



Employment Impact Review

Ministry of Energy, Mines and Natural Gas

February 2013

Contents

	Page
Executive summary	1
Introduction	1
Process	1
Restrictions	1
Proposed LNG projects	1
Definitions	2
Estimated employment impacts overall (construction and operations)	3
Estimated employment impacts resulting from construction	3
Estimated employment impacts resulting from annual operations	4
Estimated average employment compensation	5
Introduction	7
Project background	7
Scope of work	7
Restrictions	8
Definitions	8
Assumptions	9
Methodology	10
British Columbia Input-Output Model	10
Documents and information relied upon	11
Proposed LNG projects	12
Proposed LNG projects	12
Project employment	12
Estimated employment impacts	14
Introduction	14
Estimated employment impacts related to construction	14
Estimated employment impacts related to annual operations	15
Estimated average employment compensation	17
Conclusions	18
Schedule 1: Annual construction FTE jobs	19
Schedule 2: Annual operating FTE jobs	20
Restrictions and qualifications	21
Restrictions	21
Qualifications	21

Executive summary

Introduction

The Ministry of Energy, Mines and Natural Gas (the “Ministry” or the “Province”) is currently evaluating proposals for the development of liquefied natural gas (“LNG”) projects in British Columbia. Grant Thornton LLP has been engaged by the Ministry to estimate the direct, indirect and induced employment impacts of the proposed LNG projects, both during construction and during annual operations. The scenario that Grant Thornton has assessed assumes that there will be five LNG projects. This Executive Summary presents highlights from the full report.

Process

To prepare this Employment Impact report, Grant Thornton reviewed information provided by the Province and its advisors with regard to project size, capacity, development cost and operating costs. In addition, Grant Thornton reviewed the performance of other LNG projects around the world, with a focus on project size and employment requirements during construction and during normal operation. Grant Thornton used this information, and the BC Statistics Input-Output Model, to prepare an independent estimate of employment impacts under a set of assumptions.

Restrictions

The following restrictions apply to this study.

- The employment estimates contained in this report reflect the potential impact created under a given set of assumptions for a particular sector.
- The estimates are not forecasts and this report is not intended to attribute any probability that those impacts will occur or not occur in the future.
- The estimates have been prepared to illustrate the potential employment impacts under a given set of assumptions, following a systematic approach to analyzing and modelling collected information.
- The estimates do not reflect the actual or expected total impact on the overall BC employment outlook, as changes in other sectors will also affect that outlook.

Proposed LNG projects

The following table summarizes the characteristics of the five LNG projects that are the subject of this study. Construction of the first project is scheduled to begin in 2013. Construction of the fifth project

is scheduled to be completed by 2021. Based on this schedule, the first year that all five projects will be fully operational is 2021 (the first “steady state” year of operations).

Characteristics of the Five LNG Projects	Combined Total
Capacity (MTPA)*	82.0
Capital Costs** - \$Billions	\$98.4
Annual Operating Costs *** - \$ Billions	\$24.0
Construction Period	2013 - 2021

* Million tonnes per annum

** Project and pipe

*** Including feed gas

Definitions

The following definitions support Grant Thornton’s discussion on the employment impacts of the proposed LNG projects.

Full Time Equivalent (“FTE”) jobs: - The number of full time equivalent jobs (which may be a combination of full-time, part-time and seasonal jobs).

Person Year of Employment: - The equivalent of one FTE job for one year.

Jobs: - The total number of jobs, including full-time, part-time and seasonal jobs. Note that each job (if not expressed as an FTE job), regardless of whether it is full-time, part-time or seasonal, is counted as one job; therefore, the total number of jobs may be higher than the total number of FTE jobs.

Note regarding the measurement of construction employment: - Construction occurs over a fixed period of time. Therefore, when estimating construction employment, the number of FTE jobs indicated is for the entire construction period, unlike operational employment which is expressed on an annual basis. Therefore, construction employment may be expressed as:

- Person years of employment (as per the definition noted above); or
- FTE jobs for the entire construction period.

