APPENDIX A

Part 2 Project Economic Impacts: BC Input-Output Model, BC Stats

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1 BC INPUT-OUTPUT MODEL REPORT

Economic Impact of the Site C Clean Energy Project

Background

This report summarizes the results of an input-output analysis that assesses the economic impact of the construction and operation of the proposed BC Hydro Site C Clean Energy Project, located on the Peace River in British Columbia's northeast region.

The British Columbia Input-Output Model (BCIOM) was used to generate the estimates. A description of the BCIOM, and the assumptions underlying input-output analysis, is included in the Appendix.

Sources of data

The data inputs used for this study were provided to BC Stats by Robinson Consulting and Associates Limited and BC Hydro. The following table aggregates the expenditures used in the modeling for the project.

Site C Clean Energy Project ($Million)	Labour	Equipment, Materials & Services	Total expenditures, from detailed table
Total cost including contingency	1,014.9	3,569.9	5,315.8

Detailed expenditure estimates for each of the major stages of the project were included in the data supplied by BC Hydro. In some cases, the data had been coded to BCIOM categories by BC Hydro. In other cases, it was necessary to allocate totals from the BC Hydro data to model categories. This was done based on model information. A description of this process can be found in the Modeller's Report, attached as an appendix to this report.

Particular expenditure items which do not have associated economic impact in BC, such as goods, services, and labour produced outside the province, payment for use of resources, and the value of assets transferred from one owner to another, have been excluded from model inputs and expenditure totals. Namely, for this project, the cost of land, water rental, sales of merchantable timber, royalties, imported goods and services (80% of the cost of turbines and generators), labour from outside BC, and contingency costs have been excluded. An itemized overview of these expenditure items is provided in the Total Impact Summary.

A number of model runs were performed to estimate the economic impact of the Site C Clean Energy Project. The benchmark case assumes that 100% of labour originates in British Columbia. The base case assumes that 80% of labour originates locally. As well, impacts were estimated for each year of construction (2014 through 2022). The model was also used to estimate the economic impact associated with sustaining capital and annual operating expenditures

Site C Clean Energy Project Derivation of data used to shock the model	Base Case (80% BC Labour) including contingency	Benchmark Case (100% BC labour) including contingency
Estimated expenditures ($Million)	5,315.8	5,315.8
Minus Exclusions: Cost of Land, Water Rental, Sales of merchantable timber, Royalties	203.8	203.8
Imports excluded up front: Imported goods, Labour from outside BC	603.8	294.4
Equals expenditure used in BCIOM run	4,508.1	4,817.6

Note: Commercially sensitive information has been removed by BC Hydro from the public version of this report

Summary of Results, Site C Clean Energy Project

Key Modelling Assumptions

Wage data, labour costs and employment counts for direct project employment used in the model were based on estimates provided by BC Hydro, and reflect the elevated wage costs and labour conditions present in the development region.

Average wage estimates produced by the model were used to generate employment projections in supplier industries, and to estimate induced effects. The higher average wage received by direct employees, versus the wage in supplier industries, results in lower direct employment relative to that in supplier industries.

Supplier industry employment estimates were generated by the model based on the wage bill and average earnings in each affected industry. The model estimates represent average jobs in an industry. In some industries, most workers are employed full time, but in others (e.g., accommodation and food services) the typical work week is usually shorter. Hence the employment estimate is measured in jobs, not full time equivalent (FTE) counts.

The wage component of the labour cost estimate includes pre-tax wages, salaries and supplementary income (e.g., the employer's share of contributions to EI or CPP).

For the calculation of induced effects, it is assumed that 80% of workers' earnings will be used to purchase goods and services in the province (the remaining 20% goes to taxes, other payroll deductions, and savings).

It is assumed that a social safety net is in place, and that workers hired to work on the project previously had some income from EI or other safety net programs (note: the social safety net assumption only affects the estimate of worker spending, which is the induced effect associated with the project).

All of the tax revenue impacts have been calculated based on the current tax structure, which assumes an HST of 7% is applied to items subject to the tax.

The model's estimates of income tax revenues are calculated by estimating income taxes associated with a given wage.

The regional economic impact was estimated for the Peace River and Northern Rockies regional districts. The estimates are derived based on regional shares of total employment in each industry (a more complete description of the methodology is contained in the modellers report, included as an appendix to this document).

Summary of Results: Benchmark Case

The following discussion is based on a model run that assumes 100% labour from BC, including contingency costs, unless otherwise noted.

Total expenditure for all years of construction is estimated at just over $4.8 billion. Expenditure is expected to rise moderately from 2014 through 2018, after which it will decline until completion in 2022.

Of the total, $658.4 million is expected to be spent on imports from other countries, and $579.6 million on imports from other provinces. The value of goods withdrawn from inventories is estimated at $47.4 million. Labour costs are expected to be slightly over $2.0 billion, peaking in 2019, at $313.0 million (not including contingency). Taxes on factors of production sum to $9.1 million, with taxes on products net of subsides accounting for $49.3 million.

Direct, indirect and induced purchases from supplier industries total $3.2 billion. Direct purchases account for $1.4 billion, indirect purchases for $773.8 million, and spending by workers employed directly or indirectly are estimated at $959.8 million.

The direct GDP is estimated at nearly $2.1 billion, with an additional $976.0 million generated in supplier industries, plus an induced impact of $598.8 million, for a total of $3.6 billion.

Total direct employment over the course of construction is estimated at 10,223 ~~10,519~~ person years, with a further 7,360 jobs generated in industries supplying goods and services used directly in construction activity, and 4,618 jobs in industries further back in the supply chain. Including induced impacts, total employment associated with construction activity is approximately 29,609.

Federal, provincial, and local tax revenue impacts are $632.8 million, made up of $407.5 million in direct impacts, and an additional $225.3 million generated in supplier industries and those benefitting from spending by workers.

The estimated regional impact on supplier industries in the project area is $342 million in total output, $140 million in GDP, $86 million in household income, and employment of 2,530.

Economic Impact, Site C (100% local labour) ~~including contingency~~
Benchmark Case

Total impact, including Benchmark Case and supplier industry effects

	Direct	Other suppliers	Total Indirect*	Induced**	Total impact
Total expenditures, Benchmark Case ($M)	**4,817**				
Supplier industry & induced impacts ($M)	*1,429*	*774*	**2,202**	960	**3,162**
GDP at basic prices ($M)					**3,629**
Benchmark Case***	**2,054**				2,054
Supplier industry & induced impacts	*617*	*359*	**976**	599	1,575
Employment (#)****					**29,609**
Benchmark Case	~~10,519~~ 10,223			10,223	~~10,519~~
Supplier industry & induced impacts	*7,360*	*4,618*	**11,977**	7,112	19,089
Household income ($M)					**2,594**
Benchmark Case	**1,603**				1,603
Supplier industry & induced impacts	*415*	*233*	**648**	343	991
Tax revenue ($M)					**633**
Benchmark Case	**408**				408
Supplier industry & induced impacts	*94*	*53*	**147**	78	225

* The total indirect impact is the sum of the effect on direct suppliers and other supplier industries

** Assumes a social safety net is in place. Includes effects generated by project spending and activities of supplier industries

*** Project expenditure data provided by clients may not include all components of GDP (e.g., operating surplus)

**** Employment estimates are based on average annual wages in 2010. Includes total employment over the life of the project

Summary of Results: Base Case

The following discussion is based on a model run that assumes 80% labour from BC and 20% from outside of BC, including contingency costs, unless otherwise noted.

Total expenditure for all years of construction is estimated at just over $4.5 billion. Expenditure is expected to rise moderately from 2014 through 2018, after which it will decline until completion in 2022.

Of the total, $658.4 million is expected to be spent on imports from other countries, and $579.6 million on imports from other provinces. The value of goods withdrawn from inventories is approximately $47.4 million. Labour costs are expected to be slightly over $1.7 billion, peaking in 2019, at $313.0 million (not including contingency). Taxes on factors of production sum to $9.1 million, with taxes on products net of subsides accounting for $49.3 million.

Direct, indirect and induced purchases from supplier industries total slightly over $3.0 billion, at 80% local labour, including contingency. Direct purchases account for $1.4 billion, indirect purchases for $773.7 million, and spending by workers employed directly or indirectly are estimated at $813.4 million.

The direct GDP is estimated at nearly $1.8 billion, with an additional $976.0 million generated in supplier industries, plus an induced impact of $507.4 million, for a total of $3.2 billion.

Total direct employment over the course of construction is 8,400, with a further 7,360 jobs generated in industries supplying goods and services used directly in construction activity, and 4,618 jobs in industries further back in the supply chain. Including induced impacts, total employment associated with construction activity is approximately 26,405.

Federal, provincial, and local tax revenue impacts are $563.1 million, made up of $349.7 million in direct impacts, and an additional $213.4 million generated in supplier industries and those benefitting from spending by workers.

The estimated regional impact on supplier industries in the project area is $324 million in total output, $132 million in GDP, $81 million in household income, and employment of 2,340.

Economic Impact, Site C (80% local labour)
Base Case

Total impact, including Base Case and supplier industry effects	Direct	Other suppliers	Total Indirect*	Induced**	Total impact
Total expenditures, Base Case ($M)	**4,508**				
Supplier industry & induced impacts ($M)	*1,429*	*774*	**2,202**	813	**3,016**
GDP at basic prices ($M)					**3,228**
Base Case***	**1,745**				1,745
Supplier industry & induced impacts	*617*	*359*	**976**	507	1,483
Employment (#)****					**26,405**
Base Case	**8,400**				8,400
Supplier industry & induced impacts	*7,360*	*4,618*	**11,977**	6,027	18,005
Household income ($M)					**2,232**
Base Case	**1,294**				1,294
Supplier industry & induced impacts	*415*	*233*	**648**	291	939
Tax revenue ($M)					**563**
Base Case	**350**				350
Supplier industry & induced impacts	*94*	*53*	**147**	66	213

* The total indirect impact is the sum of the effect on direct suppliers and other supplier industries

** Assumes a social safety net is in place. Includes effects generated by project spending and activities of supplier industries

*** Project expenditure data provided by clients may not include all components of GDP (e.g., operating surplus)

**** Employment estimates are based on average annual wages in 2010. Includes total employment over the life of the project

Regional Impact Estimates based on Supplier Industry Output, Census Employment Data, and Labour Force Statistics
Base Case

Estimated Regional Impact, Supplier Industries in Project Area (All years)	Direct suppliers	Other suppliers	Total indirect impact (all suppliers)	Induced	Total indirect & induced
Total output ($M)	99	127	226	99	324
Total GDP ($M)	35	52	87	45	132
Total household income ($M)	25	26	51	31	81
Total employment	670	620	1,290	1,050	2,340

Note: Commercially sensitive information has been removed by BC Hydro from the public version of this report

Summary of Results: Annual Economic Impacts

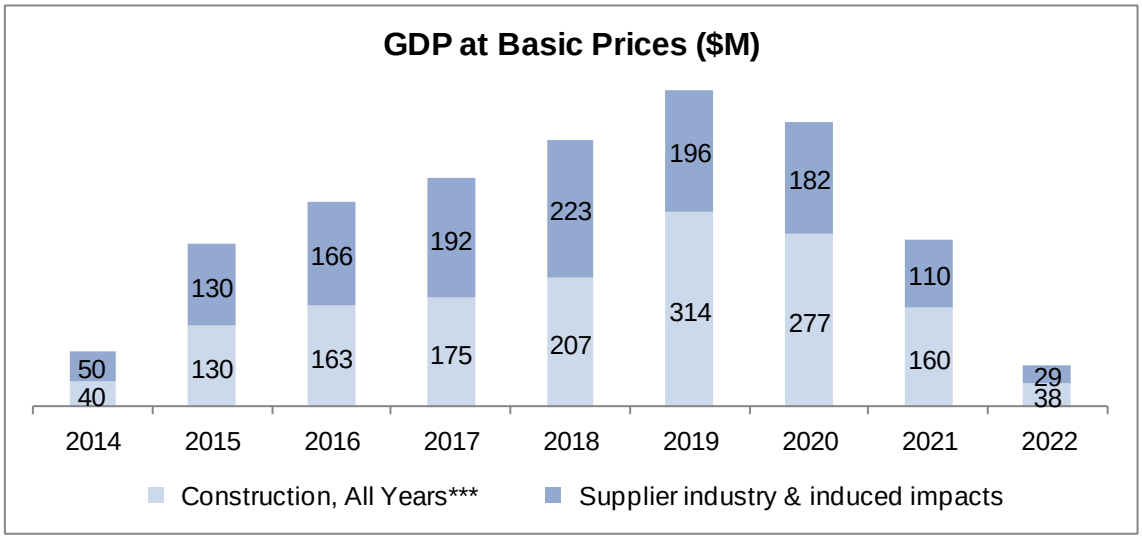
Model runs for each year of construction were run as a subset of the base case scenario, not including contingency. Details for each run can be found in the companion spreadsheet which accompanies this report. The annual Economic Impact Summary table reflects data based on the Base Case assumption of 80% labour from BC, and 20% labour from outside BC, not including contingency.

