

# Natural Gas Development in BC and the LNG Opportunity

Garth Thoroughgood, Executive Director  
Tenure and Geoscience Branch  
Ministry of Natural Gas Development

January 28, 2014 | Hyatt Regency Hotel, Vancouver



# Natural Gas

- ✓ Cleanest burning fossil fuel
  - 29% and 44% less carbon dioxide per joule delivered than oil and coal respectively
  - Fewer air pollutants
- ✓ Non-renewable - but extremely abundant
- ✓ Mostly methane - but may contain depending on geologic formation:
  - Impurities/other gases: water, carbon dioxide, nitrogen and hydrogen sulphide
  - By-products: ethane, propane, butane, pentane
  - Huge potential for value added products



# Conventional vs. Shale gas

- ✓ Shale gas IS natural gas
- ✓ BC shale Gas-in-Place estimated at 2,900 trillion cubic feet (TCF) – not all producible
  - To put in context: BC current production is 1.4 TCF
- ✓ Natural gas is not “scarce” anymore in North America
- ✓ We already knew about shale gas – but only accessible recently due to technology advances
  - Horizontal drilling / hydraulic fracturing
- ✓ “Pad development” => Less impact on the land



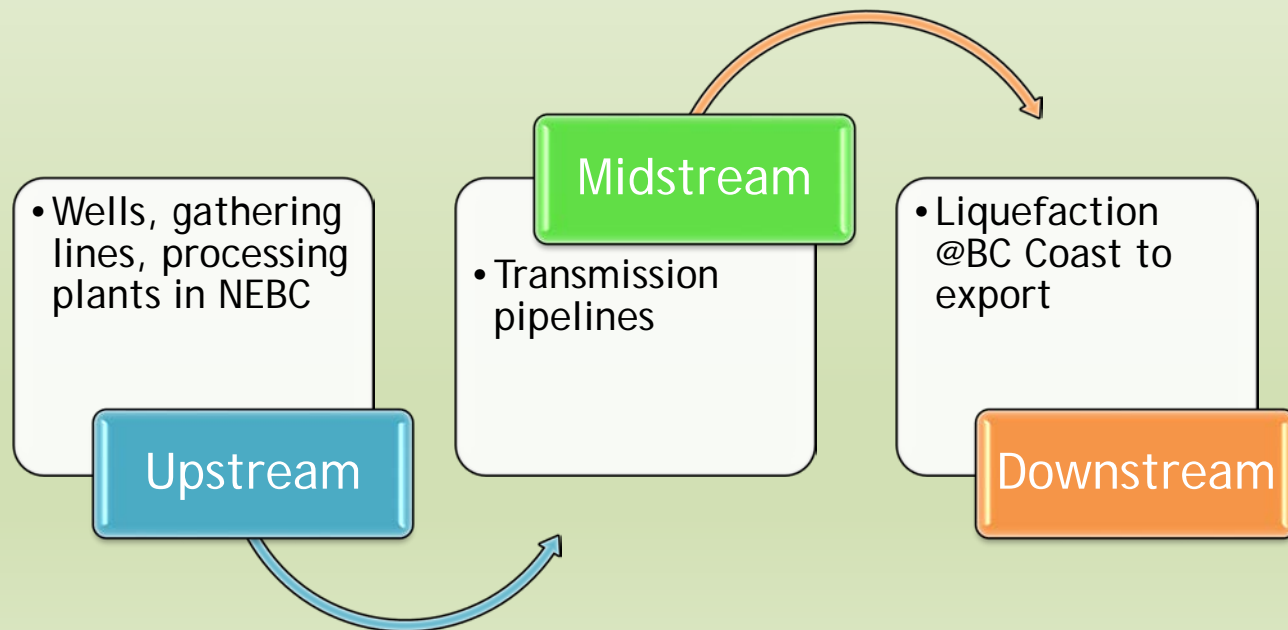
# Liquefied Natural Gas (LNG)