Direct effect: - The change in domestic output and related employment required to satisfy an initial change in demand. This would include the actual employment directly generated by construction and annual operations. For example, when the LNG projects are operational, direct employment would include the jobs required to operate and maintain the projects and supporting pipelines on an ongoing basis.

Indirect effect: - The change in domestic output and related employment generated by the activity in industries that supply goods and services used in the construction and annual operations of the business being assessed. For example, when the projects are operational, a large number of the indirect

jobs will be for new exploration and development of natural gas wells, in addition to the provision of goods and services needed to support this type of activity.

Induced effect: - The overall impact of more income accruing to the household sector and the resulting employment this generates in the broader economy. For example, when employees from the projects use their wages to purchase housing, food, clothing, gas, entertainment and other items and services, jobs are created/supported in these other industries.

Estimated employment impacts overall (construction and operations)

Construction of the five projects is estimated to generate, on average, 39,400 full time equivalent jobs annually for the nine-year construction period. Once all five projects are fully operational in 2021, the number of full time equivalent jobs required to operate the projects annually is estimated to be 75,200 over the life of the projects. Additional detail regarding the construction and annual operating employment impacts are provided below.

Estimated employment impacts resulting from construction

Construction of the first project is scheduled to commence in 2013, the second project in 2015, and the remaining three projects in 2016. Construction of all five projects is scheduled to be completed by 2021 resulting in a nine-year construction period.

Over the nine-year construction period, the five LNG projects are expected to generate an estimated 102,500 direct full time equivalent (FTE) jobs, 198,700 indirect FTE jobs and 53,000 induced FTE jobs in BC. The estimated total number of FTE jobs resulting from the construction of the five projects is 354,200, distributed over the nine-year construction period.

Note that, while full time equivalent jobs are shown below, in reality, the number of actual jobs will be higher as the FTE jobs are comprised of a combination of full time jobs, part time jobs and seasonal jobs. Collectively, the number of jobs will be higher than the FTE jobs shown below, as some of these jobs will be part time and/or seasonal.

Construction Employment over Nine-Year Construction Period

Estimated Construction Employment (in British Columbia)	Total
Total Capital Expenditures (plant & pipe) - \$ Billions	\$ 98.4
Direct employment impact - FTEs	102,500
Supplier industries (indirect impact) - FTEs	198,700
Industries benefitting from spending by workers (induced impact) - FTEs	53,000
Total FTEs (direct, indirect and induced)	354,200

The following table presents estimated construction FTE jobs per year for the duration of the nine-year construction period. The number of construction FTE jobs is expected to vary year-to-year, as each of the five projects will commence construction at different times. There will also be varying demand for construction labour over each project's construction period.

As shown in the right-hand column, the average number of direct FTE jobs per year is estimated to be 11,400, and the average number of total FTE jobs per year is estimated to be 39,400.

Annual Construction Employment over Nine-Year Construction Period

Construction Employment All Five Plants (FTEs)	2013	2014	2015	2016	2017	2018	2019	2020	2021	Total	Average per Year
Direct	1,600	1,600	6,900	21,600	21,600	18,500	14,700	11,000	5,000	102,500	11,400
Indirect	3,000	3,000	13,400	41,900	41,900	35,900	28,600	21,300	9,700	198,700	22,100
Induced	800	800	3,500	11,200	11,200	9,600	7,600	5,700	2,600	53,000	5,900
Total	5,400	5,400	23,800	74,700	74,700	64,000	50,900	38,000	17,300	354,200	39,400

Estimated employment impacts resulting from annual operations

Employment impacts resulting from annual operation of the five projects are presented in the following two tables. It should be noted that, while the construction FTE jobs noted above will be generated over the nine-year construction period, the operational FTE jobs will be required on an annual basis during the operating life of the projects.

As shown in the next table, the annual operations of the five LNG projects when all of the projects are fully operational (steady state) are expected to require an estimated 2,400 direct FTE jobs, 61,700 indirect FTE jobs and 11,100 induced FTE jobs in BC. The estimated total number of annual FTE jobs resulting from the operation of the five projects is 75,200.

