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# LNG FUEL BUNKERING FUNDAMENTALS

Technical, Commercial, Standards and Safety Considerations



## About this Training Course:

This 3-day instructor led online or 'In House' course will equip the participants with a detailed practical grounding in the fundamentals of LNG and Bunkering operations. They will learn the practical tools and techniques that can be utilised to manage risk more effectively and make better practical decisions while handling. Real-life examples will help to illustrate the main concepts and possibilities.

Liquefied Natural Gas (LNG) has provided intercontinental mobility to natural gas, which now provides about 25% of the global primary energy. Being the cleanest fossil fuel, natural gas consumption is rapidly increasing. This introductory level 3 full-day course provides a solid foundation to understand Gas and LNG Businesses by covering the relevant Technical, Commercial, Financial and Contractual aspects of LNG Bunkering.

Real-life examples will help to illustrate the main concepts and possibilities. Economics of Liquefaction and Regasification projects are developed and compared with those for Natural Gas and Oil. The entire LNG Value Chain from “produce natural gas – pipeline transport to Liquefaction facility – Liquefaction.

Storage – Shipping – Regasification and Distribution” and Bunkering is described step by step and analysed. Project Business models employed are outlined, highlighting the main actors for each segment of the LNG Value Chain, and the relevant Contractual aspects. Recent developments, including Floating LNG, Floating LNG Power, small scale LNG, LNG as an alternative transportation fuel will also be briefly described.

Project and Commercial risks at various steps in the LNG value chain will also be discussed, with particular emphasis on longer term supply contracts and the changing trends in this area. Finally, the outlook for LNG and its role in the Energy Transition – towards a lower carbon emissions future – will be discussed.

### Key topics:

After the completion of this course, participants will be able to: ▪ Understand the importance of LNG as a hydrocarbon fuel in the world energy balance. ▪ Understand how Liquefaction and Regasification facilities are designed and operated. ▪ Understand how LNG shipping and bunkering operates. ▪ Appreciate how the entire LNG Value Chain operates internationally. ▪ Learn how an LNG Bunkering project is set up and its economics and success factors. ▪ Understand functioning of the LNG markets and the pricing and contract mechanisms applied in the LNG Value Chain. ▪ Discuss the business structures required to improve performance and minimise risks. ▪ Discuss the Outlook for Natural Gas and LNG, new applications and their role in Energy Transition.

### Learn what participants have said about the Marine LNG Institute Courses;

*“Excellent course for oil and gas professionals **Operations Manager, Engie European Development B.V.***

*“This course provides a good overview of how the LNG is handled.” **Maintenance Scheduler, Chevron USA***

*“The training course is very informative. The trainer kept us interested on all the topics and workshops/discussions. The overall experience is superb, the technology and relation of LNG with our Natural Gas processing made the course really exciting.” **Engineer, Prime Energy Resource Development B.V.***

### Objectives of this Training Course:

After the completion of this course, the participants will be able to:

- ❖ Reinforce knowledge about operations that are carried out in accordance with all relevant national and international maritime legislation, local regulations, and industry best practices.
- ❖ Evaluate the different procedures and factors affecting cost of the operation.
- ❖ Ensure overall safety for LNG operation on the use of correct size and number of fenders and certified tested hoses.
- ❖ Become familiar with LNG vessels, Bunkering operations and LNG equipment.
- ❖ Enhance understanding of Ship-to-Ship transfer equipment, design, maintenance – and training methods for STS.
- ❖ Familiarise the differences of Person in Overall Advisory Control, Mooring Master and Master of the Ship.
- ❖ Establish a useful methodology in reducing risk.
- ❖ Understand environmental challenges.

- ❖ Recognise and understand differences in operations and hazards between oil and gas vessels.
- ❖ Understand requirements for LNG vessel compatibility and Optimoor studies and follow an LNG spill response case study

**In Depth Coverage of:**

- LNG Bunkering Project facilities and worldwide developments
- Advanced technologies, production and designs
- LNG Novelties and transfer systems
- FPSO, FSRV and FPO Case Studies
- LNG Bunkering Project Finance
- LNG Bunkering Operations and Handling
- Cryogenic and Roll Over - LNG Science
- LNG Infrastructures small to large bunkering facilities
- Port and Vessel LNG planning
- LNG Bunkering Methods – Terminal to Ship, Ship to Ship, Truck to Ship and Cassette
- LNG Propulsion systems and Hybrid Technology

**This course is intended for the following professionals:**

This course is intended for the following professions from the maritime and energy industry:

