

# LNG: Vessel Design, Technology & Operations

**9-12 November 2020**

**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 GMT on each day  
and conclude at 13:45 GMT*

**Organised by**



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# Course Programme

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## LNG: Vessel Design, Technology & Operations

### THE SUPPLY CHAIN

#### Cargo Focus

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<b>Monday</b> <b>9 November</b>	<b>LNG: The Basis and the Basics</b> <ul style="list-style-type: none"><li>– Physical Properties of Natural Gas and LNG</li><li>– Liquefaction and Cryogenic Engineering</li><li>– Principles of liquid gas cargo containment</li><li>– Origins and pioneers of LNG seaborne transport</li><li>– Early LNG projects and their evolution</li></ul>	<b>Session 1</b> <b>1100-1145</b>
	<b>Cargo Containment Systems &amp; Future Developments</b> <ul style="list-style-type: none"><li>– Evolution of containment systems</li><li>– Membrane vs Moss systems</li><li>– Physical challenges and capacity trends</li><li>– Who builds what and where?</li><li>– Future trends</li></ul>	<b>Session 2</b> <b>1200-1245</b>
	<b>Terminal Design and Operations</b> <ul style="list-style-type: none"><li>– Design and implementation criteria for Ports &amp; Terminals</li><li>– Production – process and facilities</li><li>– Storage tanks and discharge terminal infrastructure</li><li>– Floating Storage and Regassification and LNG Production</li><li>– Ship/Shore interface<ul style="list-style-type: none"><li>○ Check-Lists and pre-cargo meeting</li><li>○ Terminal Acceptance and Conditions of Use</li><li>○ Cargo operations: line cooling, vapour return, emergency shut-down</li><li>○ Custody Transfer Systems</li><li>○ Managing various activities / roles – interfaces and communications</li></ul></li></ul>	<b>Session 3</b> <b>1300-1345</b>

#### Vessel Focus

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<b>Tuesday</b> <b>10 November</b>	<b>LNG Cargo Handling – Processes, Equipment &amp; Custody Transfer</b> <ul style="list-style-type: none"><li>– Trading and Tank Condition Cycles<ul style="list-style-type: none"><li>○ Nitrogen Purge, Drying and Inerting, Gas-up and Cooling-down</li></ul></li><li>– Heel Retention</li><li>– LNG Cargo Operations<ul style="list-style-type: none"><li>○ Check List and pre-cargo preparations</li><li>○ Bulk load/discharge, Topping Off, End of Cargo, Purging/Draining</li><li>○ Ship's Stability Book</li></ul></li><li>– Cargo Handling Equipment<ul style="list-style-type: none"><li>○ Cargo and Engine Control Spaces</li><li>○ Gauging Systems</li><li>○ Cargo Pumps, Compressors, Vaporizer and Oxidizer</li></ul></li></ul>	<b>Session 4</b> <b>1100-1145</b>
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**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  
11 November**

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

**Session 7  
1100-1145**

- 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

12 November

**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 10**

**1100-1145**

**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 11**

**1200-1245**

**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**

**Session 12**

**1300-1345**

*Programme subject to change*