- ✓ LNG is natural gas - in liquid state
- ✓ Natural gas is cooled to  $-160^{\circ}\text{C}$  to liquefy
- ✓ Takes up about  $1/600^{\text{th}}$  the volume of natural gas in the gaseous state
- ✓ LNG mainly used to transport natural gas to markets



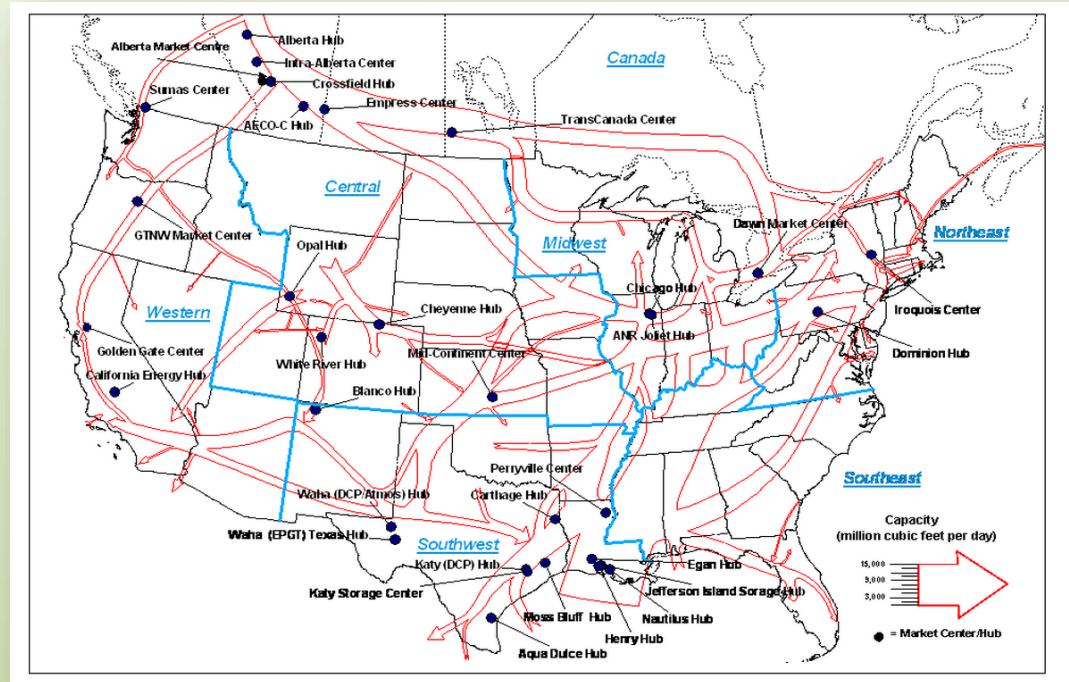
# Upstream, Midstream, Downstream

- ✓ Upstream: find and produce oil and gas
- ✓ Midstream: process, store, market, transport
- ✓ Downstream: distribution / petrochemical industry / liquefaction



