

GREEN FEEDER

DUAL FUEL CONTAINER VESSEL 1000 - ECOSMART VESSEL

The first green vessel with high added value built to the highest EU environmental regulations which globally achieve the largest fuel savings



Taking inspiration from **NATURE**

Inspired by nature's constant struggle to keep our planet clean and safe, we devoted ourselves to developing the first container vessel, with NG dual fueled two-stroke diesel engine; the most efficient, safe and environmentally friendly ship.

Green Feeder Cont. 1000 is 12.200 mt new generation eco-friendly Coverless Feeder Container vessel



ENVIRONMENTALLY FRIENDLY

and more fuel efficient

The Vessel design is developed targeting environmentally friendly worldwide transportation through a set of focus areas that helped us to build a green future.

THE VESSEL OFFERS

- low resistance; achieved by the optimization of a hull using extensive CFD analysis and model testing with the accommodation incorporated in the hull and arranged forward in the bow of the vessel
- optimized fuel saving; achieved by optimized hull, rudder, fixed pitch propeller with large diameter, as well as optimized propeller speed
- 45% fuel savings of NG engine comparing to Marine Diesel Oil
- optimized wake distribution
- reduced light ship weight through 3D FEM structural analysis
- maximum cargo volume and deadweight
- good sea-keeping characteristics
- functionality of the bridge
- social education impact; academic role in student and future employees training with NG expertise
- functionality of communication and navigation equipment
- reduced noise and vibration conditions for crew



