

# The **LIQUEFIED NATURAL GAS** Industry in BC



# LIQUEFIED NATURAL GAS Industry in BC



Northeastern BC

Ian King/Photo

## LNG Industry in BC

Oil and gas exploration in BC focuses in the north-east corner of the province. The two major areas that hold significant amounts of natural gas are the Horn River Basin of Northern BC, and the adjacent Montney Basin which spans the BC and Alberta border.

**Conventional** natural-gas production has been underway in BC since the 1950s, but **unconventional** natural-gas production has been steadily growing and in 2011 it surpassed conventional production.

Conventional natural gas is found in highly porous and permeable geological formations and can be collected by traditional drilling, pumping, or compression techniques. Unconventional natural gas is found within low permeability rock layers (formations) and in coal beds.

Unconventional natural gas is collected through techniques such as hydraulic fracturing (called fracking), which are different from the methods used for extracting conventional gas. Fracking is a process where chemicals, water, and sand are injected deep into the ground and, under intense pressure, create fractures in the rock allowing the natural gas to be released.

The focus of natural-gas production in BC has shifted to establishing a Liquefied Natural Gas (LNG) industry.

Natural gas becomes a liquid when it is chilled to about  $-160^{\circ}\text{C}$ . When natural gas is liquefied, it is reduced to 1/600th or about 0.17% of its original volume. This makes it easier and much more efficient to transport by ship over long distances than when it is in a vapour form. LNG can then be converted back into a gas and sent through a pipeline to end-users.

For BC, LNG is mostly an export product. The demand for natural gas increases as the economies of Asian countries continue to grow and nations such as China seek to decrease their dependency on coal for electricity production.

An LNG industry would see BC export natural gas to markets in Asia. There are currently no large-scale operational LNG export facilities in Canada. However, given the large scale of reserves in BC and its ideal geographic location for access to Asian markets, there is an opportunity to build an LNG export industry.

Source: BCOGC

To do this, BC will need to construct export and liquefaction facilities on the west coast, and develop a network of pipelines to connect the places where natural gas is found in the northeast corner of the province to export facilities on the coast.



## Proposed LNG Projects

As of early 2018, there were 14 LNG export related projects proposed in BC. These vary in size. All export licences have been approved by the National Energy Board and some Environmental Assessments have already been carried out or are underway for projects and pipelines.

The financial viability of many is uncertain, and none are yet operational, nor has construction begun. Most proposed projects would be affiliated with a new pipeline development, which would be needed to deliver natural gas from northeast BC.

***Selected LNG projects are described below. A full list of active proposed projects is provided in Table 1 and a list of proposed pipeline developments is provided in Table 2.***

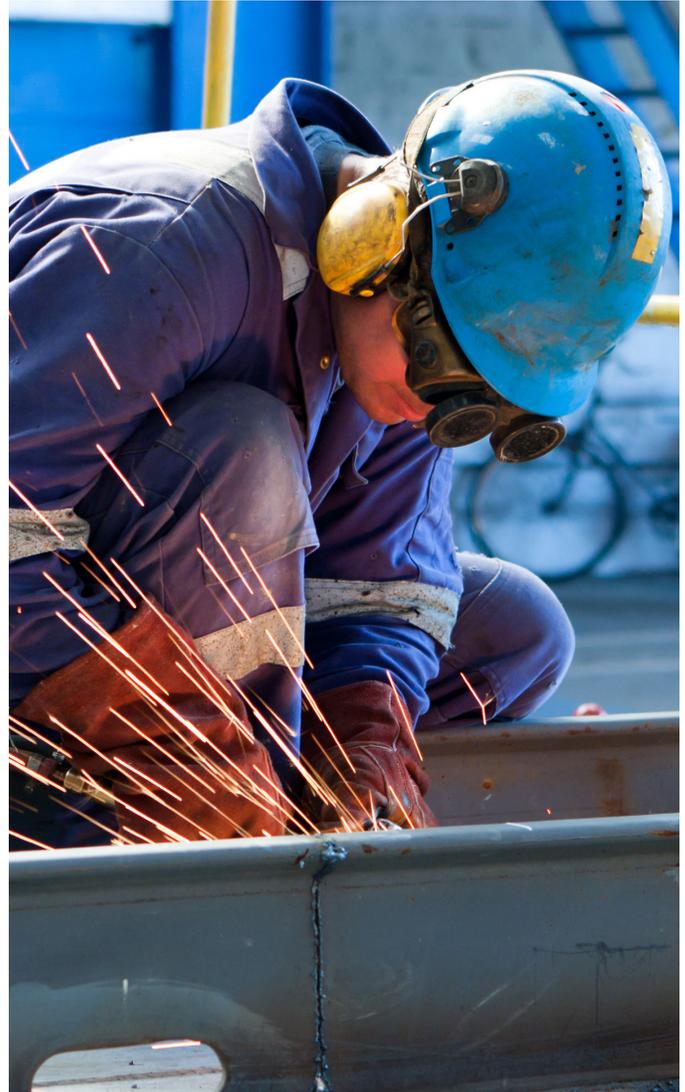
The proposed **Woodfibre LNG** project is a small-scale processing and exporting facility located southwest of Squamish, BC. The company is Woodfibre LNG (Pacific Oil and Gas).