The employment associated with oil and gas extraction (5,000 FTEs) and, to some extent support activities (3,200), are primarily generated upstream. The industries represented in “other supplier industries”, which accounts for an estimated 38,500 FTEs, include, for example: utilities, retail, transportation and warehousing, finance, insurance and real estate, construction (repair), other professional services, equipment rentals and accommodation.

Annual Operating Employment When All Five Projects are Operational

Estimated Annual Operating Employment (in British Columbia)	Total
Annual Operating Costs (including feed gas) - \$ Billions	\$ 24.0
Direct employment impact - FTEs	2,400
Supplier industries (indirect impact) - FTEs	61,700
<i>Oil and gas extraction</i>	5,000
<i>Support activities for mining and oil and gas extraction</i>	3,200
<i>Pipeline transportation</i>	4,100
<i>Architectural, engineering & related services</i>	10,900
<i>Other supplier industries</i>	38,500
Industries benefitting from spending by workers (induced impact) - FTEs	11,100
Total FTEs (direct, indirect and induced)	75,200

The following table presents the estimated FTE jobs resulting from the operation of the projects on an annual basis during the ramp-up period for the projects, with each project commencing operations at different times. All five projects are scheduled to be fully operational in 2021.

Annual Operating Employment during the Ramp-up Period

Annual Operating Employment All Five Plants (FTEs)	2017	2018	2019	2020	2021
Direct FTEs	400	400	1,100	1,700	2,400
Indirect	9,000	9,000	27,000	43,700	61,700
Induced	1,600	1,600	4,800	7,800	11,100
Total	11,000	11,000	32,900	53,300	75,200

Estimated average employment compensation

The estimated average employment compensation, including wages and benefits, for the construction and operational jobs is shown below.

FTE Job Type	Average Annual Compensation*	Source/ Comments
Construction – direct	\$140,200	<ul style="list-style-type: none"> Based on estimates provided by the Province and its advisors
Construction – indirect	\$54,100	<ul style="list-style-type: none"> Based on BC Statistics averages for annual wages and benefits for employees working in the industries that would typically supply the goods and services to the construction industry
Construction –induced	\$50,700	<ul style="list-style-type: none"> Based on BC Statistics averages for annual wages and benefits for employees working in the industries that benefit from the employee spending by direct workers on the construction projects This will include, for example, wages and benefits for workers in the following types of industries (partial list): <ul style="list-style-type: none"> Food services and drinking places Repair and maintenance Arts, entertainment and recreation Accommodation Construction (residential) Travel and entertainment Retail
Operations - direct	\$127,200	<ul style="list-style-type: none"> Based on estimates provided by the Province and its advisors
Operations - indirect	\$68,400	<ul style="list-style-type: none"> Based on BC Statistics averages for annual wages and benefits for employees working in the industries that would typically supply the goods and services to support the operations of the LNG projects This will include, for example, workers in the following

FTE Job Type	Average Annual Compensation*	Source/ Comments
		types of industries (partial list): <ul style="list-style-type: none"> ○ Oil and gas extraction ○ Support activities for oil and gas extraction ○ Pipeline transportation
Operations - induced	\$50,700	<ul style="list-style-type: none"> • Based on BC Statistics averages for annual wages and benefits for employees working in the industries that benefit from the employee spending by direct workers on the construction projects • This will include, for example, wages for workers in the following types of industries (partial list): <ul style="list-style-type: none"> ○ Food services and drinking places ○ Repair and maintenance ○ Arts, entertainment and recreation ○ Accommodation ○ Construction (residential) ○ Travel and entertainment ○ Retail

* Includes typical employee benefits (vacation pay, sick pay, etc.)

Introduction

Project background

The Ministry of Energy, Mines and Natural Gas (the “Ministry” or the “Province”) would like to understand the potential magnitude of employment impacts that could result from the construction and operation of liquefied natural gas (“LNG”) projects in British Columbia (“BC”). The scenario the Province would like to assess assumes that there will be five LNG projects. Grant Thornton LLP (“Grant Thornton”) has been engaged to estimate the potential direct employment during the construction phase and the operational phase of the LNG projects, and the potential employment impacts for supplier businesses and the economy in general (indirect and induced employment impacts).

