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ECONOMIC IMPACT ANALYSIS OF THE PROPOSED WIND DEVELOPMENT PROJECTS IN SOUTHEAST ALBERTA

CANADIAN TOURISM RESEARCH INSTITUTE

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WHAT'S INSIDE

This study reports on the potential economic impacts arising from the construction and operation of proposed wind development projects in Southeastern Alberta. The estimated capital spending and operational data over the next 5 years used in the analysis was provided by various wind farm developers in Southeast Alberta.

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EXECUTIVE SUMMARY

The Canadian Tourism Research Institute (CTRI) was contracted by the Economic Development Alliance of Southeast Alberta (EDA) to assess the potential economic impact of the construction and operation of proposed wind development projects to Southeast Alberta and the province of Alberta. The economic impacts presented in this report were based on cost estimates collected on behalf of the EDA and CTRI from cooperating developers actively pursuing developments both within the EDA region and others in Southeast Alberta with a similar need to tie into upgraded transmission lines. They have now organized themselves as the South Eastern Energy Developers (SEED). In total, SEED members plan to develop approximately 1650 MW of generating capacity in the region over the next five years.

Economic impacts generated by capital costs

Using the cost estimates provided by five prospective wind farm developers in Southeast Alberta, the total cost to develop and construct 1650 MW of wind farms in Southeast Alberta is \$3.89 billion.¹ This spending is expected to support significant economic benefits to Southeast Alberta, as well as the province of Alberta. Specifically, our analysis suggests that, over the construction phase, Southeast Alberta could benefit from:

- Increased direct employment of 1,757 equivalent full-year jobs for local residents
- Including indirect and induced effects, a total of 4,950 equivalent full-year jobs for local residents
- Payroll of \$302.0 million
- Municipal taxes & charges of \$16.5 million
- Gross domestic (regional) product in the order of \$526.7million

In addition, it is expected that the construction phase of the project would provide even larger economic benefits to the province of Alberta. Specifically, our analysis suggests that the level of economic impact would support:

- Increased direct employment of 1,836 equivalent full-year jobs for Alberta residents
- Including indirect and induced effects, a total of 6,801 equivalent full-year jobs for Alberta residents
- Total payroll of \$428.6 million
- Total taxes and charges of \$387.6 million
- Gross domestic product in the order of \$837.5 million

Economic impact generated by the annual operating and maintenance costs of Wind Parks in Southeast Alberta

In total, it is estimated that the on-going annual cost to operate and maintain wind parks in Southeast Alberta would be \$99.7 million. Our analysis suggests that, for Southeast Alberta, this spending would support:

¹ Of the 5 wind park developers that responded, 4 provided detailed cost estimated while the 1 only provided “rule of thumb” estimates. In total, the 5 wind park developers that responded represented 1250 MW of the planned 1650 MW for the region. The costs associated with the remaining 400 MW of planned capacity were imputed, on a per MW basis, from the responses received.

- Annual direct employment equivalent to 132 full-year jobs for local residents
- Including indirect and induced effects, total annual employment equivalent to 518 full-year jobs for local residents
- Annual payroll of \$35.5 million
- Municipal taxes & charges of \$10.8 million
- Lease payments to land owners in the amount of \$7.9 million per year
- Gross domestic (regional) product in the order of \$69.9 million

The annual operating and maintenance cost of wind parks in Southeast Alberta is also expected to have a large economic impact on the province of Alberta. Specifically, we estimate the annual impact within Alberta would support:

- Including direct, indirect and induced effects, total annual employment equivalent to 787 full-year jobs for Alberta residents
- A total of 787 equivalent full-year jobs for Alberta residents
- Total payroll of \$54.1 million
- Total taxes and charges of \$56.2 million
- Gross domestic product in the order of \$103.7 million

INTRODUCTION

Background

The Canadian Tourism Research Institute (CTRI) was contracted by the Economic Development Alliance of Southeast Alberta to assess the potential economic impact of the construction and operation of proposed wind development projects in Southeast Alberta over the next 5 years. The associated capital costs and operating expenditures for the wind farms were provided by five prospective developers. Of the 5 wind park developers that responded, 4 provided detailed cost estimates while the 1 only provided “rule of thumb” estimates. In total, the 5 wind park developers that responded represented 1250 MW of the planned 1650 MW for the region.

