# Global LNG Solution Provider


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# About us

Trans Gas Solution Co., Ltd. (TGS) is the global LNG solution provider in promising the cleaner future for future generations. Trans Gas Solution continues to research and develop to present advanced eco-friendly solutions for our homes and families.

## TGS provides:

1. the highest quality of engineering service
2. the best and efficient LNG solutions
3. the vessel's core equipment and technology
4. auditing for class-fit quality control
5. specialized commissioning and gas trials

As a global engineering company for LNG solutions, TGS offers class-approved engineering, procurement, commissioning, consultancy, training, and technical design services.

TGS designs to respond to the operational efficiency and safety expectations of its customers in full compliance with developments in international maritime rules and regulations. The company is actively involved in research through its partnerships with shipyards, engineering companies, research institutes and universities.



# Global Leading LNG EPCIC & Energy Trading

## Construction / Trading

### Engineering

① Small Scaled LNG Supply Chain
- FPSO
- LNG Carrier
- FLBT
- FSU
- FSRU
- LNG Bunker Vessel
- LNG Power Plant
- LNG Fueled Ship
- LNG Terminal

② LNG Fuel Gas Supply System

### Procurement

① LNG Bunkering Station
② LNG Tank
③ Insulation System
④ LNG Fuel Pump
⑤ Cryogenic Valve
⑥ Combined Vaporizer
⑦ Control System
⑧ Gas Valve Unit
⑨ Gas Engine

### Commissioning

① LNG Bunker Vessel
② LNG Carrier
③ LNG FSRU
④ LNG Power Plant

# Certificates

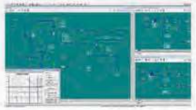
# Engineering

## Scope of Work / Key Competences

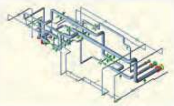
TGS provides engineering services for all product lines and phases of LNG projects

- Basic & Detail Engineering
- Piping, Structural, Electrical & Instrument Engineering
- Process & HSE Design Services
- Operator Training Services
- Operation & Maintenance Services
- Technical & Commercial Feasibility Studies
- Conceptual Design
- Environmental Impact Assessment (EIA) & HAZOP Studies
- Front-to-End Engineering Design (FEED)

Process Analysis (HYSYS, UNISIM)



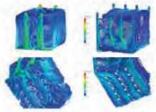
Pipe Stress Analysis (CAESAR II)



Pressure Drop Analysis (PIPENET)

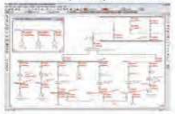
Pipe Stress Analysis (CAESAR II)

Ventilation Analysis



Control Software (FactoryTalkView)

Electric Loop Analysis (ETAP)



3D Modeling (Solidworks/CADWorks)

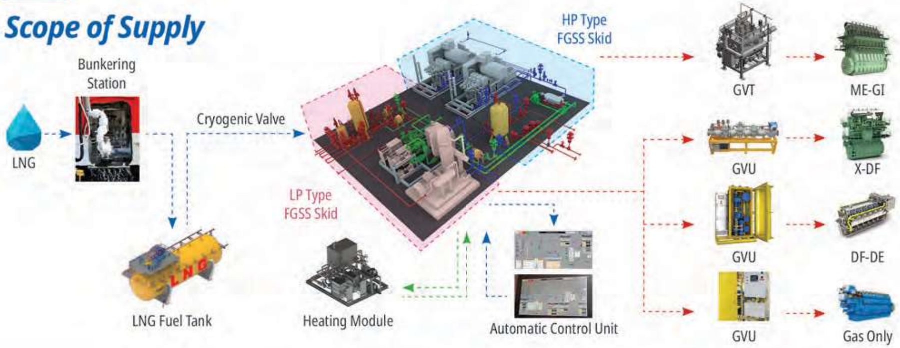
# Procurement

TGS procurement service covers the process chain of project procurement from inquiry registration, technical meeting, quality control, order, delivery and commissioning.

TGS procurement strategy is to maintain long-term relationship with customers in mutual trust and respect.

TGS provides best quality equipment with guaranteed on-time and within budget services with up-to-date international markets situation.

