

LNG Fuelling

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CMA CGM to power world's largest containerships with LNG

Shipping line CMA CGM has announced that nine new ultra-large vessels - the largest containerships ever built – will be fuelled by LNG.

The 22,000-TEU-capacity vessels will be at the upper end of current containership size, placing them in the Ultra Large Container Vessel (ULCV) category. This makes them amongst the largest vessels to be powered by LNG in the world, creating new challenges for bunkering infrastructure.

"We have made the bold decision to equip our future with a technology firmly focused on the protection of the environment... by choosing LNG, CMA CGM confirms its ambition to be a leading force in the industry in environmental protection by being a pioneer in innovative and eco-responsible technologies," Rodolphe Saadé, CMA CGM Group CEO, said.

Standards agency Bureau Veritas will provide classification for nine LNG-fuelled containerships currently under order from shipping line CMA CGM. Bureau Veritas has already been closely involved in feasibility studies for the new 22,000 TEU containerships, working with the owner, builders and technology providers through the development process.

Breakthrough for membrane containment systems

Initial feasibility studies were carried out by Bureau Veritas



CMA CGM containership

together with shipbuilding group China State Shipbuilding Corporation (CSSC) and GTT, the containment system designer.

"This is a breakthrough order for gas fuelled shipping - both in scale and in the use of a membrane containment system. Bureau Veritas has been supporting the project throughout, providing assistance to ensure the requirements for the safe use of LNG are addressed," Philippe Donche-Gay, President, Bureau Veritas Marine & Offshore, said.

ULCV powers on to LNG

"As CMA CGM have said, they will be the first shipping company in the world to equip giant containerships with LNG propulsion, pur-

suing a strong commitment to the protection of the environment and to ocean conservation," Jean-François Segretain, technical director at Bureau Veritas Marine, said.

To date the majority of LNG-fuelled vessel have been in the small to medium scale used in short sea journeys. The new CMA CGM ships however will have a bunker capacity close to 18,000 cubic metres (cbm) representing a step-change in volume.

"For us this is an exciting project to be involved in and our teams in China, supported by expertise in Paris, are looking forward to working on these innovative new ships," Segretain added.



Model of the PERFECT mega boxship

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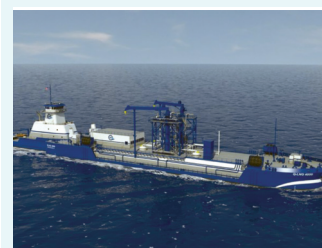
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MAN to complete record LNG retrofit for Tote

Transportation and logistics firm Tote has contracted engineering firm MAN Diesel & Turbo to retrofit two vessels for LNG operation.

After-sales division MAN PrimeServ will carry out the work to retrofit the vessels *North Star* and *Midnight Sun* on behalf of Tote Maritime Alaska. The roll on/off ships are currently both powered by four sets of MAN 58/64 engines and will be retrofitted to MAN 58/64 dual-fuel units.

"TOTE Maritime Alaska is excited to convert its fleet to LNG

power which will result in a significant reduction in air emissions including particulate matter, sulphur oxide (SOx) and nitrogen oxide (NOx). This significant investment of time and money is a reflection of our commitment to the environment, our customers and the state of Alaska" Michael Noone, President of Tote Maritime Alaska, said.



Representatives of Tote and MAN sealing the deal

Largest LNG conversion in North America

The retrofit contract will cover design, development and testing of a first-of-its-kind dual-fuel kit, which will serve as foundation for the largest LNG conversion in North America.

The two Orca class ships were originally constructed by NASSCO, part of U.S. aerospace and Defence firm General Dynamics and are used to carry operate fast routes between Anchorage, Alaska and Tacoma, Washington. Tote Maritime Alaska handles approximately one-third of goods transportation between the continental US and Alaska.

"To meet TOTE's requirements, we have developed a solution based on our well-proven 51/60DF retrofit. Accordingly, the engineering approach to the 58/64 retrofit is very familiar to us, and

this project represents a straightforward conversion procedure," Dr. Thomas Spindler, Head of Upgrades & Retrofits at MAN PrimeServ, explained.