# The integrated North American Natural Gas Market

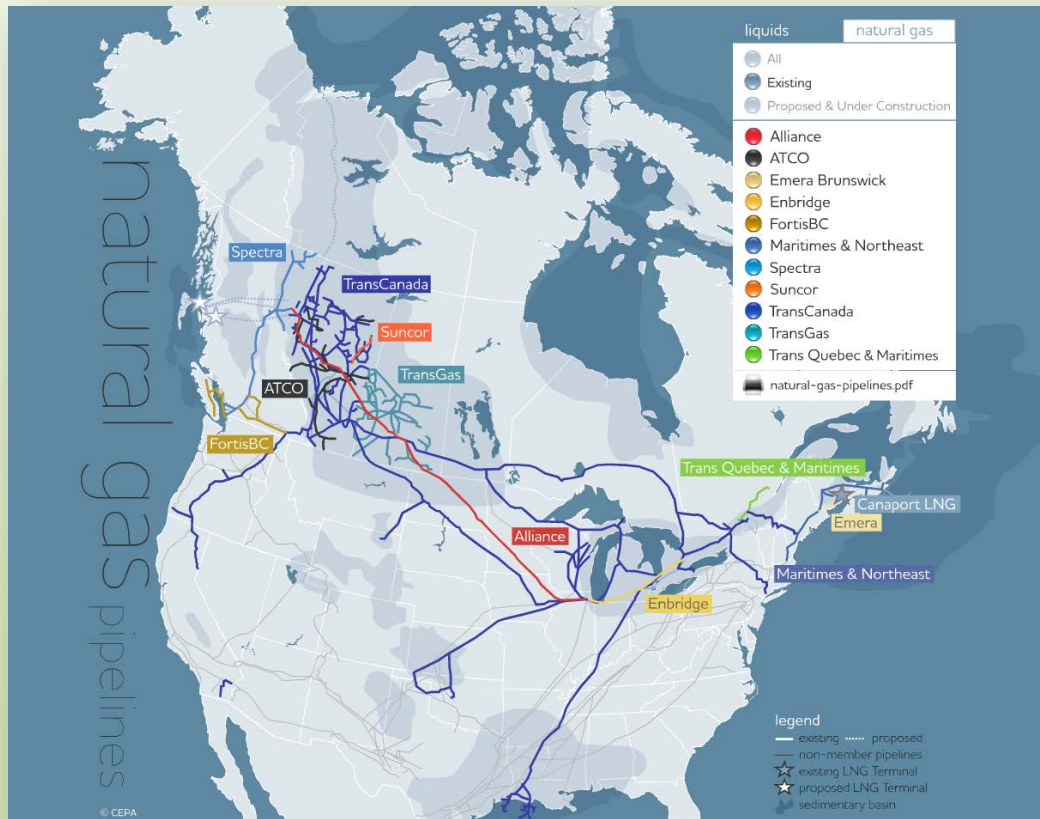
- ✓ US/Canada natural gas market very integrated through network of pipelines
- ✓ Highly competitive, with thousands of companies active in development
- ✓ North American prices driven by supply and demand and determined competitively on spot and future markets



Source: US Energy Information Administration



# The organization of the Canadian market



- ✓ Interprovincial / international pipelines (exports/imports) are regulated by the federal National Energy Board (NEB)

Source: Canadian Energy Pipeline Association



# Organization of B.C. natural gas market

- ✓ Resource is own by the Province but developed by private companies
  - More than 100 active companies producing natural gas
- ✓ Provincial government provides land tenure for development through competitive process
- ✓ Provincial government charges royalties from production of the resource
- ✓ Oil and Gas Commission (OGC) one window regulator





# A unique opportunity for B.C.

- ✓ Low natural gas prices in North America due to shale gas abundance
- ✓ High demand for clean, reliable fuels and need for source diversification in Asia



*Arbitrage Opportunity*



# B.C. has a Plan



- ✓ Strategies and plans in place to ensure B.C. is a competitive and reliable exporter of natural gas
- ✓ B.C. has clear government commitments to maximize the natural gas development opportunity
- ✓ LNG and other value added opportunities identified



# B.C.'s Shale Potential

## Liard Basin – Devonian

- 9,340 square kilometres
- OGIP – (large) > 200 Tcf
- 3 wells producing (June 2013)
- Daily production – 4.2 MMcf/d
- Cumulative production – 8.3 Bcf

## Horn River Basin – Devonian

- 11,400 square kilometres
- OGIP – 448 Tcf, Marketable – 78 Tcf
- 182 wells producing (June 2013)
- Daily production – 355 MMcf/d
- Cumulative production – 487 Bcf

