
Coal Association of Canada

Economic impact analysis of
the coal mining industry in
British Columbia, 2011

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Executive summary

Introduction

The Coal Association of Canada engaged PricewaterhouseCoopers LLP (“PwC”) to quantify the economic contributions of Canada’s coal mining industry to the national economy. As a complement to this study, the results for British Columbia’s coal industry were separated from the national results which are reported here. In this study, results are provided of the estimated economic impact of the British Columbia’s coal mining industry, at the direct and indirect level in terms of output, GDP, employment, wages and salaries, and government tax revenues.

The coal mining industry in British Columbia is made up of exploration and producing companies primarily located in the north east, (Peace River area), south east (Kootenay area), and Vancouver Island. At present, there are 10 operating mines in British Columbia of which nine mines produce metallurgical coal and one produces thermal coal. In addition, there are many coal projects under exploration or at other stages of advanced development. New coal sites currently being explored and developed include greenfield and the expansion of existing brownfield sites.

The last official survey of Canada’s coal reserves was reported by the Geological Survey of Canada in 1989. The report listed the official estimate of Canada’s coal reserves and resources at December 1985: coal reserves were 8.8 billion tonnes, of which 6.6 billion tonnes were recoverable coal reserves.¹ Based on the same report, British Columbia has coal reserves of 3.1 billion tonnes, of which 2.6 billion tonnes were recoverable reserves. Although there has been no official update since then, an assessment of British Columbia’s coal reserves was undertaken in 2010. According to this assessment, British Columbia has 12.0 billion tonnes of potentially mineable coal resources of which 8.0 billion tonnes are located in the East Kootenay coalfields in southeast British Columbia and 4.0 billion tonnes in the Peace River coalfield in northeast British Columbia. The assessment is available on coal reserves in British Columbia is available on the Ministry of Energy and Mines.²

British Columbia produces well over 27 million tonnes of metallurgical and thermal coal every year, generating significant economic benefits to communities throughout the province. In 2011, the value of provincial coal production reached \$5.7 billion.

Export sales for metallurgical and thermal coal were reported as \$7.1 billion in 2011 representing almost 22% of total provincial exports from British Columbia.³ Export sales of this magnitude make the coal industry a positive contributor to the province’s trade balance. As a percentage of national exports, British Columbia contributes 89% towards total annual coal shipments. British Columbia’s metallurgical coal is primarily shipped to Asia to be used in the steel making industry while thermal coal exports are shipped to various destinations to be used in power generation.

Estimated economic impact of the coal mining industry in British Columbia

As part of the national coal survey, coal companies across British Columbia were surveyed to determine the industry’s economic contributions to the national economy. Survey responses were received from each of the ten operating mines. As such, the results of the economic impact assessment are considered to be representative of the coal industry’s contribution to the provincial economy. The survey data was used to estimate the direct and indirect economic impacts of the coal mining industry in terms of output, GDP, employment, wages and salaries, and government tax revenues as shown in the table below.

¹ Recoverable coal reserves as reported in the national study, *Economic impact analysis of the coal mining industry in Canada, 2012*

² Geofile 2010-11, B. Northcote, www.empr.gov.bc.ca/Mining/Geoscience/Coal

³ It should be noted that the export values reported by Statistics Canada are reported FOB at port of export and include transportation costs from the mine site and shipping tariffs.

The economic impacts for British Columbia's coal mining industry are based on reported expenditures of \$5.9 billion in 2011 as reported by the coal companies participating in the survey. The direct effects include the economic activity of mine operators, companies providing support to mine operators, and transportation companies that carry mine output to purchasers. Indirect effects include the economic activity generated by suppliers, including suppliers of capital goods for mining operations.

Table E1. Summary of the economic impact of the coal mining industry in British Columbia, 2011

	Direct Impact	Indirect Impact	Total Economic Impact
Output (millions)	\$4,056	\$1,598	\$5,654
GDP (millions)	\$2,269	\$972	\$3,241
Wages and Salaries (millions)	\$1,174	\$429	\$1,603
Government Revenues (millions) *	\$298	\$101	\$399
Employment (Number of Jobs)	17,606**	8,435	26,041

*Economic impact multipliers do not take into account mineral taxes paid

**Direct employment reported by coal companies responding to the survey was 3,813 and is included in the total direct jobs of 17,606

The coal mining industry in British Columbia is estimated to contribute just over \$3.2 billion in value-added GDP activity to the provincial economy. Contributions to GDP included \$2.2 billion of direct mine site activity and under \$1 billion estimated from mining supply and other related economic activity. As a percentage of the national coal industry, British Columbia represents 62% of total estimated contributions to national GDP.

