



# Woodfibre: The Project

## What is Woodfibre LNG?

The Woodfibre LNG Project is a proposed small-scale natural gas liquefaction and export facility located at the former Woodfibre pulp mill site, about seven kilometres southwest of Squamish.

Natural gas will be delivered to the Woodfibre site through an expanded FortisBC pipeline, where it will be liquefied and loaded onto LNG carriers for shipment to overseas customers.

Based on the current project schedule, and subject to environmental approvals, Woodfibre LNG will begin construction in 2015, and be operational by 2017.

## Safety is our priority.

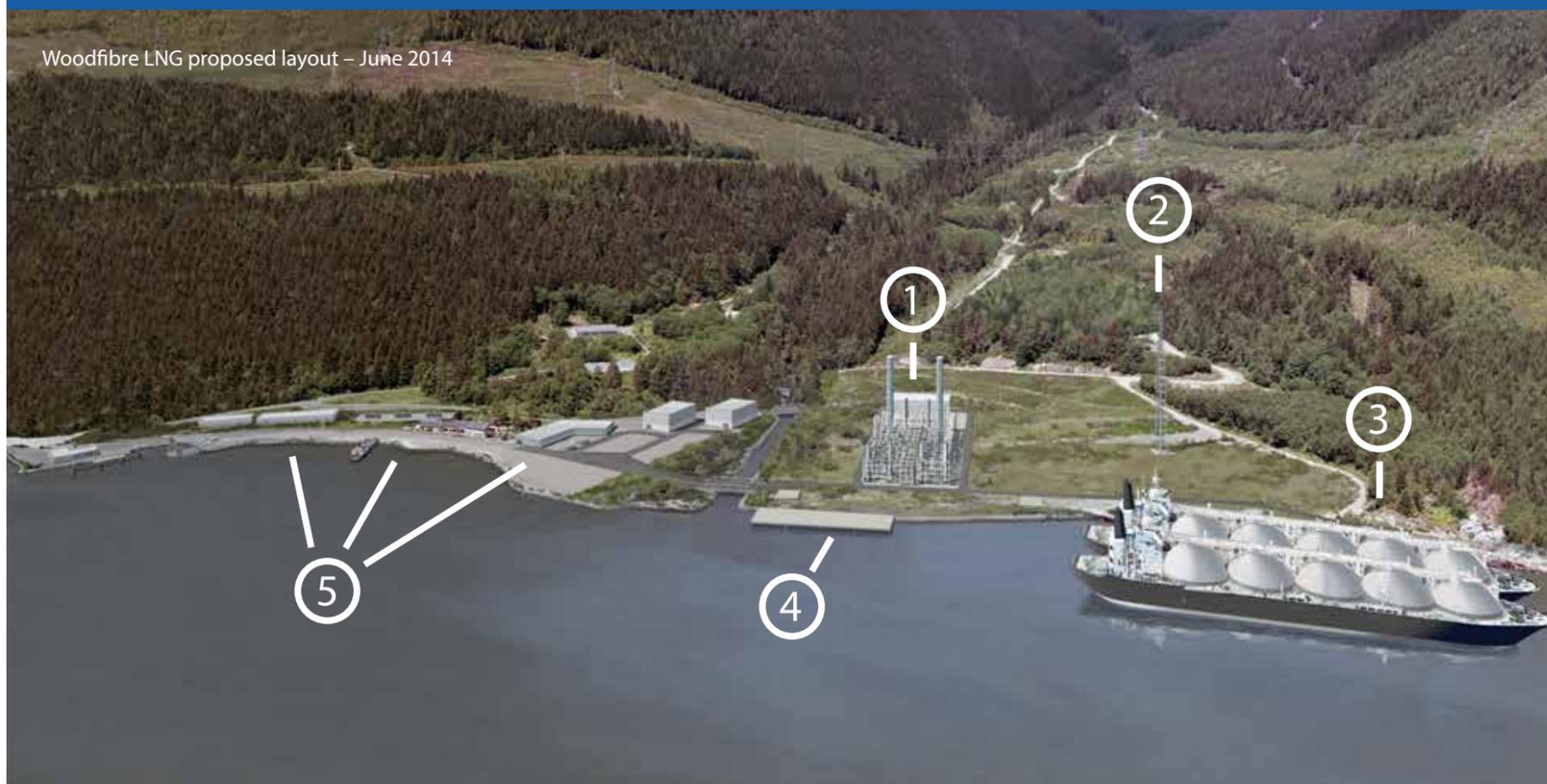
Woodfibre LNG will be designed for the safe and efficient handling of liquefied natural gas, both on land and on water.

Safety features will include: sophisticated alarm, control and monitoring systems; state of the art equipment; robust maintenance programs; and, safety and emergency response equipment, plans and training.

