Regulation of Vessels and Infrastructure to Support LNG Fueling Operations in the U.S.

LT Juan L. Rivera, USCG

2014 Expert Briefing on LNG & Alternative Fuels for Transportation

Port of Oakland
Oakland, California
June 11, 2014

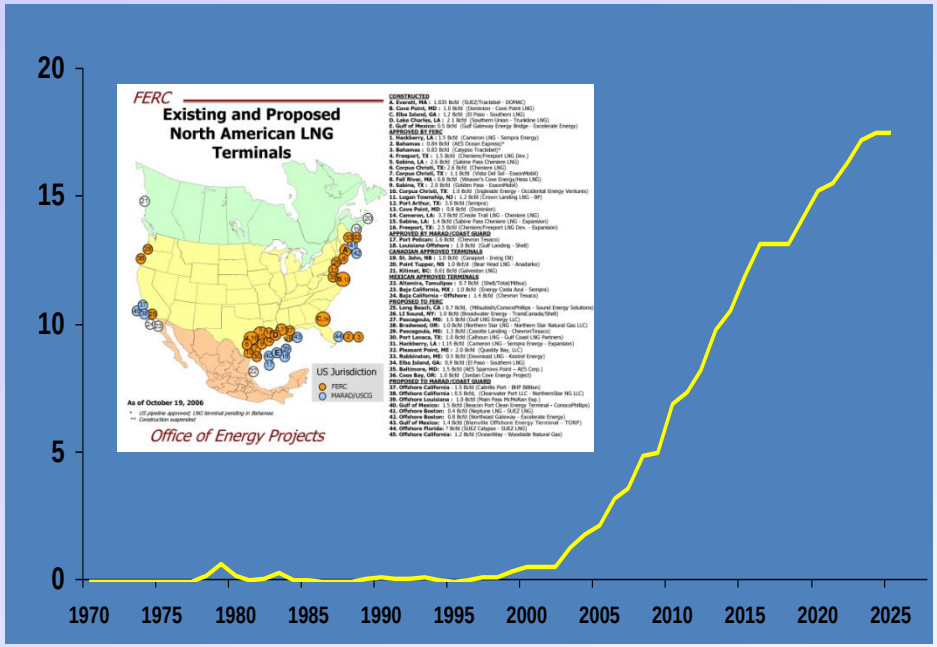
Outline

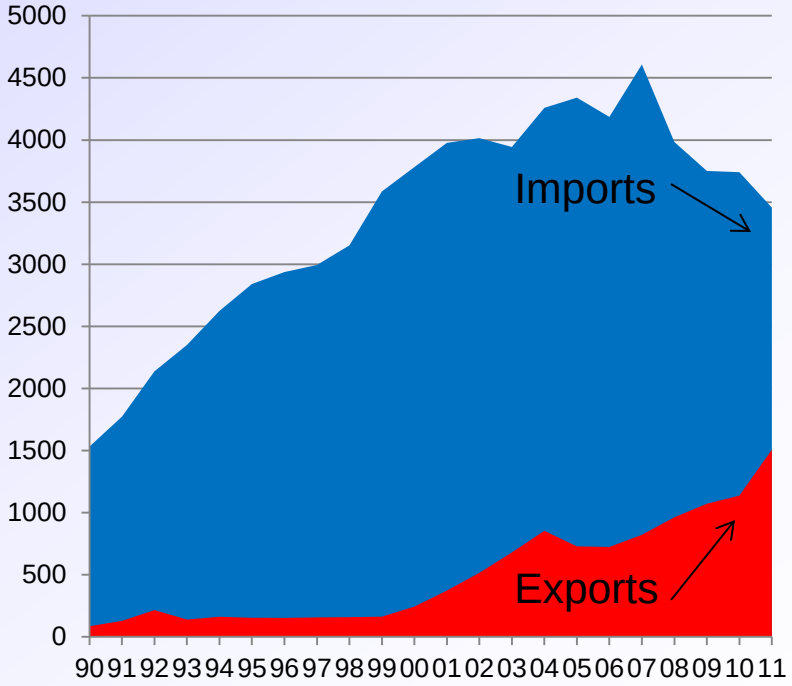
- USCG/LNG Marine Activity Past and Present
- Driving Factors
- LNG Interests
- Delivery Options
- Regulation and Standards
- Gaps
- Industry Partners
- Life Long Partnerships