The results of the analysis are summarized in the following tables and charts.

Annual Economic Impact, Base Case Scenario, Site C Construction

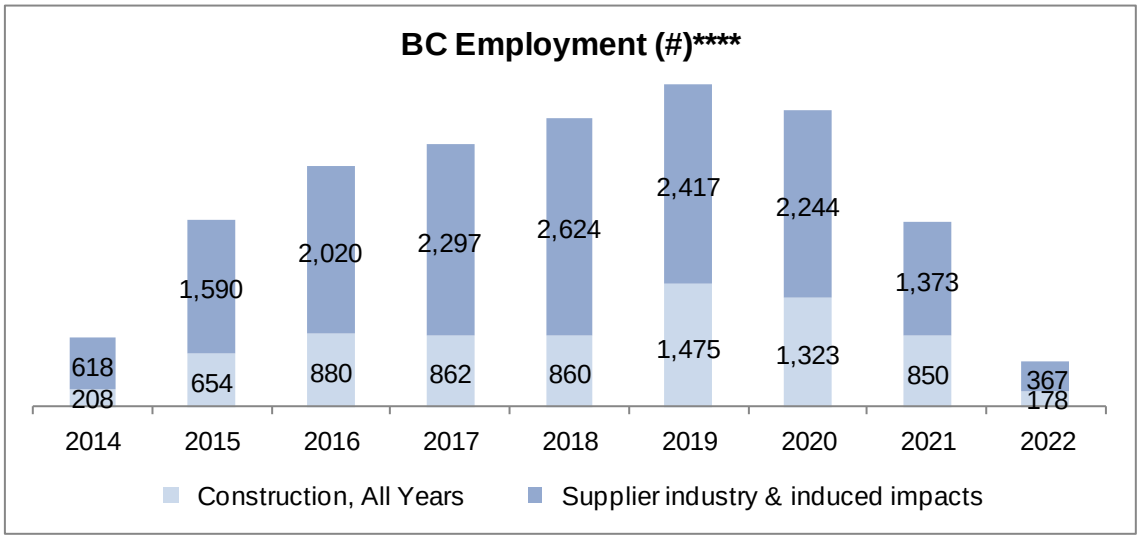
	All Years	2014	2015	2016	2017	2018	2019	2020	2021	2022	Contingency
Total expenditures	**5,316**	210	453	543	590	833	955	900	574	259	731
Total Exenditures in BC*	**3,881**	140	377	475	542	649	647	604	356	92	627
Supplier industry & induced impacts ($M)	**2,600**	103	269	340	398	466	384	359	222	59	416
GDP at basic prices ($M)	**2,785**	91	261	330	368	431	510	459	270	67	443
Construction**	**1,506**	40	130	163	175	207	314	277	160	38	239
Supplier industry & induced impacts	**1,280**	50	130	166	192	223	196	182	110	29	204
Employment (#) ***	**22,841**	826	2,245	2,900	3,159	3,484	3,893	3,566	2,223	545	3,564
Construction	**7,291**	208	654	880	862	860	1,475	1,323	850	178	1,109
Supplier industry & induced impacts	**15,550**	618	1,590	2,020	2,297	2,624	2,417	2,244	1,373	367	2,455
Household income ($M)	**1,932**	63	182	234	251	278	370	324	186	45	300
Construction, All Years	**1,122**	30	99	127	129	139	246	209	116	27	171
Supplier industry & induced impacts	**810**	33	83	106	122	139	124	115	70	18	129
Tax revenue ($M)	**486**	16	48	59	65	77	87	78	45	11	77
Construction, All Years	**302**	9	29	35	38	45	59	51	29	6	48
Supplier industry & induced impacts	**184**	7	19	24	27	32	29	27	16	4	29

* Excludes expenditures on land, water rental, sales of mechantable timber, royalties imported goods/ services ,non- BC labour and contingency.
** Project expenditure data provided by clients may not include all compoents of GDP .
*** Employment estimates are based on average annual wages in 2010. Includes total employment over the life of the project at 80% BC labour.



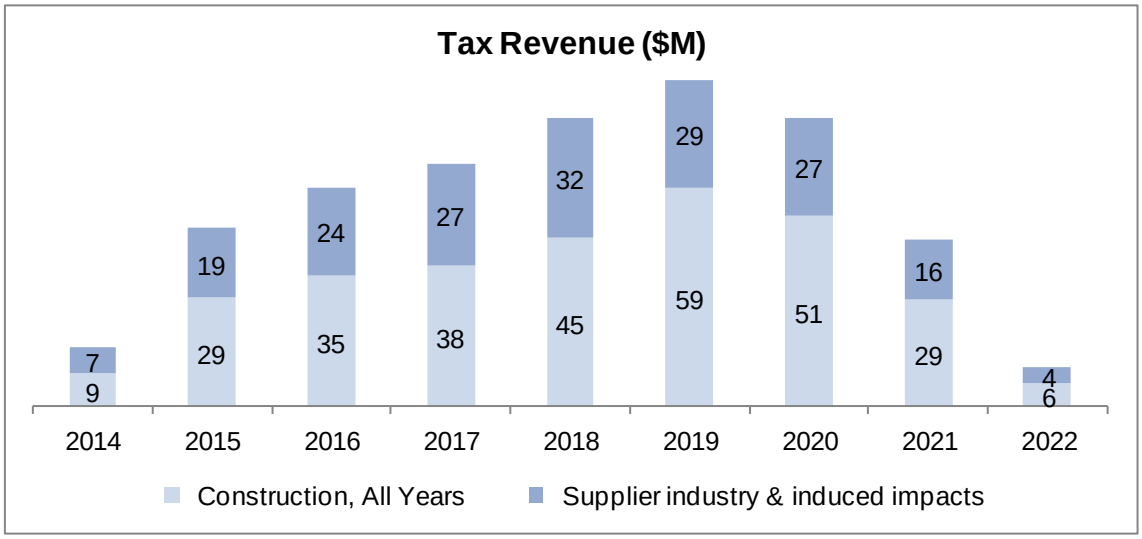
Assuming 80% local labour, no contingency

**** Project expenditure data provided by clients may not include all components of GDP (e.g., operating surplus)*



Assuming 80% local labour, no contingency

***** Employment estimates are based on average annual wages in 2010*



Assuming 80% local labour, no contingency

Note: Commercially sensitive information has been removed by BC Hydro from the public version of this report

Summary of Results: Annual Operating Expenditures

Operating expenditure data was coded to BCIOM categories by BC Hydro.

Total direct annual operating expenditure is estimated at $7.5 million, with imports from other countries representing $300,000 of total spending, and imports from other provinces totalling $700,000. Labour costs are estimated at $2.1 million, annually, with taxes on products net of subsidies accounting for nearly $39,000.

Purchases from suppliers who directly supply goods and services to the project are estimated at $4.4 million, with purchases from suppliers further up the supply chain are approximately $2.0 million. Together, with an induced impact of $1.7 million, supplier industry expenditure is estimated at $8.1 million, annually.

Total direct annual employment is estimated at 25, with a further 38 jobs generated in industries supplying goods and services used directly by the project, and 13 jobs in industries further back in the supply chain. Including induced impacts, total annual employment is 88. Of the 25 direct jobs, it is expected that just over half (13) will be filled by local workers.

Normally, one would expect the number of direct jobs to be higher than the number of jobs in supplier industries. In this case, however, the expenditure data used to estimate the impacts was largely weighted towards purchases of professional services. Of the $7.5 million in estimated annual operating expenditures, $2.6 million represents purchases of professional, scientific & technical services, and $2.2 million represents purchases of architect, engineering and scientific services. These industries tend to be labour-intensive, and this is reflected in the impact results, which show a significant number of jobs generated in supplier industries. This is also the reason why the indirect and induced GDP is higher than the project direct GDP.

Federal, provincial, and local tax revenue impacts are slightly over $700,000 annually. Of the total, approximately $200,000 is a direct impact, $400,000 is from supplier industries, and $100,000 is induced by worker spending.

The model results suggest that total indirect and induced regional impact on supplier industries in the project area, in terms of total output is $500,000. GDP generated within the region is estimated at $200,000, and household income, at $100,000. The local indirect and induced impacts associated with the operation of the dam may be understated. The method used to generate the impacts relies on the region's share of total employment in an industry. Virtually all of the supplier industry jobs are in professional, scientific & technical services and it is possible that some of the work could potentially be done by local residents.

The estimated impact on supplier industries in the rest of BC is $7.6 million in total indirect and induced output. The total GDP is estimated at $4.1 million, and total household income at $3.1 million. Total annual employment in rest of BC outside the project area is approximately 60.

Economic Impact, Site C
Annual Operating Expenditures

Total impact, including Annual Operating Expenditures and supplier industry effects	Direct	Other suppliers	Total Indirect*	Induced**	Total impact
Total expenditures, Annual Operating Expenditures ($M)	**7.5**				
Supplier industry & induced impacts ($M)	*4.4*	*2.0*	**6.4**	1.7	**8.1**
GDP at basic prices ($M)					**6.4**
Annual Operating Expenditures***	**2.1**				2.1
Supplier industry & induced impacts	*2.3*	*0.9*	**3.3**	1.0	4.3
Employment (#)****					**88**
Annual Operating Expenditures	**25**				25
Supplier industry & induced impacts	*38*	*13*	**51**	12	63
Household income ($M)					**5.3**
Annual Operating Expenditures	**2.1**				2.1
Supplier industry & induced impacts	*2.0*	*0.7*	**2.7**	0.6	3.3
Tax revenue ($M)					**0.7**
Annual Operating Expenditures	**0.2**				0.2
Supplier industry & induced impacts	*0.2*	*0.1*	**0.4**	0.1	0.5

* The total indirect impact is the sum of the effect on direct suppliers and other supplier industries

** Assumes a social safety net is in place. Includes effects generated by project spending and activities of supplier industries

*** Project expenditure data provided by clients may not include all components of GDP (e.g., operating surplus)

**** Employment estimates are based on average annual wages in 2010. Includes total employment over the life of the project

Regional Impact Estimates based on Supplier Industry Output, Census Employment Data, and Labour Force Statistics
Annual Operating Expenditures

Estimated Regional Impact, Supplier Industries in LAA (Northeast BC)	Direct suppliers	Other suppliers	Total indirect impact (all suppliers)	Induced	Total indirect & induced
Total output ($M)	0.1	0.3	0.4	0.2	0.5
Total GDP ($M)	0.0	0.1	0.1	0.1	0.2
Total household income ($M)	0.0	0.0	0.0	0.1	0.1
Total employment	0.0	0.0	0.0	0.0	0.0

Note: Commercially sensitive information has been removed by BC Hydro from the public version of this report

Summary of Results: Sustaining Capital

Though the project's total sustaining capital costs will be recorded in one period, activities associated with the costs are expected to take place spread out over the following 100 years, as significant repairs and replacements are required.

Total direct expenditure is estimated at just under $1.2 billion. Of the total, imports from other countries are expected to account for an estimated $372.4 million, and imports from other provinces, $107.1 million. Withdrawals from inventory are approximately $2.1 million. Labour costs are expected to be $490.9 million, with taxes on factors of production net of subsidies totalling nearly $100,000, and taxes on products net of subsidies estimated at almost $600,000.

Purchases from suppliers who provide goods and services directly to the project are estimated at approximately $214.0 million, with an additional $115.6 million generated in industries further back in the supply chain. An induced impact of $274.0 million from spending by workers employed directly or indirectly by the project is expected.

Direct employment was estimated from the input data, based on the assumption that wages will be similar to those paid to workers involved in the construction of the dam (averaging about $150,000). Based on this, it is expected that there will be 3,270 direct jobs, and another 1,971 in supplier industries. Together with the induced impact, total employment is estimated at 7,272.

Total federal, provincial, and local tax revenue impacts are $142.1 million, including a direct impact of $95.0 million, and $24.8 million coming from direct and indirect supplier industries. The induced impact, from spending by workers, is estimated at $22.2 million.