Scope of work

The scope of work for this assignment included the following steps:

- Review information provided by the Province and its advisors and, more specifically, estimates related to project capacity, capital expenditures and direct employment;
- Review information provided by the Province and its advisors for estimated indirect and induced employment impacts related to construction of the LNG projects;
- Review information provided by the Province and its advisors for estimated indirect and induced employment impacts related to annual operation of the LNG projects;
- Research and review estimated employment impacts of other LNG projects;
- Work with BC Statistics and the British Columbia Input-Output Model to estimate the indirect and induced employment impacts related to the construction and operation of the LNG projects; and,
- Present the results of the above research and analysis in a succinct report.

The scope of work for this assignment has been limited to information provided by the Province and its advisors. Grant Thornton did not review feasibility studies and/or business plans for LNG project development and operation. Accordingly, there may be pertinent information in any feasibility studies and/or business plans for the LNG projects which could have a material impact on Grant Thornton’s analysis.

Restrictions

The following restrictions apply to this study.

- The employment estimates contained in this report reflect the potential impact created under a given set of assumptions for a particular sector.
- The estimates are not forecasts and this report is not intended to attribute any probability that those impacts will occur or not occur in the future.
- The estimates have been prepared to illustrate the potential employment impacts under a given set of assumptions, following a systematic approach to analyzing and modelling collected information.
- The estimates do not reflect the actual or expected total impact on the overall BC employment outlook, as changes in other sectors will also affect that outlook.

Definitions

The following definitions support Grant Thornton's discussion on the employment impacts of the proposed LNG projects.

Full Time Equivalent ("FTE") jobs: - The number of full time equivalent jobs (which may be a combination of full-time, part-time and seasonal jobs).

Person Year of Employment: - The equivalent of one FTE job for one year.

Jobs: - The total number of jobs, including full-time, part-time and seasonal jobs. Note that each job (if not expressed as an FTE job), regardless of whether it is full-time, part-time or seasonal, is counted as one job; therefore, the total number of jobs may be higher than the total number of FTE jobs.

Note regarding the measurement of construction employment: - Construction occurs over a fixed period of time. Therefore, when estimating construction employment, the number of FTE jobs indicated is for the entire construction period, unlike operational employment which is expressed on an annual basis. Therefore, construction employment may be expressed as:

- Person years of employment (as per the definition noted above); or
- FTE jobs for the entire construction period.
- **Direct effect:** - The change in domestic output and related employment required to satisfy an initial change in demand. This would include the actual employment directly generated by construction and annual operations. For example, when the LNG projects are operational, direct employment would include the jobs required to operate and maintain the projects and supporting pipelines on an ongoing basis.
- **Indirect effect:** - The change in domestic output and related employment generated by the activity in industries that supply goods and services used in the construction and annual operations of the business being assessed. For example, when the projects are operational, a large number of the indirect jobs will be for new exploration and development of natural gas wells, in addition to the provision of goods and services needed to support this type of activity.

- **Induced effect:** - The overall impact of more income accruing to the household sector and the resulting employment this generates in the broader economy. For example, when employees from the projects use their wages to purchase homes, food, clothing, gas, entertainment and other items and services, jobs are created/supported in these other industries.

Assumptions

The following assumptions form an integral part of Grant Thornton's analysis and employment projections.

- The five LNG projects will be developed over the time frame currently proposed: 2013 to 2021.
- Each of the five LNG projects will have a different capacity. The total output of all five LNG projects will be 82 million tonnes per annum.
- BC has or will have the work force available to fill the construction and project operation jobs that will be created.
- The work force has or will have the requisite skills for the positions available.