A decision to begin construction on this project was made by the firm in November 2016. This project includes a related Eagle Mountain-Woodfibre Gas Pipeline, which is an expansion of an existing pipeline that serves the Sunshine Coast and Vancouver Island.

**LNG Canada** is a joint venture let be Shell Canada Energy. The project is a large-scale LNG liquefaction, storage, and export facility in Kitimat, BC. A final decision to move forward on the project was made in fall 2018

**The Coastal GasLink** pipeline would be built by the Trans Canada company. This line would be a 650-km pipeline running from west of Dawson Creek near the Alberta border to the proposed LNG Canada site in Kitimat on the BC coast.

**Chevron Canada and Woodside** are developing the Kitimat LNG facility to liquefy natural gas from BC's Liard and Horn River basins. The gas to supply the facility will be transported from Summit Lake by the 480-kilometre Pacific Trail Pipeline. Kitimat LNG has a 20-year, 10-million-metric-tonne-per-year LNG export license. All major provincial and federal environmental assessment certificates for the proposed Kitimat LNG plant and the Pacific Trail Pipeline are in place.



**Steelhead LNG** is a potential LNG project being explored by the Steelhead LNG Corporation and the Huu-ay-aht First Nations. The Kwispaa development would be located on Huu-ay-aht land at Sarita Bay, near Port Alberni on Vancouver Island, and could make use of a combination of new and existing pipelines. The project has not yet under-gone an Environmental Assessment, but Huu-ay-aht citizens voted in March 2017 to approve the project and it has received support from elected and hereditary leaders.

There have been additional proposals for export facilities and connecting pipelines, and also other projects across western BC, which are in early review and permitting stages.

# LIQUEFIED NATURAL GAS Industry in BC

**Table 1: Active Proposed LNG Projects in BC**

Proposed Projects	Project Location
Canada Stewart Energy Project	Stewart
Cedar LNG	Kitimat
Discovery LNG	Campbell River
Kitimat LNG	Bish Cove near Kitimat
Kitsault Energy Project	Kitsault
LNG Canada	Kitimat
NewTimes Energy Ltd.	near Prince Rupert
Nisga'a LNG	near Prince Rupert
Orca LNG	Prince Rupert
Steelhead LNG: Kwispa LNH	Sarita Bay near Bamfield, Vancouver Isl.
Watson Island LNG	Prince Rupert
WCC LNG Ltd.	Prince Rupert
WesPac Midstream	Tilbury Island, Delta
Woodfibre LNG	Squamish

**Table 2: Proposed Pipeline Development Projects in BC**

Proposed pipeline development	Associated LNG Facility
Pacific Northern Gas Transmission Pipeline Expansion	To be determined
Pacific Trail Pipeline	Kitimat LNG
Coastal GasLink Pipeline	LNG Canada
Prince Rupert Gas Transmission	To be determined, formerly associated with now-cancelled Pacific Northwest LNG
Eagle Mtn. – Woodfibre Gas Pipeline	Woodfibre LNG

# LIQUEFIED NATURAL GAS Industry in BC



The closeness of BC to LNG markets is considered an industry advantage.

Source: Government of BC

## Potential economic contributions from an LNG Industry

If an LNG export industry in BC is developed, it could result in broad economic benefits. However, the economic and employment impacts and the financial viability of proposed projects have been the source of debate among politicians, the public, Indigenous communities and their governments, industry proponents, and non-governmental organizations.

In a time when we are seeing shifting natural-gas prices and uncertain global markets it is tough to predict the outcomes of an industry that is not yet up and running.