- Ship Owners and Managers
- Offshore Vessel and FPSO Owners and Operators
- Oil Majors, NOCs and Independents
- Ship Superintendents and Safety Officers
- Ship Officers and Crews (Master, Chief Officers, Chief Engineers etc)
- Bunkering industry Personnel including Loading and Mooring Masters
- STS Service Providers
- Liquid Cargo and Bunker Surveyors
- Ports and Terminal Operators
- P&I Inspectors and Executives
- LNG FSU Owners, Managers, Operators
- Company Assurance Managers and Superintendents
- Project Directors
- Asset Managers
- Project Managers
- Project Planners
- Cost Estimators
- Quality Assurance Managers
- Contract Managers
- Procurement Manager. Maritime Legal Counsels or Advisors
- LNG Commercial Managers
- LNG Vessel negotiators
- LNG Project Managers or Engineers
- LNG Commercial Managers
- Vessel Operation Managers
- LNG Business Risk Managers
- LNG Business Development Managers
- LNG Contract Managers
- LNG Sourcing / Purchasing Managers
- Corporate Strategy Managers
- Energy Regulators & Investor Relations Other useful information at a glance:

**WHAT YOU GET - Other useful information at a glance:**



- ✓ **Marine LNG Institute** – Course Certification & Certificates are issued upon completion
- ✓ **Individualized “One to One” for 2 hours post training!** To further optimise your learning experience from our courses, the Marine LNG Institute also offer individualized “One to One” for 2 hours post training **free of charge**. We help improve your competence in your chosen area of interest, based on your learning.

- ✓ **All Course Material and Research Downloads** from the Marine LNG Institute
- ✓ **Marine LNG Institute - Accreditation Post nominal's and Certificates**

<b>Course level:</b>	Basic to Intermediate
<b>Maximum number of participants:</b>	10

This course is Online Instructor Led Training format or request Corporate Training - 'In House'

#### More testimonials from past participants about the trainer

*Great expert, very professional and a key speaker. I attended the PSC LNG and Offshore Technical Operations course by the trainer. Really good 3 days and got a lot out of it. It will help us develop in the future”,* **Senior Base Manager, Icon Offshore Berhad**

*“We have utilised this training for our crew and LNG Tech Superintendents for several years. There are a lot of benefits,”* **China Shipping Lines (CSL)**

*“I got so much out of it. I have never been or listen to an expert speaker in this technical LNG Maritime field. He is now going to assist us as we proceed with our ventures in the future,”* **Senior Manager, Shell Singapore**

*“I have been to several seminars and this one was the best I have attended so far. Very technical and informative, very approachable and professional. We have since engaged the trainer for further projects and oversight,”* **Technical Superintendent, Woodside Australia (Oil and Gas – Gorgon Project)**

*“The offshore technical aspects to the trainer’s seminars are excellent. I will go again when he is next in KL,”* **Offshore Strategic Manager, Sembcorp Marine Ltd**

### 3-DAYCOURSE AGENDA



### **LNG Markets**

- Current world energy supply
- Trends in LNG and New Energy development
- Technology Development in LNG
- Market drivers for LNG

### **What LNG Facilities are currently available worldwide?**

- Existing infrastructure and locations
- Potential future development by regions
- Standardisation of facilities and procedures, is there any?
- What would be the best infrastructure in region and else where

### **Exercise & Case Study & Comparison Analysis**

- The commercial arguments for LNG as marine fuel
- LNG and Low-sulphur fuels LSFO explained. LSFO vs. LNG as alternative fuel sources

### **Recent Developments in LNG Procedures and Standards**

- Applicable codes
- International Safety Management (ISM)
- Tanker Management Self-Assessment (TMSA)
- International Ship and Port Security (ISPS)
- International code safety of ships using gases as fuel (IGF)

### **LNG Operations and Procedures for various delivery methods**

#### **Barge**

- Key principles of LNG STS
- Parties involved, pre planning and equipment
- Mooring, operations and manoeuvring
- Cargo transfer operations

#### **Land to Ship**

- Truck to Ship (TTS) and Loading Arm options
- Parties involved and roles in preparedness
- Equipment and compatibility
- Key steps in preparation
- Operations

#### **Terminal pipeline**

- ISO standard (28460-2010)
- Pilotage and Vessel Traffic Services (VTS)
- Tug and mooring boat operators
- Terminal layout and operations
- Terminal and ship operator collaboration

### **LNG and Transfer Inspections**

- In service inspections
- Service leak testing
- Hose ops and vessels procedures
- Color couplings indexes
- Operational risk profiles in Bunkering
- Inspections and Audit: Rigging
- Inspections and Audit: Wire Ropes
- Inspections: Handling and Chains
- Inspection: Shackles and hardware

### **Case Study & Exercise**

- LNG Transfer Failures Investigation and Root Cause Analysis – Diagnosis, Analysis and Planning

### **Introduction to LNG Properties and LNG Science**

- LNG Properties
- LNG Science and Chemical composition
- General and Specific Risks
- Risk Assessments – Operations, People and Training
- Risk Control measures