Past and Present Market Activity

2005 - EIA forecasts U.S. demand for LNG through 2025 – Drives LNG import project initiatives

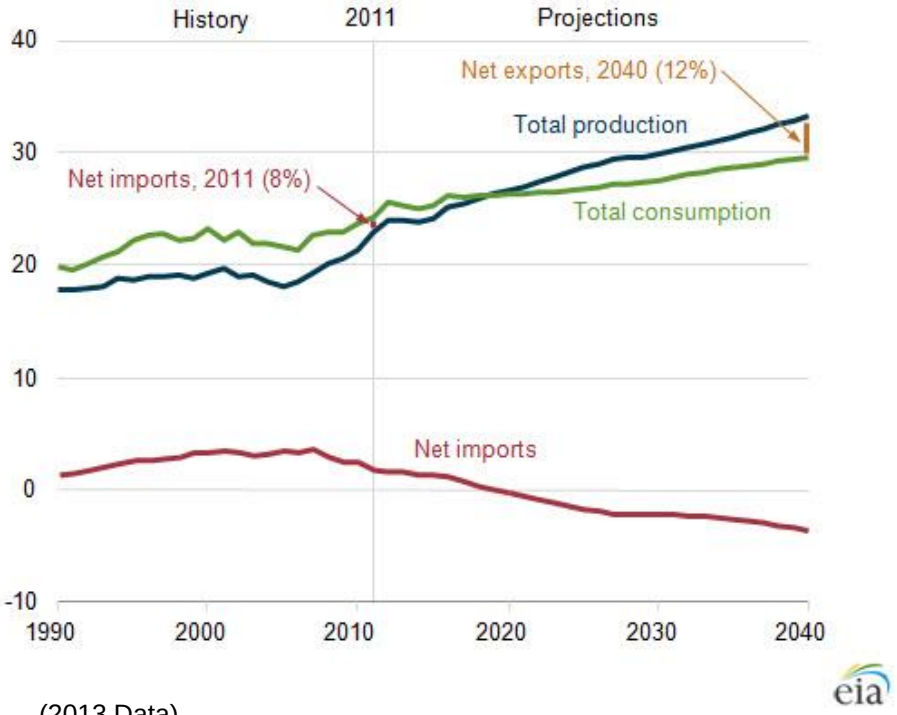
2007 to Present – LNG Imports going down - LNG exports going up