Industry expenditures were a source of approximately 26,041 jobs across Canada and represented \$1.6 billion in wages and salaries. The estimated average wage for British Columbia's coal mining industry in 2011 was \$95,174 based on the number of employees and wages and salaries paid through company payrolls as reported by coal operators. In comparison, the average coal mining industry wage is twice that of the average provincial wage of \$43,500.

In total, tax payments made by the coal mining industry to all levels of government in 2011 was approximately \$715.2 million. Of this, total tax revenue generated from economic activity for all levels of government was approximately \$399 million. Additionally, in 2011, \$316.2 million in mineral taxes was reported as paid to the provincial government. Tax revenue paid helps to support local community infrastructure and government programs.

1 Introduction

1.1 Background

The Coal Association of Canada engaged PricewaterhouseCoopers LLP (“PwC”) to quantify the economic contributions of Canada’s coal mining industry to the national economy. Results were provided for the estimated economic impact of the Canadian coal mining industry, at the direct and indirect level in terms of output, GDP, employment, wages and salaries, and government tax revenues. The national report, *Economic impact of the coal mining industry in Canada*, was released in October 2012 and can be found at the Coal Association of Canada’s website, www.coal.ca.

This report complements the national report and provides an overview of the contribution British Columbia’s coal mining industry made to the provincial economy through GDP and the impact the industry had on jobs, wages and salaries, and government tax revenues in 2011.

1.2 Project scope and industry definition

The scope of this project includes a high-level profile of the provincial coal mining industry and analysis of the economic impacts generated by British Columbia’s coal mining industry in terms of GDP, employment, wages and salaries, and tax revenues. The role of British Columbia’s provincial coal mining industry as a component of the national industry is explored and comparisons of the coal mining industry in British Columbia are made with other natural resource sectors in the province.

For purposes of this study, the coal mining industry is defined as the exploration for and the extraction and primary processing of coal and follows the definition used in the national study. Primary processing includes the coal cleaning process which occurs at the mine site. The direct coal mining industry then includes the provincial economic activity of mine operators, companies providing support to mine operators, and transportation companies carrying mine output to purchasers. Indirect effects include the provincial economic activity of suppliers including suppliers of capital goods for mining operations.

1.3 Project methodology and approach

The economic impact analysis of the Canadian coal mining industry was based on a confidential survey of the coal industry conducted between April and May 2012. A sub-section of this survey using only British Columbia-based mining company responses was used to develop the economic impact analysis of the British Columbia coal mining industry.

Survey results were reviewed for reasonableness and consistency. In total, responses were received from all operating coal companies in British Columbia. As such, the results of the economic impact assessment are considered to be representative of the coal industry’s contribution to the provincial economy. In addition to operating mines, coal companies in the exploration and development stages were invited to participate in the survey and their responses are included in the aggregated data.

Economic impact methodology

To conduct the economic impact modelling, Statistics Canada’s input-output tables for British Columbia were used to estimate industry impacts. Input-output tables depict the industrial structure of the provincial economy and are used to generate estimates of direct and indirect industry contributions. The modelling in this study follows the work done in the national study and is consistent in approach.

Further detail on the economic impact methodology is provided in section 3 of this report.

Data availability and reliability

Industry statistics provided in this report were mainly sourced from Statistics Canada. Additional material was collected through a review of data on exploration and mining activity published by British Columbia's Ministry of Energy and Mines, Natural Resources Canada, PwC's annual mining survey and other publicly available sources. Additional information on the coal companies was obtained through a review of annual reports and corporate sustainability reports, websites and news releases. Appendix A provides a list of information sources used in this report.

1.4 Organization of the report

The report is structured as follows:

Section 1 provides the introduction to the report, the project purpose and scope and the methodological approach.

Section 2 provides a high-level overview of the coal mining industry in British Columbia using key statistical indicators and a graphical representation of the location of coal sites throughout the province. A comparative assessment of British Columbia's coal mining industry relative to other natural resource sectors in the province is described.

Section 3 provides the results of the economic impact analysis for British Columbia using company financial data obtained through the online and confidential survey of coal companies across Canada and supplemented by data obtained from Statistics Canada.