Economic Impact, Site C
Sustaining Capital

Total impact, including Sustaining Capital and supplier industry effects

	Direct	Other suppliers	Total Indirect*	Induced**	Total impact
Total expenditures, Sustaining Capital ($M)	**1,187**				
Supplier industry & induced impacts ($M)	*214*	*116*	**330**	274	**604**
GDP at basic prices ($M)					**812**
Sustaining Capital***	**491**				491
Supplier industry & induced impacts	*96*	*53*	**150**	171	321
Employment (#)****					**7,272**
Sustaining Capital	**3,270**				3,270
Supplier industry & induced impacts	*1,285*	*686*	**1,971**	2,030	4,002
Household income ($M)					**696**
Sustaining Capital	**491**				491
Supplier industry & induced impacts	*72*	*36*	**108**	98	205
Tax revenue ($M)					**142**
Sustaining Capital	**95**				95
Supplier industry & induced impacts	*16*	*9*	**25**	22	47

* The total indirect impact is the sum of the effect on direct suppliers and other supplier industries

** Assumes a social safety net is in place. Includes effects generated by project spending and activities of supplier industries

*** Project expenditure data provided by clients may not include all components of GDP (e.g., operating surplus)

**** Employment estimates are based on average annual wages in 2010. Includes total employment over the life of the project

Regional Impact Estimates based on Supplier Industry Output, Census Employment Data, and Labour Force Statistics
Sustaining Capital

Estimated Regional Impact, Supplier Industries in LAA (Northeast BC)					
	Direct suppliers	Other suppliers	Total indirect impact (all suppliers)	Induced	Total indirect & induced
Total output ($M)	10	15	25	33	58
Total GDP ($M)	4	5	9	15	25
Total household income ($M)	3	3	6	10	16
Total employment	60	70	130	350	480

The estimated total indirect and induced regional impact on supplier industries in the project area is $58.1 million. Total GDP is expected to be $24.6 million, and total household income, $16.2 million. Total employment generated in the project area is estimated at 480.

The regional impact on supplier industries in the rest of BC is estimated at $545.6 million, in terms of total output. The GDP generated is approximately $296.1 million, and impacts to household income total $189.3 million. Total employment is estimated at approximately 3,520.

Note: Commercially sensitive information has been removed by BC Hydro from the public version of this report

Appendix 1: Interpreting the BCIOM results

This section defines some of the terms and concepts used in the report tables and explains how they are calculated.

Variables that are calculated directly from information supplied by clients

Total project expenditure is usually provided by the client, and includes all direct expenditures associated with the project.

There are no jobs, GDP or output associated with the production of goods and services that are imported into the province. Therefore an estimate of the value of imported goods and services is deducted from project direct spending to determine the value of **project expenditure in BC**.

Estimates of wages, salaries and other components of GDP provided by the client are reported in **project direct GDP at basic prices**.

> ***About Project Direct GDP Estimates***
>
> *It should be noted that project direct GDP figures are derived from information provided by clients. These figures are usually project-specific, but they are not always based on complete information. For example, it is often possible to get good data on wages and salaries associated with a project or activity. Labour costs are the biggest component of GDP, but other variables which ought to be included in the estimate (such as investment income, operating surplus, or depreciation) are not always known. When the GDP figures generated by the BCIOM are based on partial information, they may understate the project's direct contribution to GDP.*

Project direct employment is derived based on the project's wage bill and estimates of average annual wages in the industry.

Household income is calculated based on project direct wages, benefits and mixed income.

Variables that are estimated using model information

Commodity taxes less subsidies is calculated using information on average sales and other tax rates associated with each good or service purchased by the project. The estimates are based on current tax rates and coverage.

Project expenditure in BC is traced back to the producing industries in order to determine the **direct BC supply**. Because industries do not "produce" taxes, wages or other components of GDP, the direct BC supply only includes the value of goods and services produced by BC industries. Direct project spending on wages, salaries, operating surplus and taxes are excluded from this measure.

An estimate of **corporate and personal income taxes** associated with project direct expenditures is calculated using a modelling equation that is based on tax data from the Canada Revenue Agency. The tax revenue estimates reflect current effective tax rates by income level.

BCIOM impact estimates

The model is shocked using the direct BC supply calculated from the information provided by the client. This is used to determine the total economic impact of the project on the BC economy, which is reported in terms of direct, indirect and induced impacts.

The direct impact measures the change in economic activity required to satisfy the initial change in demand. The ***direct output impact*** is equal to the direct BC supply–the change in the economic activity of the industries producing the goods and services purchased by the project.

The ***direct GDP impact*** is the GDP generated as a result of the activities of the industries that produce the goods and services used by the project.

The ***direct employment impact*** shows total employment in these industries, and the ***direct household income impact*** is a measure of the wages, salaries, benefits and other income earned by these workers.

The ***direct tax revenue impact*** includes personal, corporation, sales and other taxes generated as a result of the activities of the industries that supply the goods and services used by the project.

The allocation of tax revenues to federal, provincial and local governments is based on model averages.

Induced effects

The induced effect, which measures the impact associated with expenditures by workers, includes purchases of a variety of goods and services, including housing.

More detailed information about the impacts is available in the report tables included in this document.

Appendix 2: Input–Output Analyses

About input-output analyses

Input-output analyses highlight the relationships among producers and consumers (businesses as well as individuals) of goods and services. An input-output analysis is based on first identifying a basket of goods and services used by a specific project[1] *and then tracing through all of the steps involved in producing those goods and services to identify the total extent to which the British Columbia economy will be affected by project expenditures.*

Three types of impacts

Three different types of impacts are reported in a typical input-output analysis:

The **direct impact** measures the *impact on BC industries supplying goods and services directly used by the project.*

The indirect impact *measures the impact on BC industries that are further back in the supply chain.* The indirect impact is cumulative, and includes transactions going all the way back to the beginning of the supply chain.

The induced impact measures the effect that spending by workers (those employed by the project, or by direct and indirect supplier industries) has on the economy.

How are economic impacts measured?

Output, GDP, employment and tax revenues are the key measures used to assess the economic impacts associated with a project. In order to properly interpret the results of a BCIOM analysis, some background information about what these measures represent and how they are calculated may be helpful. A brief explanation of terms and concepts follows.

Output is simply a measure of the total value of production associated with a project. In an ***industry-based*** analysis, output is equal to the value of goods and services produced by the BC industry or industries that are affected by a specific project. In an ***expenditure-based*** analysis, it can be measured as the total dollar amount of all spending on ***goods and services produced in BC.*** It should be noted that purchases of goods and services produced outside the province do not directly affect BC businesses, so these expenditures are explicitly excluded from the analysis. This is usually the main reason why the direct impact on BC industries is less than initial project expenditures.

Gross Domestic Product (GDP) is a measure of the value added (the unduplicated total value of goods and services) to the BC economy by current productive activities attributable to the project. It includes **household income** (wages, salaries and benefits, as well as income earned by proprietors of unincorporated businesses) from current productive activities as well as profits and other income earned by corporations. Only activities that occur within the province are included in GDP.

Employment estimates generated by the model are derived from estimated wage costs using information on average annual wages in an industry. They are not full-time equivalent (FTE) measures. Instead, they reflect the wages paid and hours spent on the job by a typical worker in an industry. For an industry where most employees work full time, the numbers will be very similar to FTE counts. However, in an industry where part-time work is more common, the job counts will be quite different from FTEs.

Government tax revenue estimates generated by the model include income taxes as well as commodity taxes. *Provincial and federal tax revenues* **include federal and provincial personal and corporation income taxes. Also included are** PST, GST and other *commodity* taxes such as gas taxes, liquor and lottery taxes

[1] Or, in the case of an industry analysis, the total value of production by one or more industries.

and profits, air transportation taxes, duties and excise taxes. Property tax revenues are not included in the estimates. *Municipal tax revenues* are primarily related to accommodation taxes.

A more detailed explanation of input-output modelling in general and the BCIOM in particular is included in the Appendix.

Output or GDP: which measure should be used to evaluate economic impacts associated with a project?

Output and GDP are both valid economic measures. However, there are some key differences between them that should be kept in mind when analyzing the results of an input-output analysis.

Output measures correspond to total spending or production, but may overstate the economic impact of a project because the value of a good or service is counted each time it changes hands.

If one is only looking at direct effects, output is a meaningful measure since it shows the total dollar value of industry production. However, there is a danger of double-counting when activities in industries further up the supply chain are also included. Output measures may overstate the indirect economic impact associated with a particular project since the activities of every industry that has contributed in some way to the creation of a final product are counted each time a good or service changes hands.

For example, when a construction company builds a house, the selling price of the house includes:

- the cost of the land on which it is built;
- the cost of inputs (lumber, shingles, cement, carpets, paint, hardware, plumbing fixtures, architectural services and so on) purchased and used by the builder; and
- the value of the work done by the construction company.

An **output-based impact measure** would include the entire selling price of the house (including all these imbedded costs) in the direct output of the construction industry. The value of architectural services included in the cost of the house would also be counted as an indirect output impact on the architectural services industry. The value of the lumber used would be counted as an indirect output impact on the wood industry, and going further back in the supply chain, the value of the logs used by the sawmill would be counted in the indirect output impact on the logging industry. In this example, the value of the logs used to produce the building materials is counted at least three times: once in the direct output impact, and twice in the indirect output impacts on the sawmill and logging industries. In other words, the indirect output impact could be quite high simply because goods (or services) used in production have changed hands many times.

Indirect output impacts provide useful information about the total amount of money that has changed hands as goods and services are transformed into final products. GDP is a better measures of the economic impact since the value of the work done by each industry is attributed only to the producing industry, and is counted only once.

GDP is calculated by subtracting the cost of purchased goods, services and energy from the total value of an industry's output. As a result, the value of the work done by a producing industry is only counted once. In the construction example, the direct GDP impact would only include the value of the work done by the construction firm. The indirect impact on the sawmill industry would only include the value of the work done to transform the logs into lumber, and the indirect impact on the logging industry would be a measure of the value of the work done by the loggers. There is no double counting in GDP measures.

Note: Commercially sensitive information has been removed by BC Hydro from the public version of this report

It should be noted that the relationship between GDP and output is a useful analytical measure since it shows the extent to which industries rely on labour and capital as opposed to material and service inputs in production. The analysis of economic impacts relies on this relationship, since output is more easily and directly measured than GDP. In fact, the starting point for most input-output analyses is a measure of the direct output associated with a project. From this, known relationships between output and other indicators such as GDP and employment can be used to estimate the economic impact associated with a specific project.

Some background on input-output models and analysis

Input-output analysis is based on statistical information about the flow of goods and services among various sectors of the economy. This information, presented in the form of tables, provides a comprehensive and detailed representation of the economy for a given year. An input-output model is essentially a database showing the relationship between commodity usage and industry output. It consists of three components:

- a table showing which commodities–both goods and services–are consumed by each industry in the process of production (the input matrix)
- a table showing which commodities are produced by each industry (the output matrix)
- a table showing which commodities are available for consumption by final users (the final demand matrix).

These data are combined into a single model of the economy which can be solved to determine how much additional production is generated by a change in the demand for one or more commodities or by a change in the output of an industry. Changing the usage or production of a commodity or group of commodities is often referred to as shocking the model. The known relationship between goods and services in the economy is used to generate an estimate of the economic impact of such a change.

If a change in demand is met by increasing or decreasing imports from other jurisdictions, there is no net effect on domestic production. All of the benefits or costs associated with employment generation or loss, and other economic effects, will occur outside the region. Therefore, it is important to identify whether or not a change in the demand for a good or service is met inside or outside a region.

Assumptions and Caveats

From an IO perspective, commodities made in BC have a much bigger impact than those imported into the province. The analysis presented here is based on using default import ratios for most commodities: i.e., assuming they are purchased locally, but allowing for the fact that they may have been manufactured elsewhere.

All tax data were generated using the model structure, and are based on averages for an industry or commodity.

The precision of the figures in the tables should not be taken as an indication of their accuracy. Economic modelling is an imprecise science and the estimates in this report are probably no better than +/- 10%.

The British Columbia Input-Output Model

The BCIOM can be viewed as a snapshot of the BC economy. It is derived from inter-provincial input-output tables developed by Statistics Canada and includes details on 727 commodities, 300 industries, 170 "final demand" categories, and a set of computer algorithms to do the calculations required for the solution of the model. It can be used to predict how an increase or a decrease in demand for the products of one industry will have an impact on

other industries and therefore on the entire economy.

Limitations and caveats associated with input-output analysis

Input-output analysis is based on various assumptions about the economy and the inter-relationships between industries. These assumptions are listed below:

Input-output models are linear. They assume that a given change in the demand for a commodity or for the outputs of a given industry will translate into a proportional change in production.

Input-output models do not take into account the amount of time required for changes to happen. Economic adjustments resulting from a change in demand are assumed to happen immediately.

It is assumed that there are no capacity constraints and that an increase in the demand for labour will result in an increase in employment (rather than simply re-deploying workers).

It is assumed that consumers spend an average of 80% of their personal income on goods and services. The remaining 20% of personal income is consumed by taxes, or goes into savings.

The BCIOM is based on a "snapshot" of the BC economy in 2008. It is assumed that relationships between industries are relatively stable over time, so that the 2008 structure of the economy continues to be applicable today. However, it should be noted that employment estimates have been adjusted to reflect wage levels for the year of the expenditures in each case.

The BCIOM does not distinguish between regional effects. It will not, for example, differentiate between the economic impact of a plant located in one region of the province and a similar plant elsewhere in BC.