Tote has been at the vanguard of shipping industry adoption of LNG as a transport fuel and has pushed the boundaries via its subsidiary Tote Maritime Puerto Rico, which ordered the world's first LNG-powered Marlin class container ships. *The Isla Bella* and *Perla del Caribe* entered service in 2015, both of which feature single MAN B&W 8L70ME-GI engines.

"We have been investigating and testing many options for shifting the fleet to LNG... This innovative solution that has been developed in partnership with MAN, will be an important milestone for the industry," Peter Keller, Executive Vice President of Tote, said.

Gabadi, Hankuk launch LNG alliance

Naval outfitter and gas carrier Gabadi has signed a partnership agreement with Korean firm Hankuk Carbon to develop solutions for the LNG bunkering sector.

The new alliance will build on Hankuk's existing expertise in the manufacture of thermic insulation for LNG systems and electronic substrates for industrial uses. The firm will now seek to develop solutions for "the carrier-to-carrier fuel supply of LNG", both at small and medium scale.

The deal builds on Gabadi's existing joint venture in China, with local firm Aojiheng Offshore Engineering. The firm is currently executing methane carrier repair in Singapore and is the first non-shipyards company, to be granted a license by LNG technologist Gaztransport and Technigaz, for the construction and repair of its

membrane tanks.

Headquartered in South Korea, Hankuk Carbon has three plants, located in Miryang and Hamyang, Korea.

Partners foresee multiplier effect

The joint venture partners expect the new collaboration will have a multiplier effect, allowing the combined alliance to obtain new contracts related to the LNG bunkering, and expand into a range of different markets, including the U.S., China and Europe.

"With this agreement, a new solution is offered, due to the combination of the LNG insulation



Gabadi and Hankuk executives at the signing ceremony

manufacturing technology from Hankuk Carbon, with the membrane tanks installation technology from Gabadi. Without a doubt, we will occupy a dominant position, owing to this cooperation", stated Antonio Llago, CEO

of the Galician company.

Based in Galicia in the north of Spain, Gabadi has provided outfitting and auxiliary services for the shipbuilding industry for over 25 years from its headquarters in Naron.

LNG Fuelling

1st Floor, 30 Warner Street
London EC1R 5EX,
United Kingdom
www.lngjournal.com
Tel: +44 (0)20 7017 3404

Publisher

Stuart Fryer

Editor

Malcolm Ramsay
+44 (0)20 7017 3413
malcolm@lngjournal.com

Ad sales enquiries

Narges Jodeyri
+44 (0)207 017 3406
narges@lngjournal.com

Subscriptions

Elena Fuertes
Tel: +44 (0) 20 7253 2700
elena@lngjournal.com
Subscription included with LNG Journal

Production

Vivian Chee
Tel: +44 (0) 20 8995 5540
chee@btconnect.com

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LNG bunker competition heats up

Competition to build and operate the next generation of LNG bunker vessels is growing as energy majors announce plans to increase their exposure to the sector.

A total of nine purpose-built vessels are reportedly on order or already on the water, with Shell dominating the race so far with a planned fleet of four LNG bunker vessels but facing new competition from energy majors Total and Korea Gas for the next phase of LNG bunker infrastructure.

Completed vessels include *Engie Zeebrugge*, *Coralius* and *Cardissa* while confirmed orders are for the 7,500 cubic-metre Hull 2234 due in South Korea in 2019, a 7,500 cubic-metre vessel due in Klaipeda in 2019 and a 3,000 cubic-metre vessel due in Rotterdam in 2019.

Shell plans *Coral Methane* modifications

Alongside its plans for a new barge to be built by Q-LNG, Shell is reportedly planning to consolidate its first-mover position in the sector by finalising plans to convert the Anthony Veder-owned *Coral Methane* from an LNG carrier to an LNG supply vessel.

While the company's plans for *Coral Methane* are still at an early stage it expects to upgrade the 7,551-cubic-metre multigas carrier to become the world's first small-scale LNG/LPG/LEG bunker vessel.

"Shell has already ordered its



The *Coral Methane*

second LNG bunker-supply ship... Number three is in the making and, already, ships number four and five are on the cards. The ball is rolling. Now, the question is getting others to follow," Laurant Wetemans, general manager for downstream LNG at Shell said during the launch of Shell's first barge *Cardissa* in Rotterdam.