## What are the main components of the Woodfibre LNG Project?

1. Natural gas pre-treatment and liquefaction plant
2. A flare
3. A permanently moored LNG floating storage and offloading (FSO) unit
4. Module load-in quay
5. Supporting infrastructure e.g., LNG plant control centre, warehouse(s), cafeteria, heliport, etc.

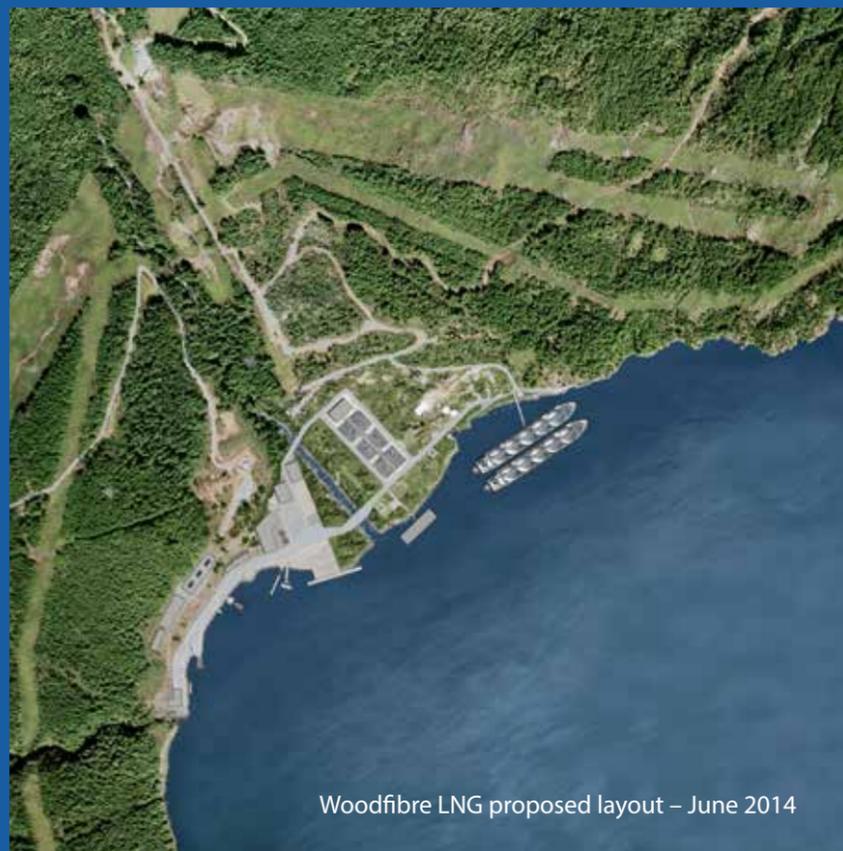
Woodfibre LNG proposed layout – June 2014



# THE PROJECT

## How will the facility work?

1. Woodfibre LNG will receive natural gas from an expanded FortisBC pipeline that delivers natural gas to homes and businesses in Squamish, Metro Vancouver and Vancouver Island.
2. Elements that would freeze during the liquefaction process are removed from the natural gas in the pre-treatment and liquefaction plant.
3. The remaining gas, which is mostly methane, is then cooled until it changes from a gas state to a liquid state (-162 C).
4. The LNG is stored in an LNG floating storage and offloading (FSO) unit.
5. Three to four times a month, an LNG carrier will arrive at the Woodfibre site. LNG will be loaded onto the carrier. About 24 hours after arriving, the LNG carrier will head out of Howe Sound, on its way to overseas customers.



### HOW OFTEN WILL THE FLARE BE USED?

The flare will be used less than 3% of the time the plant is operating: during start-up; maintenance; and, following an unscheduled event like a significant power loss or emergency. The flare is a safety feature designed to relieve pressure at the facility. LNG is not stored under high pressure, so during regular operations, the flare will not be used.

### HOW MUCH LNG WILL BE EXPORTED?

Woodfibre LNG is licensed to export approximately 2.1 million tonnes of LNG annually from the Woodfibre site (National Energy Board File OF-EI-Gas-GL-W157-2013-01 01).

### PROPERTY TAX

Woodfibre LNG is proposing to pay \$2 million a year in property tax to the District of Squamish when the facility begins operations, and increase that amount 2.5% a year, up to \$3 million a year, in property tax. More work needs to be done on property tax, but we felt it was important to make a proposal given the level of community interest in potential property tax revenue from Woodfibre LNG.