Appendix 3: Modellers Report for Site C Clean Energy Project

(Note: BC Stats Modeller's Report modified by BC Hydro to protect commercially sensitive information)

Data Source

The data used in the BCIOM analysis was provided to BC Stats by BC Hydro, containing:

- detailed expenditure information – construction phase
- expected manning schedule – construction phase
- estimated annual operating costs
- estimated sustaining capital expenditures – operations phase

This section describes the process used to transform the information supplied by BC Hydro into the data that was used to shock the model. These steps are part of any input-output analysis. Input-output models measure economic impacts on industries so it is necessary to transform commodity expenditure estimates into industry output shocks, which can then be used to determine indirect and induced impacts.

The steps involved in this process are outlined below.

Step 1: Exclusion of Expenditures with No Associated Economic Output

Some types of expenditures do not result in any change in current economic output, and are therefore excluded from the analysis. In this project, the following expenditure items were excluded from the input data used in the model run:

- Cost of land – a transfer of an asset from one owner to another does not have any associated economic output, apart from legal fees and real estate commissions that may have been paid;
- Water rentals during construction or operations – a payment to government for the use of a resource does not have any associated economic output;
- Royalties paid for crown land for material quarrying and borrowing, as well as stumpage fees – a payment to government that does not have any associated economic output;
- Sale of merchantable timber – the economic impact associated with harvesting the timber was captured in the spending on custom forestry. While the sale of the timber provides revenue to BC Hydro, it represents a change in the ownership of the asset and does not have any associated economic impact.

It is important to distinguish between expenditures made in BC and spending on BC products. For a BCIOM analysis, expenditure data should include all commodities that have been purchased from a supplier in the province (this would include imported goods that are sold in BC). The expenditure data should exclude goods and services purchased directly from suppliers outside BC. For the powerhouse and tailrace, the hydromechanical equipment; cranes and hoists; turbines and generators used in the project will be imported. BC Hydro indicated that about 20% of the cost of these commodities would be transportation and insurance (installation labour and construction equipment costs were treated as a separate expenditure category). This amount was included in the provincial impact analysis. The remaining 80% was removed from the expenditure data.

For the Site C project base case scenarios, it was assumed that 20% of the workers would come from outside BC. The wage bill and employment estimates used in the model data were reduced to reflect this, since spending by workers who

reside outside BC is not expected to generate a significant induced impact in BC.

Step 2: Allocating the remaining expenditure data to BCIOM categories

Expenditure data provided by clients is not necessarily reported using BCIOM categories. Frequently, the data is provided for broad expenditure categories. If the expenditure data cannot be mapped directly into BCIOM categories (e.g., if "fuel" is an expenditure category rather than spending on BCIOM categories such as gasoline, aviation fuel, diesel fuel, fuel oil, or other types of fuel), model data are used to allocate the broad expenditure data to BCIOM categories. The allocation is based on expenditure patterns in similar types of industries or activities.

The data inputs used in the BCIOM analysis were provided by BC Hydro, based on estimates of the capital costs associated with building the Site C dam.

Site C Clean Energy Project Derivation of data used to shock the model	Base Case (80% BC Labour) including contingency	Benchmark Case (100% BC labour) including contingency
Estimated expenditures ($Million)	5,315.8	5,315.8
Minus Exclusions: Cost of Land, Water Rental, Sales of merchantable timber, Royalties	203.8	203.8
Imports excluded up front: Imported goods, Labour from outside BC	603.8	294.4
Equals expenditure used in BCIOM run	4,508.1	4,817.6

The information was broken down into spending by commodity within broad expenditure categories. For example, Land & Rights, Flowage, Site Access and Clearing included the following:

- Cost of land
- Water rentals during construction
- Other costs: custom forestry-material for clearing; custom forestry-sales of merchantable timber as revenue; road, highway & airport runway construction; royalties; other engineering construction; motor gasoline; diesel oil; rental, other machinery & equipment; spare parts & maintenance supplies; and labour.

Wherever possible, the BC Hydro coding was used "as is".

In some cases, it was necessary to allocate the totals from the BC Hydro data to various types of goods and services. For example, in the BCIOM other engineering construction services includes a significant labour component, plus overhead, and purchases of goods and services used in construction. In the BC Hydro data, the labour and overhead were reported separately. Using the "other engineering construction services" category in the modelling would have resulted in an over-estimate of the impacts associated with labour and overhead costs, and an under-estimate of the impacts associated with purchases of materials and services used in construction. Therefore, the BCIOM analysis treated this expenditure as a purchase of various goods and services (e.g., steel, concrete, engineering services, and spare parts) typically used by the engineering construction services industry. The allocation was based on information on spending by the engineering construction services industry from the model database.

Note: Commercially sensitive information has been removed by BC Hydro from the public version of this report

Other categories that required similar reallocation include: custom forestry (material for clearing); road, highway construction; non-residential building construction; electric power, dam and irrigation construction2; equipment rental; camp operation and maintenance; contractors' indirects and overhead.

Expenditures on hydromechanical, mechanical and electrical commodities were allocated to BCIOM categories using model information.

Spare parts & maintenance supplies is a catch-all category, which includes many different types of goods. Only the items that were most likely to be used by the project were included (e.g., parts for construction equipment was assumed to include tires, conveyor and transmission belting, tubing, engines, industrial trucks, material handling and construction equipment, but spending on other types of goods was excluded). Similarly, travel expenditures were allocated to relevant commodities based on model information.

Step 3: Removing Margins from the Expenditure Data

Expenditure data provided by clients normally represents the final cost (purchaser price) of goods or services used in a project. This includes:

- The actual cost of a good at the factory gate, or the selling price of service.
- Margins embedded in the price paid for a good or service (e.g., transportation, wholesale, retail, pipeline and gas margins).
- Taxes explicitly or implicitly included in the price of goods and services (e.g., commodity taxes such as the HST, excise taxes, import duties, and profits of liquor and gaming commissions).

Using model data on margin rates (by commodity and industry or final demand category), taxes and other margins are deducted from the purchase price of each commodity and are recorded as separate expenditure items.

Step 4: Calculating Project Direct Tax Revenues and GDP

Taxes, wages, salaries, benefits, mixed income and operating surplus included in the expenditure data provided by clients are reported as a direct project impact. An estimate of personal and corporate income tax revenues is derived from input data on wages and operating surplus.

There are no indirect impacts associated with the following expenditures:

- Taxes (net of subsidies) included in the price of commodities (sales, excise and other commodity taxes). These represent a payment to government but do not directly result in increased output by a particular industry.
- Taxes (net of subsidies) on factors of production-for example, property taxes. These represent a payment to government but do not directly result in increased output by a particular industry.
- Components of GDP: wages, salaries, benefits, mixed income and operating surplus. These are payments to factors of production. However, they are not produced by any industry so there are no associated indirect impacts.

[2] The expenditure profile for electric power, dams & irrigation construction is based on spending in the model year (2008). These expenditures were primarily related to transmission line construction.

Step 5: Removing Leakages from the Expenditure Data

Indirect and induced impacts can only be generated by goods and services produced in BC in the current period. The following expenditures represent "leakages" and are excluded from the input data:

- The value (at factory gate) of imported goods or services that are purchased in BC. Production of these goods and services occurs outside the province, so any associated indirect and induced impacts will occur in the producing area.
- Goods that are supplied from inventories held by producers. These goods have already been produced, so there is no current economic impact associated with their use.

Leakages are estimated using import ratios (derived from model data on international and interprovincial imports as a percent of total consumption by commodity) and information on inventories held by producers in the model year. The leakage rates can be adjusted if necessary (for example, if it is known that a particular commodity will be locally sourced, the import ratio can be set to 0, or if a commodity will be imported from another country or province, the import ratio can be set to 1). Leakages are removed from the expenditure estimates for each commodity.

Step 6: Shocking the Model

At this point, the remaining expenditures represent the total value of all goods and services produced in BC, or the direct supply of BC goods and services. This is the value of goods and services produced by industries that are direct suppliers to the project (e.g., producers of cement, engineering firms, or operators of work camps).The derivation of the direct BC supply is summarized in the report tables.

Supplier Industry Impacts

The direct BC supply can be viewed as a first round indirect impact of a particular project. The model is then used to determine impacts in industries further back in the supply chain by tracing the relationships among industries, going all the way back to the beginning of the supply chain.

Employment Estimates

The model is used to estimate employment in supplier industries, and may also be used to derive project direct employment estimates, if they have not been supplied by clients. Employment figures are derived by dividing the estimated wage bill by average wages in each industry. They represent typical jobs in an industry and should not be confused with FTE counts.

Induced Impacts

The induced impact is calculated based on household income (wages and mixed income). Essentially, this impact measures the effect on the economy of spending by workers. It reflects the mix of goods and services typically purchased by British Columbians. The model assumes that 80% of after-tax income will be spent. Household income is used to calculate the induced impact includes wages paid by workers hired directly by the project, as well as those employed in various supplier industries.

Regional Economic Impacts

Although the model is based on provincial data, outputs from the model can be used to derive regional impact estimates. These estimates should be viewed as experimental in nature, as the methodology on which they are based is still being refined.

The main result of a model run is an estimate of direct, indirect and induced output impacts by industry for each of the 300 industries included in the model.

Data on employment by region and for each of these industries is available from the 2006 Census of Canada (the industry data from the 2011 Census has not yet been released).

Information from the Labour Force Survey (available at a more aggregated industry level) is combined with the Census data and used to estimate current employment levels and labour market characteristics in each region and for each industry.

For the specified region, the supply of available workers in the affected industry (construction in the case of the Site C project) is compared to the demand for workers directly employed on the project. The supply is reduced by the number of people expected to be direct project employees since it is assumed that the project will hire local employees if at all possible.

Then, the regional supplier industry (and induced) impact is determined by allocating a proportion of the output in each industry to the region. In most cases, the proportion is based on the region's share of total employment by industry.

It is also assumed that output and employment in the following industries will be locally supplied:

- Agriculture
- Forestry & logging
- Fishing, hunting & trapping
- Mining, oil& gas extraction
- Construction
- Traveller accommodation
- Food services& drinking places

For the industries listed above, the proportion used to determine the regional impact is based on the region's share of the total pool of unemployed labour since it is assumed that workers in these industries could be mobile across industries.

Annual construction expenditures

The BC Hydro information included high-level expenditure data by project activity and by type of expenditure (e.g., labour, equipment, materials, sub-contractors, indirect and other costs). Data on the expected profile of expenditures over time was also included.

Detailed expenditures by project and sub-category were also included. The expenditure information was coded to BCIOM categories (e.g., motor gasoline, diesel oil; cement) by BC Hydro.

Contractors' construction supervision & administration costs were treated as a separate item in the detailed expenditure information, but were allocated back to projects in the more summary spreadsheet. In addition, the detailed spreadsheet split out labour costs associated with some types of expenditures (e.g. secant pile cut-off, equipment rental, step-up transformers, and camp operation and maintenance). As a result, the allocation of labour and equipment, materials and services is not the same in the two data sets. The detailed expenditure estimates also included a more complete breakdown of BC Hydro and Interconnection costs.

A matrix showing the expected timing of these expenditures was also included in the detailed spreadsheet. It indicated the years in which expenditures would be made, but provided no information about the distribution of the expenditures over those years. The expenditure profile based on this information was not identical to the profile in the first dataset.

Because the model is run at the commodity level, it was necessary to derive a time series of expenditures for each of the goods and services used in the construction of the dam. This was done by using the expenditure matrix to determine when each type of good or service would be purchased in each year, and then allocating each expenditure estimate over the relevant time frame based on the high-level

information for the associated. The results of this exercise are summarized below.

Site C Clean Energy Project-Annual At-Gate Capital Costs	At-Gate Capital Costs (2010$)	2014	2015	2016	2017	2018	2019	2020	2021	2022
Total at-gate capital cost	5,315.8	209.7	439.9	514.9	536.6	851.4	915.8	894.1	675.9	277.5
Expenditure Profile used in BCIOM run (derived from detailed expenditures, allocated by year based on at-gate capital costs and expenditure matrix)	5,315.8	209.5	453.1	543.0	589.7	832.9	954.5	899.9	573.8	259.4
Difference (%)	0.0	-0.1	3.0	5.4	9.9	-2.2	4.2	0.6	-15.1	-6.5

BC Hydro provided a manning schedule. In order to derive time series estimates of expenditures for use in the BCIOM, it was necessary to create a series of expenditures that matched the coded information and timeline from the detailed tables, was consistent with the manning schedule provided by BC Hydro, and was as similar as possible to the summary-level profile.

Total labour costs were compared to the manning schedule information and this was used to derive an allocation of expected labour costs over time. The manning schedule was mapped to broad groupings.

For the craft employment, the following mappings were made:

- Land & rights, flowage, site access & clearing
- Diversion works and dams
- Powerhouse
- Switchgear building
- Construction services including worker accommodation, site services, site restoration.
- Transmission interconnection construction cost

The profiles for contractors' construction supervision and administration and BC Hydro construction management & management and engineering came directly were mapped directly to the categories in manning schedule.

