www.marinelnginstitute.com

LNG INFRASTRUCTURE, ENGINEERING & FEASIBILITY.

Technical Import and Export, Commercial, and Economic Considerations.

About this Training Course:

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 3 full-day instructor led online course provides a solid foundation to understand Gas and LNG Businesses by covering the relevant Technical, Commercial, Financial and Contractual aspects.

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” 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.

This 3-day online lectured course will equip the participants with a detailed practical grounding in the fundamentals of LNG Infrastructure, Engineering, Economics and operations. Learn the practical tools and techniques that can be utilised to manage risk more effectively and make better practical decisions. Real-life examples will help to illustrate the main concepts and possibilities.

Project and Commercial risks at various steps in the LNG value chain will also be discussed, with particular emphasis on pricing formulae used for 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.

Enhance your understanding:

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 operates.
- Appreciate how the entire LNG Value Chain operates internationally.
- Learn how an LNG 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.

Key in Depth Analysis of the following Topics:

- ✓ LNG Exploration and production
- ✓ Regasification and transport
- ✓ LNG Science and energy markets worldwide
- ✓ Cost Plus, OPEX - Terminal roll out and FSRU, FPSO
- ✓ Market drivers – Onshore and offshore
- ✓ LNG to Power [LNG2P] Grid - Case studies
- ✓ Factors influencing LNG Finance
- ✓ LNG Quality, Blending and Quantity assurance and risk
- ✓ LNG Import and Export development Joint Ventures - Case Studies
- ✓ FSRU Range and terminal project development and expansion
- ✓ Key Players and Stakeholders to consider in LNG Developments
- ✓ LNG Hub Trading and Hedging
- ✓ LNG Charterparty Agreement's and Negotiation
- ✓ LNG Shipping and logistics
- ✓ LNG Feasibility workshops
- ✓ LNG Infrastructure, decisions, location, design and equipment
- ✓ Regasification process and extraction
- ✓ LNG Long Term and Spot Market dynamics
- ✓ LNG Ship Bunkering and Terminal Case studies
- ✓ Terminal and Bunker Compatibility
- ✓ LNG Business frameworks SPA and TCP
- ✓ LNG portfolio asset growth

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

"Excellent course for oil and gas professionals with limited knowledge in LNG. Very good facilitation of expertise of the trainer," ***Operations Manager, Total Energies [Europe]***

"This course provides a good overview of how the LNG is handled. It is really good for my knowledge and hopefully, there will be a follow up training program," ***SWP Maintenance Scheduler, Engie Pty***

"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, Dutch Shell***

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 terminals, vessels, 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 economic and environmental challenges.
- ❖ Recognise and understand differences in operations and hazards between oil and gas vessels.
- ❖ Understand requirements for LNG vessel compatibility and Optimoor studies

This course is intended for the following LNG 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:

Course level:	**INTERMEDIATE**
Maximum number of participants:	10

This course is through Online Instructor Led Training format or Corporate In House World Wide.

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, Chevron Offshore***

"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.," ***Offshore Strategic Manager, Qatar LNG Ltd***

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**

3-DAYCOURSE AGENDA NEXT PAGE

DAY 1:

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 in Asia Pacific, USA, Europe?
- 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

Introduction to LNG EXPLORATION AND PRODUCTION
- Onshore and offshore
- Upstream
- Downstream
- Midstream
- New Trends
- FPSO, FSRU, FLNG and STS Hose designs

LIQUIDEFACTIONS AND TRANSPORTATION
- Pipeline
- Marine transportation
- Distribution to energy grids
- Introduction to LNG Quality and quantity calculations, calibrations OEM's, tools and measurement's

LNG GAS – REGASIFICATION PROCESSES
- Liquefaction terminal
  - Locations
  - Size
  - Cost
  - Basic process
- LNG vessel main types
  - Moss Rosenberg
  - Membrane
  - Steamships
  - DFDE
- Regasification terminal locations
  - Land based
  - Regas vessels

DICHARGE AND RECEIVING TERMINAL
- Receiving terminal parameters for acceptance
- Voyage management considerations to achieve terminal parameters

DAY 1 (CONTINUED):

LNG - Transfer Procedures

Loading and Discharging Operations and Preparations
• Arrival preparations and checklists
• Pre-loading procedures alongside
- Cryogenic pumps and hose design parameters
- LNG Carriers and mooring options - Finger and Face terminal design considerations
- Fire Fighting and Investigation

• Ramp up, loading and ramp down, actions and precautions
-- Ramp up, increasing loading rate
-- Tank loading procedures
-- Ramp down and the topping off tanks process
-- Vapour pressure control

Facility and Assets (Commercial Considerations and factors)

- Current LNG MMBtu $ pricing levels.
- Cost effective LNG Operations and development practices
- Cost plus Considerations and Capex considerations
- Vessel Operators cost and Chartering
- LNG Operations and ROI – Terminal OPEX and break even cost considerations
- Demurrage Cost reductions
- 24 Hr - Continuous Operations
- LNG Barges and Loading Facilities and Builds
- Dual fuel and Phases whilst in operations

