U.S. Coast Guard
Sector San Diego

AAPA Cruise Seminar – San Diego 2017

CDR Kris Szczechowicz (kris.j.szczechowicz@uscg.mil)

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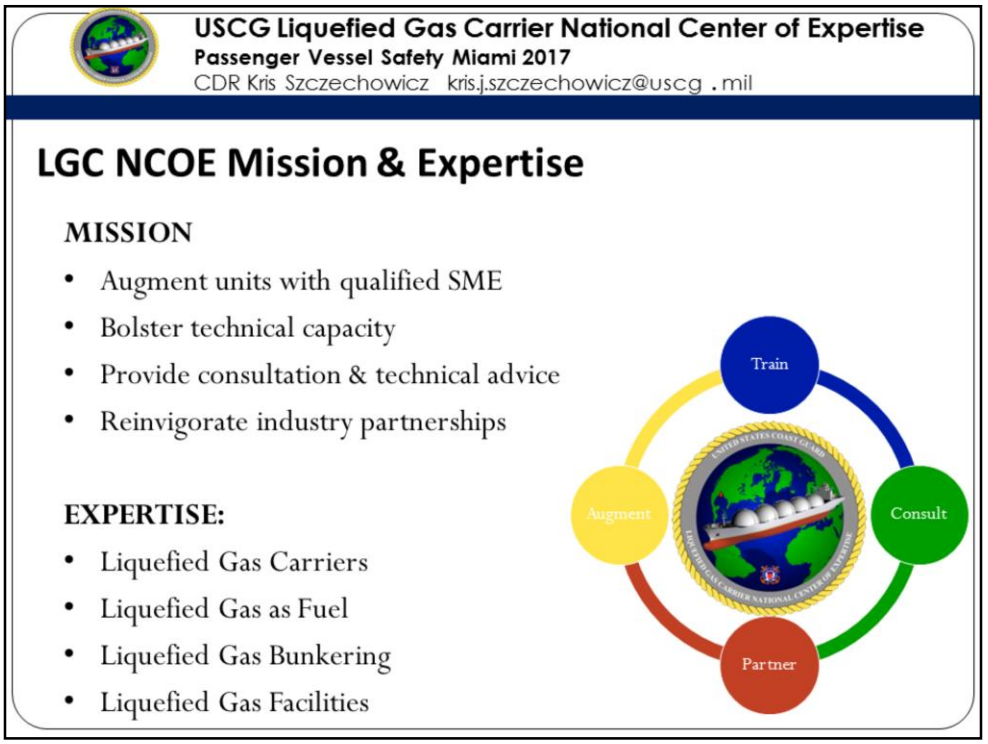
Agenda

- Why LNG?
- The U.S. Fleet
- LNG: How is it used as a Fuel
- USCG : How we are involved
- Guidance: Liquefied Gas Industry



- Assist in the capacity of Liquefied Gas qualified SMEs as a specialized force multiplier for inspections, incidents and investigations.
- Bolster inspector and technical capacity with workforce tracking, workforce development, and training opportunities
- Provide consultation & technical advice to both the Marine Industry and the Coast Guard on matters concerning the Liquefied Gas Industry.
- Reinvigorate industry partnerships

- LNG Fuel Workshop
- Senior Executive Forum
- Webinars
- COCs
- COIs
- Visits
- Ship Rides
- Industry Training

USCG Liquefied Gas Carrier National Center of Expertise
Passenger Vessel Safety Miami 2017
CDR Kris Szczechowicz kris.j.szczechowicz@uscg .mil

Regulations for Using Liquefied Gases

- Why LNG as Fuel

LNG fuel systems reduce:

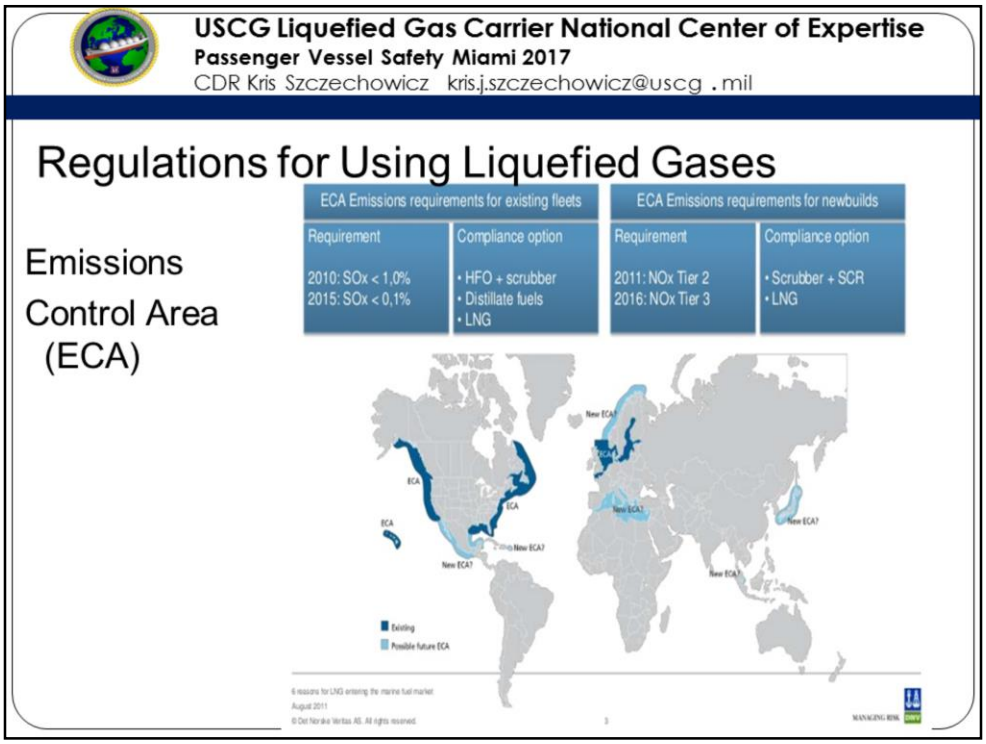
- 100 % Sulfur Oxide (SOx)
- 100% Particulate Matter (PM)
- 90% Nitrogen Oxide (NOx)
- 20-25% Reduce Carbon Dioxide (CO2)*
  *contingent on methane slippage