Annual labour costs were derived from the profile of employment for the relevant work in each year. In a small number of cases, the manning schedule information was not consistent with the time series expenditure matrix. In these cases, the labour income profile was adjusted to be consistent with the expenditure data.

The time series profile of purchases other than labour was derived by subtracting the estimated labour costs for each project from total spending on that project in each year, and the information was then allocated proportionally across expenditure items.

The last step was to remove expenditures on goods and services that do not have an impact on current production. These include purchases of land (which represent a transfer of ownership rather than new production. Water rentals, sales of merchantable timber and royalties were also excluded from the analysis. Water rentals and royalties are payments to government for the use of natural resources, so there is no associated economic impact, although there is a revenue impact on the government.

BC Hydro also identified some purchases that would be sourced entirely outside the province, and these were excluded from the analysis, as were wages paid to non-residents of the province (estimated to account for 20% of the total wage bill).

Appendix 4: Tables of Annual Economic Impacts

(tables reporting total for all years and annual values

Economic Impact, Site C (80% local labour)

Construction, All Years

Total impact, including Construction, All Years and supplier industry effects	Direct	Other suppliers	Total Indirect*	Induced**	Total impact
Total expenditures, Construction, All Years ($M)	4,508				
Supplier industry & induced impacts ($M)	1,429	774	2,203	813	3,016
GDP at basic prices ($M)					3,228
Construction, All Years***	1,745	0	0	0	1,745
Supplier industry & induced impacts	617	359	976	507	1,483
	0	0	0	0	0
Employment (#)****					26,405
Construction, All Years	8,400	0	0	0	8,400
Supplier industry & induced impacts	7,360	4,618	11,978	6,027	18,005
Household income ($M)					2,232
Construction, All Years	1,294	0	0	0	1,294
Supplier industry & induced impacts	415	233	648	291	939
Tax revenue ($M)					563
Construction, All Years	350				350
Supplier industry & induced impacts	94	53	147	66	213

* The total indirect impact is the sum of the effect on direct suppliers and other supplier industries

** Assumes a social safety net is in place. Includes effects generated by project spending and activities of supplier industries

*** Project expenditure data provided by clients may not include all components of GDP (e.g., operating surplus)

**** Employment estimates are based on average annual wages in 2010. Includes total employment over the life of the project

Allocation of Project Expenditures Construction, All Years	
Total expenditures, construction, all years ($M)	**4,508**
minus leakages:	
imports from other countries	**658**
imports from other provinces	**580**
other leakages (e.g. withdrawals from inventory)	**47**
Equals:	
Construction, All Years expenditures on goods & services (including labour and profits) produced in BC ($M)	**3,223**
Of which:	
Wages, benefits, unincorporated business income and operating surplus ($M)	**1,736**
Taxes on products net of subsidies ($M)	**49**
Taxes on factors of production net of subsidies ($M)	**9**
Direct BC supply ($M)	**1,429**
(the change in BC supplier industry output associated with construction, all years)	
Project employment during construction, all years (#)	**8,400**
Household income included in construction, all years ($M)	**1,238**

Tax revenue derived from direct project expenditures Construction, All Years	Federal	Provincial	Local	Total
Total, all sources	**215**	**129**	**6**	**350**
Taxes on products net of subsidies ($M)*	**18**	**36**	**0**	**54**
Taxes on factors of production net of subsidies ($M)	**0**	**3**	**6**	**9**
Personal income taxes ($M)	**160**	**72**		**232**
Corporate income taxes ($M)	**38**	**17**		**55**
(income taxes paid on worker's wages and returns to capital reported in project expenditure)				

*Small differences between this figure and the value for taxes on products net of subsidies reported in the allocation of project expenditure section are due to rounding and/or the inclusion of net taxes paid on some goods purchased by subcontractors which are not reflected in the indirect & induced impacts given below.

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1

Indirect & Induced Impacts resulting from project expenditures all years					
	Direct suppliers	Other suppliers	Total indirect impact (all suppliers)	Induced Impact**	Total indirect & induced impacts
Output ($M)	1,429	774	2,203	813	3,016
GDP at basic prices* ($M)	617	359	976	507	1,483
Employment (#)*	7,360	4,618	11,978	6,027	18,005
Household income ($M)	415	233	648	291	939
Total tax revenue ($M)	94	53	147	66	213
Federal ($M)	50	26	77	21	98
Personal income tax	32	17	49	16	65
Corporation income tax	15	9	24	9	34
Net taxes on products	3	0	3	-3	-1
Provincial ($M)	32	19	50	25	75
Personal income tax	12	6	19	6	25
Corporation income tax	7	4	11	4	15
Net taxes on products	12	8	21	15	35
Local ($M)	13	8	21	20	40

* Includes wages, benefits, unincorporated business income, operating surplus and net taxes on factors of production

2

** Assumes a social safety net is in place. Includes effects generated by project spending and activities of supplier industries

Regional Impact Estimates based on Supplier Industry Output, Census Employment Data, and Labour Force Statistics

Estimated Regional Impact, Supplier Industries in Project Area (All years)					
	Direct suppliers	Other suppliers	Total indirect impact (all suppliers)	Induced	Total indirect & induced
Total output ($M)	99	126	225	99	324
Total GDP ($M)	34	53	87	46	132
Total household income ($M)	24	27	51	30	80
Total employment	670	610	1,280	1,040	2,350

Estimated Impact in Rest of BC (All years)					
	Direct suppliers	Other suppliers	Total indirect impact (all suppliers)	Induced	Total indirect & induced
Total output ($M)	1,331	647	1,978	715	2,692
Total GDP ($M)	582	307	889	462	1,351
Total household income ($M)	390	209	599	260	859
Total employment	6,680	4,000	10,680	4,980	15,670

Economic Impact, Site C (80% local labour)
Construction, 2014

Total impact, including Construction, 2014 and supplier industry effects	Direct	Other suppliers	Total Indirect*	Induced**	Total impact
Total expenditures, Construction, 2014 ($M)	**140**				
Supplier industry & induced impacts ($M)	*52*	*29*	**81**	22	**103**
GDP at basic prices ($M)					**91**
Construction, 2014***	**40**				40
Supplier industry & induced impacts	*23*	*13*	**37**	14	50
Employment (#)****					**826**
Construction, 2014	**208**				208
Supplier industry & induced impacts	*287*	*168*	**456**	163	618
Household income ($M)					**63**
Construction, 2014	**30**				30
Supplier industry & induced impacts	*16*	*9*	**25**	8	33
Tax revenue ($M)					**16**
Construction, 2014	**9**				9
Supplier industry & induced impacts	*3*	*2*	**5**	2	7

* The total indirect impact is the sum of the effect on direct suppliers and other supplier industries

** Assumes a social safety net is in place. Includes effects generated by project spending and activities of supplier industries

*** Project expenditure data provided by clients may not include all components of GDP (e.g., operating surplus)

**** Employment estimates are based on average annual wages in 2010. Includes total employment over the life of the project

Allocation of Project Expenditures Construction, 2014	
Total expenditures, construction, 2014 ($M)	**139.6**
minus leakages:	
imports from other countries	*20.8*
imports from other provinces	*22.5*
other leakages (e.g. withdrawals from inventory)	*1.7*
Equals:	
Construction, 2014 expenditures on goods & services (including labour and profits) produced in BC ($M)	**94.6**
Of which:	
Wages, benefits, unincorporated business income and operating surplus ($M)	39.7
Taxes on products net of subsidies ($M)	2
Taxes on factors of production net of subsidies ($M)	1
Direct BC supply ($M)	**52**
(the change in BC supplier industry output associated with construction, 2014)	
Project employment during construction, 2014 (#)	208
Household income included in construction, 2014 ($M)	**29**

Tax revenue derived from direct project expenditures Construction, 2014				
	Federal	Provincial	Local	Total
Total, all sources	**5.06**	**3.49**	**0.38**	**8.94**
Taxes on products net of subsidies ($M)*	0.66	1.34	0.00	2.00
Taxes on factors of production net of subsidies ($M)	-0.01	0.21	0.39	0.58
Personal income taxes ($M)	3.57	1.56		5.13
Corporate income taxes ($M)	0.84	0.38		1.22
(income taxes paid on worker's wages and returns to capital reported in project expenditure)				

*Small differences between this figure and the value for taxes on products net of subsidies reported in the allocation of project expenditure section are due to rounding and/or the inclusion of net taxes paid on some goods purchased by subcontractors which are not reflected in the indirect & induced impacts given below.

Note: Commercially sensitive information has been removed by BC Hydro from the public version of this report

Indirect & Induced Impacts resulting from project expenditures					
	Direct suppliers	Other suppliers	Total indirect (all suppliers)	Induced **	Total indirect & induced
Output ($M)	52.5	28.7	81.2	21.9	103.2
GDP at basic prices* ($M)	23.4	13.3	36.7	13.7	50.4
Employment (#)*	287	168	456	163	618
Household income ($M)	16.3	8.6	24.9	7.8	32.7
Total tax revenue ($M)	**3.48**	**1.96**	**5.44**	**1.78**	**7.22**
Federal ($M)	1.89	0.98	2.87	0.58	3.45
Personal income tax	*1.29*	*0.63*	*1.92*	*0.42*	*2.34*
Corporation income tax	*0.54*	*0.34*	*0.88*	*0.25*	*1.13*
Net taxes on products	*0.06*	*0.01*	*0.07*	*-0.09*	*-0.02*
Provincial ($M)	1.14	0.69	1.82	0.67	2.50
Personal income tax	*0.49*	*0.24*	*0.73*	*0.16*	*0.89*
Corporation income tax	*0.24*	*0.15*	*0.40*	*0.11*	*0.51*
Net taxes on products	*0.41*	*0.29*	*0.70*	*0.40*	*1.10*
Local ($M)	0.45	0.29	0.74	0.53	1.27

* Includes wages, benefits, unincorporated business income, operating surplus and net taxes on factors of production

** Assumes a social safety net is in place. Includes effects generated by project spending and activities of supplier industries

Regional Impact Estimates based on Supplier Industry Output, Census Employment Data, and Labour Force Statistics

Estimated Regional Impact, Supplier Industries in Project Area (All years)					
	Direct suppliers	Other suppliers	Total indirect (all suppliers)	Induced	Total indirect & induced
Total output ($M)	4	5	9	3	12
Total GDP ($M)	2	2	4	1	5
Total household income ($M)	1	1	2	1	3
Total employment	30	20	50	30	80

Estimated Impact in Rest of BC (All years)					
	Direct suppliers	Other suppliers	Total indirect (all suppliers)	Induced	Total indirect & induced
Total output ($M)	49	24	73	19	91
Total GDP ($M)	22	11	33	12	45
Total household income ($M)	15	8	23	7	30
Total employment	260	140	400	130	540

Economic Impact, Site C (80% local labour)
Construction, 2015

Total impact, including Construction, 2015 and supplier industry effects	Direct	Other suppliers	Total Indirect*	Induced**	Total impact
Total expenditures, Construction, 2015 ($M)	**377**				
Supplier industry & induced impacts ($M)	*131*	*72*	**203**	66	**269**
GDP at basic prices ($M)					**261**
Construction, 2015***	**130**				130
Supplier industry & induced impacts	*56*	*34*	**89**	41	130
Employment (#)****					**2,245**
Construction, 2015	**654**				654
Supplier industry & induced impacts	*675*	*427*	**1,102**	488	1,590
Household income ($M)					**182**
Construction, 2015	**99**				99
Supplier industry & induced impacts	*38*	*22*	**60**	24	83
Tax revenue ($M)					**48**
Construction, 2015	**29**				29
Supplier industry & induced impacts	*8*	*5*	**13**	5	19

* The total indirect impact is the sum of the effect on direct suppliers and other supplier industries

** Assumes a social safety net is in place. Includes effects generated by project spending and activities of supplier industries

*** Project expenditure data provided by clients may not include all components of GDP (e.g., operating surplus)

**** Employment estimates are based on average annual wages in 2010. Includes total employment over the life of the project

Allocation of Project Expenditures Construction, 2015	
Total expenditures, construction, 2015 ($M)	**377.1**
minus leakages:	
imports from other countries	*51.1*
imports from other provinces	*55.0*
other leakages (e.g. withdrawals from inventory)	*3.3*
Equals:	
Construction, 2015 expenditures on goods & services (including labour and profits) produced in BC ($M)	**267.7**
Of which:	
Wages, benefits, unincorporated business income and operating surplus ($M)	129.3
Taxes on products net of subsidies ($M)	6
Taxes on factors of production net of subsidies ($M)	1
Direct BC supply ($M)	**131**
(the change in BC supplier industry output associated with construction, 2015)	
Project employment during construction, 2015 (#)	654
Household income included in construction, 2015 ($M)	**95**

Tax revenue derived from direct project expenditures Construction, 2015				
	Federal	Provincial	Local	Total
Total, all sources	**16.93**	**11.50**	**0.77**	**29.20**
Taxes on products net of subsidies ($M)*	2.18	4.44	0.00	6.62
Taxes on factors of production net of subsidies ($M)	-0.02	0.41	0.77	1.17
Personal income taxes ($M)	12.19	5.48		17.67
Corporate income taxes ($M)	2.57	1.17		3.74
(income taxes paid on worker's wages and returns to capital reported in project expenditure)				

*Small differences between this figure and the value for taxes on products net of subsidies reported in the allocation of project expenditure section are due to rounding and/or the inclusion of net taxes paid on some goods purchased by subcontractors which are not reflected in the indirect & induced impacts given below.