### **LNG Safety and Risk Management**

- Risk Analysis and Job Safety Analysis – Objectives
- Technical characteristics of LNG
- Handling, storage and spill risk
- Volatile cargo and gas vapours leak from ruptured tanks, Hoses and pipelines, causing oxygen deficiencies
- Gas Hazard Monitoring Equipment for JSA
- Adverse Weather Working – Guideline examples for JSA
- Approach to LNG and Installations
- Hose construction and length
- Hose quality and identification

### **The ‘Golden’ Safety Rules – LNG Port and Vessel Operations**

### **LNG and Offshore Installation and Safety Management Practices**

- OIM – Operations inside 500m safety zone
- Manoeuvring; safe approach, weather monitoring
- LNG and Bunkering Cargo handling and Planning
- LNG Installation Data Cards
- Accidental causes – fire on board ships
- LNG, Bunkers and Mechanical energy
- Liquids and gases
- Bunkers, Fire and the Fire Responses safety
- Investigation priorities upon arrival due to Bunkering failure
- Determining the point of origin

**LNG Custody Transfer, Measurement and Calculations**

- System setup parameters
- Ship and surveyor roles
- Certificate of Loading
- Bill of Lading issuance and presentation for certain receiving countries
- Types of Custody Transfer Measurement
  - Systems and equipment
  - Liquid form measurement
  - Volumetric measurement
  - Temperature measurement
  - Custody Transfer Measurement system
  - (CTMs) testing and checks

**LNG Infrastructure decisions, location, designs, equipment**

- Optimum location and equipment required
- LNG supplier contract and bunker cost to vessels
- Equipment types, storage tanks, pumps, Road rail requirements
- Emergency response facilities

**LNG Project Facility Development**

- Decide on location and facilities
- What operations will we do and how
- HAZID, what are the project risks
- Costing, development time, personnel
- Technical issues in LNG Bunkering Facility Development
- Feasibility assessment for a small-scale LNG project

**Production & Regasification Economics**

- Operating Cost Elements
- Margins (Gross, Net)
- Capital Cost Elements
- Optimise Production
- Pricing, Netback, Trends Optimise LNG Value Chain
- Define Boundaries
- Operational Parameters
- Constraints, Operational, Contract
- Planning & Scheduling

**LNG and other advanced technologies**

- Future: LNG Test and Technology Centre – Liquid Natural Gas (LNG) has characteristics that impacts on ship design and operation

- Reconstruction of fire
- Documentation, sketches, sketching systems plotting methods

**SWP/JSA Exercise – HSE Health and Safety Workplace Practises SWP/JSA for end-to-end Bunkering LNG****LNG for Marine Engineers and Tech Superintendents – Wear down, Fatigue and Failure Management Practices and planning for LNG Fuel and Bunkering**

- Overview of SMS & PMS
- Discuss onboard planned maintenance systems – PMS
- Discuss Trend analysis – T.A
- Analysis of Condition monitoring technical – CME
- OEM Main Engine component failures relevant to engine performance

**LNG and other advanced technologies**

- Future: LNG Test and Technology Centre – Liquid Natural Gas (LNG) has characteristics that impacts on ship design and operation
- LNG Fuelled Propulsion for Ships
- Innovative LNG transfer systems
- Development of offshore LNG Transfer

**Exercise: Implementation of end-to-end LNG bunkering**

- Developing a 10-point check list to get your LNG Bunkering project off the ground

**LNG Shipping**

- Carrier Types, Characteristics
- Shipping Contracts
- Project Shipping Capacity / Business Models LNG Regasification / Terminals
- Process Design and Technology
- Business Models

**World LNG Terminals Industry Novelties**

- Floating LNG
- Floating Storage Regasification Units (FRSU)
- Floating LNG based Power Generation

**Optimoor and accelerate LNG Compatibility Risks**

- FSRU and STS OPTIMOOR studies
- Simulator training for FSRU and STS equipment
- Cargo discharge
- LNG Cargo Unloading arms and Hoses

- Innovative LNG transfer systems
- Development of offshore LNG Transfer
- Robotics and AI technology available
- Fibre optics and software compatibilities
- OEM and aftermarket installations
- Checklists for Marine Surveyors and Engineers

#### **FPSO, FSRU, FPO Systems and Designs**

- Factual Case studies and developments
- Recent build designs from South Korea, China shipyards
- LNG vessel past and future design developments
- Development of cryogenic equipment and designs
- BOG Roll over considerations and tank designs
- Cryogenic Hoses designs and testing facilities around the globe
- QCDC
- Manifold, Saddle and ESD 1 and 2 designs

#### **LNG Trading route developments**

- New production facilities and locations
- New trading routes and hubs developing
- Off-shore industry expansion options for LNG as fuel
- On shore development of infrastructure
- Remote supplies and disaster recovery, portable LNG