Sulfur oxides (SOx) forms sulfuric acid, and thus acid rain

Nitrogen oxides (NOx) is one of the most prominent ozone depleting air pollutants that causes brown haze or smog over cities.

Carbon monoxide is a greenhouse gas.

Particulate matter is linked to health hazards such as heart disease, altered lung function and lung cancer.



Other emission control areas established under MARPOL Annex VI are: the Baltic Sea area & the North Sea area.

This action brings these waters into an international control program for the emission of nitrogen oxides (NOx), sulfur oxides (SOx), and particulate matter (PM) from ships

The ECA is expected to reduce emissions of NOx by 27 percent, PM2.5 by 86 percent, and SOx by 96 percent, below levels in 2020 absent the ECA.

The area of the U.S. Caribbean ECA includes waters adjacent to coasts of the Commonwealth of Puerto Rico and the U.S. Virgin Islands, up to roughly 50 nautical miles (nm) from the territorial sea baselines of the included islands.

The area of the North American ECA includes waters adjacent to the Pacific coast, the Atlantic/Gulf coast and the eight main Hawaiian Islands.1. It extends up to 200 nautical miles from coasts of the United States, Canada and the French territories

USCG Liquefied Gas Carrier National Center of Expertise

Passenger Vessel Safety Miami 2017

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Tote

Class: Orca Class LNG Conversion (X2)
Vessel Type: Ro/Ro
Engine: Medium speed Wartsila
Route: Tacoma – Alaska
Conversion: Vancouver, CA

Harvey Gulf

Class: vessels (X6)
Vessel Type: OSV
Engine: Medium Speed Wartsila
Route: Gulf of Mexico – Port Fourchon
Construction: Gulfport MS

Crowley

Class: Commitment class (X2)
Vessel Type : Container/RoRo
Engine: Slow Speed MAN
Route: Jacksonville – Puerto Rico
Construction: Pascagoula MS

Tote

Class: Marlin (X2)
Vessel Type : Container
Engine: Slow Speed MAN
Route: Jacksonville – Puerto Rico
Construction: San Diego CA

Worlds First LNG Passenger Vessel

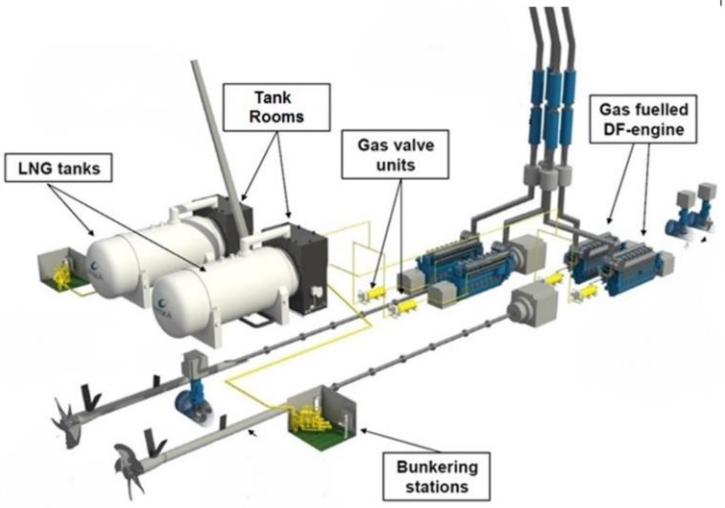
Powered by Wartsila – Dual Fuel Engines

MS *Viking Grace* is a cruiseferry constructed at STX Europe Turku Shipyard, Finland for the Finland-based ferry company Viking Line. The ship was delivered to her owners on 10 January 2013, and took service on 13 January 2013. It is the first large scale passenger ferry to be powered by liquefied natural gas (LNG).[5]

In 2016 the vessel completed it 1,000th LNG bunkering.