1.5 Report limitations

This report was prepared by PricewaterhouseCoopers LLP (PwC) at the request of the Coal Association of Canada. The comments included in this report do not constitute professional advice, nor should they be relied upon to replace professional advice. This report is not to be published in whole or in part without PwC's prior written consent. Any use that a third party makes of this report or reliance thereon, or any decision made based on it, is the responsibility of such third party. PwC accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions taken based on this report.

The material in this report reflects PwC's best judgement in light of the information available at the time of its preparation. PwC has relied upon the completeness, accuracy and fair presentation of all the information, data, advice, opinion or representations obtained from public sources and from the Coal Association of Canada (collectively, the Information). The findings in the report are conditional upon such completeness, accuracy and fair presentation of the Information. PwC has not verified independently the completeness, accuracy and fair presentation of the Information.

PwC reserves the right at its discretion to withdraw or make revisions to the report should PwC be made aware of facts existing at the date of the report which were not known to PwC when it prepared the report. The findings are given as of the date hereof and PwC is under no obligation to advise any person of any change or matter brought to its attention after such date which might affect the report's findings and conclusions.

We understand the results of this study will be shared with Coal Association of Canada members, government and agency partners, and other industry stakeholders. As well, results of the study will be made publicly available to the broader industry and public audiences.

2 Overview of the coal mining industry in British Columbia

2.1 About the coal mining industry in British Columbia

The information in this section provides an overview of the coal mining industry in British Columbia and is based on the industry survey and publically available information. Figure 1 provides the general location of the industry’s operating, exploration and development activity throughout British Columbia.

Figure 1 Coal industry activity in British Columbia



2.2 Key economic indicators for British Columbia's coal mining industry

In 2011, there were ten operating coal mines in British Columbia of which one produced thermal coal and nine produced metallurgical coal. Mines producing metallurgical coal are located in the northeast and southeast of the province while the thermal coal producer is on Vancouver Island. The large majority of coal reserves in British Columbia are metallurgical coal with smaller deposits of thermal coal.

Continued interest in developing British Columbia's coal reserves is demonstrated by the number of exploration and development projects noted by the Ministry of Energy and Mines in 2011.⁴ Of these exploration and development projects, the majority were in the exploration or mine evaluation phase, while several others were in different stages of the environmental assessment review process or had received approval of their environmental application. Additionally, one coal project is expected to resume production in 2013.

Below are economic highlights of British Columbia's coal mining industry in 2011.

Coal reserves

- The Geological Survey of Canada officially reported Canada's coal reserves and resources in 1989 (Coal Resources of Canada, Paper 89-4). The report listed the official estimate of Canada's coal reserves and resources at December 1985: coal reserves were 8.8 billion tonnes, of which 6.6 billion tonnes were recoverable coal reserves.⁵ Based on the same report, British Columbia has coal reserves of 3.1 billion tonnes, of which 2.6 billion tonnes were recoverable reserves. There has been no official update since then.
- In Canada, provinces and territories also conduct their own assessments on reserves and resources, and some of them periodically update their assessments. A table of coal resources in British Columbia is available on the Ministry of Energy and Mines website (Geofile 2010-11). Prepared in 2010, the table includes information from approximately 100 of British Columbia's published coal resource estimates that were publically available as of early 2010. According to this table, combined, British Columbia has 12.9 billion tonnes of potentially mineable coal resources; 8.0 billion tonnes in southeast British Columbia (East Kootenay coalfields) and 4.9 billion tonnes in northeast British Columbia (Peace River coalfield).⁶
- For the ten operating mines in British Columbia, proven and probable reserves as of December 31, 2010 were estimated to be 723.5 million tonnes.

Operating results

- Total production of the British Columbia coal industry in 2011 was 26.7 million tonnes of coal, a slight increase of 2.4% over 2010's production of 26.0 million tonnes. Over the last ten years, average production in British Columbia's coal industry has been around 25.0 million tonnes. In 2011, British Columbia coal production represented almost 40% of national coal production.