#### **Introduction to LNG Trading and Economics**

- LNG trading Hubs
- Spoke and wheel methods
- JCC, Henry Hub analysis
- LNG MMBTU and Hedging
- Overview of LNG Trading and definitions
- How they work and why?
- Contract and Spot evaluations
- Asian Market Premium vs. Europe and USA
- JCC markets and leverage in the LNG Import sector
- Global LNG Market leverage systems
- How to leverage LNG Imports and Hedging
- Institutional Finance market in LNG

#### **STS / FSRU – Best Practices Oil and LNG comparisons**

- Discuss main considerations
- FSRU Operational Case Study
- Time / durations / Locations and Regulations

#### **LNG Projects**

- LNG Project Models / Organisation
- Actors & Partners
- Agreements (GSA, SPA, JV, COA)
- Project Phases & Characteristics
- Changing Business Environment LNG Project ion

#### **Project Financing**

- Examples Exercise on Project Evaluation
- Discussion on Project Risks and Profitability

#### **LNG Port and Vessel Planning – Considerations, Consultations**

- Market assessment – demand
- Port and Vessel operations, emergencies, mooring systems
- Other options road tankers, ship to ship, alongside jetty
- Public relations, environment, jobs, education
- Risk Assessment, Operational and Safety benchmarks for LNG Bunkering Facilities

#### **LNG as a Fuel and Ship Design Configurations**

- Current LNG Propulsion Options
- LNG Fuel Tanks
- LNG STORAGE
- LNG Fuel System
- Impacts on Ship Configurations and Operation
- Suitable Ship Types
- LNG and other Ship design efficiencies
- TOTE – New LNG Fuel Containership
- Retro fitting of existing vessels with LNG technology

#### **Vessel Technology and Operations**

- Vessel operational preparedness for LNG
- Measures to reduce energy consumption in ship applications
- Cut operating costs while, at the same time, reducing emissions

## **DELEGATE DETAILS**

Train Your Whole Team At A Convenient Time And Location Online

To enquire or email your query for information. [www.marinelnginstitute.com](http://www.marinelnginstitute.com)

Delegate 1

Mr  Ms  Mrs  Dr  Others: \_\_\_\_\_

Name : \_\_\_\_\_

Job Title : \_\_\_\_\_

Department : \_\_\_\_\_

Telephone No. : \_\_\_\_\_

Email : \_\_\_\_\_

Delegate 2

Mr  Ms  Mrs  Dr  Others: \_\_\_\_\_

Name : \_\_\_\_\_

Job Title : \_\_\_\_\_

Department : \_\_\_\_\_

Telephone No. : \_\_\_\_\_

Email : \_\_\_\_\_

Company : \_\_\_\_\_

Address : \_\_\_\_\_

Country : \_\_\_\_\_ Postcode: \_\_\_\_\_

Attention : \_\_\_\_\_

Invoice to : \_\_\_\_\_

Telephone No. : \_\_\_\_\_

Fax No. : \_\_\_\_\_

**3 EASY WAYS TO REGISTER**

Please note

- Indicate if you have already registered and made payment by Email + or Web.
- If you have not received an acknowledgement by email before the training course, please contact us to confirm your booking.
- Photocopy this form to register multiple delegates.

**3 EASY WAYS TO REGISTER**

Marine LNG Institute [www.marinelnginstitute.com](http://www.marinelnginstitute.com)

Contact Enquires: Student Enrolments

Email: [info@marinelnginstitute.com](mailto:info@marinelnginstitute.com)

Website Portal: [Enrol – Marine LNG Institute](#)

**PAYMENT METHODS**

By Direct Transfer. Please quote your Students Name with the remittance advise via email to student enrolments via our website. [www.marinelnginstitute.com](http://www.marinelnginstitute.com)

All bank charges to be borne by payer. Please ensure that the full invoiced amount per student is received in USD.

We do not accept By Credit Card.

As Payment through credit card incurs a 3.5% admin fee payable by the payer. Payment through credit card is not applicable.

**PAYMENT POLICY**

Payment is due in full at the time of registration and enrolment. Full payment is mandatory for event attendance. By submitting this registration form, you have agreed to payment terms.

**CANCELLATIONS & SUBSTITUTIONS**

You may substitute delegates at any time. For cancellations received in writing more than seven (7) days prior to the training course, delegates will receive a 100% credit on the amount paid which can be used in another training course for up to one year from the date of issuance. The credit is transferable to other persons in the same company and applicable against any future public course. For cancellations received seven (7) days or less prior to an event (including day 7), no credit will be issued. In addition, a cancellation fee equivalent to 15% of the course fee will be charged. In the event that we postpone or cancels a course, delegate payments at the date of cancellation or postponement will be refunded in full. MLNGI does not provide refunds for cancellations and postponements or waive fees for unpaid invoices upon receipt of registration