A key advantage of a BC LNG export industry is the proximity to Asian markets. This allows LNG to be transported overseas from the BC west coast in less time than it takes ships to travel from many other North American locations.

While China, Japan, and South Korea are the largest LNG importers in Asia, there is also substantial

competition for these growing natural gas markets. Australia already has a well-established LNG export industry, with seven operating LNG developments and three more under construction. Other projects are also being considered.

The US now (2018) has two operating export plants, four under construction, and 11 more undergoing permitting processes.

Review and regulation requirements and relatively high construction costs in Canada can also mean it takes longer to get projects approved and built than might be the case in other places. But there is global business interest in BC LNG. International companies are involved in many of the key proposed projects. Canadian governments have been supportive of the industry and Canada provides a stable legal and regulatory environment.

This provides some certainty for companies, which is important for making decisions about investing.

### TRAVEL

Comparing BC's north Coast to other ports (Ship time at sea in hours, at 20 knots).

From/to	Hong Kong	Shanghai China	Kobe Japan	South Korea
Prince Rupert	264	232	205	209
Vancouver	289	255	227	231
Tacoma USA	290	255	227	231
Oakland, USA	303	275	241	256
Los Angeles USA	319	291	259	262

Based on Price Rupert Transit Time Advantage chart, from CN Rail.



# INDUSTRY

Crew loading up chopper at Husky Energy's Federal Ranch compressor station for pipeline inspection.

Ian King/Photo

## Incentives, royalties & taxes

The BC government introduced a Natural Gas Strategy in 2012. It has since been refined by the current government, which set in 2018 a new “fiscal framework” for LNG development. And it could be refined again after BC brings in its new climate strategy and clean-energy policy, expected late in 2018.

The BC government has created a number of incentives to encourage the LNG industry. These include the LNG Environmental Incentive Program (2016) to help offset the costs of projects that do not meet greenhouse gas benchmarks; credits and royalty programs for infrastructure development; and amendments to natural gas regulations — notably the LNG Income Tax (2015) which was lowered to 3.5% from 7%.

BC Hydro also offers special electricity rates for LNG facilities, which effectively lower rates to what are considered as industry standards. The BC government signed a project-development agreement in May 2015 for the proposed Pacific North-west LNG project, which ensured that significant changes would not occur to the LNG Income Tax, the natural gas tax credit, and the greenhouse gas

regulation scheme throughout the lifespan of the project. Although that project has been dropped, the agreement can be seen as a precedent.

Some researchers and non-governmental organizations are critical of the incentives and tax breaks provided to the LNG industry and question the benefits for BC. For instance, some take issue with the structure of the LNG income tax. During the construction phase, when operational costs are high and profit is at a deficit, no tax is charged and facilities are subject to lower rate until operational and investment deficits have been recovered. This means BC will not see peak revenues until a company's investments have been paid off.

Given concerns about the state of the natural-gas market, some critics have expressed concerns about whether the industry will be able contribute to lasting benefits for communities. Canada's National Energy Board maintains that the North American market is over supplied, but some analysts have questioned the impacts of potentially large LNG exports on Canada's own energy security.

The new government has expressed support for developing the industry. In early 2018, BC's government announced changes to the fiscal framework for LNG which included providing a provincial sales tax exemption on the construction costs of any LNG facility as well as setting a cap on carbon taxes.



Source: LNG Canada

# EMPLOYMENT

A key potential benefit of the BC LNG industry is job creation. Estimates of **employment** impact vary because many include not only direct permanent jobs but also short-term construction jobs, jobs created in industries supplying goods and services, and jobs to support natural-gas operations such as drilling, production of gas, and transportation.

Government and industry have emphasized the direct and indirect employment opportunities resulting from an LNG industry, but others have argued that the long-term benefits may be overstated. Employment impact will vary depending on the scale of the proposed facility.

Companies and government agencies provide rough estimates. For example, the LNG Canada project estimates that its plant and the associated pipeline will together employ about 10,000 people at peak construction, with up to 900 people at the Kitimat plant for operations in the first phase.

The smaller scale Woodfibre LNG project is estimated to provide 650 temporary jobs each year of a two-year construction period, and then about 100 permanent operational jobs.

Many of the jobs created would be short term, and largely focused on the construction of facilities and the pipelines needed to deliver gas to them. But for smaller communities in BC where such plants would be located, the permanent jobs that come with an LNG facility could make a notable difference to local economies.