The prospective developers also provided a breakdown of the specific cost items as well as the share of spending that could be expected to go to local suppliers (located within Southeast Alberta) or to suppliers located in other parts of Alberta.

Using the information provided by the various prospective developers, an economic impact analysis was performed using the CTRI's economic assessment model. The economic impact model is supported by Canada's leading economic forecasting organization, The Conference Board of Canada. CTRI's economic assessment model has been used to assess the economic impact of specific proposed wind development projects on Prince Township and on the counties of Grey and Simcoe, all of which are in Ontario.

The economic impact analysis presented in this report is based on the total generating capacity (1650 MW) of SEED members in Southeast Alberta over the next five years. While detailed capital and operating costs were received from only five prospective developers (accounting for a potential 1250 MW of generating power), linear extrapolations were performed to estimate the costs associated with 1650 MW of generating capacity.

It should be noted that the economic impact analysis presented in this report is based solely from the perspective of capital costs associated with planning and constructing the wind parks as well as the typical annual year operations of running and maintaining them. No attempt has been made to estimate the (possible) impacts attributed to energy prices and/or to the opportunity costs for financial partners in the project.

Capital cost assumptions

Estimated costs to develop and construct 1650 MW of Wind Farms in Southeast Alberta

Based on data provided by the prospective wind farm developers, the total cost to develop and construct 1650 MW of wind farms in Southeast Alberta is \$3.89 billion. This figure represents the total capital costs estimated to be incurred by SEED members currently planning to develop wind generating capacity in Southeast Alberta over the next 5 years. While a significant portion of that spending is expected to go towards the purchase of wind turbine generators, produced outside of Canada, a sizeable portion could be expected to occur within Southeast Alberta. The range of services that are expected to be provided to wind farm developers by companies located in Southeast Alberta include construction, transportation, accommodation as well as legal, financial and professional advice.

TABLE 1: Capital Costs – Aggregate costs associated with potential wind farm development in Southeast Alberta over the next 5 years

Expenditure Category	Cost	Percent to Alberta Suppliers	Percent to Southeast Alberta Suppliers
Feasibility Study	\$5,053,125	100.0%	80.0%
Development	\$3,353,625	100.0%	26.7%
Turbine Supply and Construction of Wind Park (breakdown follows)	\$3,818,155,688	23.1%	7.9%
<i>Wind Turbine Generators (WTG)</i>	\$2,602,875,000	2.0%	0.0%
<i>WTG Shipping</i>	\$164,133,750	13.0%	4.0%
<i>Construction</i>	\$1,051,146,938	76.0%	28.0%
Other Costs	\$64,603,687	100.0%	0.0%
Total Costs	\$3,891,166,125	24.5%	7.8%

Operating cost assumptions

Estimated annual costs related to the operation and maintenance of the proposed wind development projects in Southeast Alberta

According to data provided by the prospective wind farm developers, the annual spending required to operate and maintain the various wind farm developments proposed is \$99.74 million. While a significant portion of this spending could be expected to occur within the local area (Southeast Alberta), a similar portion of the spending might occur outside the area in other parts of Alberta. It is also expected that a significant portion of spending (the costs to maintain the turbines) would go to the original turbine suppliers, located outside the country.

TABLE 2: Operating and Maintenance Costs – Average annual costs associated with operation and maintenance of potential wind farms in Southeast Alberta

Expenditure Category	Cost	Percent to Alberta Suppliers	Percent to Southeast Alberta Suppliers
Land Royalties	\$7,931,000	100.0%	100.0%
Energy Charges	\$4,086,500	100.0%	0.0%
Turbine warranty and maintenance	\$42,762,500	75.8%	37.9%
Administrative costs	\$10,862,500	100.0%	32.7%
Property taxes	\$9,212,500	100.0%	100.0%
Insurance	\$7,562,500	10.0%	0.0%
Income & capital taxes	\$17,325,000	40.0%	0.0%
Total Costs	\$99,742,500	72.4%	37.0%

ECONOMIC IMPACT ANALYSIS

Economic impacts generated by capital costs

According to data provided by the prospective wind farm developers, the total cost to develop and construct 1650 MW of wind farms in Southeast Alberta is \$3.89 billion

Economic impact of capital costs in the local area (Southeast Alberta)

The capital spending required for the development and construction of 1650 MW of wind farms in Southeast Alberta is expected to support direct local employment equivalent to 1,757 full-year jobs over the entire construction phase of the project. The payroll for these workers is estimated to exceed \$123 million.