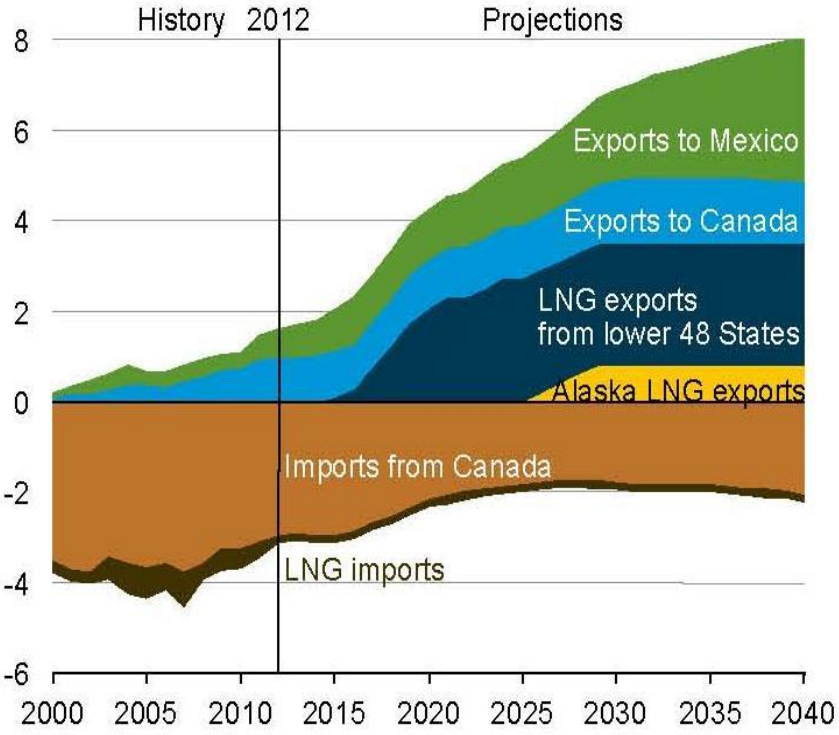
EIA Annual Energy Outlook Data

Figure 2. Total U.S. natural gas production, consumption, and net imports in the Reference case, 1990-2040 (trillion cubic feet)



(2013 Data)

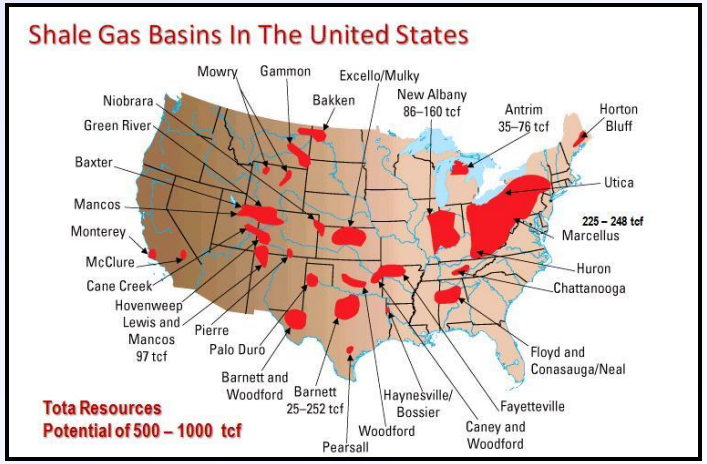
Figure 4. U.S. natural gas imports and exports, 2000-40 (trillion cubic feet)



(2014 Data)

Driving Factors for Use of LNG in the U.S

- U.S. shale gas bringing gas abundance
- Tighter diesel fuel sulfur limits driving price increase
- Gas fuel complies with U.S. ECA
- Net effect: major fuel savings and environmental compliance

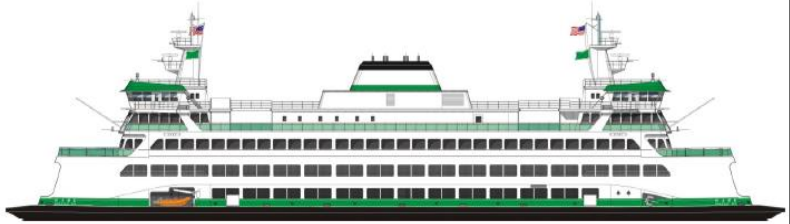


LNG Fueled Vessel Interest in the U.S.

TOTE LNG-Fueled Containership

Harvey Gulf LNG-Fueled OSV

LNG as a Ferry Fuel – Concept for Washington State Ferries



By: Sean Caughlan, PE, Senior Marine Engineer, The Glosten Associates
Endicott (Cotty) Fay, MSE, PE, Chief Naval Architect/Mgr. Design, Washington State Ferries

9 November 2010

TOTE RO/RO Containership
LNG Retrofit

U.S. Locations of LNG Interest

LNG Fueled Vessel Supply Options

- Shore to Ship

- Tank Truck to Ship

- Ship to Ship

U.S. Federal Regulations

- LNG Supply by Shore (Fixed)
- LNG Supply by Shore (Mobile)
- LNG Supply by Sea (Ship/Barge)
- Ship's Using LNG as Fuel (Other than Boil-off)

- 33 CFR Part 127[1]
- 33 CFR Part 127, 49 CFR Parts 172, 177, and 178
- 46 CFR Subchapter D, 46 CFR Parts 11, 12, 15, and 154, 33 CFR Parts 155 and 156.
- Applicable Subchapters Used for Certification

Note 1: Regulations of DOT and/or FERC may apply depending on actual design.