180 cubic meters / 47k gallons each

Fuel System


Tank Rooms
Gas valve units
Gas fuelled DF-engine
LNG tanks
Bunkering stations

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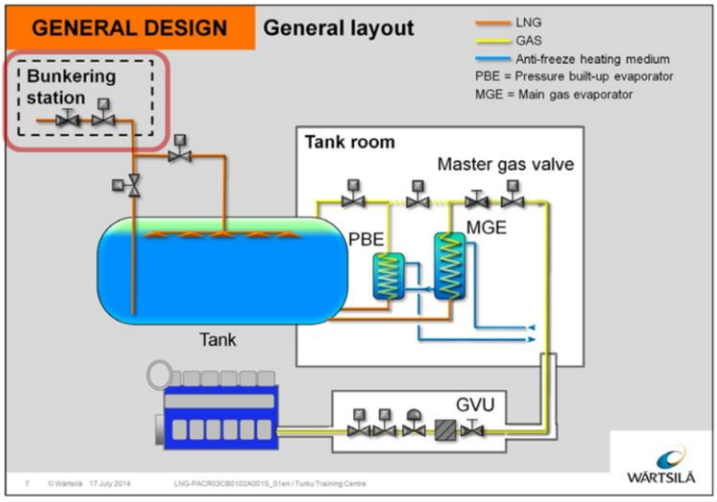
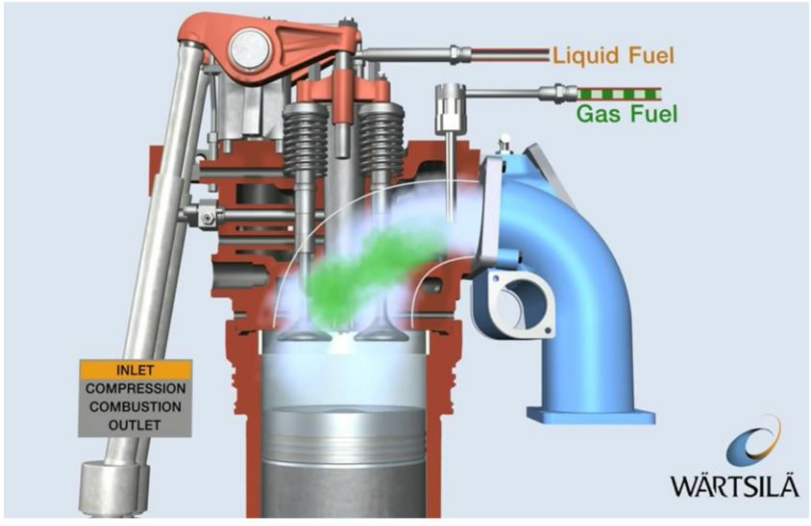
Fuel System Components

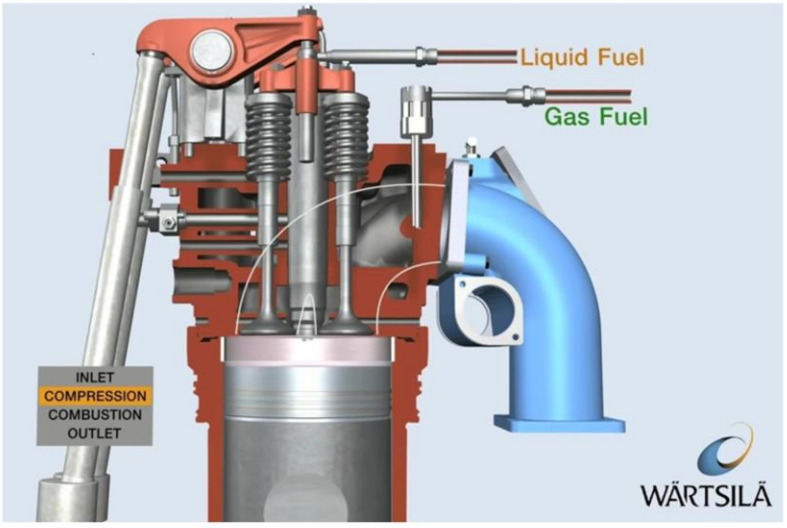


Dual Fuel – How it works



• Runs on Methane, Liquefied gas compressed of 600 parts to 1 (Liquid changed to Methane Gas

Dual Fuel – How it works



- Methane with Diesel fuel (ECA Compliant) injected for ignition source.

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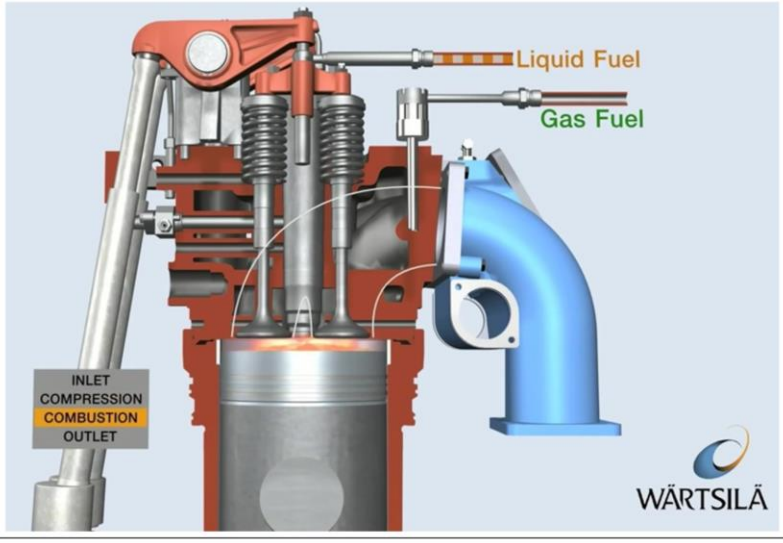
Dual Fuel – How it works



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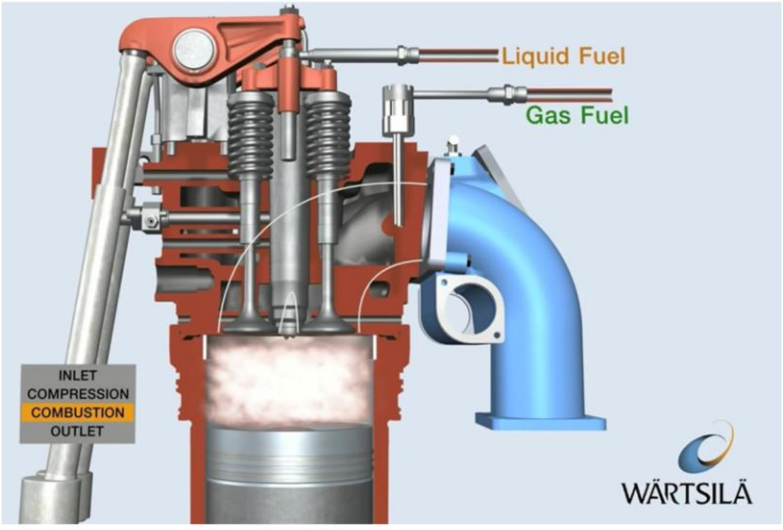