## DIRECT EMPLOYMENT

Direct employment refers to **jobs** directly related to the production of natural gas or LNG. As a result of direct employment, jobs are also generated in the businesses that supply goods and services to the natural gas industry. This is called indirect employment.

When the incomes from direct and indirect jobs are spent in the economy on housing, food, clothing, or recreation, it creates what analysts call an induced employment **effect**.



Source: LNG Canada

**Indirect job creation** can be difficult to predict. The growth in natural-gas production may not correspond to matching increases in employment in the natural-gas sector as a whole, because technology and other factors can mean that fewer people may be needed once things are up and running.

It is also argued that there is a shortage of skilled labour for specialized positions in the LNG industry, and that many positions would be filled by foreign workers. There is also strong pressure from governments and First Nations to provide opportunities for training and employment for Indigenous people.

LNG developers in the BC LNG alliance say priority will go to local workers first, other Canadians second, and foreign workers third, and then only if needed. The BC government is looking for firm priorities and commitments. The BC government has been optimistic that skilled labour demands

can be met and the **BC Natural Gas Workforce Strategy Committee** was developed with the goal of ensuring that the labour needed for growth in LNG is available.

The skills and training developed in the creation of the LNG industry could provide opportunities for people to work elsewhere in the economy once facilities are completed. While many jobs would require training and special skills, some employment would not necessarily require high skill levels, especially in the indirect job sectors.

Given that an LNG export industry is not yet established, models and predictions of possible employment impacts are really **best guesses**.

Establishing an LNG export industry will result in the creation of both temporary and permanent jobs. However, the extent of this impact is debated and depends on when and how many of the proposed projects go ahead.

# LIQUEFIED NATURAL GAS Industry in BC



## LNG FUTURE

### Drill site in northeastern BC

Source: Ian King

The future of the LNG export industry in Canada is highly dependent on a range of economic factors including the cost of production in BC, global natural-gas market conditions, the growth of Asian economies, and energy demand in those economies.

Market prices for LNG have varied widely over the last few years. Lower prices, a growing North American supply, and more competition in key markets may delay some Canadian natural gas development.

For countries exporting LNG, secure long-term sales are important for financing large projects, but countries importing LNG often seek shorter flexible contracts.

This mismatch between the needs of countries importing and those exporting LNG poses challenges for making decisions about investment and production levels. Proposed projects are also subject to the outcomes of regulation and project review processes.

Projects can take anywhere from 5 to 10 years to plan, get approval, and build. In that time market conditions can change considerably. The global market for natural gas may see significant increases if countries such as China continue to move to use natural gas instead of coal to produce electricity. China is doing this to improve air quality and reduce climate change impacts.

Countries may do this to reduce their impacts on climate change since natural gas would produce less CO<sub>2</sub> than using coal. New technologies may

also make natural gas desirable at the community or residential level for heating, electricity production through fuel cells, and even providing fuel for cars and trucks.

Natural gas may also emerge as an important transition fuel as countries move away from using coal and oil, and work toward building new renewable energy options to help meet climate change goals.

The BC government's 2012 LNG Strategy outlined a goal of having the first LNG facility operational by 2015, and then to have three facilities operational by 2020. As of the fall of 2018, only the proponents of LNG Canada and Woodfibre LNG had made an official investment decision to begin construction.

Based on Shell's recent LNG Outlook 2018, the global liquefaction supply and demand for natural gas might be strong in the next few years. The International Energy Agency sees a tight world market for LNG developing by 2023. Such forecasts would improve interest in developing supply opportunities for BC LNG, and moving forward with new facilities.

It is expected that the BC government will continue to view the LNG industry as an important prospect for BC's economy, but the future of the industry in BC will depend on a range of economic, social, environmental, regulatory, and other factors. Many of these factors are determined by economic conditions and policies that occur outside of Canada.