U.S. Federal Regulations (Cont.)

- Vessel will continue to be regulated under applicable subchapters.

Gaps in Existing Regulations

The Current Regulations Do Not:

1. Outline requirements for design and construction of LNG fuel systems.

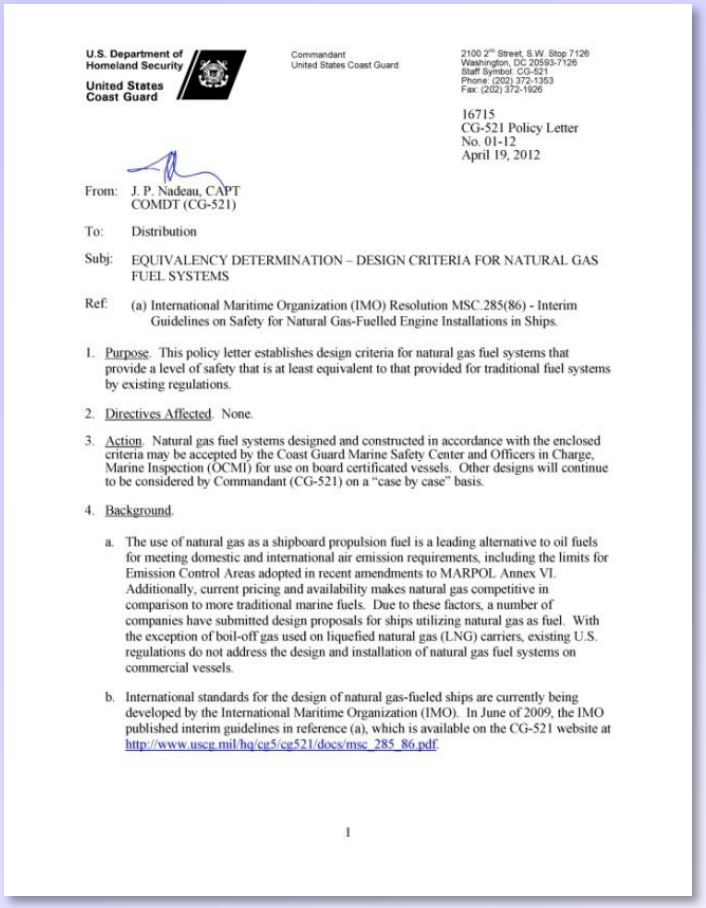
2. Outline requirements for operations, training, and general safety for personnel on vessels where LNG fuel systems are installed.

3. Outline requirements specific to LNG transfer operations (Current procedures viewed in light of oil transfers).

4. Outline requirements for small scale LNG (e.g. bunkering) operations conducted from vessels and shore side facilities (Currently viewed in context of large scale cargo transfer).

5. Provide adequate requirements for barges transporting LNG in bulk.

Short Term Solution



U.S. Department of Homeland Security
United States Coast Guard

Commandant
United States Coast Guard

2100 2nd Street, S.W. Stop 7126
Washington, DC 20593-7126
Staff Symbol: CG-521
Phone: (202) 372-1353
Fax: (202) 372-1926

16715
CG-521 Policy Letter
No. 01-12
April 19, 2012

From: J. P. Nadeau, CAPT
COMDT (CG-521)

To: Distribution

Subj: EQUIVALENCY DETERMINATION – DESIGN CRITERIA FOR NATURAL GAS FUEL SYSTEMS

Ref: (a) International Maritime Organization (IMO) Resolution MSC.285(86) - Interim Guidelines on Safety for Natural Gas-Fuelled Engine Installations in Ships.