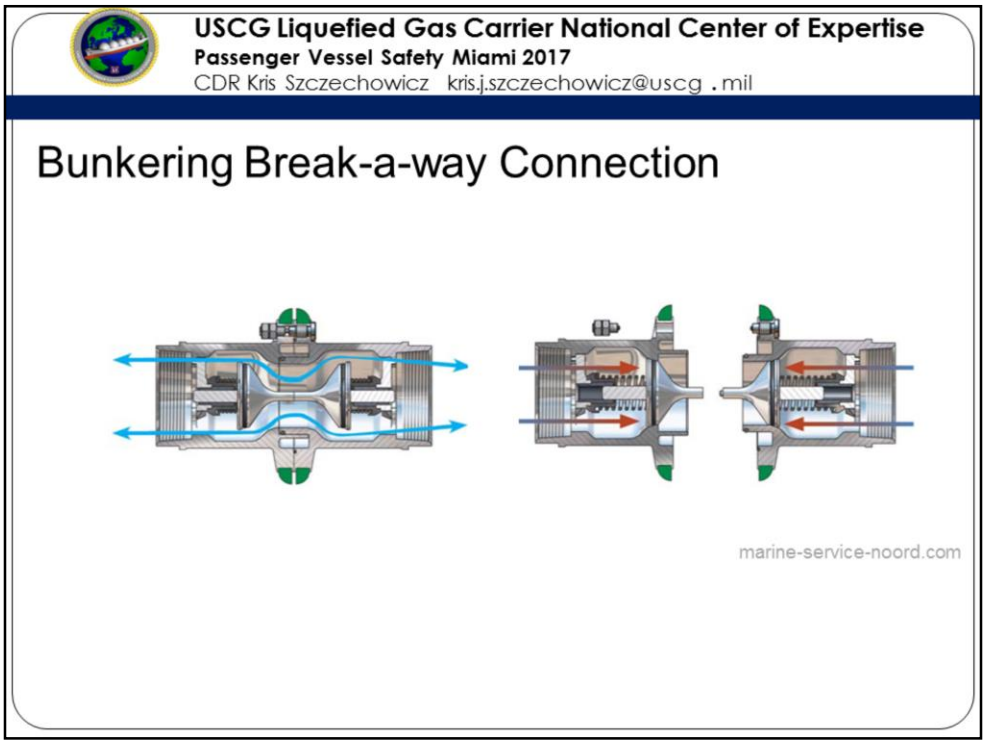

Source: http://marine-service-noord.com/news/cryogenic-bunker-connection/

The bunker connection coupling provides a safe and quick way to connect to the bunker station or LNG truck.

The cryogenic break-away coupling is used to prevent against pull away accidents. The coupling has a diverted breaking point set at a determined break-load. When the coupling breaks the internal valves in the coupling will close automatically on both sides.

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http://www.mann-tek.com/products/cryogenic-break-away-couplings

Marine Cryogenic Break-away Couplings are designed to only release by inline pull and used between two strings of hose.

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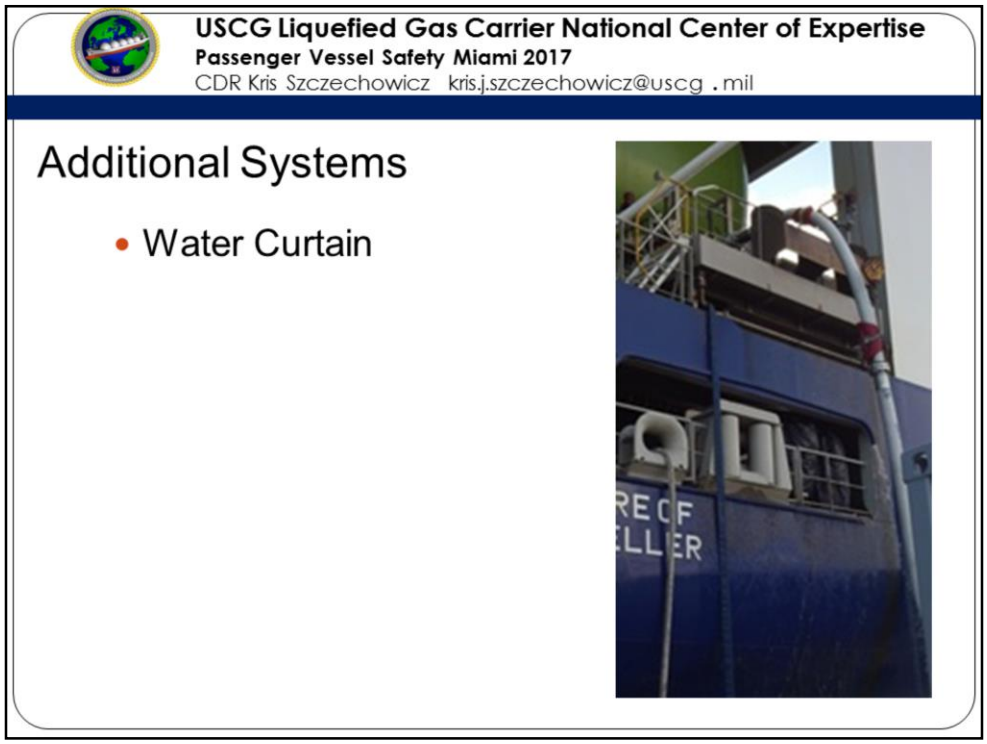
https://www.dixonvalve.com/product/MSBC500SSMNPT

How it works

The safety break-away valve consists of two halves, each with a valve that has an O-ring seal. When the safety break-away couplings separate, it allows the valves to close. The two valves close rapidly, minimizing exposure to personnel and the environment.