## Scope of Supply




# Commissioning

TGS provides specialized commissioning services with globally-experienced engineers.

Every ship TGS delivers undergoes an intense period of commissioning and gas trials regardless of vessel types and new build or overhaul.

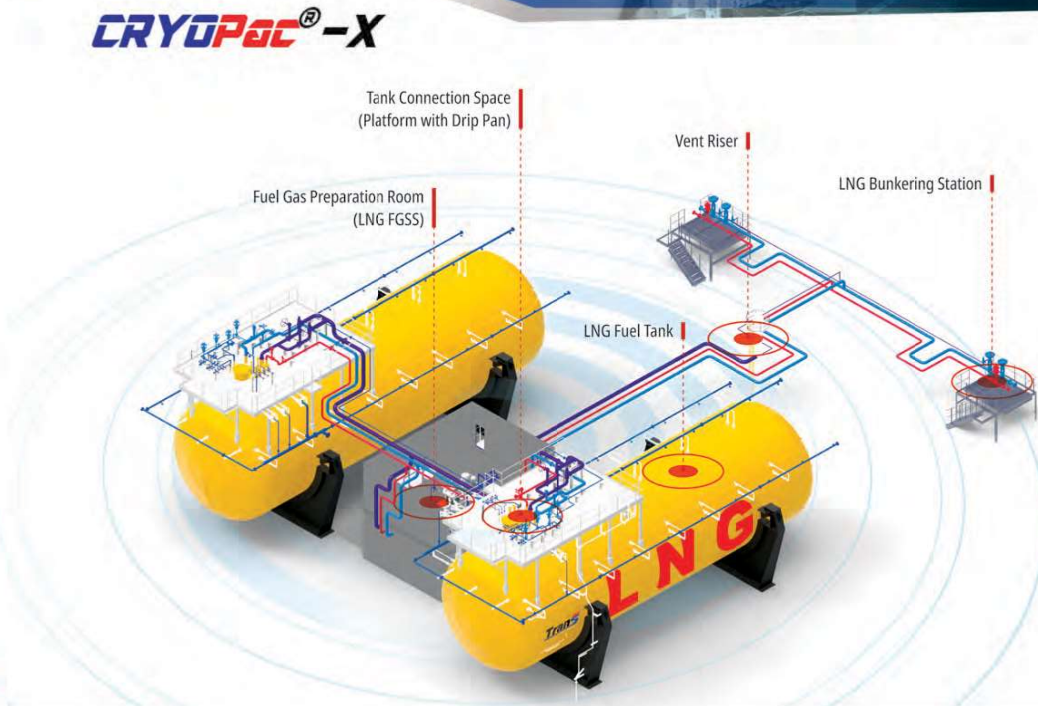
With the right experts, customers are guaranteed to receive quality controlled vessels.