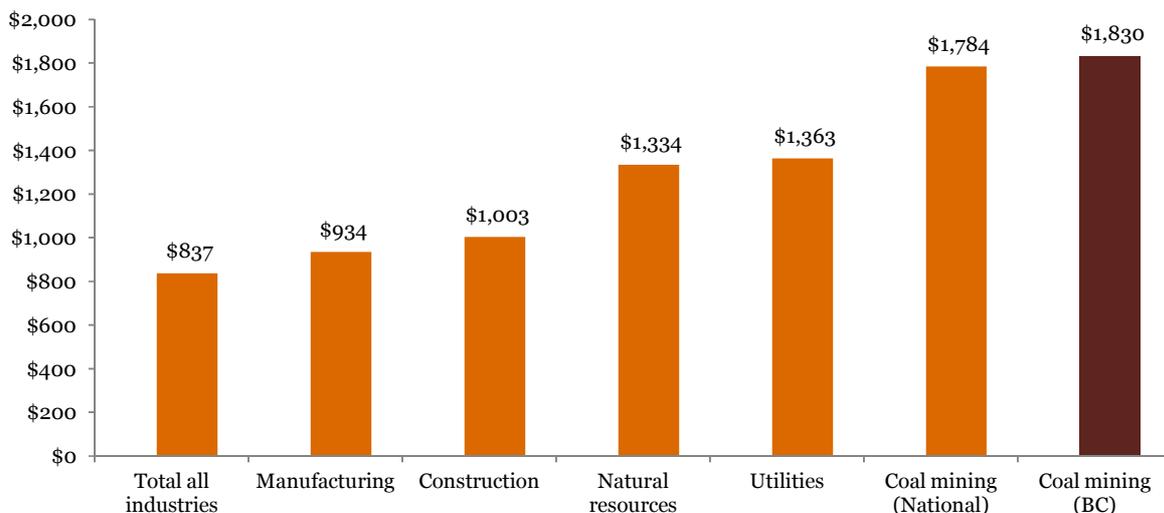
⁴ British Columbia coal industry overview 2011, Table 2: Selected exploration and development projects in British Columbia, 2011, p. 5, BC ministry of Energy and Mines

⁵ Recoverable coal reserves as reported in the national study, *Economic impact analysis of the coal mining industry in Canada*, 2012

⁶ Geofile 2010-11, B. Northcote, sources include publically available information from British Columbia Coal Assessment Reports, documents made public by exploration and mining companies including technical reports, annual reports or project descriptions filed as part of an environmental review process, www.empr.gov.bc.ca/Mining/Geoscience/Coal

- In 2011, the production value of coal produced in British Columbia increased by 33.8% over 2010 reflecting an increased average coal price in 2011. The production value of coal in 2011 reached \$5.7 billion in comparison to 2010 when production value was \$4.3 billion based on coal production of 26.7 million tonnes and 26.0 million tonnes respectively.
- British Columbia’s coal mining industry generated approximately \$3.2 billion in direct and indirect GDP impacts in 2011 which represented 61.9% of total GDP impacts generated by the national industry of \$5.2 billion in 2011.⁷
- British Columbia coal operators reported payroll employment of 3,813 jobs in 2011 for an average wage of \$95,174 which is 2.6% higher than the national coal operator’s average wage of \$92,785. British Columbia’s coal operator’s employment represented 53.5% of the national coal operator’s employment of 7,154. The average provincial wage for all industries in 2011 was \$43,500, almost half the average coal mining wage at the provincial and national level.
- In comparison to the average wages paid to other industries in British Columbia, coal mining is a highly paid occupation. In the figure below, the average wage for coal mining was just over two times the average weekly wage for all industries in British Columbia and higher than the average wage for manufacturing, construction, natural resources, and utilities industries.

Figure 2 Comparison of average weekly wages for selected British Columbia sectors and the national coal industry , 2011



Source: BC Stats, PwC calculations

- In 2011, coal mineral tax payments made by coal companies to the Province of British Columbia were \$316.2 million or 88% of total provincial mineral taxes reported of \$357.7 million.⁸ In 2011, the national coal industry reported payments of an estimated \$344.0 million in mineral taxes of which British Columbia’s coal industry contributed approximately 91.9% towards the total.

