

ST Ocean Americas LNG Bunker Barge Estimate

U.S. Hull with Chinese & Korean Content

Objectives

- To build an LNG bunker barge in the U.S. with minimum Jones Act content
- Design barge to accommodate Chinese and Korean LNG tanks, pumps, and piping modules for “drop in” assembly in U.S.
- Maximize and confirm STO supplied content and design barge to accommodate these major auxiliaries
- Drive cost down by coordinating design with STO engineering, suppliers, and U.S. assembly yard. STO to provide local inspection and oversight
- Ensure logistics are coordinated with U.S. assembly yard for in time delivery to minimize barge building delays


Current State of U.S. LNG Bunker Barge Industry

Designer	Owner	Delivery Yard	Naval Architects	Operator	Barge Name	Capacity (m3)	Delivery
Jensen Maritime Consultants/VT Halter	Q-LNG, Harvey Gulf Shane Guidry	VT Halter Marine Pascagoula	Jensen Maritime Consultants/Crowley	Shell NA LNG	Q LNG 4000 (ATB)	4,000	2021
Fincantieri Marine Group (WI)	Sea Side LNG Holding	Conrad Industries Port Fourchon	Scharer /Bristol Harbor Group	Tote Original/ Seaside LNG - 2023 - Galveston	Clean Jacksonville	2,200	2021
Fincantieri Marine Group (WI)	Sea Side LNG Holding	Finantieri Sturgeon Bay Shipbuilding		Polaris New Energy	Clean Canaveral (ATB)	5,500	2022
Fincantieri Marine Group (WI)	Sea Side LNG Holding	Finantieri Sturgeon Bay Shipbuilding		Polaris New Energy	Clean Everglades (ATB)	5,500	2023
Crowley Maritime Corporation	Crowley	Finantieri Sturgeon Bay Shipbuilding		Shell NA LNG	Progress	12,000	2024

U.S. Built LNG Barge with Maximum Chinese Content

Cost Efficient Elements

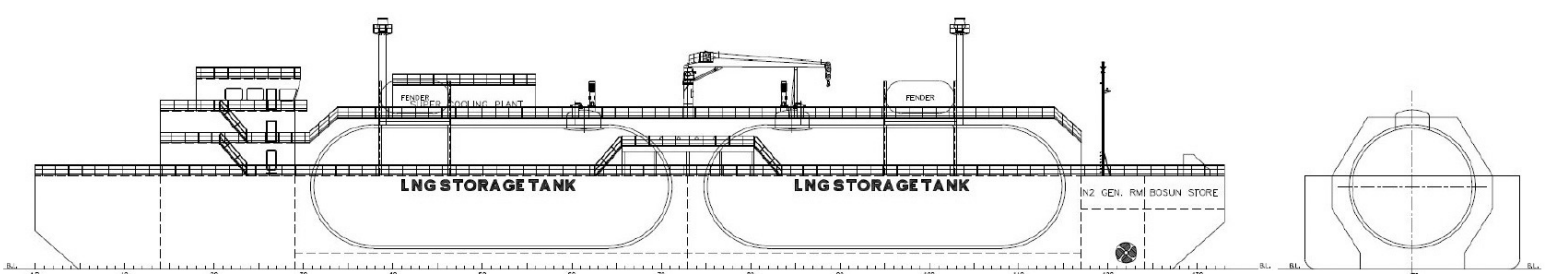
- Dual Fueled power generation located on barge. Used only in docking and transfer mode
- Type C tanks supplied by STO Americas supplier
- Chinese build modules for cost efficient installation
- Chinese built main and auxiliary systems




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<p><u>MAIN PARTICULARS</u></p> <p>Length over all Apprx. 106.40 m Breadth, moulded 19.20 m Depth, moulded 8.50 m</p> <p><u>CARGO TANKS</u></p> <p>Q'ty/Type 2 sets, IMO type C Capacity 2,550m³ per tank Max Design Press. 5.0 bar.g MARVS 6.0 bar.g SRV 2 sets / tank Min. design temp. -163 °C Material AISI 304L or 9% Nickel Insulation Foam insulation</p> <p><u>CARGO PIPING SYSTEM</u></p> <p>Design pressure 10 bar.g Min design temp. -163 °C Material AISI 304L Manifold L-V-L (P&S) Insulation Double wall vacuum insulated Single wall insulated in tank domes Vent riser 2 sets</p>		<p><u>CARGO PUMP</u></p> <p>Q'ty 4 sets (100% x 2 sets / tank) Type Submersible or Deep well (VFD), Capacity 500m³/h x 140 MLC (S.G: 0.5)</p> <p><u>SUPER COOLING PLANT</u></p> <p>Q'ty 1 set Type/ Model Turbo-Brayton cycle TBF-350 (Air Liquide) Capacity 0.5 ton/h</p> <p><u>NITROGEN GENERATOR</u></p> <p>Q'ty 1 set Type Membrane or PSA Capacity 425Nm³/h Dew point -50 °C Discharge pressure 6 bar.g</p> <p><u>FIRE FIGHTING SYSTEM</u></p> <p>Water spray system Dry chemical powder system</p>	<p><u>TANK MONITORING SYSTEM</u></p> <p>Custody Transfer System Radar type (2 sensor / tank) Temperature sensor 4 sensor / tank Pressure sensor 1 sensor / tank Hi-hi level & over fill alarm 1 radar type / tank</p> <p><u>AUTOMATION SYSTEM</u></p> <p>Fully integrated process-based Automation System. PMS and Valve remote control system to be integrated. Workstation 2 sets in Cargo Control Room I/O about 1200HW + 1000Serial bus</p> <p><u>SAFETY SYSTEM</u></p> <p>Gas detection unit 1 set, Catalytic sampling type ESD & Data Transfer Trelleborg, Universal Safety Link</p> <p><u>METERING SYSTEM</u></p> <p>Flowmeter & Totalizer 2 sets, Coriolis type</p> <p><u>VALVE REMOTE CONTROL SYSTEM</u></p> <p>Actuator Hydraulic type HPU 1 set Valve control to be integrated into Automation System</p>
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5,000 CBM LNG Bunkering Barge

Project No.	GTK2404
Revision No.	PP01
Date	2024.05. 23

To Complete Presentation

- Assumed U.S. Content
 - Hull, LNG tank bases, module foundations, piping, wiring, machinery supports and bracing, main deck and topsides, pump house, and other deck houses as required
- Assumed Chinese/Korean Content
 - LNG type C tanks, tank monitoring, super cooling system
 - LNG pump modules, valves, and controllers
 - LNG piping & transfer hoses
 - Electrical emergency and shutdown systems/digital control systems
 - Fire protection
 - Deisel powered bow thruster
 - Winches, Anchors, and chains
 - Metering System
- USCG and Naval Architects to be contacted to confirm % content and design