Total eyes Asian tie-up

French energy firm Total has also reportedly invited shipyards to bid for the construction of a new LNG bunker-supply ship that will be double the size of any built to date.

Discussions between Total and Chinese and South Korean shipyards are reportedly aimed at constructing a vessel capable of supplying up to 18,000 cubic me-

tres of LNG. The deal is linked to shipping line CMA CGM's order for nine 22,000 TEU container ships due for delivery by the end of 2019.

Total does not intend to own and operate the new bunker vessels according to reports by LNG World Shipping which suggest that inquiries with a shipowner are happening in parallel. Total is instead discussing means to charter the necessary capacity.

Korea Gas meanwhile has ordered a Samsung Heavy Industries-built Hull 2234, which it plans to charter for LNG supply and US-based Jax LNG is building the *Clean Jacksonville*, which is expected to be the first barge in the U.S. when it enters service later this year.

NEWS NUDGES

Klaipeda operations officially commence

Terminal operator Klaipedos Nafta has officially started operation of its small-scale on-shore LNG reloading station at KLAIPEDA but expects trial operations and commissioning works to continue until the end of the year.

"The LNG reloading station is one of the major investment projects included in the company's strategy for the period until 2020, with the need for and usefulness of it already seen at the time of the station's commissioning: the first commissioning cargo has been delivered by the global oil and gas giant Shell, and the first LNG trucks already shipped to Poland. We believe that Lithuania will eventually develop the network of LNG regasification stations: its beginning can already be seen in Druskininkai, with the progress and favorable prospects felt in the neighboring countries," Mindaugas Jusius, CEO of Klaipedos Nafta, said.