⁷ PwC economic impact calculations for British Columbia’s coal mining industry and results from the national report

⁸ Mineral Resource Tax/Coal royalties/Mineral Tax, Historical Revenue Summary, 1986-2011, Ministry of Finance

- In addition to mineral taxes, British Columbia’s industry contributed an estimated \$399 million in additional direct and indirect tax payments to all levels of government that can be attributed to personal income tax, indirect taxes and corporate income taxes. This represents approximately 57.2% of the national industry’s total tax payments made to all levels of governments in 2011 of \$698 million. ⁹

Coal exports

- In 2011, Canada was the third largest exporter of metallurgical coal after Australia and the United States. As 89% of the Canadian metallurgical coal exports come from British Columbia, the province can be considered the third largest exporter of metallurgical coal in the world and one of the top ten global producers. ¹⁰
- Exports of thermal coal are modest making up approximately 0.01% of total coal exports and in 2011 were reported being shipped to various destinations around the world including Asia and Europe.
- In 2011, with \$7.1 billion in coal exports, British Columbia coal exports were a major contributor to British Columbia’s export activity making up 21.8% of total provincial exports in 2011. Shipments of coal increased 10% from 22.3 million tonnes in 2010 to 24.5 million tonnes in 2011 with the value of coal exports growing by an impressive 35% from \$5.3 to \$7.1 billion.
- As shown in table 1 below, coal exports are a major contributor to British Columbia’s export activity contributing almost 22% of total provincial exports. This share exceeds exports from forestry and logging at 2%, oil and gas extraction with 6%, and other mining exports (7%) of total provincial exports.

Table 1 Export comparison with other British Columbia provincial industries, 2011

Industry	Exports (millions, \$)	Percentage of provincial total
Total provincial exports	\$33,216.4	100%
Forestry and logging	\$596.6	2%
Oil and gas extraction	\$2,076.8	6%
Coal mining industry	\$7,141.4	22%
Metal ore and non-metallic mineral and quarrying	\$2,254.1	7%

Source: Industry Canada - Trade Data Online

- In 2011, when compared to exports of other natural resource products, coal represented a larger share (21.8%) of total exports. Exports from wood products made up 17.4% of provincial export value, pulp and paper products 13.1%, metallic mineral products 10.7% and oil and gas exports 5.8% of total provincial exports.
- Asia is the principal market for British Columbia’s coal exports, accounting for just over two-thirds of the total export value in 2011 of \$7.1 billion. In 2011, Japan (27%) and South Korea (24%) consumed the largest share of British Columbia’s total metallurgical coal exports by value. However, China’s demand (10%) for British Columbia coal has increased significantly in recent years, and is expected to increase further in the

⁹ PwC economic impact calculations

¹⁰ AME Mineral Economics, World Coal Association

near future. Coal is also shipped to Europe and the United States with 16% and 3% respectively of exports. The next largest shipments at 9% are to Brazil, Taiwan with 4%, exports to Turkey at 3% and India at 1% and the balance of 3% of coal exports being shipped to other world destinations (Chile, Mexico, Pakistan, and Egypt). Table 2 below provides the coal exported from British Columbia to each major coal market in 2011 by value and percentage of exports to total shipped.

Table 2 British Columbia coal exports by destination, 2011

Export destination	Coal exports by destination, (\$millions)	Percentage of total coal exports, by destination
Japan	1,933	27%
South Korea	1,709	24%
Europe	1,115	16%
China	721	10%
Brazil	653	9%
Taiwan	297	4%
Turkey	236	3%
United States	224	3%
India	72	1%
Rest of World	181	3%
Totals	7,141	100%

Source: Industry Canada, Trade Database Online

Transportation

- On average, coal makes up 11% of total railway traffic carried across Canada annually. In 2010, British Columbia was the destination for 92% (38.5 million tonnes) of the total coal tonnage carried by rail in Canada. Of the total coal tonnage carried by rail, 27.3 million tonnes or 65.8% originated in British Columbia.
- British Columbia has two primary shipping ports, the Port of Prince Rupert in northern British Columbia and Port Metro Vancouver located in southern British Columbia. Of these two ports, there are three coal terminals which provide shipping services to coal operators. In addition, there is an independent terminal service on Texada Island which is located between the Lower Mainland and Vancouver Island:
 - Ridley Terminals located on the northwest coast at the Port of Prince Rupert with current operating capacity of 12 million tonnes and planned expansion to 25 million tonnes by 2014;
 - Westshore Terminals located south of Vancouver at Robert's Bank (Port Metro Vancouver) with annual shipping capacity of 29 million tonnes in 2011 and planned expansion to 33 million tonnes by 2013;
 - Neptune Terminals, a privately-owned terminal by a coal operator located at Port Metro Vancouver with current coal capacity of 6 million tonnes currently undergoing terminal improvements that will see capacity eventually increase to 18.5 million metric tonnes; and,
 - Facilities on Texada Island provide terminal services for a coal operator located on Vancouver Island and ships thermal coal to export markets.