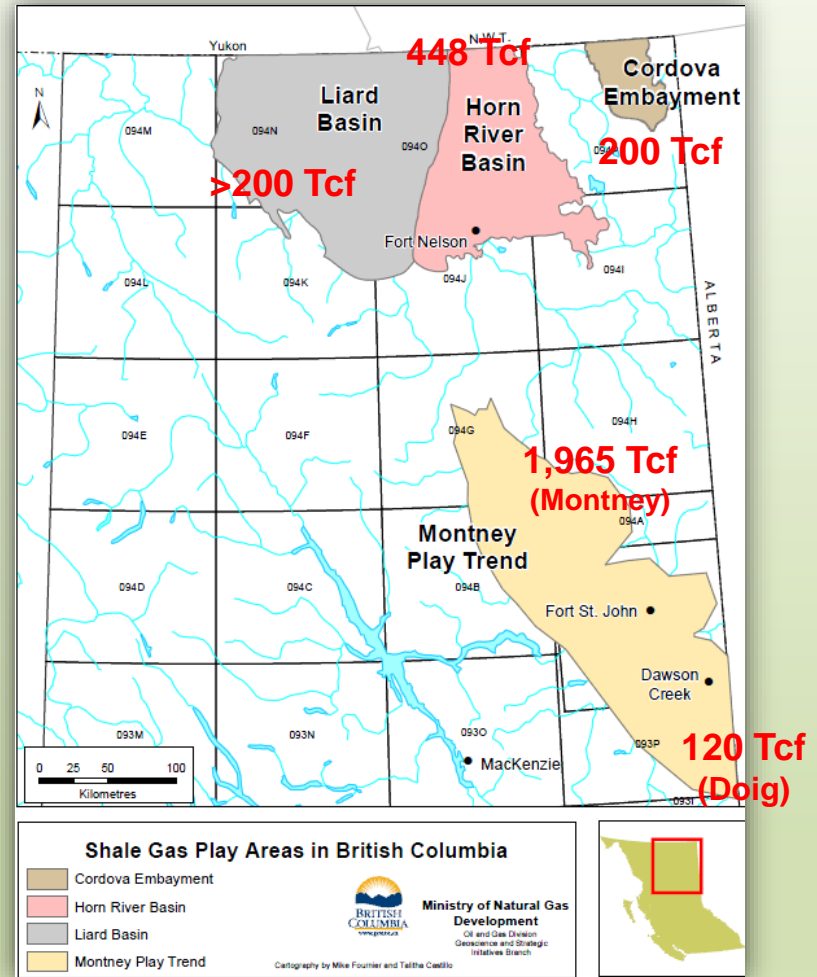
## Cordova Embayment – Devonian

- 2,690 square kilometres
- OGIP – 200 Tcf
- 17 wells producing (June 2013)
- Daily production – 31.5 MMcf/d
- Cumulative production – 15.9 Bcf

## Montney – Triassic

- 29,850 square kilometres
- OGIP – 1,965 Tcf, Marketable – 271 Tcf
- 1,244 wells producing (June 2013)
- Daily production – 1.7 Bcf/d
- Cumulative production – 1.8 Tcf

**Total Gas-in-Place estimates exceeding 2,900 Tcf**



Source: MNGD/NEB/AER/CSUR



# B.C. - Reliable producer and exporter

- ✓ BC drilling, producing and exporting natural gas for six decades
  - Current production ~ 4 bcf/day or 1.4 trillion cubic feet per year
  - Only 15% of current production consumed within Province
    - *85% exported to rest of Canada and US*
- ✓ In an 82 Million Tonnes per Annum (MTPA) LNG scenario:
  - Production to increase by 11.6 bcf/day (to more than 15 bcf/day or 5.5 trillion cubic feet per year).