Methodology

British Columbia Input-Output Model

The estimated employment impacts of the proposed LNG projects were derived using the BC Input-Output Model (“BCIOM”). The BCIOM is an econometric model of the BC economy that estimates the economic and employment impacts associated with specific expenditure patterns. As such, it traces the flow of goods and services amongst various sectors of the BC economy that are associated with the business or operation that is being assessed. The model is maintained by BC Statistics and is populated with economic and demographic data collected by Statistics Canada. Sector-specific multipliers from the model have been published.

The BCIOM has been used to estimate the expected economic and employment benefits of a variety of development projects throughout the province. The model was originally developed in 1974 by Statistics Canada and has been updated periodically since this time.

The BICOM is primarily used to predict how an increase or decrease in demand in one industry (e.g., construction) will impact other industries, and, therefore, the entire economy. The model assumes that all industries are operating at full capacity and that supply is perfectly inelastic.

The focus of this assignment is employment impacts generated by the construction phase and the annual operations phase of the proposed LNG projects. With regard to employment impacts, the model measures the following impacts:

- *Direct effect* - The change in domestic output and related employment required to satisfy an initial change in demand. This would include the actual employment directly generated by construction and annual operations.
- *Indirect effect* - The change in domestic output and related employment generated by the activity in industries that supply goods and services used in the construction and annual operations of the business being assessed.
- *Induced effect* - the overall impact of more income accruing to the household sector and the resulting employment this generates in the broader economy.

The methodology for this study involved using the BCIOM to estimate:

- The one-time employment impacts, measured in FTE jobs, generated by the construction of the LNG projects; and,
- The ongoing annual employment impacts, measured in FTE jobs, generated by the operation of the LNG projects.

Documents and information relied upon

In completing this review, Grant Thornton relied upon the following documents and information.

- Capacity estimates measured in million tonnes per annum (“MTA”), provided by the Province and its advisors;
- Total estimated capital expenditures required to build the LNG projects, provided by the Province and its advisors;
- Estimated annual operating expenditures for the LNG projects, provided by the Province and its advisors;
- Construction schedule for the LNG projects, provided by the Province and its advisors;
- Direct estimates for annual employment related to operation of the LNG projects, provided by the Province and its advisors;
- The BCIOM to estimate indirect and induced employment impacts related to construction and the annual operation of the LNG projects;
- Economic Impact Studies pertaining to LNG projects in the U.S.A. and Australia; and,
- Workforce Planning Report for the Queensland Liquefied Natural Gas Industry.

Proposed LNG projects

Proposed LNG projects

This report addresses five potential LNG projects to be located in northern BC. The scenario assumes that the projects will be constructed between 2013 and 2021. If all of the projects proceed, their collective capacity following completion will be approximately 82.0 million tonnes per annum (“MTPA”).

The following table summarizes the characteristics of the five LNG projects. Construction of the first project is scheduled to begin in 2013. Construction of the fifth project is scheduled to be completed by 2021. Based on this schedule, the first year that all five projects will be fully operational is 2021 (the first “steady state” year of operations).

Table 1: Characteristics of Five LNG Projects

Characteristic	Combined Total
Capacity (MTPA)*	82.0
Capital Costs** - \$Billions	\$98.4
Annual Operating Costs *** - \$ Billions	\$24.0
Construction Period	2013 - 2021

* Million tonnes per annum

** Plant and pipe

*** Including feed gas

Project employment

To estimate the employment impacts that would be generated by the construction and operation of the five LNG projects, Grant Thornton reviewed the initial direct employment projections submitted by the Province and its advisors as well as the actual and/or forecasted employment statistics for other LNG projects.

The direct employment projections prepared and submitted by the Province and its advisors were as follows:

- Project construction – average of 2,300 direct FTE jobs, per year, per project, over the construction period
- Project operations – 300 to 700 direct FTE jobs per project per year

In comparison, projections for the Australia Pacific LNG Project in a 2010 economic impact study included the following employment forecasts.

- Project construction – Direct employment of 3,300 jobs per year
- Project operations – 345 direct FTE jobs per year

Therefore, the direct employment projections for the construction and operation of the LNG project in Australia are very similar to direct employment projections for the proposed LNG projects in BC.