- In addition to British Columbia ports, in 2011, approximately one million tonnes of British Columbia coal was shipped through Thunder Bay Terminals for domestic customers.
- In 2010, Port Metro Vancouver and Port of Prince Rupert reported total coal shipments of 30.3 million tonnes and 8.1 million tonnes respectively for total coal shipments of 38.5 million tonnes. In 2011, shipments increased by 10% to 42.4 million tonnes with the Port of Metro Vancouver shipping 32.7 million tonnes and the Port of Prince Report shipping 9.7 million tonnes.
- Of total bulk cargo shipments through British Columbia ports in 2011, coal made up 40.8 % of total shipments in terms of metric tonnes shipped.

Table 3 below provides a time series of key industry data with year-over-year percentage changes from 2000 to 2011.

Table 3 British Columbia coal mining industry indicators (2000 – 2011)												
Key Indicators	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Production (m tonnes)	25.7	27.0	24.4	23.1	27.3	26.7	23.1	25.7	26.2	21.2	26.0	26.7
% change		5.2	-9.7	-5.4	18.4	-2.2	-13.7	11.6	1.7	-19.0	22.9	2.4
Production value (\$m)	812	959	1,035	972	1,191	2,300	2,105	1,949	3,738	3,297	4,253	5,691
% change		18.1	7.9	-6.1	22.6	93.1	-8.5	-7.4	91.8	-11.8	29.0	33.8
Exports (\$m)^a	1,332	1,431	1,373	1,450	1,583	2,992	2,845	2,495	5,437	4,371	5,272	7,141
% change		7.4	-4.0	5.6	9.2	88.9	-4.9	-12.3	117.9	-19.6	20.6	35.5
Coal mineral taxes^b	17.9	16.3	24.9	21.8	18.6	92.2	128.2	75.0	259.6	237.0	288.8	316.2
% change		-9.1	52.9	-12.5	-14.7	396.3	39.0	-41.5	246.0	-8.7	21.9	9.5
Employment (number)	2,925	2,869	2,990	2,724	2,620	2,754	3,201	3,487	3,746	3,778	3,800	3,813
% change		-1.9	4.2	-8.9	-3.8	5.1	16.2	8.9	7.4	0.9	0.6	0.3%

Source: BC Ministry Energy and Mines, BC Ministry of Finance, Industry Canada, PwC Coal Survey

^a It should be noted that the export values reported by Statistics Canada are reported FOB at port of export and include transportation costs from the mine site and shipping tariffs

^b Coal mineral taxes are payments made by coal companies as required under British Columbia's mineral tax regime and is in addition to the \$399 million in taxes paid to other levels of government for direct and indirect taxes shown in table 6

3 Economic impact of British Columbia's coal mining industry

3.1 Introduction

British Columbia's economy benefits from the various activities conducted by the coal mining industry in the province. The coal mining industry provides employment, pays higher than average wages and generates overall economic value to the provincial economy. However, the economic contribution of the coal mining industry is greater than these direct effects. Also included are effects from construction and operations expenditures generated from coal mining companies that includes the purchase of goods and services from suppliers. These activities are considered spill-over effects and also contribute economically to the provincial economy. Taxes are collected by governments at the federal, provincial and local levels on mining company activities which in turn provide services to the general public.

3.2 Survey methodology

The economic impact analysis and industry profile of British Columbia's coal mining industry were based on aggregated data from an industry survey administered by PwC. Survey data was gathered from industry participants by means of an online and confidential questionnaire. PwC independently reviewed the survey responses for reasonableness and consistency.

Additional industry information was obtained through a review of data on exploration and mining activity published by National Resources Canada, BC Ministry of Energy and Mines, mining associations and other publicly available sources. Additional information on the coal companies was obtained through reviewing annual reports, corporate sustainability reports, websites and news releases.

3.3 Economic impact methodology

Economic impact modelling in this study uses information in what are called Input-Output accounts to predict how an increase in demand for the products of one industry will impact on other industries and therefore on the Canadian economy. The Statistics Canada Input-Output accounts reflect the underlying industrial structure of the entire Canadian economy in terms of who makes what and who uses what. In principle, the model contains the recipes for every output of the economy.

The Input-Output approach was selected because of its widespread use, and ability to facilitate comparisons with economic impact studies of other industries. The fundamental philosophy behind economic impact analysis on some goods and services generates a need for additional goods and services and by using this approach it is possible to track this cascading effect through the economy. In addition, using the Input-Output accounts, the appropriate economic impact multipliers were developed and applied to arrive at the economic impacts of the activities of British Columbia's coal industry.