The *Clean Jacksonville* is due to enter operations this year



LNG VALUE CHAIN SOLUTIONS

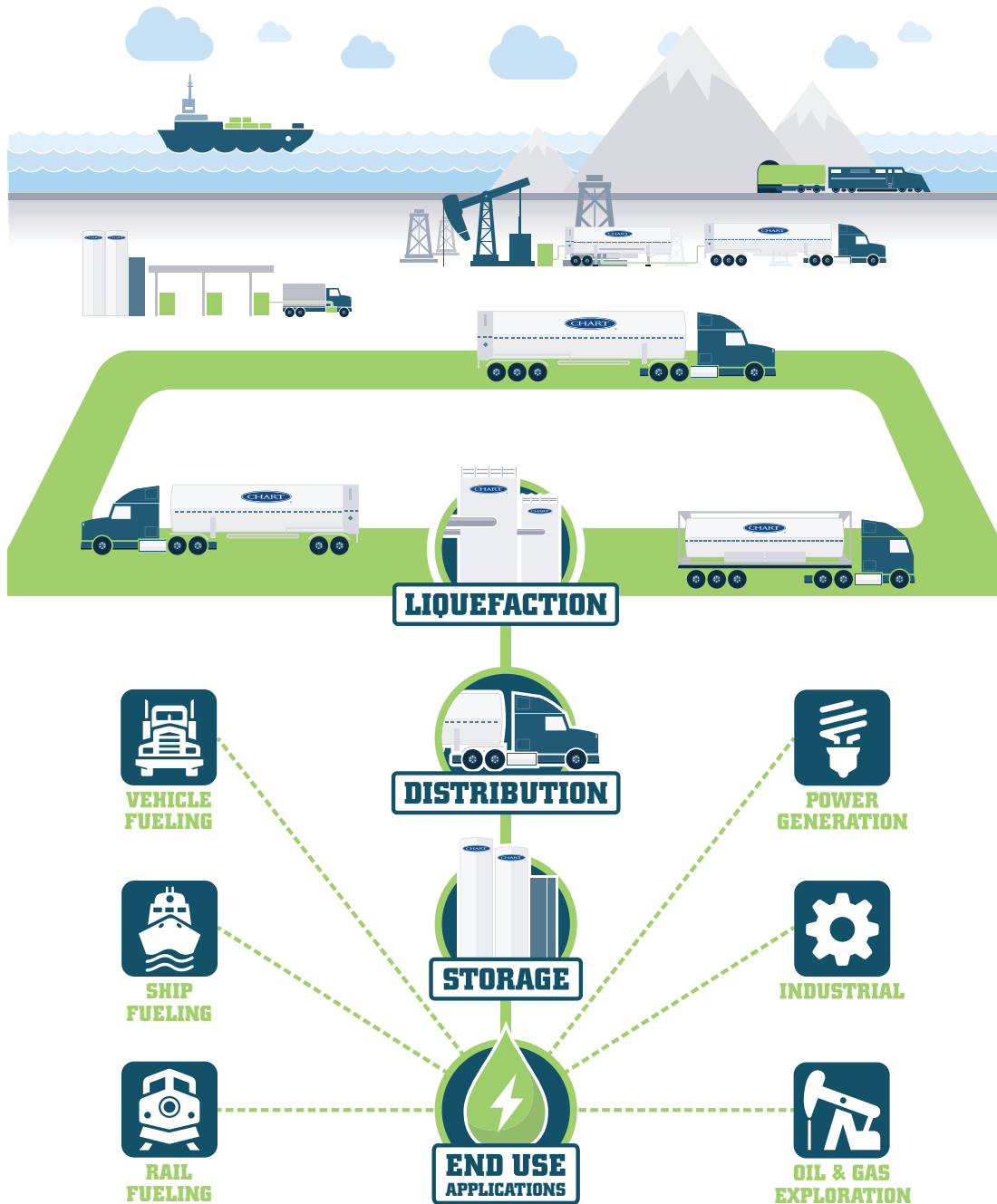


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Skangas, Titan sign LNG bunkering partnership

Fuel specialists Skangas and Titan LNG have signed a memorandum of understanding (MoU) to cooperate on the supply of LNG for shipping in the North Sea and Baltic region.

The firms expect the collaboration will drive further “innovative solutions” with the agreement designed to improve “optimization of LNG deliveries” and increase overall availability of LNG in the region.

“Vessels require flexibility in order to trade profitably and need to bunker in a variety of ports. Hence ship operators need flexible, reliable and rapid deliveries of LNG. By partnering with Skangas we will develop a broader delivery scope for the operators of LNG powered vessels,” Niels den Nijs, CEO of Titan LNG, said.

To date, Skangas’ main operating area has been the Baltic and North Sea where the firm operates two LNG bunker vessels. Titan LNG meanwhile has built up capability in the Amsterdam, Rotterdam and Antwerp region (ARA) and is due

to take delivery of the first LNG bunkering pontoon, FlexFueler1, in Q3 2018.

LNG adoption accelerating

The new partnership will take advantage of Titan LNG’s experience supplying industrial transport solutions as part of IVECO Schouten Group. Sister company Rolande LNG, is also a leading LNG fuelling station operator for road transportation.

“LNG is rapidly becoming the fuel of choice for vessel owners and operators. Adoption is accelerating, as it’s a cost-effective alternative. LNG is suitable for a lot of vessel types and sizes,” Michael Schaap, Commercial Director for Titan LNG, said.

Joint venture company Skangas is 70% owned by Finnish natural



Skangas LNG bunker vessel *Coralius*

energy gas expert Gasum and 30% owned by Norwegian electricity group Lyse Energi. The firm is one of the largest LNG suppliers in the Nordic region and provides fuel for shipping, industrial and heavy-duty road transport needs.

“This is a step in the right directions for us. Having invested heavily in making LNG available for the market in the Nordics we can now gain from our experience and knowhow in new geographical areas. This memorandum can lead to a win-win-situation for both our

marine customers and our two companies,” Kimmo Rahkamo, CEO of Skangas, said.

One-stop-shop for LNG

The new partners will now focus on developing a “one-stop-shop” for marine customers seeking to use LNG.

“For ship owners considering if they should go for LNG as their new fuel there is now even less to worry about as we can assist them with both design and increased LNG availability,” den Nijs added. ■

Jost orders LNG-fuelled trucks, sets 2020 conversion target

Logistics specialist Jost Group has ordered 500 IVECO LNG-fuelled trucks and announced plans to target 35% conversion of its fleet to LNG by 2020.