Employment in the local area would benefit from three different impacts – the direct impact, the indirect impact and the induced impact. The direct impact on employment would include local employees providing service to wind park developers in construction, transportation, accommodation as well as legal, financial and professional advice.

The indirect impact would extend to other local suppliers that provide inputs to those businesses directly involved in the construction project. This would include the manufacturing sector, wholesale and retail trade as well as other business services. Finally, the induced impact is supported through a portion of the direct and indirect payroll that is spent in the local community on basic goods and services. Appendix B includes a more detailed discussion on different impacts and model methodology.

Including the indirect and induced effects, we estimate the development and construction of 1650 MW of wind farms to support local employment equivalent to 4,950 full-year jobs over the entire construction phase of the project. The payroll for these workers is estimated to reach nearly \$302 million.

The construction phase of wind farms in Southeast Alberta is also expected to support municipal taxes and charges of \$16.5 million over the entire construction phase of the project. The estimate of taxes supported at the municipal level is calculated on a share basis of the total municipal taxes paid by employees and businesses impacted².

TABLE 3: Economic Impact of Capital Costs - (within Southeast Alberta over the construction phase - 5 years)

Total Capital Costs	\$3.89 Billion
Economic Impact Measures	
Gross Domestic Product (Regional) - \$	\$526.7 million
Wages - \$	\$302.0 million
Employment (equivalent full-year jobs)	4,950

² The share of municipal taxes is equal to the percentage of wages or business revenues attributed to the construction activity. For instance, if construction activity represents 5 per cent of the total revenues for a local business, then our analysis suggests 5 per cent of property taxes paid by that business are supported through this construction activity.

Taxes (only municipal taxes shown for local area impact)	\$16.5 million
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Source: Canadian Tourism Research Institute.

Economic impact of construction phase for the province of Alberta

Including direct, indirect and induced effects, the capital spending attributed to the development and construction of wind farms in Southeast Alberta is expected to support 6,801 equivalent full-year jobs for Alberta residents over the construction phase. In conjunction, this level of employment will support wages of \$428.6 million.

With nearly 1,712 of those equivalent full-year jobs, the construction sector is expected to benefit most. Following the construction sector, employment in finance, insurance, real estate and rental and leasing is expected to benefit with 1,020 equivalent full-year jobs. Meanwhile, professional, scientific and technical services employment is expected to receive a boost equivalent to 731 full-year jobs. The remaining sectors to experience the strongest gains in employment include manufacturing, retail trade and accommodation and food services, respectively.

In addition, a total of \$387.6 million of taxes for all levels of government would be supported by the development and construction of wind farms in Southeast Alberta and related economic activity. \$292.4 million of these taxes would be allocated to the federal government, \$72.7 million to the provincial government and \$22.5 million to municipal governments within Alberta.

TABLE 3: Economic Impact of Capital Costs - (within the province of Alberta over the construction phase - 5 years)

Total Capital Costs	\$3.89 Billion
Economic Impact Measures	
Gross Domestic Product - \$	\$837.5 million
Wages - \$	\$428.6 million
Employment (equivalent full-year jobs)	6,801
Taxes	
Federal	\$292.4 million
Provincial	\$72.7 million
Municipal	\$22.5 million
Total taxes	\$387.6 million

Source: Canadian Tourism Research Institute.

Economic impact generated by the annual operations and maintenance costs of wind parks in Southeast Alberta

In total, it is estimated that the on-going annual cost to operate and maintain wind parks in Southeast Alberta will be \$99.7 million.

Economic impact of on-going operation and maintenance of Wind Parks in Southeast Alberta on the local area (Southeast Alberta)

The on-going operating and maintenance costs attributed to 1650 MW of wind parks in Southeast Alberta is expected to direct employment equivalent to 132 full-year jobs. This level of employment is expected to support wages of \$35.5 million for local residents. Including indirect and induced effects, 518 equivalent full-jobs jobs are expected to be supported by on-going operating and maintenance for residents of Southeast Alberta.

The direct impact on employment in the local area from wind park operations includes only those assigned workers stationed at (or assigned to) the various wind parks on a permanent basis. Meanwhile, indirect employment impacts extend to other local businesses that provide on-going supplies and services to the maintenance and operation of the wind parks in Southeast Alberta. Induced impacts are supported through a portion of the direct and indirect payroll that is spent in the local area on basic goods and services.