## Sources

BC Oil and Gas Commission. Major Projects Centre: LNG Canada <https://www.bcogc.ca/public-zone/major-projects-centre/lng-canada>

BC Oil and Gas Commission. Major Projects Centre: Pacific Northwest LNG <https://www.bcogc.ca/public-zone/major-projects-centre/pacific-northwest-lng>

BC Hydro. News Release. "New eDrive Electricity Rates for LNG Facilities." Nov 4, 2016. [https://www.bchydro.com/news/press\\_centre/news\\_releases/2016/new-edrive-electricity-rate-for-lng-facilities.html](https://www.bchydro.com/news/press_centre/news_releases/2016/new-edrive-electricity-rate-for-lng-facilities.html)

Canadian Association of Petroleum Producers. (2015). Overview of the World LNG Market and Canada's Potential for Exports of LNG-An Update. <https://www.capp.ca/publications-and-statistics/publications/266489>

Canadian Association of Petroleum Producers (2017). Canada's Oil and Natural Gas Industry: Energy Tomorrow. <https://www.capp.ca/publications-and-statistics/publications/309951>

Canadian Centre for Policy Alternatives (2015a) A Clear Look at BC LNG. <https://www.policyalternatives.ca/publications/reports/clear-look-bc-lng>

Canadian Centre for Policy Alternatives. (2015b). LNG and Employment in BC. <https://www.policyalternatives.ca/BC-LNG-jobs>

Government of British Columbia. BC LNG Projects. <https://Inginbc.gov.bc.ca/tile/bc-lng-projects/>

Government of British Columbia, LNG 101. <https://Inginbc.gov.bc.ca/tile/lng-101/>

Government of British Columbia. (2012). Natural Gas Strategy. [http://www.gov.bc.ca/ener/natural\\_gas\\_strategy.html](http://www.gov.bc.ca/ener/natural_gas_strategy.html)

Government of British Columbia, Ministry of Energy and Mines. (2012). Liquefied Natural Gas: A Strategy for BC's Newest Industry. [http://www.gov.bc.ca/ener/popt/down/liquefied\\_natural\\_gas\\_strategy.pdf](http://www.gov.bc.ca/ener/popt/down/liquefied_natural_gas_strategy.pdf)

Government of British Columbia. (2015a). Liquefied Natural Gas Income Tax Regulation. [http://www2.gov.bc.ca/assets/gov/taxes/natural-resource-taxes/oil-natural-gas/lng-income-tax/101\\_2015.pdf](http://www2.gov.bc.ca/assets/gov/taxes/natural-resource-taxes/oil-natural-gas/lng-income-tax/101_2015.pdf)

Government of British Columbia: Ministry of Finance. Liquefied Natural Gas Income Tax. <http://www2.gov.bc.ca/assets/gov/taxes/natural-resource-taxes/oil-natural-gas/lng-income-tax/lng-income-tax-presentation.pdf>

Government of British Columbia. BC Gov News. "Prov-

ince Releases First LNG Project Development Agreement." (2015b). <https://news.gov.bc.ca/stories/province-releases-first-lng-project-development-agreement>

Government of British Columbia. BC Gov News. "Factsheet: Strong Framework for a New Industry Benefits B.C." (2015c). <https://news.gov.bc.ca/factsheets/factsheet-strong-framework-for-a-new-industry-benefits-bc>

Government of British Columbia. (2016). Liquefied Natural Gas Environmental Incentive Program. <http://www2.gov.bc.ca/assets/gov/environment/climate-change/ind/lng/lng-env-incentive-program.pdf>

Government of British Columbia: BC Gov News: "New Framework for Natural Gas Development Puts Focus on Economic and Climate Targets" (March 22, 2018). <https://news.gov.bc.ca/releases/2018PREM0012-000480>

Government of Canada: Natural Resources Canada. British Columbia's Shale and Tight Resources. <http://www.nrcan.gc.ca/energy/sources/shale-tight-resources/17692>

Fraser Institute. (2015). LNG Exports from British Columbia: The Cost of Regulatory Delay. <https://www.fraserinstitute.org/studies/lng-exports-from-british-columbia-the-cost-of-regulatory-delay>

International Gas Union. (2016). 2016 World LNG Report. [www.igu.org](http://www.igu.org)

LNG Canada [Proponent website]: About. <https://www.lngcanada.ca/>

LNG Canada: Project Overview. <https://www.lngcanada.ca/wp-content/uploads/2016/11/LNG-Canada-Project-Overview-fact-sheet.pdf>

"LNG Canada's Joint Venture Participants Delay Timing of Final Investment Decision" July 11, 2016. <https://www.lngcanada.ca/wp-content/uploads/2017/01/2016-07-11-LNG-Canada-Media-Release.pdf>

LNG in Northern B.C. (2013). BC Natural Gas Workforce Strategy and Action Plan. <http://Inginnorthernbc.ca/index.php/learn-more/bc-natural-gas-workforce-strategy-and-action-plan/>