The supply agreement will see Jost gain 500 IVECO Stralis NP trucks as part of its operations providing pan-European transport. The first 150 vehicles are set to enter operation during 2018, with the full fleet to be in service by 2020.

“This marks a key turning point for our business as we begin a strategic move away from our dependence on diesel and towards green logistics, as requested by our customers, which are demand-

ing a more sustainable transport. Our excellent experience operating Stralis Euro 5 EEV diesel vehicles has seen us establish a solid relationship with IVECO, supported by a very strong service network across Belgium,” Roland Jost, Owner of Jost Group, said.

LNG to replace ageing diesel

The new trucks will replace 4-to-5-year-old diesel-powered vehicles

in the Belgian firm’s fleet of 1,400 trucks and 3,000 trailers. The firm currently operates 132 Stralis vehicles, including two running on compressed natural gas (CNG).

Iveco has sold an estimated 22,000 gas-powered vehicles to date and was one of the first manufacturers to introduce natural gas fuelled options for trucks, vans and buses in 1991.

“Gas offers the widest range of opportunities to replace diesel in the commercial vehicle market - it’s no longer a fuel of tomorrow, it’s a fuel of today. This has been firmly demonstrated with one of Europe’s biggest fleets selecting the Stralis NP, running on LNG, to lead their fleet replacement programme,” Pierre Lahutte, IVECO Brand President, commented.

Jost plans investment in three LNG fuelling stations

Alongside plans to roll-out more

LNG-fuelled vehicles in the company’s fleet, Jost also plans to invest in the development of bunkering stations and other infrastructure to support the growth of LNG as a transport fuel.

“We’re proud to be amongst the early adopters of this new technology: our goal for the next three years is to have 35% of our fleet running on LNG. Our Group is also supporting this with an investment in our own LNG refuelling infrastructure, with plans to open up to three filling stations within our major operating centres in Belgium,” Jost Explained.

Family-run firm, Jost Group employs more than 2,800 staff across offices in 10 countries in Europe and North Africa. The group offers full, partial and bulk load transport solutions, including dry freight and temperature controlled cargos, plus the movement of containers, dangerous goods and waste. ■



The IVECO Stralis NP

Shell builds LNG bunker barge fleet

Energy major Shell has signed a long-term charter agreement with Q-LNG Transport for a new LNG bunker barge to expand its bunkering network in the U.S.

The barge will have capacity to carry 4,000 cubic meters of LNG and is the first of its kind to be based in the U.S. Shell plans to deploy the ocean-going LNG barge to supply fuel to marine customers along the southern East Coast of the U.S.

"Our commitment in the Americas builds on Shell's existing LNG bunkering activities in Singapore and Europe, as well as recently announced plans in the Middle East and gives us the ability to deliver LNG as a marine fuel to customers around the world," Maarten Wetselaar, director of Integrated Gas and New Energies at Shell, said.

Singapore Technologies Engineering has been contracted via its subsidiary VT Halter Marine for engineering services and detailed

functional designs for the LNG Bunkering ATB unit. The ATB tug will have two GE 6L250 MDC EPA Tier 4-compliant main engines, the barge is designed to carry 4,000 cubic metres of LNG.

Harvey Gulf to operate

The LNG bunker barge is designed to offer high efficiency and manoeuvrability and will feature an innovative transfer system enabling it to load LNG from big or small terminals and bunker a variety of customers.

"More ship owners and operators are choosing cleaner-burning LNG fuel over traditional marine fuels to respond to sulphur and nitrogen oxide emissions regulations, including the International Maritime Organization's (IMO) recent decision to implement

a global 0.5% sulphur cap in 2020," a spokesperson for Shell commented.

Q-LNG Transport will build and own the new barge while Harvey Gulf International Marine will operate it. Q-LNG is 30%-owned by Harvey Gulf International Marine with the remainder owned by CEO Shane Guidry personally.

Cruise line demand for LNG increasing

While the new bunker barge will be designed to supply a range of LNG-fuelled ship, Shell reports that it will particularly focus on meeting "growing cruise line demand" for the fuel.

North American cruise line operators such as Carnival, MSC Cruises and Seaspans have been amongst the earliest adopters of the fuel, partly driven by the need to reduce emissions while idling in port for long periods of time.