The municipal share of taxes supported by annual operation and maintenance of the wind parks is estimated at \$10.8 million. The estimate of taxes supported at the municipal level equals the property taxes paid by the various wind development projects plus a share of municipal taxes paid by employees and businesses that relates to the operations and maintenance of the sites.

TABLE 5: Economic Impact of Operations/Maintenance - (within Southeast Alberta)

Annual Operating/Maintenance Costs (range)	\$99.7 Million
Economic Impact Measures	
Gross Domestic Product (Regional) - \$	\$69.9 million
Wages - \$	\$35.5 million
Employment (equivalent full-year jobs)	518
Taxes (only municipal taxes shown for local area impact)	\$10.8 million

Source: Canadian Tourism Research Institute.

Economic impact of on-going operation and maintenance of Wind Parks in Southeast Alberta on the Alberta economy

The on-going operating and maintenance costs attributed to 1650 MW of wind parks in Southeast Alberta is expected to support 787 equivalent full-year jobs for Alberta residents. In conjunction, this level of employment will support wages of \$54.1 million.

In addition, a total of \$56.2 million of taxes for all levels of government would be supported by the operation and maintenance of wind parks in Southeast Alberta and related economic activity. \$29.7million of these taxes would be allocated to the federal government, \$14.1 million to the provincial government and \$12.4 million to municipal governments within Alberta.

TABLE 6: Economic Impact of Operations/Maintenance - (within the province of Alberta)

Annual Operating/ Maintenance Costs (range)	\$99.7 Million
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**Economic Impact
Measures**

Gross Domestic Product (Regional) - \$	\$103.7 million
Wages - \$	\$54.1 million
Employment (equivalent full-year jobs)	787
Taxes	
Federal	\$29.7 million
Provincial	\$14.1 million
Municipal	\$12.4 million
Total taxes	\$56.2 million

Source: Canadian Tourism Research Institute.

APPENDIX A: ECONOMIC OUTPUT TABLES (SELECT TABLES)

Economic impacts related to Capital Costs

Table #1(A) - Economic Impact Summary - Capital Spending:				Alberta
(Dollars)				
	Total Alberta	Local Area Southeast Alberta	Rest of Alberta	
Initial Expenditure	\$3,891,166,125	\$3,891,166,125	\$0	
Gross Domestic Product				
Direct Impact	\$276,487,383	\$269,344,579	\$7,142,804	
Indirect Impact	\$389,548,034	\$174,412,863	\$215,135,171	
Induced Impact	\$171,441,343	\$82,940,329	\$88,501,014	
Total Impact	\$837,476,760	\$526,697,771	\$310,778,989	
Total/Direct (A)	3.03	1.96		
Total/Initial (B)	0.22	0.14	0.08	
Wages & Salaries				
Direct Impact	\$129,055,055	\$123,441,617	\$5,613,438	
Indirect Impact	\$194,766,872	\$118,013,765	\$76,753,107	
Induced Impact	\$104,789,609	\$60,518,301	\$44,271,307	
Total Impact	\$428,611,536	\$301,973,684	\$126,637,852	
Total/Direct (A)	3.32	2.45		
Total/Initial (B)	0.11	0.08	0.03	
Employment (Full-year jobs)				
Direct Impact	1,835.5	1,757.0	78.6	
Indirect Impact	2,997.2	1,958.9	1,038.3	
Induced Impact	1,968.7	1,234.5	734.2	
Total Impact	6,801.4	4,950.4	1,851.1	
Total/Direct (A)	3.71	2.82		
Total/1\$ Million (B)	1.75	1.27	0.48	

Table #17 - Employment (Direct - Combined Total):		Southeast Alberta
(Full-year jobs)		
Crop and Animal Production		0.0
Forestry and Logging		0.0
Fishing, Hunting and Trapping		0.0
Support Activities for Agriculture and forestry		0.1
Mining and Oil and Gas Extraction		0.0
Utilities		0.0
Construction		1,691.4
Manufacturing		0.0
Wholesale Trade		0.6
Retail Trade		5.3
Transportation and Warehousing		8.8
Information and Cultural Industries		0.1
Finance, Insurance, Real Estate and Rental and Leasing		11.3
Professional, Scientific and Technical Services		10.7
Administrative and Support, Waste Management and Remediation Services		9.6
Educational Services		0.0
Health Care and Social Assistance		0.9
Arts, Entertainment and Recreation		0.0
Accommodation and Food Services		4.1
Other Services (Except Public Administration)		14.1
Operating, Office, Cafeteria and Laboratory Supplies		0.0
Travel, Entertainment, Advertising and Promotion		0.0
Total		1,757.0