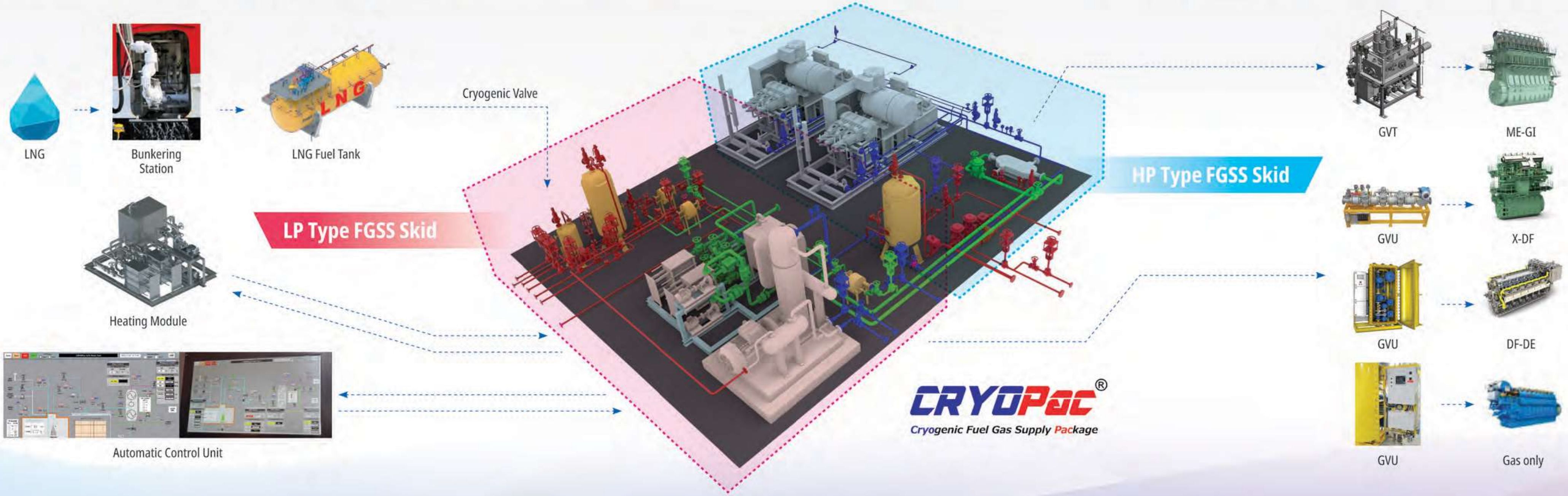
# CRYOPac®

# LNG Fuel Gas Supply System

CRYOPac® is the LNG fuel supply system for LNG fueled ships fit accordingly to the selected engines.

CRYOPac® consists of LNG tanks, LNG fuel pumps, combined LNG vaporizer, cryogenic valves, and control system.