Post loading operations
- Boil off gas Management

-- Commencement of gas burning and line disconnection
• Pre-arrival preparations, terminal requirements and ship line cool down
• Discharging and ramp down, heel options
-- Overview of standard discharge operations
-- Ramp down for heel distribution option

Loading and Discharging Operations and Preparations

- Arrival preparations and checklists
- LNG Loading Arms – Technology, vendors and designs
- Cryogenic Hoses, testing and type 8 inch and 6 Inch
- Dynamic Positioning
- Manoeuvring with and without tug assistance DP
- Jetty Approaches – Finger or Face Terminal Design Interface
- Pre-loading procedures alongside

- Typical requirements from charterers
- Use of Boil Off Gas (BOG), natural or forced
- Fuel oil use and consumptions allowed
- Restrictions on distances and voyage times
    - Routing and cargo management options for different engine and vessel types
- Which type of vessel is easiest to manage for cargo considerations
- Options for cargo management
- Speed and distance
- Weather routing
- Vapour control

LNG Large and Small scale - Terminal and Bunker Compatibility Studies

• Roles and responsibility of terminal in LNG cargo transfer

• Terminal loading and discharging
    - Storage tank capacity
    - Storage tank types
    - Development of LNG Export facilities
    - Development of LNG Import Facilities
    - LNG Road Transportation
    - Floating LNG Facility design
    - Differences to On and Off shore design capabilities

• Ship-to-Shore operations interfaces

• Compatibility forms
    - Optimoor and accelerate

Business framework:

- Classic Gas Producer with Gas Buyer
    - Sales Purchase Agreement (SPA)
- Gas Buyer with Gas Off taker Gas Off take with Gas Producer
    - Time Charter Party (TCP)
- Gas Producer with LNG Shipping Gas Buyer

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)
- Ramp up, loading and ramp down, actions
- precautions
- Ramp up, increasing loading rate
- Tank loading procedures
- Ramp down and the topping off tanks process
- Vapour pressure control
- Post loading operations
- Commencement of gas burning and line disconnection
- Pre-arrival preparations, terminal requirements and ship line cool down
- Discharging and ramp down, heel options
- Overview of standard discharge operations
- Ramp down for heel distribution option •discharging operations

DAY 2

Mooring system

- FSRU alongside and double bank with LNGC
- FSRU and LNGC alongside to jetty (no double bank)
- Pile jetty with some distance from shore end

Considerations

- Environmental
- Close to off taker
- Ship draft limitation

Advantage & Disadvantage

- Easier for mooring system
- Lower cost for the re-gas pipe line on shore
- Easier for controlling and monitoring
- dredging or jetty extended to achieve ship draft
- More effect from ship traffic

Sea water quality should be confirmed

Market drivers and Investments

- Significant additional supply of uncommitted LNG globally
- The major LNG players actively search for new markets in small-scale LNG segment which is expected to account for 8-10% of global LNG traded in 2025
- Governmental environmental policies on emission reductions (CO_2, SO_X, NO_X,)
- Easier access to large scale facilities
- Medium / small-scale LNG production require new transportation and receiving solutions
- Timely development of receiving terminal facilities (onshore or barge type FS(R)Us)

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 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

KEY REQUIREMENTS TO FINANCE LNG PROJECTS
- Customers / Demand
- Contractual Framework
- Costs
- Construction Risk
- Market Liquidity
- Project Pipeline

FACTORS INFLUENCING LNG FINANCING MARKET
- Oil & Gas Environment
- Significant Exposure to U.S. LNG
- Capital Markets
- Increasing Cost of Funds
- Relationship Focus

Growing the market for "LNG to Power (L2P)" Projects through the Conversion of Existing LNG Carriers

STRATEGY CHECKLIST – Main Objective is to lower cost/risk.
- optimize cashflow, whilst meeting schedule requirements
- Compatibility with Standard Sized LNG – take advantage of the LNG Product and Shipping
- oversupply in the current market of standard sized LNG Chain. Right Project Size - Develop projects of the right size
- Avoid disconnect with standard sized infrastructure.
- Easy Location - Important to ensure low CAPEX cost for mooring and gas infrastructure and OPEX.
- Lowering Contract Risk – start by utilizing FSRU with ship classification (self-propel) or FRU/FSU approach.
- Overcoming LNG logistics challenges,
- Utilise existing small scale LNGC,
- Hub and Spokeapproach to optimize logistics.

Identifying the Right Range of LNG Regasification Terminal
- LNG Value Chain & Technology Overview
- Mini LNG Terminal Comparison & Mini LNG Tanks
- Cost Comparison Large LNGC Vs Mini LNGC
- LNG Regasification Requirement
- Mini LNG for Power Generation: A Case Study

DAY 3

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
- LNG Fuelled Propulsion for Ships
- 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

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 (FOB, DES, COA, Chartering)
- 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)

LNG Projects

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

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

DELEGATE DETAILS

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. :

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**

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

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 Contact Enquires: Student Enrolments

Email: info@marinelnginstitute.com

Website Portal: Enrol – Marine LNG Institute