*"(Woodfibre LNG's decision to use BC Hydro electric power) sets a standard that others need to follow." - Merran Smith, Director, Clean Energy Canada, Vancouver Sun, May 13, 2014*

# SHIPPING

## How big are LNG carriers? About the length of a cruise ship.



### Moss LNG Carrier

LENGTH: 285m | DRAFT: 11.5m



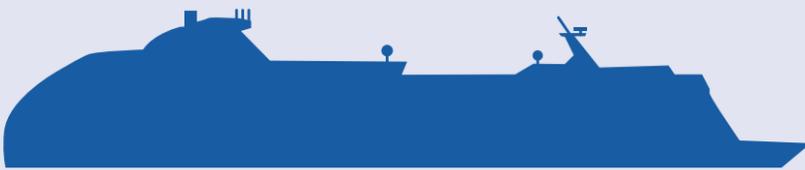
### Membrane LNG Carrier

LENGTH: 294m | DRAFT: 11.5m



### Large Container Ship (Sofie Maersk)

LENGTH: 347m | DRAFT: 14m



### Cruise Ship

LENGTH: 294m | DRAFT: 8.2m



### BC Ferries (Coastal Celebration)

LENGTH: 160m | DRAFT: 5.7m

## HOW MANY SHIPMENTS PER MONTH?

There will be three to four LNG carrier shipments a month. Each carrier will be accompanied by escort tugboats. Each carrier also will be piloted by BC Coast Pilots, which is required by Canadian marine regulations.

## HOW FAST WILL THE LNG CARRIERS TRAVEL?

LNG carriers will be manoeuvring at about 8 to 10 knots in Howe Sound. A vessel wake assessment estimated the wake generated by the carriers in normal conditions would be less than 10 centimetres at 50 metres away from the carrier, which is less than the wind-generated waves typically encountered in Howe Sound.

## IS HOWE SOUND TOO NARROW FOR LNG CARRIERS?

BC Coast Pilots tell us that because Howe Sound is generally a mile or more wide, with a minimum channel width of .8 nautical miles and few outlying navigational hazards, they would not characterize Howe Sound as a narrow waterway.

## NATURAL GAS VS DIESEL

- Natural gas will be the primary fuel of LNG carriers in Howe Sound.
- Using natural gas instead of diesel to fuel LNG carriers reduces GHG emissions by about 25%.

### ESTIMATED EMISSIONS IN TONNES FOR HOWE SOUND ROUND TRIP:

	NATURAL GAS	LOW SULPHUR DIESEL
CO <sub>2</sub>	95	130
NO <sub>x</sub>	1.0	1.7
SO <sub>x</sub>	0	1.0

## BALLAST WATER

- Ballast water exchange must be completed at deep sea, at least 200 nautical miles offshore, prior to arrival.

Source: Royal Dutch Shell



## TECHNOLOGY

Limiting air emissions where possible is a priority at Woodfibre LNG. We will use electric drive (instead of gas turbine) to power the liquefaction process refrigerant compressors, making Woodfibre LNG among the LNG facilities with the lowest GHG emissions in the world.

### ESTIMATED ANNUAL EMISSIONS IN TONNES:

	ELECTRIC DRIVE	GAS DRIVE
<b>GHG</b>	<b>80,000</b>	<b>450,000</b>
<b>NOx</b>	<b>20</b>	<b>310</b>
<b>SOx</b>	<b>17</b>	<b>17</b>

### WHERE WILL THE EMISSIONS COME FROM?

The majority of Woodfibre LNG air emissions will come from elements removed from the natural gas prior to liquefaction, which are incinerated.

## WHAT'S BEEN HAPPENING AT THE WOODFIBRE SITE?

Activity at the site is related to:

- The Woodfibre site is being cleaned-up to industrial standards as part of Western Forest Products's sale of the site to Woodfibre LNG Limited.
- Environmental consultants have been on site to collect certain baseline data, which is required for a formal environmental assessment.
- Woodfibre LNG engineers have been on site to oversee geotechnical investigations to better understand soil, bedrock and ground water conditions.
- Western Forest Products has a small staff on site doing maintenance work and operating an existing power plant.

Rock drilling to investigate foundation conditions, courtesy Knight Piésold Ltd.



## Job opportunities

Woodfibre LNG now expects to employ approximately 500 people per year during construction and at least 100 full time staff in three to four shifts at the facility during operations.

Operations jobs may include:

- |                          |                     |                          |                         |
|--------------------------|---------------------|--------------------------|-------------------------|
| · Document Management    | · Logistics Manager | · Project Engineer       | · Transport Coordinator |
| · Electrician            | · Marine Engineer   | · Safety Officer         | · Transport Supervisor  |
| · Environmental Engineer | · Marine Officer    | · Security Supervisor    | · Warehouse Helper      |
| · Fire Team              | · Marine Supervisor | · Site Administrator     | · Warehouse Supervisor  |
| · Laboratory Technician  | · Mechanic          | · Training Administrator |                         |

There will also be additional management, office support and engineering positions in Squamish and Vancouver.

Woodfibre LNG is committed to ensuring Squamish residents are aware of potential job opportunities, as it is our intention to fill positions locally where possible. We will be conducting Business Information Sessions, and advertising career opportunities locally as the project moves forward.

To learn more about job opportunities, and to stay up to date on the Woodfibre LNG Project, visit our web site: [woodfibrelng.ca](http://woodfibrelng.ca).

**CONTACT US:** To read our first newsletter LNG: Safe, Clean, Reliable, or signup for our Project updates email:

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