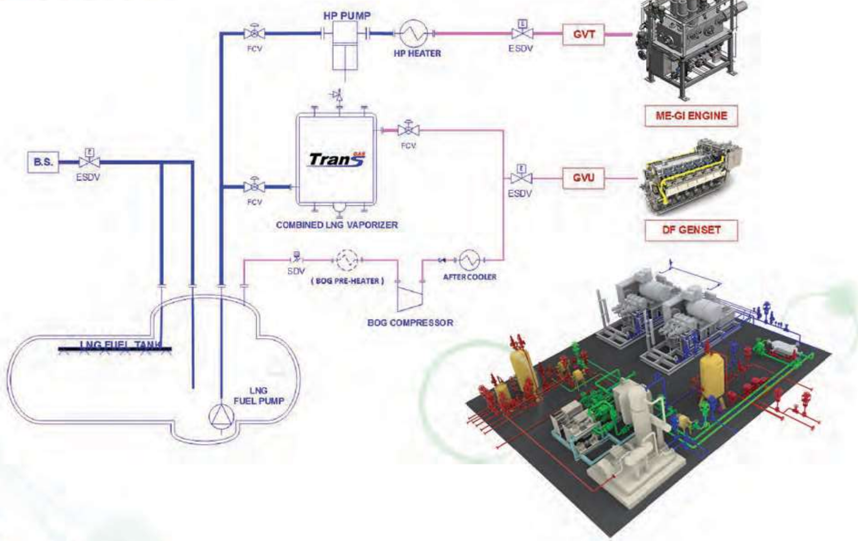


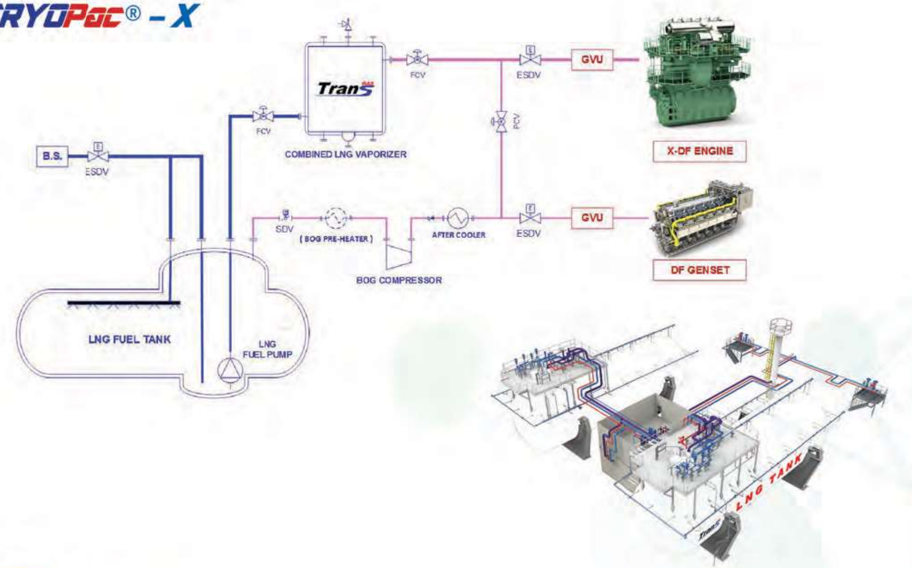
# CRYOPac ®

# LNG Fuel Gas Supply System

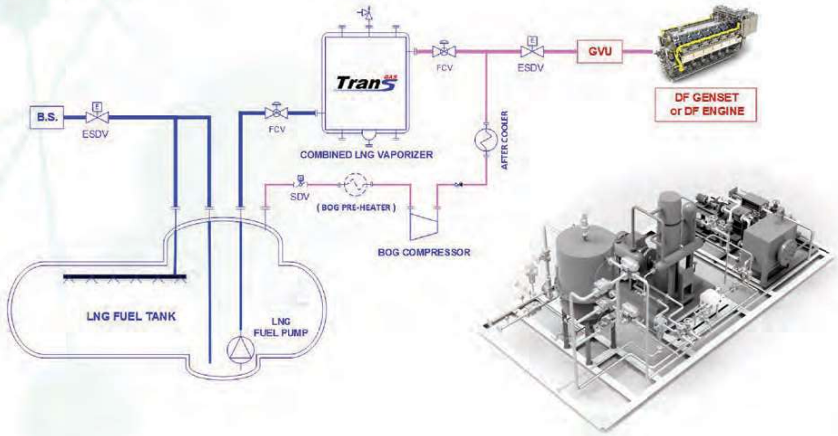
## CRYOPac® – H



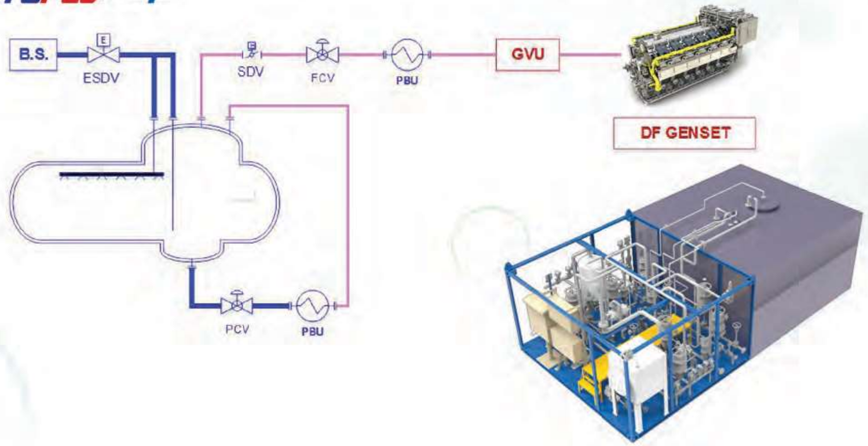

## CRYOPac® – X




## CRYOPac® – L




## CRYOPac® – P



# RENOVA®

## Renewed & Combined LNG Vaporizer

- Combination of LNG Vaporizer, Heavy Carbon Separator and Fuel Gas Heater
- Satisfying Methane Number of 80 or higher for the engine
- 50% reduced installation space ($8m^2 \rightarrow 4m^2$)
- 30% reduced material cost (in average)
- Standard design (up to 20 bar gas)
  : 1MW, 3MW, 5MW, 10MW, 15MW, 20MW Class