Input-Output analysis does not address whether the inputs have been used in the most productive manner or whether the use of these inputs in this industry promotes economic growth by more than their use in another industry or economic activity. Nor does input analysis evaluate whether, when or where these inputs might be employed elsewhere in the economy if they were not employed in this industry at this time. Input-Output analysis reports the direct and indirect economic impacts which can reasonably be expected to result in the economy when these inputs are used in this industry, based on historical relationships within the economy.

Direct and indirect economic impacts

The economic contribution of coal mining to British Columbia's provincial economy includes its direct impact plus the economic activity of other industries that supply the coal mining industry. Economic impacts may be estimated at the direct and indirect levels.

- **Direct impacts** are activities directly attributable to mining, such as the employees and output of mining companies. These effects include the ongoing operations and maintenance of the mine site including transportation of mine output from the mine to the purchaser.
- **Indirect impacts** are the activities of suppliers to mining companies and include contractors and other companies providing inputs to mining companies. Indirect effects also include the activity of suppliers to these companies.

Estimating direct and indirect economic impacts are generally done through the use of Input-Output multipliers. The most commonly used of these measures are output, Gross Domestic Product (GDP), employment, wages and salaries, and government tax revenues. Each of these measures is described below.

- **Output** - represents the total sum of all economic activity that has taken place in connection with expenditures made through the British Columbia coal companies and is the broadest measure of economic activity.
- **GDP** - the "value added" to the economy by an industry. Since the GDP figure captures the difference between the value of output and the value of intermediate inputs, it represents the unduplicated total value of economic activity that has taken place. The GDP impacts in this report represent the value added to the economy as a result of coal company expenditures in British Columbia.
- **Employment** - the number of jobs created as a result of the expenditures made by coal companies in British Columbia.
- **Wages and Salaries** - measures the additional wages and salaries generated and include direct wages and salaries, as well as supplementary labour income and mixed income sources.
- **Government Tax Revenues** - arise from personal income taxes, indirect taxes less subsidies (e.g. sales tax), corporate income taxes and is measured as the total amount of tax revenues generated for each level of government (municipal, provincial and federal). Government tax revenues generated using the input-output approach does not include mineral taxes collected by provincial governments.

The economic impacts presented in the following section represent impacts generated for the year 2011.

3.4 Estimated economic impact of the coal mining industry in British Columbia

The direct and indirect economic impacts for the coal mining industry presented in table 4 below are based on the results of the survey responses from British Columbia coal mining and exploration companies. The economic impacts below for output, GDP, wages and salaries, government revenues and employment are based on expenditures of approximately \$4.1 billion in 2011 as reported by the survey participants.

The direct coal mining industry includes the British Columbian economic activity of mine operators, companies providing support to mine operators, and transportation companies carrying mine output to purchasers. Indirect effects then include the economic activity of suppliers including suppliers of capital goods for mining operations.

For purposes of this study, the coal mining industry is defined as the exploration for, extraction and primary processing of coal and follows the definition used in the national study. Primary processing includes the coal cleaning process which occurs at the mine site. The direct coal mining industry then includes the provincial economic activity of mine operators, companies providing support to mine operators, and transportation companies carrying mine output to purchasers. Indirect effects then include the provincial economic activity of suppliers including suppliers of capital goods for mining operations.

Table 4 Summary of the economic impact of the coal mining industry in British Columbia, 2011

	Direct Impact	Indirect Impact	Total Economic Impact
Output (millions)	\$4,056	\$1,598	\$5,654
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*Economic impact multipliers do not take into account mineral taxes paid

**Direct employment reported by coal companies responding to the survey was 3,813 and is included in the total direct jobs of 17,606

The coal mining industry in British Columbia is estimated to contribute just over \$3.2 billion in value-added GDP activity to the provincial economy. Contributions to provincial GDP included \$2.2 billion of direct mine site activity and under \$1 billion estimated from mining supply and other related economic activity. British Columbia's GDP makes up 61.9% of the national GDP.