Economic Impacts related to Capital Costs - con't

Table #10 - Employment (Direct,Indirect,Induced - Capital Spending):		Alberta
(Full-year jobs)		
Crop and Animal Production		155.2
Forestry and Logging		10.6
Fishing, Hunting and Trapping		0.4
Support Activities for Agriculture and forestry		3.8
Mining and Oil and Gas Extraction		206.1
Utilities		72.8
Construction		1,711.8
Manufacturing		668.4
Wholesale Trade		238.7
Retail Trade		546.4
Transportation and Warehousing		200.3
Information and Cultural Industries		172.9
Finance, Insurance, Real Estate and Rental and Leasing		1,020.1
Professional, Scientific and Technical Services		730.9
Administrative and Support, Waste Management and Remediation Services		259.5
Educational Services		22.4
Health Care and Social Assistance		138.0
Arts, Entertainment and Recreation		3.4
Accommodation and Food Services		451.8
Other Services (Except Public Administration)		187.9
Operating, Office, Cafeteria and Laboratory Supplies		0.0
Travel, Entertainment, Advertising and Promotion		0.0
Total		6,801.4

Table #25 - Taxes (Direct,Indirect,Induced - Capital Spending):				Alberta
(Dollars)				
	Total Alberta	Local Area Southeast Alberta	Rest of Alberta	
Personal Income Tax	\$138,233,582	\$96,857,375	\$41,376,207	
Corporate Income Tax	\$43,959,439	\$23,108,517	\$20,850,921	
S. S. Pension & Medical	\$17,498,406	\$12,598,530	\$4,899,876	
Excise,Duties & Gas	\$10,016,561	\$7,196,569	\$2,819,992	
Property (Personal)	\$12,858,346	\$9,059,211	\$3,799,136	
Property (Business)	\$9,679,819	\$7,456,118	\$2,223,701	
GST	\$155,330,383	\$153,416,057	\$1,914,325	
PST	\$0	\$0	\$0	
Total	\$387,576,536	\$309,692,378	\$77,884,158	
Federal	\$292,381,374	\$244,190,836	\$48,190,538	
Provincial	\$72,656,996	\$48,986,213	\$23,670,784	
Municipal	\$22,538,165	\$16,515,329	\$6,022,837	
Total	\$387,576,536	\$309,692,378	\$77,884,158	

Economic Impacts related to Operation/Maintenance

Table #1(A) - Economic Impact Summary - Operational Spending:			Alberta
(Dollars)			
	Total Alberta	Local Area Southeast Alberta	Rest of Alberta
Initial Expenditure	\$99,742,500	\$99,742,500	\$0
Gross Domestic Product			
Direct Impact	\$44,368,500	\$44,368,500	\$0
Indirect Impact	\$33,881,257	\$14,422,502	\$19,458,755
Induced Impact	\$25,416,225	\$11,112,034	\$14,304,192
Total Impact	\$103,665,983	\$69,903,036	\$33,762,947
Total/Direct (A)	2.34	1.58	
Total/Initial (B)	1.04	0.70	0.34
Wages & Salaries			
Direct Impact	\$17,831,000	\$17,831,000	\$0
Indirect Impact	\$20,799,248	\$9,776,182	\$11,023,066
Induced Impact	\$15,428,059	\$7,869,281	\$7,558,778
Total Impact	\$54,058,307	\$35,476,463	\$18,581,844
Total/Direct (A)	3.03	1.99	
Total/Initial (B)	0.54	0.36	0.19
Employment (Full-year jobs)			
Direct Impact	132.0	132.0	-
Indirect Impact	366.7	213.0	153.7
Induced Impact	287.9	173.0	114.9
Total Impact	786.6	518.0	268.6
Total/Direct (A)	5.96	3.92	
Total/1\$ Million (B)	7.89	5.19	2.69