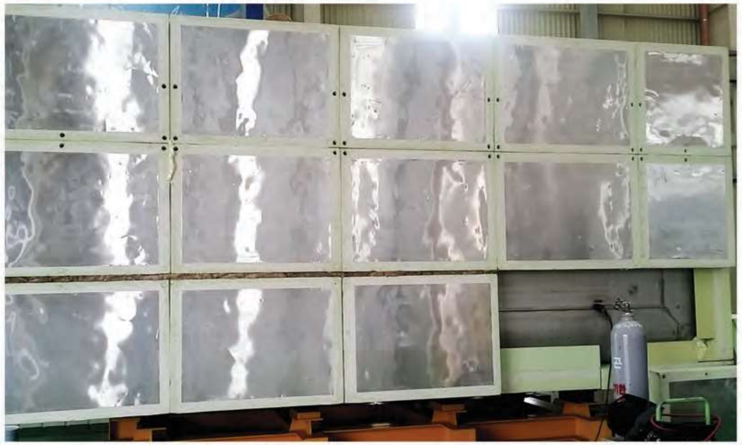
RENOVA
Skid Structure



# I-LIS™

## Innovative LNG Insulation System

- 40% reduced weight
- 60% reduced insulation thickness
- 20% reduced tank construction period
- 99% flame resistant panel-type
- 200% excellence in heat conductivity
- 10% increased storage volume (in average)



I-LIS Testing

# EXIAS™

## FGSS Control System

- Dynamic simulation for electric propulsion type LNGC
- Real time check for control functions (HILS)
- Distributed architecture based on DCS platform
- Ultra-high availability, reliability and security
- User-friendly interface
- Redundancy at all levels of control & communication
- Type approval of ship classification
- Process knowledge based operation function
- Self-diagnostic function

# NEXIM™

## Operator Training System

TGS specializes in small/medium-scale LNG-fueled vessels, LNG bunkering barge and vessel, and all kinds of LNG vessels. With this operator training system, operator and maintenance personnel can be trained in familiarizing the system beforehand.

## Mathematical Modeling

- Cargo Tanks
- Cargo Pumps
- Compressors
- Heaters
- GCU
- GENSET

Process Simulator Station

Interface Module

Main Control System

## Control & Safety Logic

- Cargo Handling Sequence
- Bridge Maneuvering Logic
- Gas Handling Logic
- GENSET Logic & Sequence
- Power Management Sequence
- Electric Propulsion Logic

## Main Equipment & Process


Process Modeling

Control Center

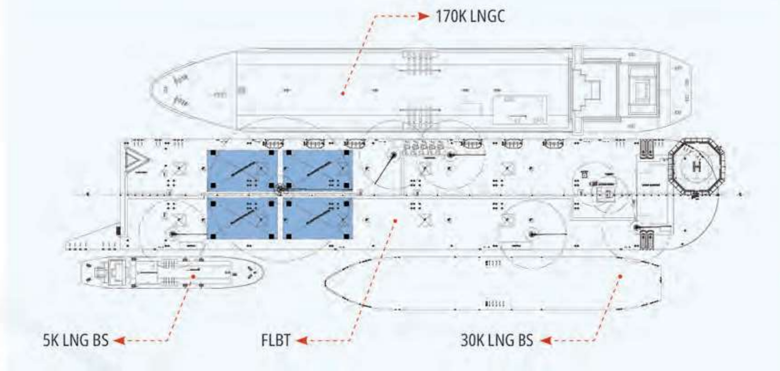
## Monitoring & Control

- Bridge Maneuvering
- Cargo Handling
- Gas Handling
- GENSET Handling
- Power Management

# LNG Bunkering & Supply Chain (LNG TranS)

TGS covers the LNG Value Chain from LNG production vessel to customers.

LNG Value Chain includes gas production, offloading, transportation, re-gasification, re-liquefaction, storage, power production, and supply to end users.