National Energy Board (2015). Short Term Canadian Natural Gas Deliverability 2015-2017. <https://www.neb-one.gc.ca/nrg/sttstc/ntrigs/rprt/ntrigsdvlrbly20152017/ntrigsdvlrbly20152017-eng.html>

National Energy Board. (2016). Canadian Energy Dynamics: Highlights of 2015-Energy Market Analysis, Chapter 11: Liquefied Natural Gas. <https://www.neb-one.gc.ca/nrg/ntgrtd/mrkt/dnmc/2015/index-eng.html#s11>

## Sources

Northwest Institute. (2014). LNG In Northwest B.C. <http://northwestinstitute.ca/images/uploads/LNG-Info-brochure-May2014.pdf>

Pacific Northwest LNG [Proponent website]: The Project. <http://www.pacificnorthwestlng.com/the-project/the-project/>

"Pacific Northwest LNG Project Not Proceeding" July 25, 2017 <http://www.pacificnorthwestlng.com/media/NewsRelease-Backgrounder-PNWLNG-July25-2017.pdf>

Pembina Institute. (2015). Pacific Northwest LNG Implications. <http://www.pembina.org/reports/pacific-northwest-lng-implications.pdf>

Shell LNG Outlook 2018 (2018). <https://www.shell.com/energy-and-innovation/natural-gas/liquefied-natural-gas-lng/lng-outlook.html>

Steelhead LNG [Proponent website]: <http://www.steelheadlng.com>

The Oxford Institute for Energy Studies. Gomes, I. (May 2015). Natural Gas in Canada: What are the Options Going Forward? <https://www.oxfordenergy.org/publications/natural-gas-in-canada-what-are-the-options-going-forward/>

Woodfibre LNG [Proponent website]: About the Project

<https://www.woodfibrelng.ca/the-project/about-the-project/Project-Benefits>. <https://www.woodfibrelng.ca/the-project/about-the-project/project-benefits/>

Parent Company Authorizes Woodfibre LNG to Proceed with Project, Nov. 4 2016. <https://www.woodfibrelng.ca/parent-company-authorizes-woodfibre-lng-to-proceed-with-project/>

## For additional information

BC Environmental Assessment Office: <http://www.eao.gov.bc.ca/>

Natural Resources Canada, Natural Gas Facts, 2018 <https://www.nrcan.gc.ca/energy/facts/natural-gas/20067>

British Petroleum, Natural Gas Production <https://www.bp.com/en/global/corporate/energy-economics/statistical-review-of-world-energy/natural-gas/natural-gas-production.html>

BC Oil and Gas Commission: <https://www.bcogc.ca/>

BC Ministry of Environment: Ministry of Environment. <http://www.env.gov.bc.ca/>

Canadian Centre for Policy Alternatives. <https://www.policyalternatives.ca/>

First Nations LNG Alliance: <https://www.fnlngalliance.com/>  
LNG in Northern BC: <http://lnginnorthernbc.ca/>

The Fraser Institute: <https://www.fraserinstitute.org/>

The Pembina Institute: <http://www.pembina.org/>

**Cover photo source: FortisBC**

## Author

Lauren Arnold is a Research Associate in the Centre for Environmental Assessment Research at UBC. Her work focuses on cumulative effects assessment, information and knowledge needs for environmental assessment processes and decision making, and development of energy and mining projects in Canada's north. Lauren has a background in government and consulting where she has work on a range of issues and projects in environmental management and data analysis.

The Information Series is produced by the First Nations LNG Alliance in collaboration with the Centre for Environmental Assessment Research at UBC. The series provides information for individuals and communities interested in learning about the nature, structure, operation and impacts of the LNG industry and natural gas resource development in British Columbia. Where possible the information sheets are developed using sources available online. This is so readers can more easily access the sources used by the author. Information sheets may be updated periodically. Please check the date of issue for the most current version.

October 2018

## Info sheets in this series:

Natural Gas  
Unconventional Gas Production  
Liquefied Natural Gas Industry in BC  
First Nations Issues and the Development of BC's LNG Industry  
The Review and Assessment of LNG Projects  
Understanding and Managing Risk  
Production and Transportation of Liquefied Natural Gas

Please visit [www.fnlngalliance.com](http://www.fnlngalliance.com) to see the information sheets.



**CEAR Centre for Environmental Assessment Research at UBC**