"This investment in LNG as a marine fuel for the US will provide the shipping industry with a fuel that helps meet tougher emissions regulations from 2020," Wetselaar added.

NEWS NUDGES

WinGD to supply LNG engines for ULCVs

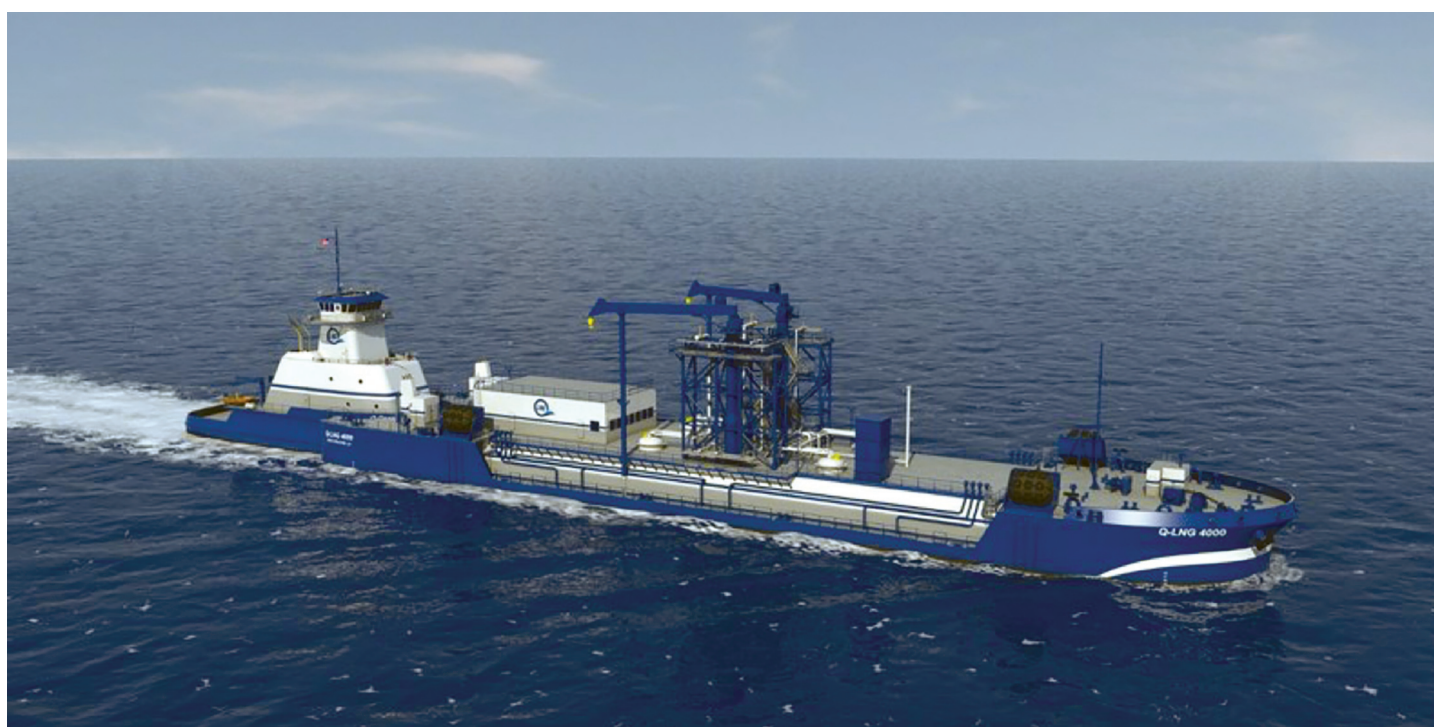
Equipment manufacturer Winterthur Gas & Diesel is to supply its low-speed X-DF dual-fuel engines for Shipping line CMA CGM's recent order of nine Ultra Large Container Vessels.

The 12-cylinder X92DF engines will be installed for the vessels under construction at Hudong-Zhonghua Shipbuilding and Shanghai Waigaoqiao Shipbuilding which are due to enter service in 2020 on routes between Asia and Europe.

"Given the low NOx emissions of dual-fuel engines using lean burn combustion and the extremely low sulphur content of natural gas, by choosing our X-DF engines and LNG, CMA CGM is automatically complying with all existing and future emissions regulations," Volkmar Galke, General Manager of Sales at WinGD, said.