Safety break-away couplings have three external break bolts. In the case of axial

tension all of the bolts take up the force corresponding to the break force on the hose with a safety margin.



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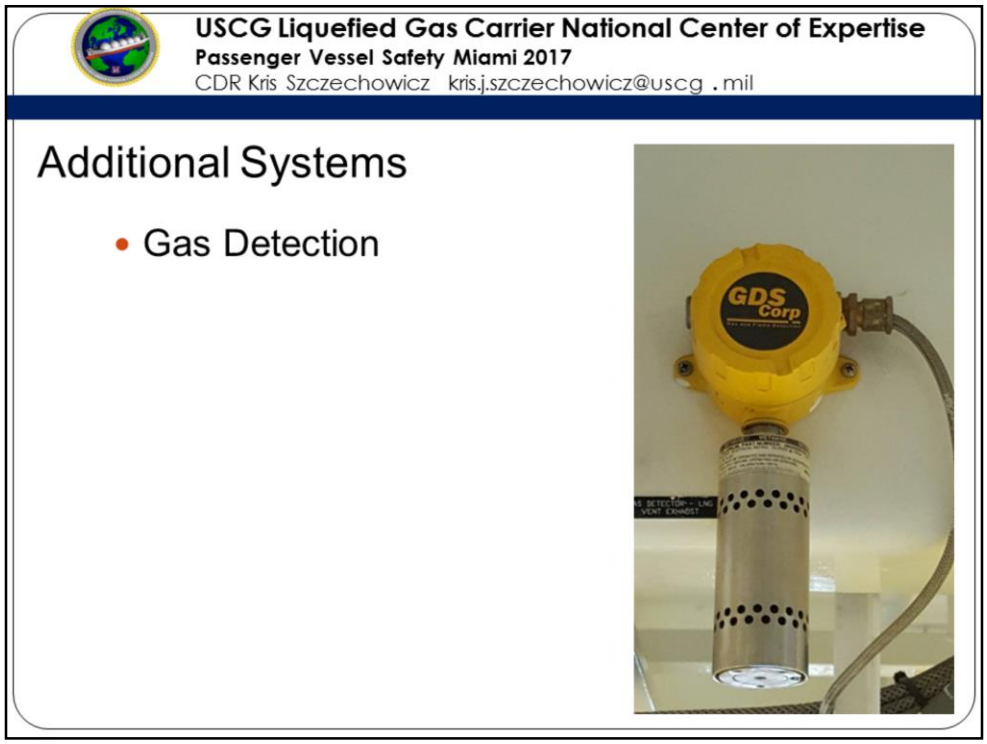

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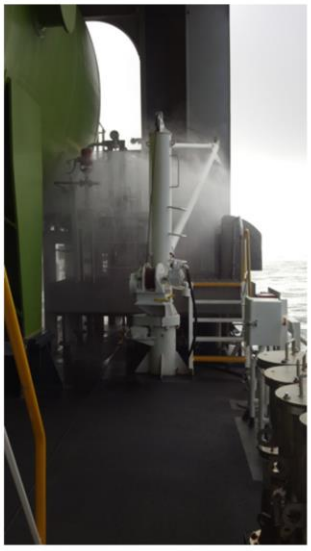
Additional Systems

- Deluge System

LNG is approx. - 260°F
-160°C



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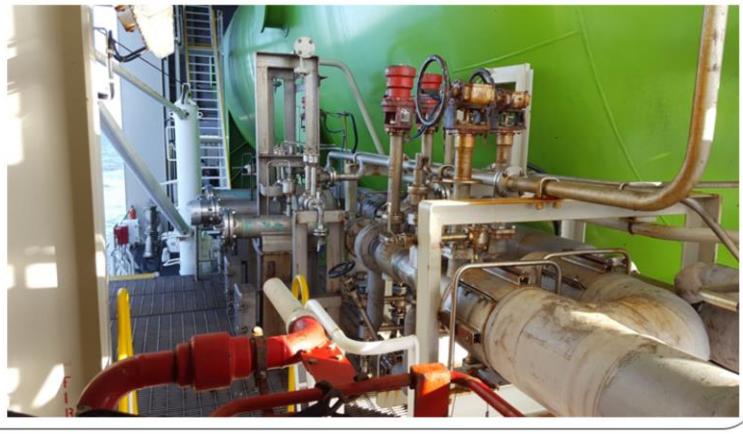
Additional Systems

- Dry Powder



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Additional Systems

- Emergency Shutdown Device (ESD)

