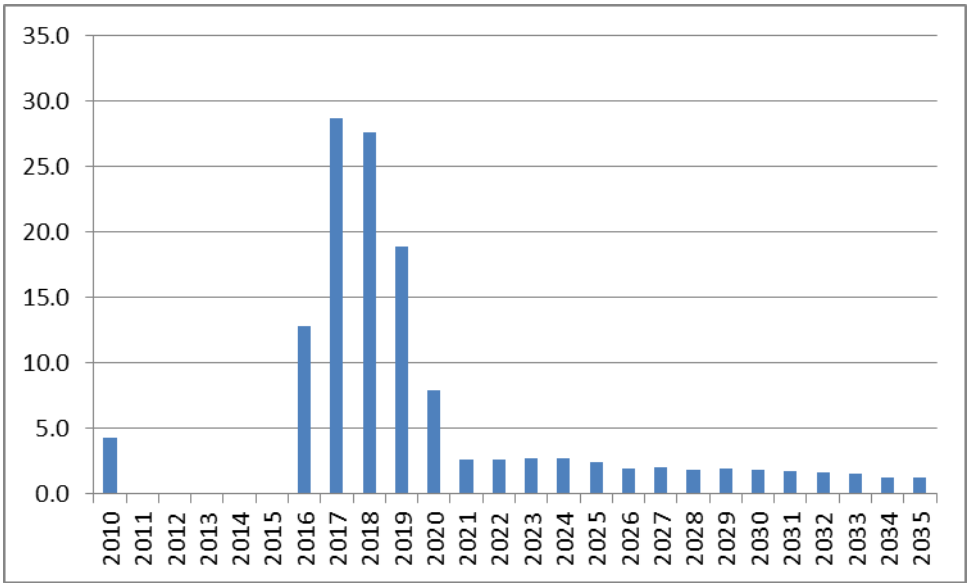
U.S. Investment and Operations Impacts

- U.S. project investment and operational GDP is forecast at $11,289 million
- 131,000 person-years of employment are forecast
- Overall US employee compensation is $5,670 million with California, Indiana, New York and Texas being key employment centres.

	$CAD Million		Thousand Person Years
	GDP	Compensation of Employees	Employment
Alabama	127	65	2
Alaska	35	8	0
Arizona	163	82	2
Arkansas	71	34	1
California	1,420	693	15
Colorado	157	77	2
Connecticut	191	96	2
Delaware	36	14	0
District of Columbia	35	22	0
Florida	436	215	6
Georgia	246	130	3
Hawaii	29	13	0
Idaho	50	26	1
Illinois	516	269	6
Indiana	974	573	12
Iowa	139	65	2
Kansas	83	43	1
Kentucky	122	62	2
Louisiana	178	55	1
Maine	39	20	1
Maryland	150	78	2
Massachusetts	310	170	3
Michigan	413	225	5
Minnesota	256	132	3
Mississippi	64	32	1
Missouri	161	86	2
Montana	23	10	0
Nebraska	56	27	1
Nevada	68	33	1
New Hampshire	54	30	1
New Jersey	286	148	3
New Mexico	54	21	1
New York	660	339	6
North Carolina	306	142	4
North Dakota	27	12	0
Ohio	403	215	5
Oklahoma	117	51	1
Oregon	229	112	3
Pennsylvania	366	192	5
Rhode Island	46	23	1
South Carolina	114	61	2
South Dakota	35	15	0
Tennessee	193	100	3
Texas	952	401	9
Utah	69	34	1
Vermont	19	10	0
Virginia	220	113	3
Washington	260	131	3
West Virginia	34	17	1
Wisconsin	275	144	3
Wyoming	24	6	0
Total US	**11,289**	**5,670**	**131**

US Total Employment

- Peak US Employment will run between 2016 and 2019



3.3. PADD-Level Economic Impacts

3.3.1. Case 1A $6.00/mcf long run gas price – PADD-level Economic Impacts

US PADD-level Investment and Operations

- Distribution of US PADD level impacts is focused on PADD I and II regions

2010-2035	$CAD Million		Thousand Person Years
	GDP	Compensation of Employees	Employment
PADD I	3,203	1,644	37
PADD II	3,445	1,859	43
PADD III	1,319	562	14
PADD IV	291	139	4
PADD V	1,964	960	21
Total US	10,223	5,165	119

3.3.2. Case 1B $8.00/mcf long run gas price – PADD-level Economic Impacts

US PADD-level Investment and Operations Economic Impacts

- Distribution of PADD level impacts is again focused on PADD level I and II regions.

2010-2035	$CAD Million		Thousand Person Years
	GDP	Compensation of Employees	Employment
PADD I	3,548	1,817	41
PADD II	3,770	2,020	47
PADD III	1,446	609	15
PADD IV	323	153	4
PADD V	2,203	1,071	24
Total US	11,289	5,670	131

Appendix One References

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