Indirect & Induced Impacts resulting from project expenditures					
	Direct suppliers	Other suppliers	Total indirect (all suppliers)	Induced **	Total indirect & induced
Output ($M)	131.3	72.0	203.2	65.9	269.1
GDP at basic prices* ($M)	55.6	33.6	89.2	41.1	130.3
Employment (#)*	675	427	1,102	488	1,590
Household income ($M)	38.3	21.5	59.8	23.5	83.3
Total tax revenue ($M)	**8.37**	**4.90**	**13.26**	**5.34**	**18.61**
Federal ($M)	4.51	2.44	6.96	1.74	8.69
Personal income tax	*3.03*	*1.57*	*4.60*	*1.26*	*5.87*
Corporation income tax	*1.31*	*0.86*	*2.17*	*0.75*	*2.93*
Net taxes on products	*0.17*	*0.01*	*0.18*	*-0.28*	*-0.10*
Provincial ($M)	2.74	1.72	4.46	2.02	6.48
Personal income tax	*1.15*	*0.60*	*1.75*	*0.48*	*2.23*
Corporation income tax	*0.59*	*0.39*	*0.98*	*0.34*	*1.32*
Net taxes on products	*1.00*	*0.72*	*1.73*	*1.20*	*2.92*
Local ($M)	1.11	0.74	1.85	1.59	3.44

* Includes wages, benefits, unincorporated business income, operating surplus and net taxes on factors of production

** Assumes a social safety net is in place. Includes effects generated by project spending and activities of supplier industries

Regional Impact Estimates based on Supplier Industry Output, Census Employment Data, and Labour Force Statistics

Estimated Regional Impact, Supplier Industries in Project Area (All years)					
	Direct suppliers	Other suppliers	Total indirect (all suppliers)	Induced	Total indirect & induced
Total output ($M)	10	13	23	8	30
Total GDP ($M)	3	5	8	4	12
Total household income ($M)	2	3	5	2	7
Total employment	60	60	120	80	210

Estimated Impact in Rest of BC (All years)					
	Direct suppliers	Other suppliers	Total indirect (all suppliers)	Induced	Total indirect & induced
Total output ($M)	122	59	181	58	239
Total GDP ($M)	52	28	80	37	118
Total household income ($M)	36	19	55	21	76
Total employment	610	370	980	400	1,380

Economic Impact, Site C (80% local labour)
Construction, 2016

Total impact, including Construction, 2016 and supplier industry effects	Direct	Other suppliers	Total Indirect*	Induced**	Total impact
Total expenditures, Construction, 2016 ($M)	**475**				
Supplier industry & induced impacts ($M)	*166*	*90*	**256**	84	**340**
GDP at basic prices ($M)					**330**
Construction, 2016***	**163**				163
Supplier industry & induced impacts	*72*	*42*	**114**	53	166
Employment (#)****					**2,900**
Construction, 2016	**880**				880
Supplier industry & induced impacts	*863*	*531*	**1,394**	625	2,020
Household income ($M)					**234**
Construction, 2016	**127**				127
Supplier industry & induced impacts	*49*	*27*	**76**	30	106
Tax revenue ($M)					**59**
Construction, 2016	**35**				35
Supplier industry & induced impacts	*11*	*6*	**17**	7	24

* The total indirect impact is the sum of the effect on direct suppliers and other supplier industries

** Assumes a social safety net is in place. Includes effects generated by project spending and activities of supplier industries

*** Project expenditure data provided by clients may not include all components of GDP (e.g., operating surplus)

**** Employment estimates are based on average annual wages in 2010. Includes total employment over the life of the project

Allocation of Project Expenditures Construction, 2016	
Total expenditures, construction, 2016 ($M)	**475.0**
minus leakages:	
imports from other countries	*67.2*
imports from other provinces	*67.1*
other leakages (e.g. withdrawals from inventory)	*5.1*
Equals:	
Construction, 2016 expenditures on goods & services (including labour and profits) produced in BC ($M)	**335.6**
Of which:	
Wages, benefits, unincorporated business income and operating surplus ($M)	162.1
Taxes on products net of subsidies ($M)	6
Taxes on factors of production net of subsidies ($M)	1
Direct BC supply ($M)	**166**
(the change in BC supplier industry output associated with construction, 2016)	
Project employment during construction, 2016 (#)	880
Household income included in construction, 2016 ($M)	**123**

Tax revenue derived from direct project expenditures Construction, 2016				
	Federal	Provincial	Local	Total
Total, all sources	**20.95**	**13.54**	**0.81**	**35.30**
Taxes on products net of subsidies ($M)*	2.38	4.84	0.00	7.22
Taxes on factors of production net of subsidies ($M)	-0.02	0.43	0.81	1.23
Personal income taxes ($M)	15.64	6.92		22.56
Corporate income taxes ($M)	2.95	1.34		4.29
(income taxes paid on worker's wages and returns to capital reported in project expenditure)				

*Small differences between this figure and the value for taxes on products net of subsidies reported in the allocation of project expenditure section are due to rounding and/or the inclusion of net taxes paid on some goods purchased by subcontractors which are not reflected in the indirect & induced impacts given below.

Note: Commercially sensitive information has been removed by BC Hydro from the public version of this report

Indirect & Induced Impacts resulting from project expenditures					
	Direct suppliers	Other suppliers	Total indirect (all suppliers)	Induced**	Total indirect & induced
Output ($M)	165.8	90.1	255.8	84.4	340.2
GDP at basic prices* ($M)	71.8	41.8	113.6	52.6	166.2
Employment (#)*	863	531	1,394	625	2,020
Household income ($M)	49.3	26.8	76.2	30.2	106.3
Total tax revenue ($M)	**10.68**	**6.10**	**16.78**	**6.84**	**23.62**
Federal ($M)	5.83	3.04	8.87	2.22	11.09
Personal income tax	*3.91*	*1.96*	*5.87*	*1.62*	*7.49*
Corporation income tax	*1.71*	*1.07*	*2.77*	*0.97*	*3.74*
Net taxes on products	*0.22*	*0.01*	*0.23*	*-0.36*	*-0.13*
Provincial ($M)	3.48	2.14	5.62	2.58	8.21
Personal income tax	*1.48*	*0.74*	*2.22*	*0.62*	*2.84*
Corporation income tax	*0.77*	*0.49*	*1.25*	*0.43*	*1.68*
Net taxes on products	*1.24*	*0.91*	*2.15*	*1.53*	*3.68*
Local ($M)	1.37	0.92	2.29	2.03	4.32

* Includes wages, benefits, unincorporated business income, operating surplus and net taxes on factors of production

** Assumes a social safety net is in place. Includes effects generated by project spending and activities of supplier industries

Regional Impact Estimates based on Supplier Industry Output, Census Employment Data, and Labour Force Statistics

Estimated Regional Impact, Supplier Industries in Project Area (All years)					
	Direct suppliers	Other suppliers	Total indirect (all suppliers)	Induced	Total indirect & induced
Total output ($M)	11	16	27	10	37
Total GDP ($M)	4	7	11	5	15
Total household income ($M)	3	3	6	3	9
Total employment	80	70	150	110	260

Estimated Impact in Rest of BC (All years)					
	Direct suppliers	Other suppliers	Total indirect (all suppliers)	Induced	Total indirect & induced
Total output ($M)	155	74	229	74	303
Total GDP ($M)	68	35	103	48	151
Total household income ($M)	46	24	70	27	97
Total employment	790	460	1,250	520	1,760

Economic Impact, Site C (80% local labour)
Construction, 2017

Total impact, including Construction, 2017 and supplier industry effects	Direct	Other suppliers	Total Indirect*	Induced**	Total impact
Total expenditures, Construction, 2017 ($M)	**542**				
Supplier industry & induced impacts ($M)	*201*	*108*	**308**	89	**398**
GDP at basic prices ($M)					**368**
Construction, 2017***	**175**				175
Supplier industry & induced impacts	*87*	*50*	**136**	56	192
Employment (#)****					**3,159**
Construction, 2017	**862**				862
Supplier industry & induced impacts	*1,002*	*633*	**1,635**	663	2,297
Household income ($M)					**251**
Construction, 2017	**129**				129
Supplier industry & induced impacts	*58*	*32*	**90**	32	122
Tax revenue ($M)					**65**
Construction, 2017	**38**				38
Supplier industry & induced impacts	*13*	*7*	**20**	7	27

* The total indirect impact is the sum of the effect on direct suppliers and other supplier industries

** Assumes a social safety net is in place. Includes effects generated by project spending and activities of supplier industries

*** Project expenditure data provided by clients may not include all components of GDP (e.g., operating surplus)

**** Employment estimates are based on average annual wages in 2010. Includes total employment over the life of the project

Allocation of Project Expenditures Construction, 2017	
Total expenditures, construction, 2017 ($M)	**541.5**
minus leakages:	
imports from other countries	*75.9*
imports from other provinces	*75.5*
other leakages (e.g. withdrawals from inventory)	*7.0*
Equals:	
Construction, 2017 expenditures on goods & services (including labour and profits) produced in BC ($M)	**383.1**
Of which:	
Wages, benefits, unincorporated business income and operating surplus ($M)	174.0
Taxes on products net of subsidies ($M)	7
Taxes on factors of production net of subsidies ($M)	1
Direct BC supply ($M)	**201**
(the change in BC supplier industry output associated with construction, 2017)	
Project employment during construction, 2017 (#)	862
Household income included in construction, 2017 ($M)	**123**

Tax revenue derived from direct project expenditures Construction, 2017	Federal	Provincial	Local	Total
Total, all sources	**22.24**	**14.71**	**0.86**	**37.81**
Taxes on products net of subsidies ($M)*	2.69	5.48	0.00	8.18
Taxes on factors of production net of subsidies ($M)	-0.02	0.46	0.86	1.30
Personal income taxes ($M)	15.73	7.02		22.75
Corporate income taxes ($M)	3.83	1.75		5.58
(income taxes paid on worker's wages and returns to capital reported in project expenditure)				

*Small differences between this figure and the value for taxes on products net of subsidies reported in the allocation of project expenditure section are due to rounding and/or the inclusion of net taxes paid on some goods purchased by subcontractors which are not reflected in the indirect & induced impacts given below.

Indirect & Induced Impacts resulting from project expenditures					
	Direct suppliers	Other suppliers	Total indirect (all suppliers)	Induced Impact**	Total indirect & induced
Output ($M)	200.5	107.8	308.4	89.4	397.8
GDP at basic prices* ($M)	86.6	49.9	136.5	55.8	192.3
Employment (#)*	1,002	633	1,635	663	2,297
Household income ($M)	57.9	32.1	90.0	31.9	121.9
Total tax revenue ($M)	**12.74**	**7.27**	**20.01**	**7.25**	**27.26**
Federal ($M)	6.97	3.62	10.60	2.36	12.95
Personal income tax	*4.57*	*2.34*	*6.92*	*1.72*	*8.63*
Corporation income tax	*2.14*	*1.26*	*3.40*	*1.02*	*4.42*
Net taxes on products	*0.27*	*0.02*	*0.28*	*-0.38*	*-0.10*
Provincial ($M)	4.13	2.55	6.68	2.74	9.42
Personal income tax	*1.73*	*0.89*	*2.62*	*0.66*	*3.28*
Corporation income tax	*0.95*	*0.57*	*1.53*	*0.46*	*1.99*
Net taxes on products	*1.45*	*1.08*	*2.53*	*1.62*	*4.15*
Local ($M)	1.63	1.10	2.73	2.16	4.89

* Includes wages, benefits, unincorporated business income, operating surplus and net taxes on factors of production

** Assumes a social safety net is in place. Includes effects generated by project spending and activities of supplier industries

Regional Impact Estimates based on Supplier Industry Output, Census Employment Data, and Labour Force Statistics

Estimated Regional Impact, Supplier Industries in Project Area (All years)					
	Direct suppliers	Other suppliers	Total indirect (all suppliers)	Induced	Total indirect & induced
Total output ($M)	12	18	30	11	41
Total GDP ($M)	4	8	12	5	17
Total household income ($M)	3	4	7	3	10
Total employment	80	80	160	110	280