# B.C.'s Regulatory Regime

- ✓ Modern Oil and Gas Activities Act
- ✓ Single window regulator: B.C. Oil and Gas Commission
- ✓ Canada and B.C. regulatory alignment and common priority in the development of natural gas
- ✓ Alignment across government on environmental assessment process
- ✓ Commitment to streamlined and efficient processes with defined timelines



# B.C.'s Transportation Advantage

## Closest Gateway to Asia



*Vessel Transit Times, in Days, from Major North American Ports to Major Asian Cities*

	Hong Kong	Shanghai	Yokohama	Pusan	Chennai
<b>Prince Rupert</b>	<b>11.1</b>	<b>9.9</b>	<b>7.92</b>	<b>9.5</b>	<b>17.1</b>
<b>Vancouver</b>	<b>12</b>	<b>10.6</b>	<b>8.92</b>	<b>9.7</b>	<b>18</b>
<b>Los Angeles</b>	<b>13.2</b>	<b>11.9</b>	<b>10.08</b>	<b>11</b>	<b>19.3</b>
<b>Louisiana</b>	<b>22.1</b>	<b>20.8</b>	<b>19.1</b>	<b>19.9</b>	<b>24.0</b>

*\*Estimated based on vessel speed of 20 knots*

Source: B.C., Canada Prospects in Mining and Natural Gas



# B.C. Proposed LNG Projects - Kitimat

- **Douglas Channel Energy Project**
  - *Texan company / Haisla partnership / Golar*
  - *Received a NEB export license in February 2012*
  - *Expected to be online by 2015*
- **Kitimat LNG**
  - *Chevron/ Apache*
  - *Provincial and federal EA approved - Received a NEB export license in 2011*
  - *Pacific Trail Pipelines (Pacific Trail Pipelines Limited Partnership)*
  - *Expected to be online by 2017/18*
- **LNG Canada**
  - *Shell / Mitsubishi / Petro China / KOGAS*
  - *Project description filed with the B.C. EAO and CEAA in April, 2013 - A NEB export license granted in February 2013*
  - *Coastal Gaslink Pipeline (TransCanada)*
  - *Expected to be online by 2019*
- **AltaGas/Idemitsu LNG Project**
  - *AltaGas/Idemitsu Kosan*



# B.C. Proposed LNG Projects - Prince Rupert

- **Pacific Northwest LNG**

- *PETRONAS acquired Progress in December 2012*
- *JAPEX joined the partnership in January 2013*
- *Agreement with Prince Rupert Port Authority (Lelu Island)*
- *NEB export license approved in December 2013*
- *Project Description filed with the CEAA in February, 2013 and also with EAO*
- *Prince Rupert Gas Transmission Line (TransCanada)*
- *Online target: 2019*

- **Prince Rupert LNG**

- *BG Group*
- *Agreement with Prince Rupert Port Authority (Ridley Island)*
- *NEB export license approved in December 2013*
- *Project Description filed with B.C. EAO in April 2013*
- *Natural Gas Transmission System (Spectra Energy )*





# B.C. Proposed LNG Projects - Grassy Point, Prince Rupert

- ✓ On February 23, 2013 the Provincial government issued a Request for Expression of Interest for Crown land tenure on Grassy Point for the purpose of developing an LNG plant and marine export terminals
- ✓ Four companies participated
- ✓ Northern parcel: CNOOC's Nexen and partners INPEX and JGC have finalized a Sole Proponent Agreement
- ✓ Southern parcel: negotiations in process



# B.C. Proposed LNG Projects - Southern B.C. and Unspecified Location

- **Woodfibre LNG Project**
  - *Woodfibre Natural Gas Limited (a subsidiary of Pacific Energy Corporation)*
  - *NEB application approved December 2013*
  - *Proposed to build small-scale LNG processing and export facilities at Howe Sound, Squamish, B.C.*
- **Discovery LNG Project**
  - *Quicksilver*
  - *Proposed to build LNG facilities on a former Catalyst Paper Corp. pulp mill site in Campbell River, B.C.*
  - *Expected to be online by 2019*
- **4 Other Undisclosed Proponents**



# Thank you!

Garth Thoroughgood  
Executive Director, Tenure and Geoscience Branch  
1-250-952-6382

[garth.thoroughgood@gov.bc.ca](mailto:garth.thoroughgood@gov.bc.ca)