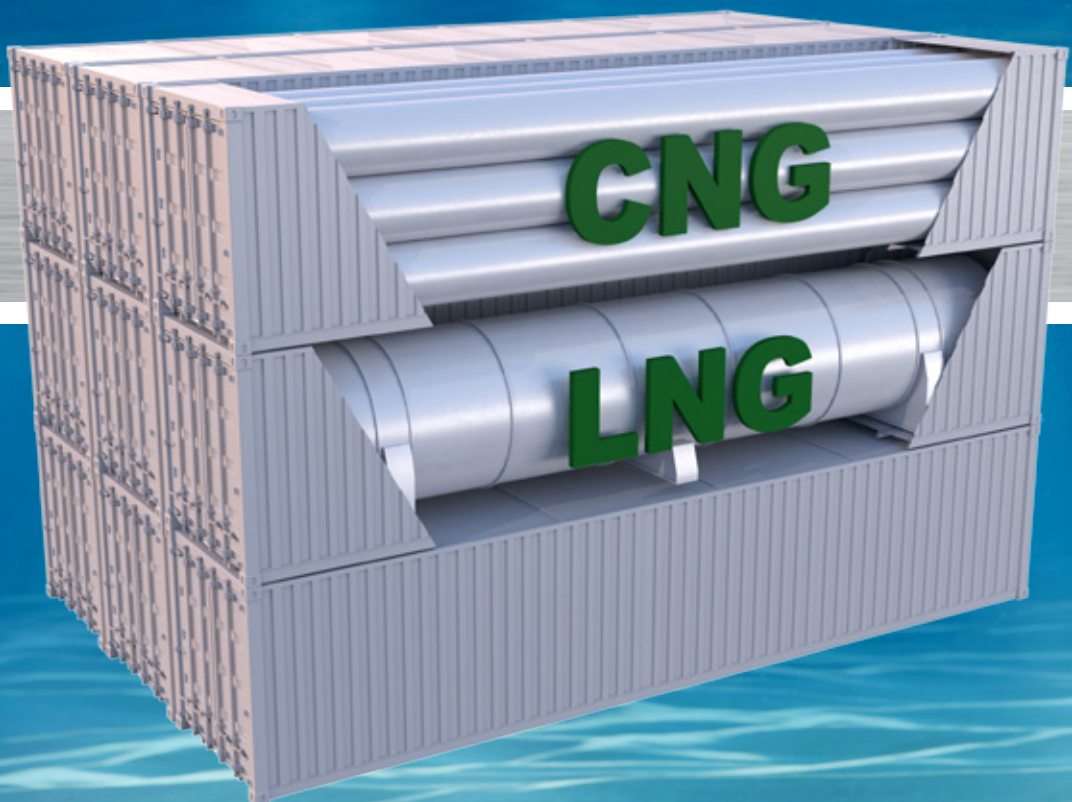
ECOLOGICAL FEATURES

- NG powered propulsion and energy supply with no heavy fuel on board
- NG dual-fueled main and auxiliary engines
- the first green vessel with high added value built to the highest EU environmental regulations, which globally achieve the largest fuel savings
- two-stroke low consumption engine with direct driven propeller
- use of removable 20ft, 40ft and 45ft container modules with NG cylinders for clean transportation with positive impact on maintenance cost and hull longevity, reducing the bunkering time and hazard
- efficient and safe handling of dangerous goods
- sewage and waste treatment plant
- use of biolubricants
- ballast water treatment
- extensive use of LED lighting
- extensive waste heat recovery
- considerably reduced fuel consumption and cost
- considerably reduced emissions of greenhouse gas CO₂ (for 25%)
- considerably reduced emissions of NO_x (for 60%)
- eliminated emission of SO_x and solid particles (for >99%).
- complete control of harmful substances emission into water and air
- compliance with the relevant environmental regulations

PROVEN DESIGN SOLUTION & quality engineering

Brodosplit developed the design of container vessels of various TEU capacities. The shipyard decided to develop a new project of coverless dual fuel feeder container vessel, emphasizing environmentally friendly approach and fuel efficiency, simultaneously **aiming to achieve EEDI (energy efficiency design index) lower than IMO required for year 2025.**

The Vessel and its equipment will be suitable for the transportation of containers, including reefer containers and containers with dangerous goods. Cargo holds will have movable cell guides and all container slots in holds, while the deck will be usable for Euro pallet wide containers.





MAIN PARTICULARS

Loa:	163.60 m
Lbp:	152.00 m
B (mld):	23.80 m
D:	14.50 m
Design draught:	8.00 m
Scantling draught:	8.50 m
Deadweight on design draught	12200 mt
Deadweight on scantling draught	14300 mt
Ballast tanks capacity	7100 m ³

Classification:

GL + 100 A5 E1 IW HATCHCOVERLESS BWM (D2) DG Container Ship,
LC, RSCS, MC E1 AUT GF EP-D





RULES AND REGULATIONS


The latest rules and regulations, which are in force, will be applicable:

1. International Load Line Convention 1966 with 1971, 1975 and 1979 amendments
2. International Convention for Safety of Life at Sea 1974 (SOLAS 1974) with amendments
3. Code on intact stability for all types of ships covered by IMO Instruments, Resolution A.749 (18)
4. International Convention for Prevention of Pollution from Ships 1973 (MARPOL 1973) with 1978 Protocol (ANNEX 1), ANNEX V, VI.
5. International Regulations for Prevention of Collisions at Sea 1972 with 1981 Amendments
6. International Telecommunication Convention 1973 and Radio Conference (1979 WARC) and Radio Regulations, 1982, Amendment 1st February, 1992 GLOBAL MARITIME DISTRESS AND SAFETY SYSTEM
7. ISO 6954 "Guidelines for the Evaluation of Vertical and Horizontal Vibration of Merchant Ships"
8. Standard Specification of the International Maritime Satellite Communication System for Ships and INMARSAT Regulations
9. Noise Levels - Code on Noise Levels on Board Ships (Resolution MSC.337 (91))
10. International Conference on Tonnage Measurement of Ship 1969 and Amendments July 1982, in force as from July 18th, 1994
11. IMO Regulations and Recommendation on the carriage of dangerous cargoes and amendments
12. MSC/Circular.608/Rev.1 - Interim Guidelines for Open-top Container ships
13. Kiel Canal regulations
14. International Labor Organization ILO, Maritime Labor Convention 2006, MLC 2006
15. National Rules of Netherlands
16. Resolution MSC. 285(86): Interim Guidelines on Safety for Natural Gas-Fueled Engine Installations in Ships (IGF Guideline), including BLG 14 interpretations
17. Resolution of MSC.215 (82), Performance Standard for Protective Coatings for dedicated seawater ballast tanks in all types of Ships and double-side space of Bulk Carriers
18. GL Rules for Classification of Ships including "Guidelines for the Use of Gas as Fuel for Ships"
19. Green Passport - Guidance on Ships Recycling