Estimated Impact in Rest of BC (All years)					
	Direct suppliers	Other suppliers	Total indirect (all suppliers)	Induced	Total indirect & induced
Total output ($M)	188	90	278	79	357
Total GDP ($M)	82	42	124	51	175
Total household income ($M)	55	29	84	29	112
Total employment	920	550	1,470	550	2,020

Economic Impact, Site C (80% local labour)
Construction, 2018

Total impact, including Construction, 2018 and supplier industry effects	Direct	Other suppliers	Total Indirect*	Induced**	Total impact
Total expenditures, Construction, 2018 ($M)	**649**				
Supplier industry & induced impacts ($M)	*240*	*128*	**368**	98	**466**
GDP at basic prices ($M)					**431**
Construction, 2018***	**207**				207
Supplier industry & induced impacts	*103*	*59*	**162**	61	223
Employment (#)****					**3,484**
Construction, 2018	**860**				860
Supplier industry & induced impacts	*1,140*	*757*	**1,896**	727	2,624
Household income ($M)					**278**
Construction, 2018	**139**				139
Supplier industry & induced impacts	*66*	*38*	**104**	35	139
Tax revenue ($M)					**77**
Construction, 2018	**45**				45
Supplier industry & induced impacts	*15*	*9*	**24**	8	32

* The total indirect impact is the sum of the effect on direct suppliers and other supplier industries

** Assumes a social safety net is in place. Includes effects generated by project spending and activities of supplier industries

*** Project expenditure data provided by clients may not include all components of GDP (e.g., operating surplus)

**** Employment estimates are based on average annual wages in 2010. Includes total employment over the life of the project

Allocation of Project Expenditures Construction, 2018	
Total expenditures, construction, 2018 ($M)	**649.3**
minus leakages:	
imports from other countries	*93.7*
imports from other provinces	*88.8*
other leakages (e.g. withdrawals from inventory)	*9.8*
Equals:	
Construction, 2018 expenditures on goods & services (including labour and profits) produced in BC ($M)	**457.0**
Of which:	
Wages, benefits, unincorporated business income and operating surplus ($M)	205.8
Taxes on products net of subsidies ($M)	10
Taxes on factors of production net of subsidies ($M)	2
Direct BC supply ($M)	**240**
(the change in BC supplier industry output associated with construction, 2018)	
Project employment during construction, 2018 (#)	860
Household income included in construction, 2018 ($M)	**131**

Tax revenue derived from direct project expenditures Construction, 2018				
	Federal	Provincial	Local	Total
Total, all sources	**26.20**	**18.26**	**1.00**	**45.46**
Taxes on products net of subsidies ($M)*	3.62	7.40	0.00	11.01
Taxes on factors of production net of subsidies ($M)	-0.02	0.53	1.00	1.51
Personal income taxes ($M)	16.93	7.73		24.66
Corporate income taxes ($M)	5.68	2.59		8.27
(income taxes paid on worker's wages and returns to capital reported in project expenditure)				

*Small differences between this figure and the value for taxes on products net of subsidies reported in the allocation of project expenditure section are due to rounding and/or the inclusion of net taxes paid on some goods purchased by subcontractors which are not reflected in the indirect & induced impacts given below.

Note: Commercially sensitive information has been removed by BC Hydro from the public version of this report

Indirect & Induced Impacts resulting from project expenditures					
	Direct suppliers	Other suppliers	Total indirect (all suppliers)	Induced**	Total indirect & induced
Output ($M)	239.9	127.7	367.6	98.2	465.8
GDP at basic prices* ($M)	102.7	59.2	161.9	61.2	223.2
Employment (#)*	1,140	757	1,896	727	2,624
Household income ($M)	65.5	38.2	103.7	35.1	138.8
Total tax revenue ($M)	**15.29**	**8.61**	**23.90**	**7.96**	**31.86**
Federal ($M)	8.31	4.26	12.56	2.59	15.15
Personal income tax	*5.12*	*2.78*	*7.90*	*1.88*	*9.78*
Corporation income tax	*2.85*	*1.46*	*4.31*	*1.12*	*5.43*
Net taxes on products	*0.34*	*0.02*	*0.36*	*-0.42*	*-0.06*
Provincial ($M)	4.94	3.04	7.97	3.01	10.98
Personal income tax	*1.94*	*1.06*	*2.99*	*0.72*	*3.71*
Corporation income tax	*1.26*	*0.67*	*1.93*	*0.50*	*2.44*
Net taxes on products	*1.74*	*1.31*	*3.05*	*1.78*	*4.83*
Local ($M)	2.05	1.32	3.36	2.37	5.73

* Includes wages, benefits, unincorporated business income, operating surplus and net taxes on factors of production

** Assumes a social safety net is in place. Includes effects generated by project spending and activities of supplier industries

Regional Impact Estimates based on Supplier Industry Output, Census Employment Data, and Labour Force Statistics

Estimated Regional Impact, Supplier Industries in Project Area (All years)					
	Direct suppliers	Other suppliers	Total indirect (all suppliers)	Induced	Total indirect & induced
Total output ($M)	14	20	34	12	46
Total GDP ($M)	5	9	14	5	19
Total household income ($M)	3	4	7	4	11
Total employment	80	100	180	130	310

Estimated Impact in Rest of BC (All years)					
	Direct suppliers	Other suppliers	Total indirect (all suppliers)	Induced	Total indirect & induced
Total output ($M)	226	107	333	86	420
Total GDP ($M)	98	51	149	56	205
Total household income ($M)	62	34	96	31	128
Total employment	1,060	660	1,720	600	2,320

Economic Impact, Site C (80% local labour)
Construction, 2019

Total impact, including Construction, 2019 and supplier industry effects	Direct	Other suppliers	Total Indirect*	Induced**	Total impact
Total expenditures, Construction, 2019 ($M)	**647**				
Supplier industry & induced impacts ($M)	*157*	*86*	**243**	141	**384**
GDP at basic prices ($M)					**510**
Construction, 2019***	**314**				314
Supplier industry & induced impacts	*69*	*40*	**109**	88	196
Employment (#)****					**3,893**
Construction, 2019	**1,475**				1,475
Supplier industry & induced impacts	*852*	*521*	**1,373**	1,044	2,417
Household income ($M)					**370**
Construction, 2019	**246**				246
Supplier industry & induced impacts	*47*	*26*	**73**	50	124
Tax revenue ($M)					**87**
Construction, 2019	**59**				59
Supplier industry & induced impacts	*11*	*6*	**17**	11	29

* The total indirect impact is the sum of the effect on direct suppliers and other supplier industries

** Assumes a social safety net is in place. Includes effects generated by project spending and activities of supplier industries

*** Project expenditure data provided by clients may not include all components of GDP (e.g., operating surplus)

**** Employment estimates are based on average annual wages in 2010. Includes total employment over the life of the project

Allocation of Project Expenditures Construction, 2019	
Total expenditures, construction, 2019 ($M)	**646.9**
minus leakages:	
imports from other countries	*98.5*
imports from other provinces	*69.5*
other leakages (e.g. withdrawals from inventory)	*4.6*
Equals:	
Construction, 2019 expenditures on goods & services (including labour and profits) produced in BC ($M)	**474.4**
Of which:	
Wages, benefits, unincorporated business income and operating surplus ($M)	313.0
Taxes on products net of subsidies ($M)	4
Taxes on factors of production net of subsidies ($M)	1
Direct BC supply ($M)	**157**
(the change in BC supplier industry output associated with construction, 2019)	
Project employment during construction, 2019 (#)	1,475
Household income included in construction, 2019 ($M)	**238**

Tax revenue derived from direct project expenditures Construction, 2019				
	Federal	Provincial	Local	Total
Total, all sources	**38.27**	**19.99**	**0.52**	**58.78**
Taxes on products net of subsidies ($M)*	1.22	2.40	0.00	3.62
Taxes on factors of production net of subsidies ($M)	-0.01	0.28	0.53	0.80
Personal income taxes ($M)	31.36	14.71		46.07
Corporate income taxes ($M)	5.70	2.60		8.31
(income taxes paid on worker's wages and returns to capital reported in project expenditure)				

*Small differences between this figure and the value for taxes on products net of subsidies reported in the allocation of project expenditure section are due to rounding and/or the inclusion of net taxes paid on some goods purchased by subcontractors which are not reflected in the indirect & induced impacts given below.

Indirect & Induced Impacts resulting from project expenditures					
	Direct suppliers	Other suppliers	Total indirect (all suppliers)	Induced**	Total indirect & induced
Output ($M)	157.0	85.9	242.8	141.0	383.8
GDP at basic prices* ($M)	68.7	39.8	108.5	87.9	196.5
Employment (#)*	852	521	1,373	1,044	2,417
Household income ($M)	47.0	26.3	73.3	50.4	123.6
Total tax revenue ($M)	**11.12**	**6.03**	**17.15**	**11.43**	**28.58**
Federal ($M)	5.69	2.97	8.66	3.72	12.37
Personal income tax	*3.62*	*1.92*	*5.54*	*2.70*	*8.25*
Corporation income tax	*1.63*	*0.97*	*2.60*	*1.61*	*4.21*
Net taxes on products	*0.44*	*0.07*	*0.52*	*-0.60*	*-0.08*
Provincial ($M)	3.89	2.15	6.03	4.32	10.35
Personal income tax	*1.37*	*0.73*	*2.10*	*1.04*	*3.14*
Corporation income tax	*0.73*	*0.44*	*1.17*	*0.72*	*1.89*
Net taxes on products	*1.79*	*0.98*	*2.77*	*2.56*	*5.32*
Local ($M)	1.55	0.91	2.46	3.40	5.86

* Includes wages, benefits, unincorporated business income, operating surplus and net taxes on factors of production

** Assumes a social safety net is in place. Includes effects generated by project spending and activities of supplier industries

Regional Impact Estimates based on Supplier Industry Output, Census Employment Data, and Labour Force Statistics

Estimated Regional Impact, Supplier Industries in Project Area (All years)					
	Direct suppliers	Other suppliers	Total indirect (all suppliers)	Induced	Total indirect & induced
Total output ($M)	12	13	25	17	42
Total GDP ($M)	4	5	9	8	17
Total household income ($M)	3	3	6	5	11
Total employment	90	70	160	180	340

Estimated Impact in Rest of BC (All years)					
	Direct suppliers	Other suppliers	Total indirect (all suppliers)	Induced	Total indirect & induced
Total output ($M)	145	73	218	124	341
Total GDP ($M)	64	35	99	80	179
Total household income ($M)	44	24	68	45	112
Total employment	760	450	1,210	860	2,080

Note: Commercially sensitive information has been removed by BC Hydro from the public version of this report

Economic Impact, Site C (80% local labour)
Construction, 2020

Total impact, including Construction, 2020 and supplier industry effects	Direct	Other suppliers	Total indirect*	Induced**	Total impact
Total expenditures, Construction, 2020 ($M)	**604**				
Supplier industry & induced impacts ($M)	*154*	*84*	**238**	121	**359**
GDP at basic prices ($M)					**459**
Construction, 2020***	**277**				277
Supplier industry & induced impacts	*67*	*39*	**106**	76	182
Employment (#)****					**3,566**
Construction, 2020	**1,323**				1,323
Supplier industry & induced impacts	*835*	*511*	**1,346**	898	2,244
Household income ($M)					**324**
Construction, 2020	**209**				209
Supplier industry & induced impacts	*46*	*26*	**72**	43	115
Tax revenue ($M)					**78**
Construction, 2020	**51**				51
Supplier industry & induced impacts	*11*	*6*	**17**	10	27

* The total indirect impact is the sum of the effect on direct suppliers and other supplier industries

** Assumes a social safety net is in place. Includes effects generated by project spending and activities of supplier industries

*** Project expenditure data provided by clients may not include all components of GDP (e.g., operating surplus)

**** Employment estimates are based on average annual wages in 2010. Includes total employment over the life of the project

Allocation of Project Expenditures Construction, 2020	
Total expenditures, construction, 2020 ($M)	**603.9**
minus leakages:	
imports from other countries	*96.6*
imports from other provinces	*67.9*
other leakages (e.g. withdrawals from inventory)	*4.4*
Equals:	
Construction, 2020 expenditures on goods & services (including labour and profits) produced in BC ($M)	**435.0**
Of which:	
Wages, benefits, unincorporated business income and operating surplus ($M)	276.5
Taxes on products net of subsidies ($M)	4
Taxes on factors of production net of subsidies ($M)	1
Direct BC supply ($M)	**154**
(the change in BC supplier industry output associated with construction, 2020)	
Project employment during construction, 2020 (#)	1,323
Household income included in construction, 2020 ($M)	**201**

Tax revenue derived from direct project expenditures Construction, 2020				
	Federal	Provincial	Local	Total
Total, all sources	**33.14**	**17.33**	**0.49**	**50.96**
Taxes on products net of subsidies ($M)*	1.25	2.47	0.00	3.73
Taxes on factors of production net of subsidies ($M)	-0.01	0.26	0.49	0.74
Personal income taxes ($M)	26.18	11.98		38.16
Corporate income taxes ($M)	5.72	2.61		8.33
(income taxes paid on worker's wages and returns to capital reported in project expenditure)				

*Small differences between this figure and the value for taxes on products net of subsidies reported in the allocation of project expenditure section are due to rounding and/or the inclusion of net taxes paid on some goods purchased by subcontractors which are not reflected in the indirect & induced impacts given below.