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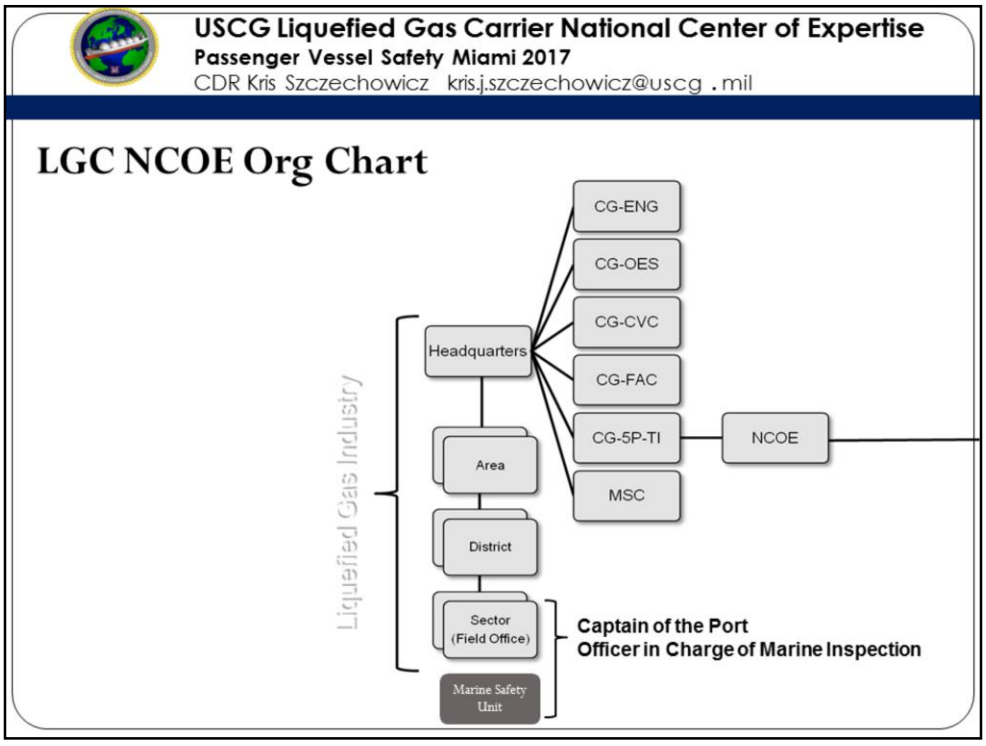
Additional Systems

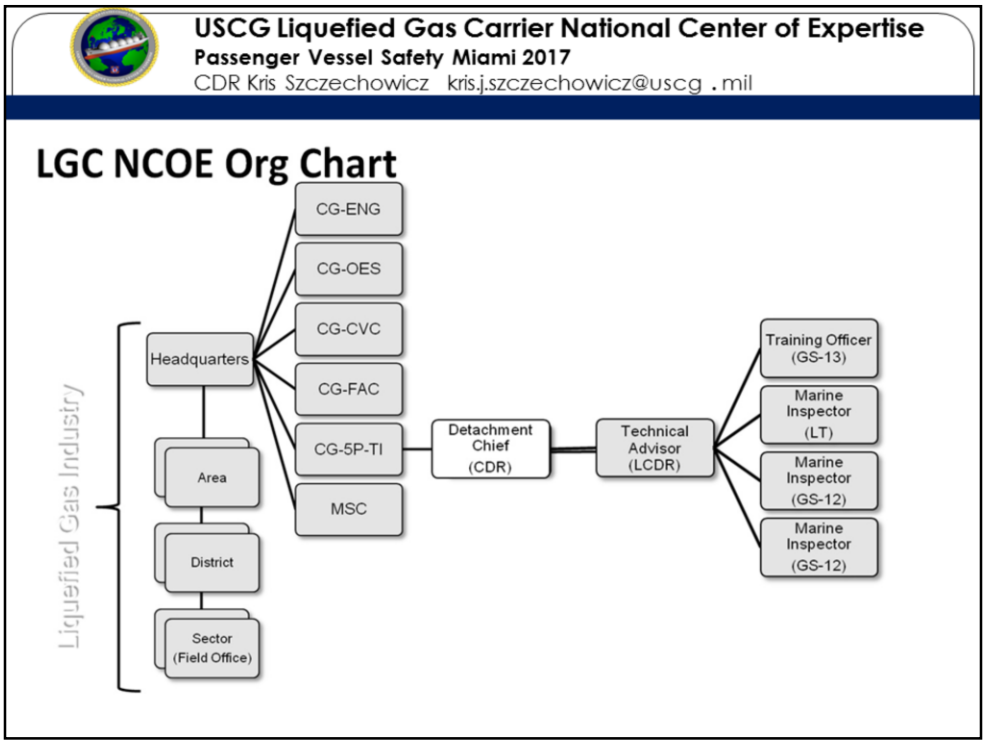
- Training



A lot of office and a lot of units that are involved with LNG gas Industry

These are the most prominent

Almost 200 office in HQ



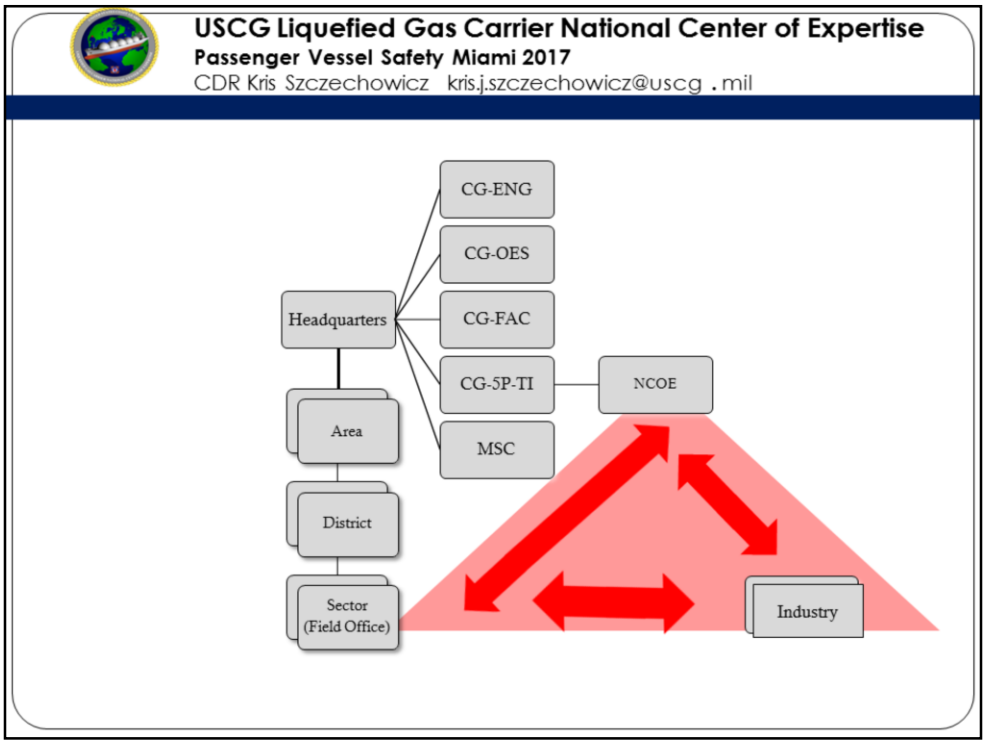
There are Four Vessel Inspection NCOE offices

