



WELCOME!

LNG Safety & Security Workshop

6th January 2005

National Energy Board and Nova Scotia Dept. of Energy

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Our Common Purpose

- To develop a common understanding of the pertinent issues in ensuring public safety and security when dealing with an LNG project in Canada
- Identify gaps in the current regulatory processes by examining the safety and technical components of LNG transportation, handling and storage



Some Context for the workshop...

- Conservative estimates indicate an annual 2.5% increase in demand for natural gas in North America
- Conventional North American sources of supply may not be able to meet demand
- LNG is the fastest growing fuel source worldwide (could be 30% of global gas trade by 2010)
- LNG could make an important contribution to Canadian gas supply.

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Some Context for the workshop...

- There are currently 7 LNG facility proposals in Canada at various stages of advancement (2 in Nova Scotia, 1 in New Brunswick, 2 in Quebec and 2 in British Columbia)
- Most are located close to existing infrastructure and centres of potential high demand
- There is much to be gained in finding common understandings, examining the regulatory burden, while sharing a responsibility for ensuring safe facilities

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Proposed Canadian LNG Facilities



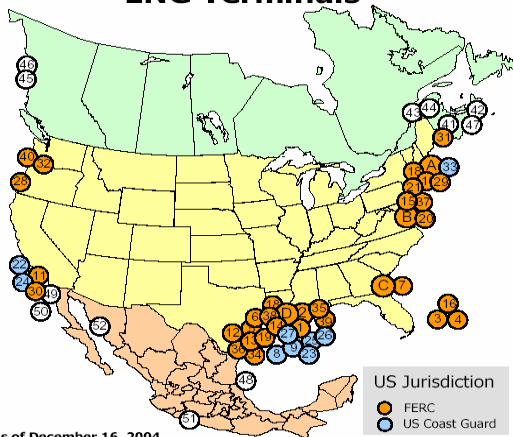
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FERC

Existing, Proposed and Potential North American LNG Terminals



As of December 16, 2004

* US pipeline approved, LNG terminal pending in Bahamas
 ** These projects have been approved by the Mexican and Canadian authorities