Total direct and indirect tax revenue paid to all levels of government by the provincial coal mining industry was approximately \$399 million and represents 57.2% of the estimated taxes paid to all levels of government by the national industry. Government tax revenues generated through the input-output multipliers included impacts from personal income taxes, indirect taxes and corporate income taxes and are a conservative estimate of total tax revenues. As noted in the table above, government tax revenue generated using the input-output approach does not include mineral taxes collected. Additional mineral taxes collected and reported by the provincial government in 2011 were \$316.2 million and are in addition to the tax revenues estimated above.

Of the estimated 17,606 direct jobs attributable to coal mining activity in the province, British Columbia coal operators reported payroll employment of 3,813 jobs in 2011 for an average wage of \$95,174;. 2.6% higher than the national coal operator's average wage of \$92,785. British Columbia's coal operator's employment represented 53.5% of the national coal operator's payroll employment of 7,154. The average provincial wage for all industries in 2011 was \$43,500, almost half the average coal mining wage at the provincial and national level.

Industry expenditures were a source of approximately 26,041 direct and indirect jobs in British Columbia with total wages and salaries of \$1.6 billion. Total coal industry employment in British Columbia represents 61.9% of the total direct and indirect national employment of 42,030.

3.5 Estimated economic impacts by category of expenditure in British Columbia

This section provides a more detailed economic impact by the two major categories of coal mining expenditures:

1. Operating expenditures
2. Capital expenditures

Operating and capital expenditures generated the most economic impacts provincially. Details of the economic impacts generated by these expenditure categories are provided in tables 5 to 6.

Operating expenditures

Operating expenditures include spending that is required when a coal mine is in operation. These include production materials and supplies, cleaning costs, professional and technical services including contract work, salaries and benefits, education and training, and the total cost of energy purchased including fuel and electricity costs among others. The economic impacts for operating expenditure activities in British Columbia are presented in table 5 below.

Table 5 Economic impacts of operating expenditures in British Columbia, 2011

	Direct Impact	Indirect Impact	Total Economic Impact
Output (millions)	\$1,800	\$766	\$2,566
GDP (millions)	\$1,175	\$462	\$1,637
Wages and Salaries (millions)	\$465	\$144	\$609
Government Revenues (millions)	\$112	\$37	\$149
Employment (Number of Jobs)	5,078*	3,567	8,645

*Direct employment reported by survey participants was 3,813 and is included in the total direct jobs of 5,078.

The estimated total output of operating expenditures was approximately \$2.6 billion made up of \$1.8 billion and approximately \$766 million in direct and indirect impacts respectively.

Operating expenditure impacts in terms of contribution to GDP was estimated at \$1.6 billion and consisted of \$1.2 billion and over \$400 million in estimated direct and indirect impacts respectively.

Estimated government tax revenues generated was approximately \$149 million and consisted of \$112 million in direct and \$37 million in indirect impacts.

Approximately 8,645 jobs were supported by the coal mining industry in British Columbia of which 3,813 were employed directly by the survey respondents.

Capital expenditures

The economic impacts for capital expenditures, including construction materials, are based on the 2011 survey data. It appears that 2011 was an active year in British Columbia in terms of construction, with direct expenditures

accounting for approximately 73% of total national expenditures. Capital expenditures included the purchase of lands and mining rights, expenditures on all buildings and other surface structures, machinery, equipment, construction materials, mine shafts and underground work. The economic impacts for capital expenditures are presented in table 6 below.

Table 6 Economic impacts of capital expenditures in British Columbia, 2011

	Direct Impact	Indirect Impact	Total Economic Impact
Output (millions)	\$1,115	\$427	\$1,542
GDP (millions)	\$463	\$290	\$753
Wages and Salaries (millions)	\$327	\$155	\$482
Government Revenues (millions)	\$88	\$30	\$118
Employment (Number of Jobs)	3,390	2,060	5,450

The estimated total output for capital expenditures was \$1.5 billion made up of \$1.1 billion in direct capital spending impacts and over \$400 million in estimated indirect impacts.

In terms of GDP, capital expenditures contributed an estimated \$753 million to the provincial economy and consisted of \$463 million and \$290 million in direct and indirect impacts respectively.

Estimated government tax revenues on capital expenditures generated were approximately \$118 million and consisted of \$88 million in direct and \$30 million in indirect impacts.

Wages and salaries amounted to \$482 million and included contract workers during capital construction with indirect wages representing wages and salaries of employees of suppliers. Employment based on capital expenditures was approximately 5,450 jobs based on an estimated 3,390 direct jobs and 2,060 indirect jobs.

Appendices

Appendix A – References and data sources

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