Outer Continental Shelf (OSC NCOE)

Towing Vessel (TV NCOE)

Cruise Ship (CS NCOE)

Liquefied Gas Carriers (LGC NCOE)



We work for the USCG's Chief Traveling Inspector, Captain Flaherty

Field works for District who works for the Area who works for Headquarters

Those offices I have listed are those most commonly associated with liquefied gases

The NCOE has the ability to serve as a direct line of communication for the field and industry, on project coordination and to serve as an advisor on technical issues.

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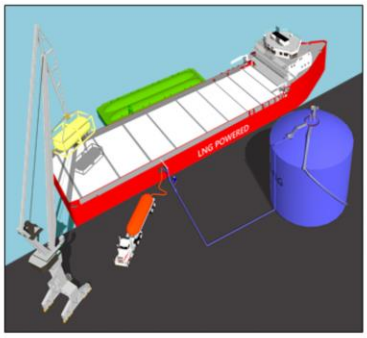
Guidance for Using Liquefied Gases

LNG as Fuel:

- LNG Fueled Vessel
- LNG Bunker Facility
  - Ship to Ship
  - Shore to Ship
  - Truck to Ship



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Guidance for Using Liquefied Gases

LNG FUELED VESSEL GUIDANCE

- International Gas and Low Flash Point Fuel (IGF) Code
- CG-521 Policy Letter 01-12: Equivalency Determination; Design Criteria for Natural Gas Fueled Systems
- CG-OES Policy Letter 01-15: Guidelines for LNG Fuel Transfer Operations and Training of Personnel
- MSRO Policy Letter 07-13: "LNG fueled vessels and LNG bunkering operations do not require an escort"

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Guidance for Using Liquefied Gases

LNG SHORETO SHIP BUNKER GUIDANCE

- 33 CFR 127: Waterfront Facilities Handling LNG
- CG-OES Policy Letter 02-15: Guidelines for Vessels and Waterfront Facilities Conducting LNG Marine Fuel Transfer Ops
- MSRO Policy Letter 07-13: "LNG fueled vessels and LNG bunkering operations do not require an escort"

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Guidance for Using Liquefied Gases

LNG SHIP TO SHIP BUNKER GUIDANCE

- 46 CFR 154: Safety Standards for Self-Prop. Vls Carrying Bulk LG
- CG-ENG Policy Letter 02-15; Design Standards for US Barges Intending to Carry LNG in Bulk
- CG-OES Policy Letter 02-15: Guidelines for Vessels and Waterfront Facilities Conducting LNG Marine Fuel Transfer Ops
- MSRO Policy Letter 07-13: "LNG fueled vessels and LNG bunkering operations do not require an escort"

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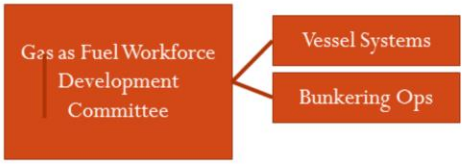
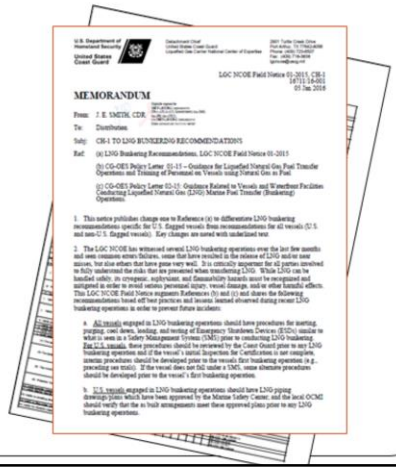
LGC NCOE Roles and Services

- **LNG as Fuel Workforce Development Committee (LNGFWDC)**
  - Checklists
  - Qualification Standards
  - Inspection Processes
  - Classroom Training




MEMORANDUM

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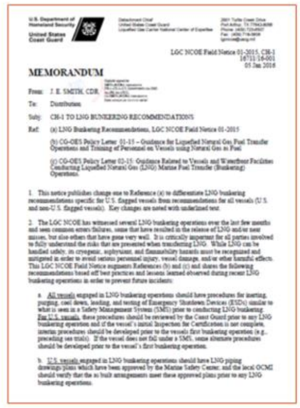
Announcements

- **NCOE Field Notice 01-15 CH 1; LNG Bunkering Recommendations**
  - LNG system drawings/plans
    - approved prior to bunkering ops
  - Crew
    - familiarity with LNG system.
  - Procedures
    - inerting, purging, cool down, loading, and testing of Emergency Shut Down (ESD)
    - approved prior to bunkering ops