## LNG FPSO

- LNG Production

## LNG Carrier

- Transportation

## Floating LNG Bunkering Terminal

- Storage
- LNG Bunkering
- Regasification
- Reliquefaction

## LNG Bunkering Vessel

## LNG Bunkering Barge

- LNG Bunkering

## Floating LNG Power Plant

- Storage
- Regasification
- Power Production

## LNG Fueled Vessel

## LNG Regas Satellite Skid

- ISO Tank Type Solution
- RENOVA & LNG Fuel Tank
- LNG Storage Tanks

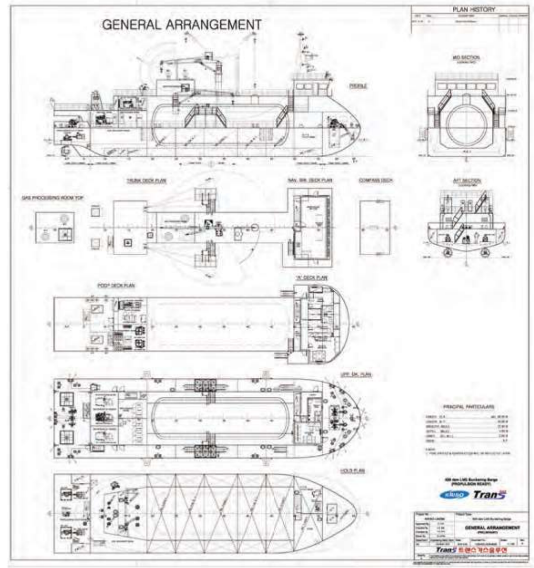
## On-Land Satellite Power Plant

- Gas Turbine Generator
- Dual Fuel Engine Generator
- Fuel Cell Generator

# LNG Bunkering Vessel (KOLT-05)

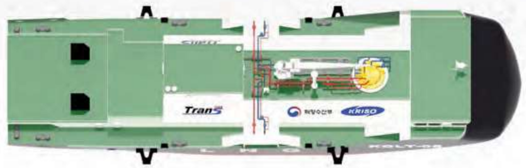
South Korea's 1st LNG Bunkering Vessel in initiating the LNG bunkering infrastructure market in Korea.

Key Features: A low-pressure LNG fuel gas supply system (CRYOPac®-L) applied with a dual-side LNG bunkering stations.


## Principal Particular

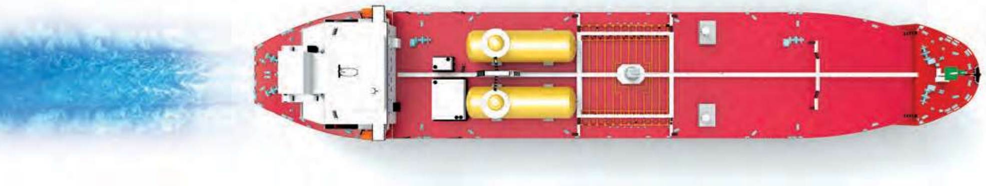
| | | |
|---|---|---|
| L.O.A | : | abt 48.50m |
| L.B.P | : | 45.65m |
| Breath MLD | : | 12.40m |
| Depth MLD | : | 4.50m |
| Draft MLD | : | 2.50m |

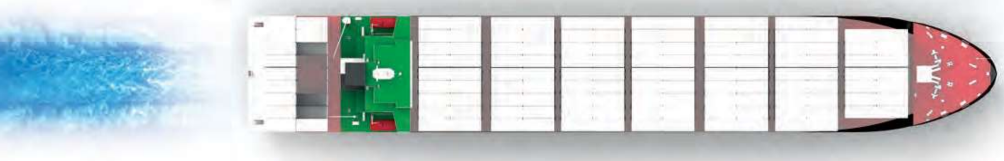
# LNG Fueled Ship

Design Approval received by classification society for LNG Fueled Ships

## 50K MR Tanker

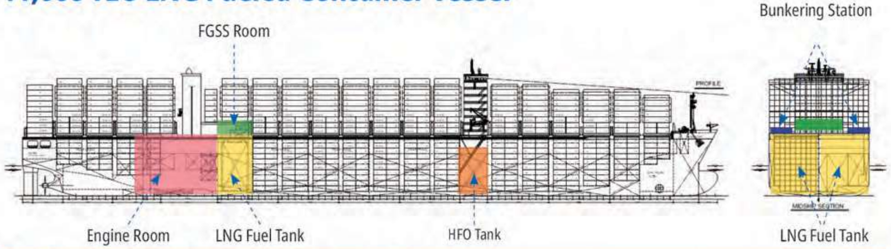


## 1,000 TEU Container Ship



Design Approval received by classification society for LNG Bunker Barge and LNG Fueled Container Vessel