Estimated employment impacts

Introduction

Construction of the five projects is estimated to generate, on average, 39,400 full time equivalent jobs annually for the nine-year construction period. Once all five projects are fully operational in 2021, the number of full time equivalent jobs required to operate the projects annually is estimated to be 75,200 over the life of the projects. Additional details regarding the construction and annual operating employment impacts are provided in this section.

Estimated employment impacts related to construction

As shown below, total capital expenditures for the five LNG projects combined are estimated to be \$98.4 billion. Direct employment impacts (FTE jobs) generated by the construction of the projects are estimated to be 102,500 over the duration of the construction period.

The employment impacts in supplier industries as a result of this construction (indirect employment) are estimated to be 198,700 FTE jobs. Induced employment impacts resulting from employees involved in construction of the projects spending wages in the broader economy are estimated to be 53,000 FTE jobs.

The estimated total number of FTE jobs resulting from construction of the five projects is 354,200. Additional details pertaining to the source of the estimates and related assumptions are shown below the table.

Table 2: Estimated Employment Resulting from LNG Project Construction

Estimated Construction Employment (in British Columbia)	Total
Total Capital Expenditures (plant & pipe) - \$ Billions	\$ 98.4
Direct employment impact - FTEs	102,500
Supplier industries (indirect impact) - FTEs	198,700
Industries benefitting from spending by workers (induced impact) - FTEs	53,000
Total FTEs (direct, indirect and induced)	354,200

Schedule 1 presents the estimated annual number of construction FTE jobs each year over the proposed development period (nine years).

Notes Regarding Sources and Assumptions Used to Estimate the Construction Employment Impacts

1. Estimated capital expenditures were provided by the Province and its advisors.
2. Estimated direct FTE jobs resulting from construction were provided by the Province and its advisors.
3. The number of indirect FTE jobs resulting from the construction of the LNG projects (including pipes) was estimated using BC Statistics BCIOM and associated multipliers that were adjusted to reflect the LNG sector. The multipliers were applied to the relevant sectors and only to the portions of capital expenditures that were estimated to originate in BC. Therefore, the estimated number of indirect FTE jobs shown in the table represents FTE jobs generated in BC for industries that supply the construction materials and activities associated with constructing the LNG projects.
4. The number of induced FTE resulting from the construction of the LNG projects (including pipes) was estimated using the estimated wages provided by the Province and its advisors and the BC Statistics BCIOM and associated multipliers that were adjusted to reflect the LNG sector. The induced FTE jobs are generated by employees, directly employed during the construction phase of the projects, spending their wages in the broader economy, which, in turn, generates employment in other sectors.

Estimated employment impacts related to annual operations

The table on the following page presents estimated employment impacts related to the annual operation of the LNG projects. Total annual operating costs are estimated to be \$24 billion. Direct employment impacts (FTE jobs) generated by the annual operation of the projects are estimated to be 2,400.

The employment impacts in supplier industries (indirect impacts) as a result of annual operations are estimated to be 61,700 FTE jobs. Note that these indirect employment impacts include employment related to upstream exploration and supply of feedgas, including pipeline services. The Province and its advisors have assumed that 100% of feedgas will be sourced in BC. A further breakdown of the indirect FTE jobs resulting from annual operation of the five LNG projects indicates that:

- Oil and gas extraction (typically upstream) to support the five projects will generate an estimated 5,000 FTE jobs annually;
- Support activities for mining and oil and gas extraction will generate an estimated 3,200 FTE jobs annually;
- Pipeline transportation activities to support the five projects will generate an estimated 4,100 FTE jobs annually;
- Architectural, engineering and related services to support the five projects will generate an estimated 10,900 FTE jobs annually; and,
- Other supplier industries to support the five projects will generate an estimated 38,500 FTE jobs annually.

The industries represented in “other supplier industries”, which, as noted above, accounts for an estimated 38,500 FTE jobs, include, for example: utilities, retail, transportation and warehousing, finance, insurance and real estate, construction (repair), other professional services, equipment rentals and accommodation.