- Constructed**
- A. Everett, MA: 1.035 Bcf/d (Tractebel – DOMAC)
 - B. Cove Point, MD: 1.0 Bcf/d (Dominion – Cove Point LNG)
 - C. Elba Island, GA: 0.68 Bcf/d (El Paso – Southern LNG)
 - D. Lake Charles, LA: 1.0 Bcf/d (Southern Union – Trunkline LNG)
- Approved by FERC**
- 1. Lake Charles, LA: 1.1 Bcf/d (Southern Union – Trunkline LNG)
 - 2. Hackberry, LA: 1.5 Bcf/d. (Sempra Energy)
 - 3. Bahamas: 0.84 Bcf/d. (AES Ocean Express)**
 - 4. Bahamas: 0.83 Bcf/d. (Calypso Tractebel)*
 - 5. Freeport, TX: 1.5 Bcf/d. (Chienery/Freeport LNG Dev.)
 - 6. Sabine, LA: 2.0 Bcf/d (Chevron LNG)
 - 7. Elba Island, GA: 0.54 Bcf/d (El Paso – Southern LNG)
- Approved by MARAD/Coast Guard**
- 8. Port Palanca: 1.0 Bcf/d. (Chevron Texaco)
 - 9. Gulf of Mexico: 0.5 Bcf/d. (El Paso Energy Bridge GOM, LLC)
- Proposed to FERC**
- 10. Fall River, MA: 0.8 Bcf/d. (Weaver's Cove Energy/Hess LNG)
 - 11. Long Beach, CA: 0.7 Bcf/d. (Mitsubishi/ConocoPhillips – Sound Energy Solutions)
 - 12. Corpus Christi, TX: 2.0 Bcf/d. (Chienery LNG)
 - 13. Corpus Christi, TX: 1.0 Bcf/d (Vista Del Sol – ExxonMobil)
 - 14. Sabine, TX: 1.0 Bcf/d (Golden Pass – ExxonMobil)
 - 15. Logan Township, NJ: 1.2 Bcf/d (Crown Landing LNG – BP)
 - 16. Bahamas: 0.5 Bcf/d. (Seafarer – El Paso/PFL)
 - 17. Corpus Christi, TX: 1.0 Bcf/d (Ingleside Energy – Occidental Energy Ventures)
 - 18. Providence, RI: 0.5 Bcf/d (Keyspan & BG LNG)
 - 19. Port Arthur, TX: 1.5 Bcf/d (Sempra)
 - 20. Cove Point, MD: 0.8 Bcf/d (Dominion)
 - 21. LI Sound, NY: 1.0 Bcf/d (Brookwater Energy – TransCanada/Shell)
- Proposed to MARAD/Coast Guard**
- 22. California Offshore: 1.5 Bcf/d (Cabrillo Port – BHP Billiton)
 - 23. Louisiana Offshore: 1.0 Bcf/d (Gulf Landing – Shell)
 - 24. So. California Offshore: 0.5 Bcf/d. (Crystal Energy)
 - 25. Louisiana Offshore: 1.0 Bcf/d (Main Pass/McHofas Exp.)
 - 26. Gulf of Mexico: 1.0 Bcf/d (Compass Port – ConocoPhillips)
 - 27. Gulf of Mexico: 2.8 Bcf/d (Pearl Crossing – ExxonMobil)
- Potential Sites Identified by Project Sponsors**
- 28. Coos Bay, OR: 0.13 Bcf/d. (Energy Projects Development)
 - 29. Somerset, MA: 0.65 Bcf/d (Somerset LNG)
 - 30. California - Offshore: 0.75 Bcf/d. (Chevron Texaco)
 - 31. Pleasant Point, ME: 0.5 Bcf/d (Quoddy Bay, LLC)
 - 32. St. Helena, OR: 0.7 Bcf/d (Port Westward LNG LLC)
 - 33. Offshore Boston, MA: 0.8 Bcf/d (Northeast Gateway – ExcoEnergy)
 - 34. Galveston, TX: 1.2 Bcf/d (Enliven Island – BP)
 - 35. Pascagoula, MS: 1.0 Bcf/d (Gulf LNG Energy LLC)
 - 36. Port Lavaca, TX: 1.0 Bcf/d (Calhoun LNG – Gulf Coast LNG Partners)
 - 37. Philadelphia, PA: 0.6 Bcf/d (Freedom Energy Center – PSW)
 - 38. Pascagoula, MS: 1.3 Bcf/d (ChevronTexaco)
 - 39. Cameron, LA: 2.0 Bcf/d (Croble Trail LNG – Chienery LNG)
 - 40. Astoria, OR: 1.0 Bcf/d (Skipanon LNG – Calpine)
- Canadian Approved and Potential Terminals**
- 41. St. John, NS: 1.0 Bcf/d. (Canaport – Irving Oil)
 - 42. Point Tupper, NS: 1.0 Bcf/d (Bear Head LNG – Anadarko)**
 - 43. Quebec City, QC: 0.5 Bcf/d (Project Rabauda – Enbridge/Gaz Met/Gaz de France)
 - 44. Rivière-du-Loup, QC: 0.5 Bcf/d (Cacouna Energy – TransCanada/PetroCanada)
 - 45. Kitimat, BC: 0.34 Bcf/d (Galeton LNG – Enbridge)
 - 46. Prince Rupert, BC: 0.30 Bcf/d (WestPac Terminals)
 - 47. Goldboro, NS: 1.0 Bcf/d (Ketic Petrochemicals)
- Mexican Approved and Potential Terminals**
- 48. Altamira, Tamaulipas: 1.12 Bcf/d. (Shell)* (Shell)*
 - 49. Baja California, MX: 1.0 Bcf/d. (Sempra & Shell)**
 - 50. Baja California - Offshore: 1.4 Bcf/d. (Chevron Texaco)
 - 51. Lázaro Cárdenas, MX: 0.5 Bcf/d (Tractebel/Repsol)
 - 52. Puerto Libertad, MX: 1.3 Bcf/d (Sempra Pacific LNG)

Office of Energy Projects



LNG Safety and Security

- Energy transportation and storage of LNG over the past 40 years has an excellent safety record though not entirely without incident.
- Appropriate containment / isolation, system redundancy, leak detection, emergency shutdown capability and safe set back distances all combine to mitigate potential hazards
- However each project may have its issues...



LNG Terminal Development Issues

- Site Selection
- Topography/Geotech surveys
- Plant layout
- Safety/ HAZOP evaluation
- Marine facilities
- Export pipeline
- Shipping studies
- Environmental risks assessment
- Permitting
- LNG storage
- Vaporizer selection



Fortunately help is at hand...



Source: [www: energy/u/h/edu](http://www.energy.uh.edu)

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From the past, the man of the present acts prudently, so as not to imperil the future - Titian.



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And to help us act prudently today I'd like to welcome and thank:

Stephen Zwicker (Environment Canada)
Richard Hoffman (FERC)
Alejandro Brena (CRE)
Norman Trussler (CSA)

and each of you for taking part.

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Desired Outcomes

- A better understanding of how LNG projects have been regulated by others (in Canada, US and Mexico)
- Determining what an effective regulatory model for LNG Projects would look like.
- Working collaboratively to develop an effective and consistent approach when dealing with construction and operational issues of LNG facilities

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