Note: Commercially sensitive information has been removed by BC Hydro from the public version of this report

Indirect & Induced Impacts resulting from project expenditures					
	Direct suppliers	Other suppliers	Total indirect (all suppliers)	Induced **	Total indirect & induced
Output ($M)	154.1	84.0	238.1	121.2	359.3
GDP at basic prices* ($M)	67.3	39.0	106.3	75.6	181.9
Employment (#)*	835	511	1,346	898	2,244
Household income ($M)	46.1	25.7	71.8	43.3	115.1
Total tax revenue ($M)	**10.86**	**5.90**	**16.76**	**9.83**	**26.58**
Federal ($M)	5.56	2.90	8.46	3.19	11.66
Personal income tax	*3.55*	*1.88*	*5.43*	*2.32*	*7.75*
Corporation income tax	*1.58*	*0.95*	*2.53*	*1.39*	*3.92*
Net taxes on products	*0.43*	*0.07*	*0.50*	*-0.52*	*-0.01*
Provincial ($M)	3.79	2.10	5.89	3.71	9.60
Personal income tax	*1.34*	*0.72*	*2.06*	*0.89*	*2.95*
Corporation income tax	*0.70*	*0.43*	*1.13*	*0.62*	*1.76*
Net taxes on products	*1.74*	*0.95*	*2.70*	*2.20*	*4.90*
Local ($M)	1.51	0.90	2.40	2.92	5.33

* Includes wages, benefits, unincorporated business income, operating surplus and net taxes on factors of production

** Assumes a social safety net is in place. Includes effects generated by project spending and activities of supplier industries

Regional Impact Estimates based on Supplier Industry Output, Census Employment Data, and Labour Force Statistics

Estimated Regional Impact, Supplier Industries in Project Area (All years)					
	Direct suppliers	Other suppliers	Total indirect (all suppliers)	Induced	Total indirect & induced
Total output ($M)	12	13	25	15	39
Total GDP ($M)	4	5	9	7	16
Total household income ($M)	3	3	6	5	10
Total employment	90	70	160	160	310

Estimated Impact in Rest of BC (All years)					
	Direct suppliers	Other suppliers	Total indirect (all suppliers)	Induced	Total indirect & induced
Total output ($M)	142	71	213	107	320
Total GDP ($M)	63	34	97	69	166
Total household income ($M)	43	23	66	39	105
Total employment	750	440	1,190	740	1,930

Economic Impact, Site C (80% local labour)
Construction, 2021

Total impact, including Construction, 2021 and supplier industry effects	Direct	Other suppliers	Total Indirect*	Induced**	Total impact
Total expenditures, Construction, 2021 ($M)	**356**				
Supplier industry & induced impacts ($M)	*101*	*55*	**155**	66	**222**
GDP at basic prices ($M)					**270**
Construction, 2021***	**160**				160
Supplier industry & induced impacts	*43*	*25*	**69**	41	110
Employment (#)****					**2,223**
Construction, 2021	**850**				850
Supplier industry & induced impacts	*550*	*331*	**882**	491	1,373
Household income ($M)					**186**
Construction, 2021	**116**				116
Supplier industry & induced impacts	*29*	*17*	**46**	24	70
Tax revenue ($M)					**45**
Construction, 2021	**29**				29
Supplier industry & induced impacts	*7*	*4*	**11**	5	16

* The total indirect impact is the sum of the effect on direct suppliers and other supplier industries

** Assumes a social safety net is in place. Includes effects generated by project spending and activities of supplier industries

*** Project expenditure data provided by clients may not include all components of GDP (e.g., operating surplus)

**** Employment estimates are based on average annual wages in 2010. Includes total employment over the life of the project

Allocation of Project Expenditures Construction, 2021	
Total expenditures, construction, 2021 ($M)	**356.1**
minus leakages:	
imports from other countries	*47.6*
imports from other provinces	*41.0*
other leakages (e.g. withdrawals from inventory)	*3.8*
Equals:	
Construction, 2021 expenditures on goods & services (including labour and profits) produced in BC ($M)	**263.8**
Of which:	
Wages, benefits, unincorporated business income and operating surplus ($M)	159.4
Taxes on products net of subsidies ($M)	3
Taxes on factors of production net of subsidies ($M)	1
Direct BC supply ($M)	**101**
(the change in BC supplier industry output associated with construction, 2021)	
Project employment during construction, 2021 (#)	850
Household income included in construction, 2021 ($M)	**111**

Tax revenue derived from direct project expenditures Construction, 2021				
	Federal	Provincial	Local	Total
Total, all sources	**18.50**	**10.02**	**0.35**	**28.86**
Taxes on products net of subsidies ($M)*	1.14	2.26	0.00	3.40
Taxes on factors of production net of subsidies ($M)	-0.01	0.18	0.35	0.52
Personal income taxes ($M)	13.68	5.89		19.57
Corporate income taxes ($M)	3.68	1.68		5.36
(income taxes paid on worker's wages and returns to capital reported in project expenditure)				

*Small differences between this figure and the value for taxes on products net of subsidies reported in the allocation of project expenditure section are due to rounding and/or the inclusion of net taxes paid on some goods purchased by subcontractors which are not reflected in the indirect & induced impacts given below.

Indirect & Induced Impacts resulting from project expenditures					
	Direct suppliers	Other suppliers	Total indirect (all suppliers)	Induced **	Total indirect & induced
Output ($M)	100.7	54.6	155.3	66.3	221.5
GDP at basic prices* ($M)	43.4	25.4	68.7	41.3	110.1
Employment (#)*	550	331	882	491	1,373
Household income ($M)	29.4	16.6	46.0	23.7	69.7
Total tax revenue ($M)	**6.90**	**3.79**	**10.68**	**5.38**	**16.06**
Federal ($M)	3.56	1.86	5.43	1.75	7.18
Personal income tax	*2.24*	*1.21*	*3.45*	*1.27*	*4.72*
Corporation income tax	*1.08*	*0.63*	*1.70*	*0.76*	*2.46*
Net taxes on products	*0.24*	*0.03*	*0.27*	*-0.28*	*-0.01*
Provincial ($M)	2.37	1.34	3.71	2.03	5.74
Personal income tax	*0.85*	*0.46*	*1.31*	*0.49*	*1.80*
Corporation income tax	*0.48*	*0.29*	*0.77*	*0.34*	*1.11*
Net taxes on products	*1.04*	*0.59*	*1.63*	*1.20*	*2.83*
Local ($M)	0.96	0.59	1.54	1.60	3.14

* Includes wages, benefits, unincorporated business income, operating surplus and net taxes on factors of production

** Assumes a social safety net is in place. Includes effects generated by project spending and activities of supplier industries

Regional Impact Estimates based on Supplier Industry Output, Census Employment Data, and Labour Force Statistics

Estimated Regional Impact, Supplier Industries in Project Area (All years)					
	Direct suppliers	Other suppliers	Total indirect (all suppliers)	Induced	Total indirect & induced
Total output ($M)	9	9	18	8	26
Total GDP ($M)	3	4	7	4	11
Total household income ($M)	2	2	4	2	7
Total employment	70	40	110	80	210

Estimated Impact in Rest of BC (All years)					
	Direct suppliers	Other suppliers	Total indirect (all suppliers)	Induced	Total indirect & induced
Total output ($M)	92	46	138	58	196
Total GDP ($M)	40	22	62	38	100
Total household income ($M)	27	15	42	21	63
Total employment	470	290	760	410	1,170

Note: Commercially sensitive information has been removed by BC Hydro from the public version of this report

Economic Impact, Site C (80% local labour)
Construction, 2022

Total impact, including Construction, 2022 and supplier industry effects	Direct	Other suppliers	Total Indirect*	Induced**	Total impact
Total expenditures, Construction, 2022 ($M)	**92**				
Supplier industry & induced impacts ($M)	*28*	*15*	**43**	16	**59**
GDP at basic prices ($M)					**67**
Construction, 2022***	**38**				38
Supplier industry & induced impacts	*12*	*7*	**19**	10	29
Employment (#)****					**545**
Construction, 2022	**178**				178
Supplier industry & induced impacts	*151*	*98*	**249**	118	367
Household income ($M)					**45**
Construction, 2022	**27**				27
Supplier industry & induced impacts	*8*	*5*	**13**	6	18
Tax revenue ($M)					**11**
Construction, 2022	**6**				6
Supplier industry & induced impacts	*2*	*1*	**3**	1	4

* The total indirect impact is the sum of the effect on direct suppliers and other supplier industries

** Assumes a social safety net is in place. Includes effects generated by project spending and activities of supplier industries

*** Project expenditure data provided by clients may not include all components of GDP (e.g., operating surplus)

**** Employment estimates are based on average annual wages in 2010. Includes total employment over the life of the project

Allocation of Project Expenditures Construction, 2022	
Total expenditures, construction, 2022 ($M)	**92.0**
minus leakages:	
imports from other countries	*14.1*
imports from other provinces	*10.8*
other leakages (e.g. withdrawals from inventory)	*0.8*
Equals:	
Construction, 2022 expenditures on goods & services (including labour and profits) produced in BC ($M)	**66.2**
Of which:	
Wages, benefits, unincorporated business income and operating surplus ($M)	37.8
Taxes on products net of subsidies ($M)	0
Taxes on factors of production net of subsidies ($M)	0
Direct BC supply ($M)	**28**
(the change in BC supplier industry output associated with construction, 2022)	
Project employment during construction, 2022 (#)	178
Household income included in construction, 2022 ($M)	**25**

Tax revenue derived from direct project expenditures Construction, 2022	Federal	Provincial	Local	Total
Total, all sources	**4.21**	**2.07**	**0.07**	**6.36**
Taxes on products net of subsidies ($M)*	0.13	0.22	0.00	0.34
Taxes on factors of production net of subsidies ($M)	0.00	0.04	0.07	0.11
Personal income taxes ($M)	3.16	1.39		4.55
Corporate income taxes ($M)	0.93	0.43		1.36
(income taxes paid on worker's wages and returns to capital reported in project expenditure)				

*Small differences between this figure and the value for taxes on products net of subsidies reported in the allocation of project expenditure section are due to rounding and/or the inclusion of net taxes paid on some goods purchased by subcontractors which are not reflected in the indirect & induced impacts given below.

Note: Commercially sensitive information has been removed by BC Hydro from the public version of this report

Indirect & Induced Impacts resulting from project expenditures					
	Direct suppliers	Other suppliers	Total indirect (all suppliers)	Induced**	Total indirect & induced
Output ($M)	27.9	15.4	43.3	16.0	59.3
GDP at basic prices* ($M)	11.8	7.2	19.0	10.0	29.0
Employment (#)*	151	98	249	118	367
Household income ($M)	8.0	4.8	12.8	5.7	18.5
Total tax revenue ($M)	**1.96**	**1.08**	**3.04**	**1.30**	**4.34**
Federal ($M)	0.97	0.53	1.50	0.42	1.92
Personal income tax	*0.61*	*0.34*	*0.95*	*0.31*	*1.26*
Corporation income tax	*0.29*	*0.17*	*0.47*	*0.18*	*0.65*
Net taxes on products	*0.07*	*0.01*	*0.09*	*-0.07*	*0.02*
Provincial ($M)	0.69	0.38	1.07	0.49	1.56
Personal income tax	*0.23*	*0.13*	*0.36*	*0.12*	*0.48*
Corporation income tax	*0.13*	*0.08*	*0.21*	*0.08*	*0.29*
Net taxes on products	*0.32*	*0.18*	*0.50*	*0.29*	*0.79*
Local ($M)	0.30	0.17	0.47	0.39	0.85

* Includes wages, benefits, unincorporated business income, operating surplus and net taxes on factors of production

** Assumes a social safety net is in place. Includes effects generated by project spending and activities of supplier industries

Regional Impact Estimates based on Supplier Industry Output, Census Employment Data, and Labour Force Statistics

Estimated Regional Impact, Supplier Industries in Project Area (All years)					
	Direct suppliers	Other suppliers	Total indirect (all suppliers)	Induced	Total indirect & induced
Total output ($M)	3	2	5	2	8
Total GDP ($M)	1	1	2	1	3
Total household income ($M)	1	1	2	1	2
Total employment	20	20	40	20	60

Estimated Impact in Rest of BC (All years)					
	Direct suppliers	Other suppliers	Total indirect (all suppliers)	Induced	Total indirect & induced
Total output ($M)	25	13	38	14	52
Total GDP ($M)	11	6	17	9	26
Total household income ($M)	7	4	11	5	17
Total employment	130	80	210	100	310