Induced employment impacts, resulting from employees involved in annual operations spending wages in the broader economy, are estimated to be 11,100 FTE jobs. The estimated total number of annual FTE jobs resulting from the operation of the five projects is 75,200.

Additional details pertaining to the source of the estimates and related assumptions are shown below the table.

Table 3: Estimated Annual Employment Resulting from LNG Project Operations

Estimated Annual Operating Employment (in British Columbia)	Total
Annual Operating Costs (including feed gas) - \$ Billions	\$ 24.0
Direct employment impact - FTEs	2,400
Supplier industries (indirect impact) - FTEs	61,700
<i>Oil and gas extraction</i>	<i>5,000</i>
<i>Support activities for mining and oil and gas extraction</i>	<i>3,200</i>
<i>Pipeline transportation</i>	<i>4,100</i>
<i>Architectural, engineering & related services</i>	<i>10,900</i>
<i>Other supplier industries</i>	<i>38,500</i>
Industries benefitting from spending by workers (induced impact) - FTEs	11,100
Total FTEs (direct, indirect and induced)	75,200

Schedule 2 presents the estimated number of FTE jobs associated with the operation of the five projects over a five-year period; the period required to get all the five of the projects operational.

Notes Regarding Sources and Assumptions Used to Estimate the Operating Employment Impacts

1. Estimated annual operating costs were provided by the Province and its advisors.
2. Estimated direct annual FTE jobs resulting from the operation of the projects were provided by the Province and its advisors. Grant Thornton benchmarked these estimates to those of other proposed LNG projects, concluding that these direct employment estimates provided by the Province and its advisors are reasonable; see Table 4 below for a summary of this comparison.
3. The number of annual indirect FTE jobs resulting from the operation of the LNG projects was estimated using BC Statistics BCIOM and associated multipliers that were adjusted to reflect the LNG sector. These estimates were further broken down to illustrate the estimated indirect FTE jobs in several of the individual supplier industries.
4. The number of annual induced FTE jobs resulting from the operation of the LNG projects (pipe and plant) was estimated using BC Statistics BCIOM and associated multipliers that were adjusted to reflect the LNG sector. The induced FTE jobs result from those directly employed

in the annual operation of the projects spending their wages in the broader economy, which, in turn, generates employment in other sectors.

The following table shows a comparison of the estimated direct FTE jobs for the five LNG projects combined and LNG projects proposed for Australia and the U.S.A. (Maine). Capacity in MTPA, direct FTE jobs and direct FTE jobs per MTPA are presented below. The average number of direct FTE jobs per MTPA for the proposed BC LNG projects is 29.27, which is slightly higher than the number of FTE jobs estimated for the two other projects (21.56 for the Australian project and 20.63 for the U.S. project). Overall, the estimates are comparable.

Table 4: Comparison of Direct Annual Operating FTE Jobs

	Location	Capacity (MTPA)*	Direct** FTE jobs	Direct FTE jobs/MTPA (estimated)
5 LNG Projects- combined (proposed)	BC	82.0	2,400	29.27
5 LNG Projects - average (proposed)	BC	16.4	480	29.27
Pacific LNG Project	Australia	16.0	345	21.56
Robbinston Terminal	Maine (USA)	3.8	78	20.63

* Million tonnes per annum

** Direct annual operating FTE jobs (estimated)

Estimated average employment compensation

The estimated average employment compensation, including wages and benefits, is shown below.

FTE Job Type	Average Annual Compensation*	Source/ Comments
Construction – direct	\$140,200	<ul style="list-style-type: none"> Based on estimates provided by the Province and its advisors
Construction – indirect	\$54,100	<ul style="list-style-type: none"> Based on BC Statistics averages for annual wages and benefits for employees working in the industries that would typically supply the goods and services to the construction industry
Construction –induced	\$50,700	<ul style="list-style-type: none"> Based on BC Statistics averages for annual wages and benefits for employees working in the industries that benefit from the employee spending by direct workers on the construction projects This will include, for example, wages and benefits for workers in the following types of industries (partial list): <ul style="list-style-type: none"> Food services and drinking places Repair and maintenance Arts, entertainment and recreation Accommodation Construction (residential) Travel and entertainment Retail
Operations - direct	\$127,200	<ul style="list-style-type: none"> Based on estimates provided by the Province and its advisors
Operations - indirect	\$68,400	<ul style="list-style-type: none"> Based on BC Statistics averages for annual wages and benefits for employees working in the industries that would