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

LGC NCOE Field Notice 01-2015, CH-1
16711/16-001
05 Jan 2016

MEMORANDUM

From: J. E. SMITH, CDR

To: Distribution

Subj: CH-1 TO LNG BUNKERING RECOMMENDATIONS

Ref: (a) LNG Bunkering Recommendations, LGC NCOE Field Notice 01-2015
(b) CG-OES Policy Letter 01-15 – Guidance for Liquefied Natural Gas Fuel Transfer Operations and Training of Personnel on Vessels using Natural Gas as Fuel
(c) CG-OES Policy Letter 02-15: Guidance Related to Vessels and Waterfront Facilities Conducting Liquefied Natural Gas (LNG) Marine Fuel Transfer (Bunkering) Operations

1. This notice publishes change one to Reference (a) to differentiate LNG bunkering recommendations specific for U.S. flagged vessels from recommendations for all vessels (U.S. and non-U.S. flagged vessels). Key changes are noted with underlined text.

2. The LGC NCOE has witnessed several LNG bunkering operations over the last few months and seen common errors/failures, some that have resulted in the release of LNG and/or near misses, but also others that have gone very well. It is critically important for all parties involved to fully understand the risks that are presented when transferring LNG. While LNG can be handled safely, its cryogenic, asphyxiant, and flammability hazards must be recognized and mitigated in order to avoid serious personnel injury, vessel damage, and/or other harmful effects. This LGC NCOE Field Notice augments References (b) and (c) and shares the following recommendations based off best practices and lessons learned observed during recent LNG bunkering operations in order to prevent future incidents:

a. All vessels engaged in LNG bunkering operations should have procedures for inerting, purging, cool down, loading, and testing of Emergency Shutdown Devices (ESDs) similar to what is seen in a Safety Management System (SMS) prior to conducting LNG bunkering. For U.S. vessels, these procedures should be reviewed by the Coast Guard prior to any LNG bunkering operation and if the vessel's initial Inspection for Certification is not complete, interim procedures should be developed prior to the vessels first bunkering operation (e.g., preceding sea trials). If the vessel does not fall under a SMS, some alternate procedures should be developed prior to the vessel's first bunkering operation.

b. U.S. vessels engaged in LNG bunkering operations should have LNG piping drawings/plans which have been approved by the Marine Safety Center, and the local OCMI should verify that the as built arrangements meet these approved plans prior to any LNG bunkering operations.

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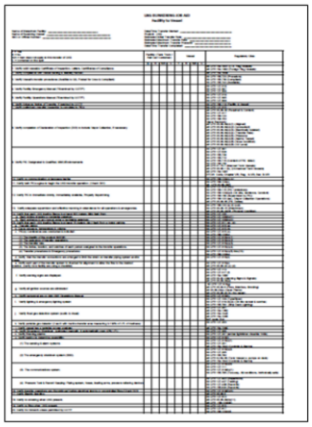
Announcements

- **LNG Bunkering Shore to Ship Job Aid**
  - Transfer Procedures
  - Emergency and Ops Manuals
  - Designated/Qualified PIC
  - Communications
  - Safety/Hazardous Zones
  - Warning Signs
  - Lighting
  - Piping
  - Cargo Temp/Pressure
  - Gas Detection
  - ESD



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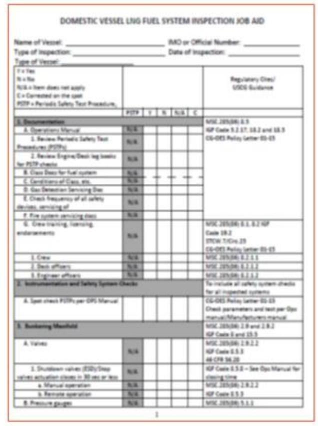
Announcements

- **Domestic Vessel LNG Fuel Systems Job Aid**
  - Documentation
  - Instrumentation
  - Bunkering Manifold
  - Air Locks
  - Semi-Enclosed Spaces
  - Fuel Tanks
  - Cargo Pumps
  - Cold Box/Vaporizer/Compressor Room
  - Gas Piping
  - Gas Detection
  - Nitrogen Generation
  - Gas Interlocks
  - Electrical
  - PPE


DOMESTIC VESSEL LNG FUEL SYSTEM INSPECTION JOB AID

Name of Vessel: ____________ IMO or Official Number: ____________
Type of Inspection: ____________ Date of Inspection: ____________
Type of Vessel: ____________

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Announcements

- **Still working on…**
  - Simultaneous Operations (Not Prohibited)
  - Mariner training course approvals
  - Foreign vessel inspections
  - Use of ISO containers
  - Risk assessment criteria
  - Pre-Commissioning Criteria
  - National consistency
  - Next generation low flash point fuels

SIMOPS: Risk assessment that ops on vsl and surrounding vsl will be safe.

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Finding the information

- **Navigating website:**

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Finding the information

- **Navigating website:**
- Contacts

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Finding the information

- **Navigating website:**

- Liquefied Gas Carriers

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Finding the information

- **Navigating website:**

- Liquefied Gas as Fuel

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Finding the information

- **Navigating website:**

- Liquefied Gas Bunkering

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Finding the information

- **Navigating website:**

- Liquefied Gas Facilities

Instructor Notes:

Some additionally regulatory aspect for operators.

Only facilities/vessels that are compliant with the regulations above can supply LNG bunkers to LNG-fueled ships in the US.

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Come Early – Come Often

Questions