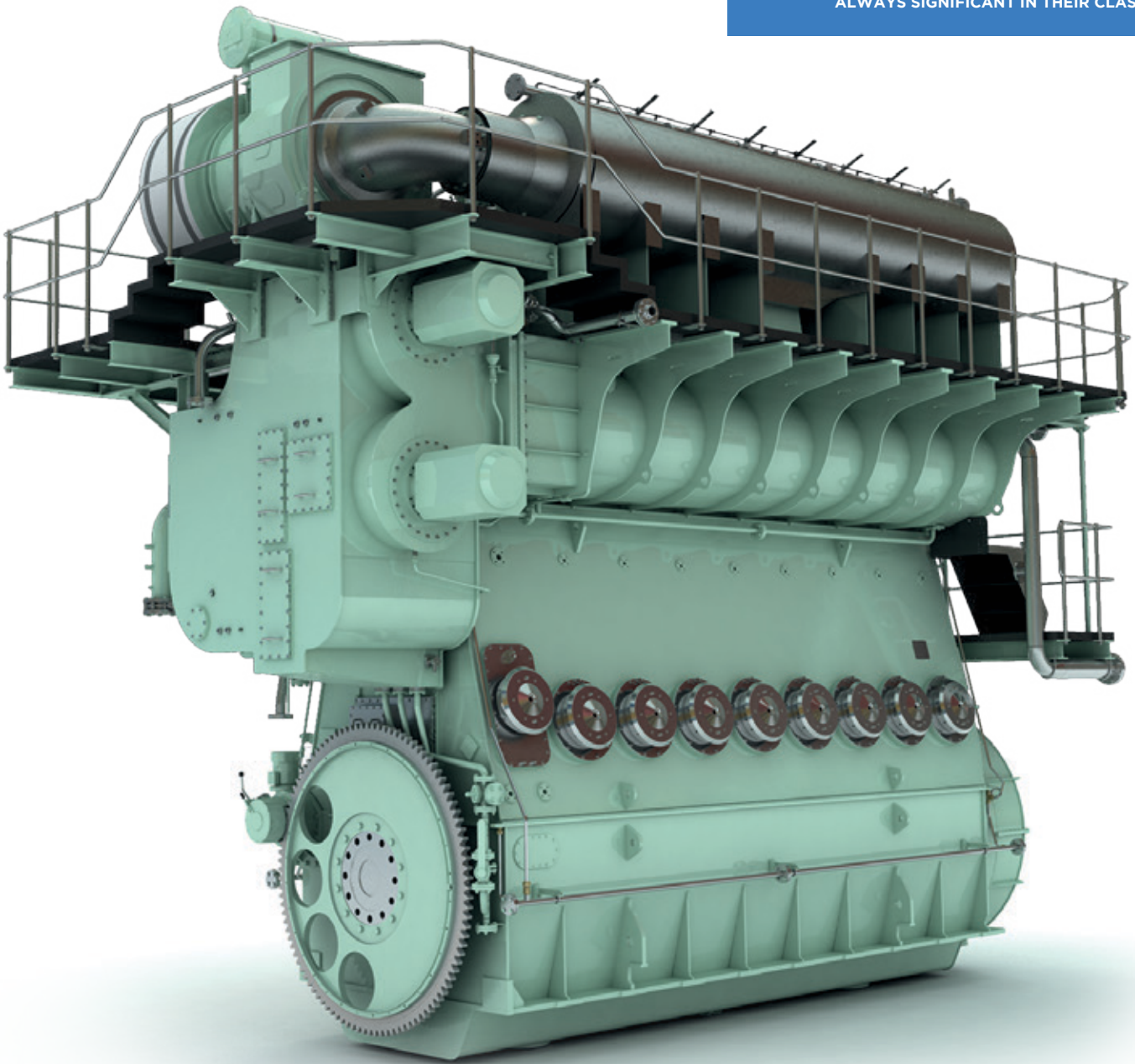
CARGO AREA

COMPARISON TABLE



CHARACTERISTICS	CABS	M/V BALKAN	M/S LINDA	CONTAINER FEEDER 900
LOA (m)	163.60	161.00	141.20	150.12
Breadth (m)	23.80	25.00	21.55	21.80
Depth (m)	14.50	13.90	-	9.50
Draught (m)	7.80	9.90	8.60	7.20
Main Engine	MAN B&W 6G45ME-C9.5-GI-TII	MAN B&W 6S60MC-C	WARTSILA 8L46C	MAK 9M43C
Speed (knots)	17.00	20.00	17.70	18.00
Total daily Pilot F.O.C. (mt/day)	1.00	-	-	-
Total daily G.C. (mt/day)	16.60	-	-	-
Container capacity	1058	1304	907	902
Classification	GL	GL	GL	-