Table #17 - Employment (Direct - Combined Total):		Southeast Alberta
(Full-year jobs)		
Crop and Animal Production		0.0
Forestry and Logging		0.0
Fishing, Hunting and Trapping		0.0
Support Activities for Agriculture and forestry		0.0
Mining and Oil and Gas Extraction		0.0
Utilities		132.0
Construction		0.0
Manufacturing		0.0
Wholesale Trade		0.0
Retail Trade		0.0
Transportation and Warehousing		0.0
Information and Cultural Industries		0.0
Finance, Insurance, Real Estate and Rental and Leasing		0.0
Professional, Scientific and Technical Services		0.0
Administrative and Support, Waste Management and Remediation Services		0.0
Educational Services		0.0
Health Care and Social Assistance		0.0
Arts, Entertainment and Recreation		0.0
Accommodation and Food Services		0.0
Other Services (Except Public Administration)		0.0
Operating, Office, Cafeteria and Laboratory Supplies		0.0
Travel, Entertainment, Advertising and Promotion		0.0
Total		132.0

Economic Impacts related to Operation/Maintenance - con't

Table #10 - Employment (Direct,Indirect,Induced - Operational Spending):		Alberta
(Full-year jobs)		
Crop and Animal Production		12.4
Forestry and Logging		0.9
Fishing, Hunting and Trapping		0.1
Support Activities for Agriculture and forestry		0.2
Mining and Oil and Gas Extraction		9.3
Utilities		151.0
Construction		2.7
Manufacturing		55.2
Wholesale Trade		11.9
Retail Trade		169.5
Transportation and Warehousing		12.0
Information and Cultural Industries		18.6
Finance, Insurance, Real Estate and Rental and Leasing		186.3
Professional, Scientific and Technical Services		39.6
Administrative and Support, Waste Management and Remediation Services		18.6
Educational Services		3.0
Health Care and Social Assistance		20.3
Arts, Entertainment and Recreation		0.8
Accommodation and Food Services		57.2
Other Services (Except Public Administration)		17.0
Operating, Office, Cafeteria and Laboratory Supplies		0.0
Travel, Entertainment, Advertising and Promotion		0.0
Total		786.6

Table #25 - Taxes (Direct,Indirect,Induced - Operational Spending):				Alberta
(Dollars)				
	Total Alberta	Local Area Southeast Alberta	Rest of Alberta	
Personal Income Tax	\$16,831,852	\$10,708,772	\$6,123,080	
Corporate Income Tax	\$22,087,386	\$18,818,299	\$3,269,087	
S.S. Pension & Medical	\$2,526,045	\$1,833,534	\$692,511	
Excise,Duties & Gas	\$1,202,179	\$788,095	\$414,084	
Property (Personal)	\$1,621,749	\$1,064,294	\$557,455	
Property (Business)	\$10,712,590	\$9,728,734	\$983,856	
GST	\$1,177,664	\$1,035,638	\$142,026	
PST	\$0	\$0	\$0	
Total	\$56,159,465	\$43,977,367	\$12,182,098	
Federal	\$29,683,773	\$22,577,796	\$7,105,977	
Provincial	\$14,141,352	\$10,606,543	\$3,534,810	
Municipal	\$12,334,339	\$10,793,028	\$1,541,311	
Total	\$56,159,465	\$43,977,367	\$12,182,098	

APPENDIX B: ECONOMIC IMPACT METHODOLOGY

Technical Description of the Impact Methodology

The approach we have implemented in all our economic impact models are based on input-output techniques. Input-Output models involve the use of coefficients that are based on economic or business linkages. These linkages trace how consumer expenditures or business operations filter through the economy. In turn, the coefficients applied are then used to quantify how the probed activity in a particular region generates employment, taxes, income, etc. The input-output approach indicates not only the direct and indirect impact of the spending under analysis but can also indicate the induced effect resulting from the re-spending of wages and salaries generated.

All impacts generated by the model are given at the direct impact stage (i.e. the "front line" businesses impacted by expenditures), indirect impact stage (i.e. those industries which supply commodities and/or services to the "front line" businesses) and the induced impact stage (induced consumption attributable to the wages and salaries generated from both the direct and indirect impact). In this sense, the model is closed with respect to wages. Imports are also determined within the model, so the model is closed with respect to imports. Exports are not endogenized (i.e. additional exports are not assumed with the induced impact) which consequently generates more conservative impacts. Another assumption of the model, which leads to more conservative impacts, is that not all commodities and/or services purchased are assumed to have at least one stage of production within the province.