“More ship owners and operators are choosing cleaner-burning LNG fuel over traditional marine fuels to respond to sulphur and nitrogen oxide emissions regulations”

- Shell spokesperson



Artist's rendition of the bunker barge

WORLD LNG-FUELLED CONFIRMED NEWBUILDS

Year	Type of Vessel	Owner	Class
2017	Car/passenger ferry	Society of Quebec ferries	LR
2017	Car/passenger ferry	Society of Quebec ferries	LR
2017	Tug	Drydocks World	
2017	PSV	Siem Offshore	DNV GL
2017	Gas carrier	Evergas	BV
2017	PSV	Siem Offshore	DNV GL
2017*	Ro-Ro	TOTE Shipholdings	ABS
2017	Car/passenger ferry	BC Ferries	LR
2017	Gas carrier	Ocean Yield	DNV GL
2017	Gas carrier	Ocean Yield	DNV GL
2017	Gas carrier	Ocean Yield	DNV GL
2017	Gas carrier	Navigator Gas	ABS
2017	Dredger	DEME	BV
2017	Dredger	DEME	BV
2017*	Container ship	Wessels Reederei	BV
2017	Hopper Barge	Bremenports	DNV GL
2017	HSLC	Fred. Olsen	DNV GL
2017	PSV	Harvey Gulf Int.	ABS
2017	PSV	Harvey Gulf Int.	ABS
2017	Cable layer	DEME Tideway	DNV GL
2017	Gas carrier	Evergas	BV
2017	Gas carrier	Evergas	BV
2017	Tug	Østensjø Rederi	
2017	Tug	Østensjø Rederi	
2017	Tug	Østensjø Rederi	
2017*	Car/passenger ferry	BC ferries	ABS
2017	RoPax	Rederi AB Gotland	DNV GL
2017	Car/passenger ferry	Caronte & Tourist	RINA
2017	Oil/chemical tanker	Groupe Desgagnés	BV
2017	Oil/chemical tanker	Groupe Desgagnés	BV
2017	Oil/chemical tanker	Groupe Desgagnés	BV
2017	Oil/chemical tanker	Groupe Desgagnés	BV
2017	Car/passenger ferry	BC Ferries	LR
2017	Oil/chemical tanker	Terntank	BV
2017	Container ship	Crowley Maritime Corp.	DNV GL
2017	Container ship	Crowley Maritime Corp.	DNV GL
2017	RoPax	Tallink	BV
2017	Container ship	Brodosplit	DNV GL
2018	Container ship	Brodosplit	DNV GL
2018	Bulk ship	ESL Shipping	DNV GL
2018	Bulk ship	ESL Shipping	DNV GL
2018	Tug	Keppel Smit Towage	ABS
2018	Tug	Maju Maritime	ABS
2018*	Car/passenger ferry	BC ferries	ABS
2018	PSV	Harvey Gulf Int.	ABS
2018	Container ship	Brodosplit	DNV GL
2018	Container ship	Brodosplit	DNV GL
2018	Car/passenger ferry	Royal Doeksen	LR
2018	Car/passenger ferry	Royal Doeksen	LR
2018	Car/passenger ferry	CHFS	LR
2018	Car/passenger ferry	CHFS	LR
2018*	Ro-Ro	TOTE Shipholdings	ABS
2018	RoPax	Rederi AB Gotland	DNV GL
2018	General cargo ship	Nordnorsk Shipping	DNV GL
2018	Container ship	Containerships	ABS