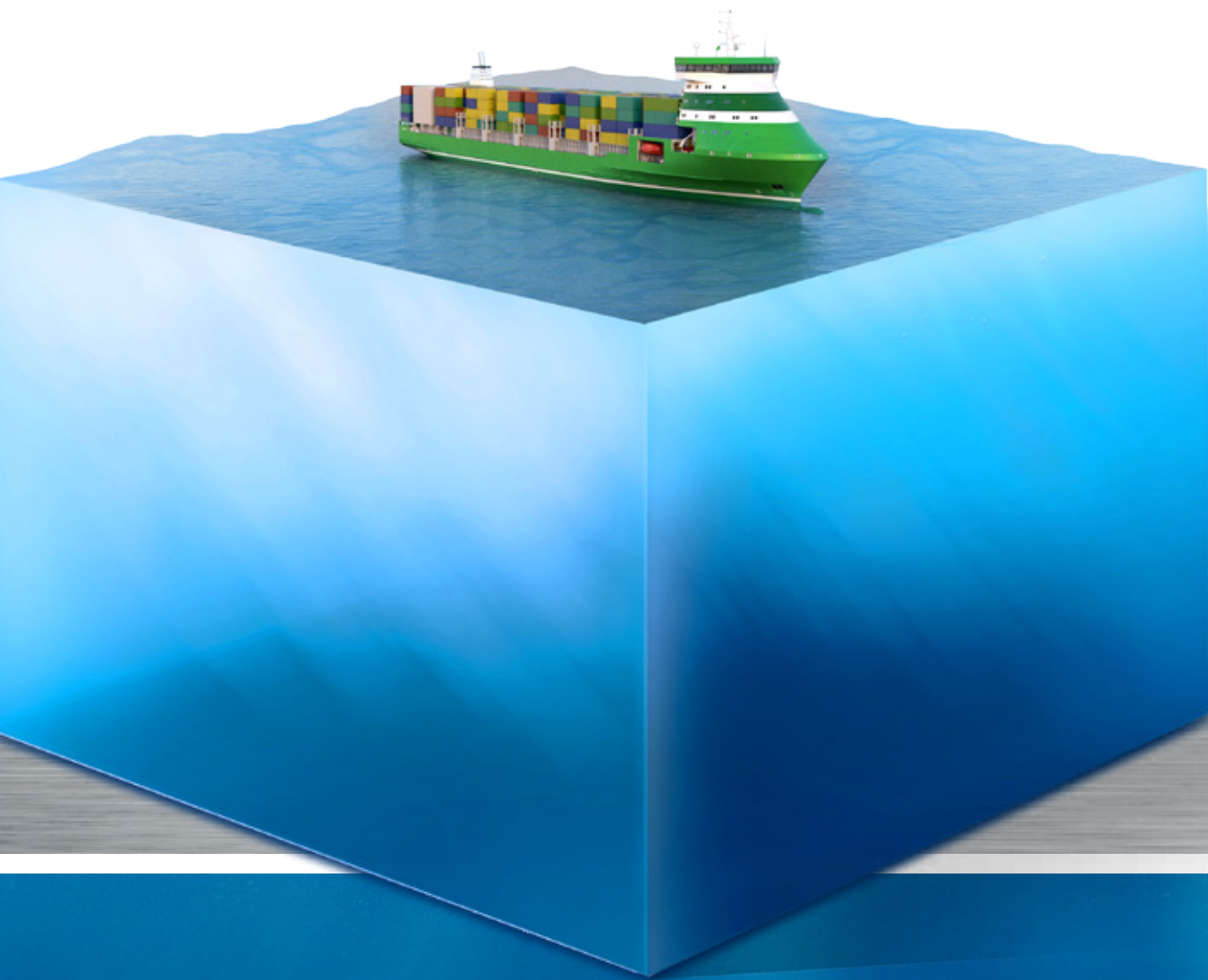
MACHINERY

Main Engine	<p>MAN B&W 6G45ME-C9.5-GI Tier II single acting, long stroke, turbocharged, reversible, optimized for part load operation, Diesel engine SMCR 6176 kW at 105 rpm, manufactured by Brodosplit Diesel Engine Factory with MAN B&W license.</p> <p>The vessel propeller can be driven by the M.E. assisted by the shaft generator running as booster motor mode abt.700 kW.</p> <p>Low speed 2-stroke "dual fuel" (NG/MGO) engine with superb efficiency extra low consumption, low maintenance costs and longer life span.</p>
Propeller	<p>One fixed pitch propeller, diameter abt. 5,8 m, 4 - bladed, solid type, keyless, of nickel aluminum bronze.</p>
Shaft generator/ booster motor	<p>One gearbox tunnel gear execution for:</p> <ul style="list-style-type: none"> - PTO of 1200 kW for shaft generator, - PTI of 700 kW for propeller power boosting
Tunnel thrusters	<p>Two electrically driven fixed pitch transverse thrusters, one of 800 kW frequency controlled in the fore part, one of 400 kW frequency controlled in the aft part.</p>
Hot water boiler	<p>One 650 kW hot water boiler with electric heaters</p> <ul style="list-style-type: none"> - One ME exhaust gas economizer acc. ME NCR range for hot water - Two AE exhaust gas economizer acc. AE load for hot water
Main generators	<p>Main dual fuel four-stroke diesel electric aggregates AC 440 V, 3-phase, 60 Hz:</p> <ul style="list-style-type: none"> - Two 1662 kVA (1400 kW) up to 720 rpm - One 1187 kVA (1000kW) up to 720 rpm
Emergency generator	<p>One MGO four-stroke diesel electric aggregate AC 440 V, 3-phase, 60 Hz, 300kVA (250 kW).</p>
Battery buffering system	<p>For running of stern and bow thrusters in maneuvering mode</p>



SETTING THE BENCHMARK

for efficiency and environmental
performance



Highly optimized & competitive hull shape

- 15.0 knots at NCR consuming 11.7 tons/day NG based on the continuous service rating (CSR) of 4000 kW and LCV of 50000 kJ/kg
- The capacity of NG container tanks will be for cruising range of abt. 1.200 nm
- NG bunkering allowed in port, estimated time for NG bunkering up to 3 hrs
- Shore power connection installation ("cold ironing") allows activity of all required consumers, without running of electric generator units in the port (no pollution in port)