Taxes and employment are key economic impacts and as such must involve the use of both input-output and econometric techniques. As the data embodied in the provincial input-output tables are from 2002, taxes and employment must incorporate current coefficients and/or rates. These coefficients and/or rates are then applied to measures determined within the input-output framework of the model. Determining the level of taxes and employment outside the input-output framework of the model allows rates and/or coefficients to be selectively changed for updating or in order to conduct a scenario analysis.

APPENDIX C: GLOSSARY OF TERMS USED

Initial Expenditure - This figure indicates the amount of initial expenditures or revenue used in the analysis. This heading indicates not only the total magnitude of the spending but also the region in which it was spent (thus establishing the "impact" region).

Direct Impact - Relates ONLY to the impact on "front-line" businesses. These are businesses that initially receive the operating revenue or capital expenditures for the project under analysis. From a business operating perspective, this impact is limited only to that particular business or group of businesses involved.

Indirect Impact - Refers to the impacts resulting from all intermediate rounds of production in the supply of goods and services to industry sectors identified in the direct impact phase.

Induced Impact - These impacts are generated as a result of spending by employees (in the form of consumer spending) and businesses (in the form of investment) who benefited either directly or indirectly from the initial expenditures under analysis. An example of induced consumer spending would be the impacts generated by hotel employees on typical consumer items such as groceries, shoes, cameras, etc. An example of induced business investment would be the impacts generated by the spending of retained earnings, attributable to the expenditures under analysis, on machinery and equipment.

Gross Domestic Product (GDP)- This figure represents the total value of production of goods and services in the economy resulting from the initial expenditure under analysis (valued at market prices).

NOTE: *The multiplier (A), Total/Initial, represents the total (direct, indirect and induced) impact on GDP for every dollar of direct GDP. This is a measure of the level of spin-off activity generated as a result of a particular project. For instance if this multiplier is 1.5 then this implies that for every dollar of GDP directly generated by "front-line" businesses an additional \$0.50 of GDP is generated in spin-off activity (e.g. suppliers).*

The multiplier (B), Total/\$ Expenditure, represent the total (direct, indirect and induced) impact on GDP for every dollar of expenditure (or revenue from a business perspective). This is a measure of how effective project related expenditures translate into GDP for the province (or region). Depending upon the level of expenditures, this multiplier ultimately determines the overall level of net economic activity associated with the project. To take an example, if this multiplier is 1.0, this means that for every dollar of expenditure, one dollar of total GDP is generated. The magnitude of this multiplier is influenced by the level of withdrawals, or imports, necessary to sustain both production and final demand requirements. The less capable a region or province is at fulfilling all necessary production and final demand requirements, all things being equal, the lower the eventual economic impact will be.

Wages & Salaries - This figure represents the amount of wages and salaries generated by the initial expenditure. This information is broken down by the direct, indirect and induced impacts.

Employment - Depending upon the selection of employment units (person-years or equivalent full-year jobs) these figures represent the employment generated by the initial expenditure. These figures distinguish between the direct, indirect and induced impact. "Equivalent Full-Year Jobs", if selected, include both part-time and full-time work in ratios consistent with the specific industries.

NOTE: *The multiplier (B) is analogous to Multiplier (B) described earlier with the exception being that employment values are represented per \$1,000,000 of spending rather than per dollar of spending. This is done to alleviate the problem of comparing very small numbers that would be generated using the traditional notion of a multiplier (i.e. employment per dollar of initial expenditure).*

Industry Output - These figures represent the direct & indirect and total impact (including induced impacts) on industry output generated by the initial expenditure. It should be noted that the industry output measure represents the **sum** total of all economic activity that has taken place and consequently involve double counting on the part of the intermediate production phase. Since the Gross Domestic Product (GDP) figure includes only the **net** total of all economic activity (i.e. considers only the value added), the industry output measure will always exceed or at least equal the value of GDP.

Taxes - These figures represent the amount of taxes contributed to municipal, provincial and federal levels of government relating to the project under analysis. This information is broken down by the direct, indirect and induced impacts.

APPENDIX D: MAP OF POTENTIAL AREAS FOR WIND FARM DEVELOPMENT IN SOUTHEAST ALBERTA (EDA DESIGNATED AREA)

