

# LNG: Vessel Design, Technology & Operations

**7-10 June 2021**

**Online Course  
Tutor**

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*Each day of this four-day course will consist of three lectures of 45 minutes  
with two fifteen minute breaks. Classes will start at 11:00 BST (10:00 GMT) on each day  
and conclude at 13:45 BST (12:45 GMT). Local time in London is GMT+1.*

**Organised by**



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# Course Programme

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## LNG: Vessel Design, Technology & Operations (Times shown are local time in London)

### THE SUPPLY CHAIN

#### Cargo Focus

**Monday  
7 June**

**Session 1  
1100-1145**

#### **LNG: The Basis and the Basics**

- Physical Properties of Natural Gas and LNG
- Liquefaction and Cryogenic Engineering
- Principles of liquid gas cargo containment
- Origins and pioneers of LNG seaborne transport
- Early LNG projects and their evolution

**Session 2  
1200-1245**

#### **Cargo Containment Systems & Future Developments**

- Evolution of containment systems
- Membrane vs Moss systems
- Physical challenges and capacity trends
- Who builds what and where?
- Future trends

**Session 3  
1300-1345**

#### **Terminal Design and Operations**

- Design and implementation criteria for Ports & Terminals
- Production – process and facilities
- Storage tanks and discharge terminal infrastructure
- Floating Storage and Regassification and LNG Production
- Ship/Shore interface
  - o Check-Lists and pre-cargo meeting
  - o Terminal Acceptance and Conditions of Use
  - o Cargo operations: line cooling, vapour return, emergency shut-down
  - o Custody Transfer Systems
  - o Managing various activities / roles – interfaces and communications

#### Vessel Focus

**Tuesday  
8 June**

**Session 4  
1100-1145**

#### **LNG Cargo Handling – Processes, Equipment & Custody Transfer**

- Trading and Tank Condition Cycles
  - o Nitrogen Purge, Drying and Inerting, Gas-up and Cooling-down
- Heel Retention
- LNG Cargo Operations
  - o Check List and pre-cargo preparations
  - o Bulk load/discharge, Topping Off, End of Cargo, Purging/Draining
  - o Ship's Stability Book
- Cargo Handling Equipment
  - o Cargo and Engine Control Spaces
  - o Gauging Systems
  - o Cargo Pumps, Compressors, Vaporizer and Oxidizer

**Session 5  
1200-1245**

**Vessel Propulsion Systems**

- Naval Architecture: the Balance between Form and Function
  - o Hull Form and impact on Power, Speed and stability
  - o Use of Boil-off and achievable speeds
  - o Steam Turbines - evolution into hybrid technology and likely demise
- Propulsion: Current and Future Trends
  - o DFDE
  - o Key advantages of slow speed 2-stroke Diesel Engines
  - o Overview of NG compatible engines (jargon buster)
  - o Main Engine with Gas Injection (MEGI and XDF)
  - o Comparison of Win XDF vs MEGI
- Changes to Propulsion Orderbook and Market Trends

**Session 6  
1300-1345**

**Decarbonisation and LNG as a Marine Fuel**

- Emission Regulations and Pathways to Decarbonisation
- LNG as Fuel: Enablers, Economics and Concerns
- Slow Steaming and Just-in-Time Arrival
- Energy Efficiency Design Index (EEDI) and Management Plan (SEEMP)
- LPG, Bio Gas, Methanol, Ammonia, Hydrogen Fuel Cells and Electric

**THE VALUE CHAIN: BUSINESS FRAMEWORK**

**Control of the Asset**

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**Wednesday  
9 June**

**Session 7  
1100-1145**

**Legislative Framework, Risk, Insurance and Assurance**

- IMO and other (National) Regulators
- Flag States vs Open Registries
- Role of the Classification Societies
- Overview of LNG Industry Regulatory and Interest Groups (NGOs)
- Insurance: Protection & Indemnity, Hull & Machinery, Cargo, Charterers
- Ship Vetting, SIRE Inspections and Terminal Acceptance
- Officer Experience Matrix

**Session 8  
1200-1245**

**Voyage Operations and Managing Stakeholders**

- The importance of clear, professional communications
- Role of the Broker (and how it may need to change)
- Agents, Port Authority and Harbour Master
- Exercise: Spot the error/omission

**Session 9  
1300-1345**

**Asset Management, OPEX & CAPEX Drivers**

- Types of Vessel Ownership, Control and Cost Allocation
- Key components of (LNG) Vessel Operating Costs (OPEX)
  - o Repair and Maintenance
  - o Crew Composition and Cost Models
- Impact of CAPEX on Daily Rates
  - o Yard pricing and negation
  - o Impact of the QG mega-order

**Utilising the Asset**

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**Thursday  
10 June**

**Session 10  
1100-1145**

**Supply & Demand Overview and Trade Flows**

- Energy Transition: the Case for Natural Gas
- Natural Gas in the Energy Mix:
- LNG vs Pipeline, Gas on Gas competition
- Evolution of LNG flows: Europe, Asia and US
- Arbitrage, Optimisation and Trading

**Session 11  
1200-1245**

**New Opportunities: Small Scale LNG and Bunkering**

- Dimensions and Growth Drivers
- Entry into traditional shipping segments: cruise, container, dry bulk
- Small Scale and LNG Bunkering projects across the globe
- LNG Bunker Vessels – Design features and Operations

**Session 12  
1300-1345**

**Core Components of Voyage and Deal Economics**

- Fundamental Cost & Revenue Criteria
- Deal vs. Voyage Economics (and exclusions thereof)
- Who Pays What in a Ship Charter Party?
- Freight Calculations: Unit Cost versus Time Charter Equivalent (TCE)
- Exercise and worked example
  
- **Final round-up and Q&A**

*Programme subject to change*