1. Purpose. This policy letter establishes design criteria for natural gas fuel systems that provide a level of safety that is at least equivalent to that provided for traditional fuel systems by existing regulations.

2. Directives Affected. None.

3. Action. Natural gas fuel systems designed and constructed in accordance with the enclosed criteria may be accepted by the Coast Guard Marine Safety Center and Officers in Charge, Marine Inspection (OCMI) for use on board certificated vessels. Other designs will continue to be considered by Commandant (CG-521) on a "case by case" basis.

4. Background.

a. The use of natural gas as a shipboard propulsion fuel is a leading alternative to oil fuels for meeting domestic and international air emission requirements, including the limits for Emission Control Areas adopted in recent amendments to MARPOL Annex VI. Additionally, current pricing and availability makes natural gas competitive in comparison to more traditional marine fuels. Due to these factors, a number of companies have submitted design proposals for ships utilizing natural gas as fuel. With the exception of boil-off gas used on liquefied natural gas (LNG) carriers, existing U.S. regulations do not address the design and installation of natural gas fuel systems on commercial vessels.

b. International standards for the design of natural gas-fueled ships are currently being developed by the International Maritime Organization (IMO). In June of 2009, the IMO published interim guidelines in reference (a), which is available on the CG-521 website at http://www.uscg.mil/hq/cg5/cg521/docs/msc_285_86.pdf.

1

Policy Letters to Bridge Gaps:

- Policy letters drafted to bridge gaps in regulations until regulations can be developed.
- Policy letters based on existing regulations applicable to LNG cargo operations scaling down to fit needs and accomplish safety mission.
- Aligned with ongoing work of leading international organizations (e.g. IMO, ISO, SIGTTO, etc.).
- Utilize existing USCG OCMI/COTP authorities to implement existing regs & evaluate safe alternatives.

Long Term Solution

Issue Regulations to Close Gaps

1. Initiate rulemaking project.

2. Use implemented policy to help identify additional areas needed to be addressed in regulation.

3. Incorporate standards and guidance developed by the international community and LNG industry where appropriate.

U.S. Coast Guard LNG Industry Partners

Standards Development

- IMO - International Code of Safety for Ships Using Gases or Other Low-Flashpoint Fuels (IGF Code)
- IMO - International Code for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk (IGC Code)
- ISO - International Guidelines for Bunkering LNG as a Marine Fuel (TC67 WG10)
- NFPA 52 - Vehicular Gaseous Fuel Systems Code (updates to Chapter on Marine Vessels)
- NFPA 59A - Production, Storage, and Handling of Liquefied Natural Gas (LNG)

U.S. Coast Guard LNG Industry Partners (Cont.)

Advisory Committees / Interagency & Industry Workgroups

- CGHQ Internal Natural Gas Workgroup
- Federal LNG Interagency Roundtable (Washington, DC)
- CTAC, MERPAC, TSAC Subcommittees (Federal Advisory Committee)
- SIGTTO – LNG Fuel Safety Advisory Group (London, UK)
- LNG Fuel Advisory Council (chaired by DNV, Houston)

U.S. Coast Guard LNG Industry Partners (Cont.)

Other Industry Contacts

- Great Lakes Maritime Research Institute
- Center for LNG

Life Long Partnership

- Early Engagement

a. Concept phase

b. Planning and Proposal stage

c. Construction and Implementation stage

The USCG provides free consulting services

USCG HQ
Point of Contact

Ken Smith
Commandant (CG-OES-2)
U.S. Coast Guard – Stop 7509
2701 Martin Luther King Jr. Ave SE
Washington, DC 20593-7509
Ken.A.Smith@uscg.mil
(202) 372-1413

Questions?

LT Juan L. Rivera, USCG

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