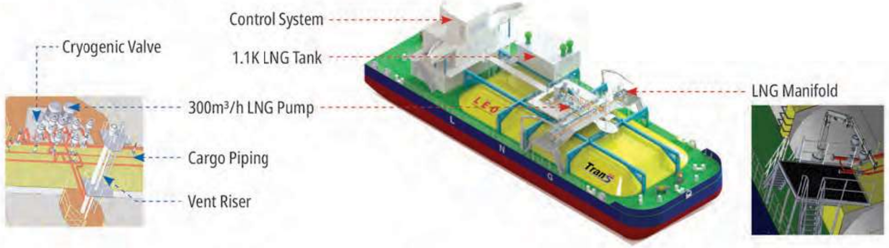
## 11,000 TEU LNG Fueled Container Vessel




**11,000 TEU LNG Fueled Container Vessel General Information**

| | | | | | |
|---|---|---|---|---|---|
| Main Dimension | Length Overall | 334.0 m | Main Engine | Type | MAN B&W 8G95ME-C9.5-GI |
| | Length Between Perpendiculars | 320.0 m | | MCR | 40,590 kW x 76.4 rpm |
| | Breadth Moulded | 48.2 m | | NCR | 32,472 kW x 70.9 rpm |
| | Depth Moulded | 27.2 m | | | |
| | Design Draft | 12.5 m | Power Supply | Type | Wartsila 8L34DF |
| | Scantling Draft | 14.5 m | | Diesel Generator | 3,840 kW x 4 sets |
| Dead Weight | Design Draft | 89,000 MT | | Em'cy Generator | 300 kW x 1 set |
| | Scantling Draft | 13,600 MT | | | |

## 1.1k CBM Class Tug Pulling LNG Barge

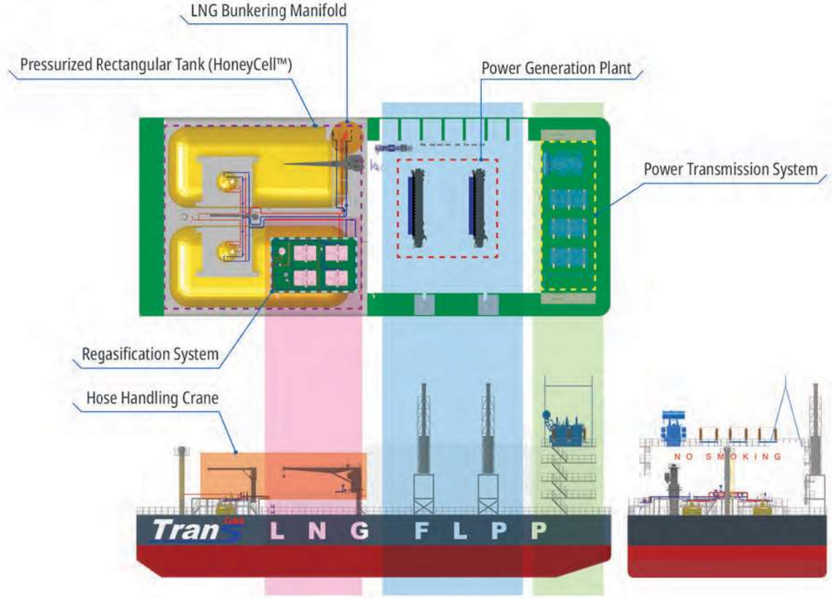



# Floating LNG Power Plant (FLPP)

A gas-powered power production facility, highly favored and feasible in islands where power supply is of high demand; especially in regions of Southeast Asia and Oceania.

Transportable and permanent installation available

Short construction cycles, flexibility in deployment and minimal land required.




| Technical Specifications | |
|---|---|
| 20~80MW Gas Engine Power Gen. | |
| LNG Fuel Gas Supply System | 2,000 cbm Cargo Tank x 2 |
| | Fuel Pump x 4 |
| | BOG Compressor |
| | LNG Vaporizer |
| | Cryogenic Valves |
| Waste Heat Recovery System | |
| Ballast Water Tank System | |

## Principal Particular

| | | |
|---|---|---|
| L.O.A | : | abt 76.00m |
| L.B.P | : | 76.00m |
| Breath MLD | : | 32.00m |
| Depth MLD | : | 10.00m |
| Draft MLD | : | 3.30m |