OPERATIONAL FLEXIBILITY

and efficiency

Cargo space is divided into four (4) cargo holds with open top concept which reduce loading/unloading time. Air pollution avoided using shore power connection.

Cargo holds have movable cell guides. Socket outlets for reefer containers will be arranged in Hold No.2 and 3 and on main deck aft.

Intended cargo:

ISO containers 20', 40' and 45'



All 40' container stacks in holds and on the deck are arranged for mixed stowage of 20' and/or 40' containers. Containers 45' may be carried in holds No. 2, 3 and 4 and on deck in way of engine room. All container slots in holds and on deck will be useable for 2.500 mm wide Euro pallet containers.

Dangerous goods in closed freight containers according SOLAS II-2, Reg. 19 of the classes 1.4S, 2, 3, 4, 5, 6, 8, 9 can be carried in the holds, except goods containing hydrogen or hydrogen mixture and classes 2.3, 4.3 liquids having a flashpoint less than 23°C as listed in the IMDG Code and 5.2, for which stowage in open-top container cargo spaces is prohibited.



Above engine room Class 5, 6, 8 and 9 to be carried except in dangerous zone in way of NG tanks.

Ballast system consists of ballast tanks arranged in double side and double bottoms facilitating safe and effective ballast water exchange, using two (2) pumps of 500 m³/h each, stripping eductor of 50 m³/h and ballast water treatment system. Heeling tanks located in double side.

Access for inspection is provided by a complete double hull configuration according to the latest IMO requirements.



SAFETY

- Crew safety
- Two Davit launched lifeboats one of which is rescue boat
- Inflatable life raft
- Water mist firefighting system
- Bridge visibility 360
- Permanent thermal and immersion suits
- Fireman's outfit

Think **ECO-FRIENDLY**

Low emission machinery:

- Minimized environmental impact
- Meeting existing & future emission control regulations
 - MDO is carried in side tanks located in the engine room
 - NG is carried in tank containers located on the aft part of main deck
- Easy and safe water ballast exchange
- No air pollution in the port due the use off-shore power connection instead of generators (cold ironing)





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