FTE Job Type	Average Annual Compensation*	Source/ Comments
		<p>typically supply the goods and services to support the operations of the LNG projects</p> <ul style="list-style-type: none"> • This will include, for example, workers in the following types of industries (partial list): <ul style="list-style-type: none"> ○ Oil and gas extraction ○ Support activities for oil and gas extraction ○ Pipeline transportation
Operations - induced	\$50,700	<ul style="list-style-type: none"> • Based on BC Statistics averages for annual wages and benefits for employees working in the industries that benefit from the employee spending by direct workers on the construction projects • This will include, for example, wages for workers in the following types of industries (partial list): <ul style="list-style-type: none"> ○ Food services and drinking places ○ Repair and maintenance ○ Arts, entertainment and recreation ○ Accommodation ○ Construction (residential) ○ Travel and entertainment ○ Retail

* Includes typical employee benefits (vacation pay, sick pay, etc.)

Conclusions

Over the construction period, the five LNG projects are expected to generate an estimated 102,500 direct FTE jobs, 198,700 indirect FTE jobs and 53,000 induced FTE jobs. The estimated total number of FTE jobs resulting from construction of the five projects is 354,200. The annual operations of the five LNG projects are expected to generate an estimated 2,400 direct FTE jobs, 61,700 indirect FTE jobs and 11,100 induced FTE jobs. The estimated total number of annual FTE jobs resulting from the operation of the five projects is 75,200.

Table 5: Summary of Estimated Employment Impacts for BC LNG Projects

Impact Category	Number of FTE jobs (5 BC LNG Projects)
Over Construction Period	
Direct	102,500
Indirect	198,700
Induced	53,000
Total	354,200
Annual Operations	
Direct	2,400
Indirect	61,700
Induced	11,100
Total	75,200

Schedule 1: Annual construction FTE jobs

Estimated Annual Construction FTE jobs in BC for the Duration of Construction

The following schedule presents estimated construction FTE jobs per year for the duration of the nine-year construction period. The number of construction FTE jobs is expected to vary year-to-year, as each of the five projects will commence construction at different times. One project is scheduled to commence construction in 2013, one in 2015 and two in 2016. There will also be varying demand for construction labour over each project's construction period.

As shown in the right-hand column, the average number of direct FTE jobs per year is estimated to be 11,400, and the average number of total FTE jobs per year is estimated to be 39,400.

Construction Employment All Five Plants (FTEs)	2013	2014	2015	2016	2017	2018	2019	2020	2021	Total	Average per Year
Direct	1,600	1,600	6,900	21,600	21,600	18,500	14,700	11,000	5,000	102,500	11,400
Indirect	3,000	3,000	13,400	41,900	41,900	35,900	28,600	21,300	9,700	198,700	22,100
Induced	800	800	3,500	11,200	11,200	9,600	7,600	5,700	2,600	53,000	5,900
Total	5,400	5,400	23,800	74,700	74,700	64,000	50,900	38,000	17,300	354,200	39,400

Schedule 2: Annual operating FTE jobs

Estimated Annual Operating FTE jobs in BC

The following schedule presents the estimated FTE jobs resulting from the operation of the projects on an annual basis during the ramp-up period for the projects, with each project commencing operations at different times. All five projects are scheduled to be operating in 2021.

Annual Operating Employment All Five Plants (FTEs)	2017	2018	2019	2020	2021
Direct FTEs	400	400	1,100	1,700	2,400
Indirect	9,000	9,000	27,000	43,700	61,700
Induced	1,600	1,600	4,800	7,800	11,100
Total	11,000	11,000	32,900	53,300	75,200

Restrictions and qualifications

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