Year	Type of Vessel	Owner	Class
2018	Container ship	Containerships	ABS
2018	Container ship	GNS Shipping	ABS
2018	Container ship	GNS Shipping	ABS
2018	Container ship	GNS Shipping	ABS
2018	Container ship	GNS Shipping	ABS
2018	Heavy lift vessel	Heerema Offshore	LR
2018	Oil/chemical tanker	Furetank Rederi	BV
2018	Oil/chemical tanker	Furetank Rederi	BV
2018	Oil/chemical tanker	Furetank Rederi	BV
2018	Dredger	DEME	BV
2018	Bulk ship	POSCO	KR
2018	Dredger	van der Kamp	DNV GL
2018	Car/passenger ferry	Torghatten	
2018	Car/passenger ferry	Torghatten	
2018	Car/passenger ferry	Torghatten	
2018	Car/passenger ferry	Torghatten	
2019	Car/passenger ferry	Torghatten	
2019	Cruise ship	Carnival Corporation	RINA
2019	Cruise ship	Carnival Corporation	RINA
2019	Oil/chemical tanker	Älvtank	BV
2019	Oil/chemical tanker	Älvtank	BV
2019	Oil/chemical tanker	Thun Tankers	BV
2019	RoPax	Baleària	BV
2019	Car carrier	Siem Car Carriers	
2019	Car carrier	Siem Car Carriers	
2019	Emergency response ship	German Transport Ministry	
2019	Emergency response ship	German Transport Ministry	
2019	RoPax	Brittany Ferries	
2019	RoPax	Baleària	
2019	RoPax	Baleària	
2019	Oil/chemical tanker	Rosneft	
2020	Oil/chemical tanker	Rosneft	
2020	Oil/chemical tanker	Rosneft	
2020	Oil/chemical tanker	Rosneft	
2020	Research ship	German Transport Ministry	
2020	RoPax	Viking Line	
2020	Cruise ship	Carnival Corporation	RINA
2020	Cruise ship	Carnival Corporation	
2021	Cruise ship	Carnival Corporation	
2021	Cruise ship	Carnival Corporation	
2022	Cruise ship	Carnival Corporation	RINA
2022	Cruise ship	MSC Cruises	
2022	Cruise ship	RCCL	
2024	Cruise ship	MSC Cruises	
2024	Cruise ship	RCCL	

Excluding LNG carriers and inland waterway vessels. For more information please visit www.dnvgl.com

Data last updated : 15 February 2017

* = conversion projects

LNG-FUELLED SHIPS IN OPERATION WORLDWIDE

Year	Type of Vessel	Owner	Class
2000	Car/passenger ferry	Fjord1	DNV GL
2003	PSV	Simon Møkster	DNV GL
2003	PSV	Eidesvik	DNV GL
2006	Car/passenger ferry	Fjord1	DNV GL
2007	Car/passenger ferry	Fjord1	DNV GL
2007	Car/passenger ferry	Fjord1	DNV GL
2007	Car/passenger ferry	Fjord1	DNV GL
2007	Car/passenger ferry	Fjord1	DNV GL
2008	PSV	Eidesvik Shipping	DNV GL
2009	PSV	Eidesvik Shipping	DNV GL
2009	Car/passenger ferry	Tide Sjø	DNV GL
2009	Car/passenger ferry	Tide Sjø	DNV GL
2009	Car/passenger ferry	Tide Sjø	DNV GL
2009	Patrol vessel	Remøy Management	DNV GL
2009	Car/passenger ferry	Fjord1	DNV GL
2010	Patrol vessel	Remøy Management	DNV GL
2010	Car/passenger ferry	Fjord1	DNV GL
2010	Patrol vessel	Remøy Management	DNV GL
2010	Car/passenger ferry	Fjord1	DNV GL
2010	Car/passenger ferry	Fjord1	DNV GL
2010	Car/passenger ferry	Fosen Namsos Sjø	DNV GL
2011	PSV	DOF	DNV GL
2011*	Oil/chemical tanker	Tarbit Shipping	DNV GL
2011	Car/passenger ferry	Fjord1	DNV GL
2011	PSV	Solstad Rederi	DNV GL
2012*	Car/passenger ferry	Fjord1	DNV GL
2012	PSV	Eidesvik	DNV GL
2012	PSV	Olympic Shipping	DNV GL
2012	PSV	Island Offshore	DNV GL
2012	General Cargo	Nordnorsk Shipping	DNV GL
2012	PSV	Eidesvik Shipping	DNV GL
2012	PSV	Island Offshore	DNV GL
2012	Car/passenger ferry	Torghatten Nord	DNV GL
2012	Car/passenger ferry	Torghatten Nord	DNV GL
2012	Car/passenger ferry	Torghatten Nord	DNV GL
2013	PSV	REM	DNV GL
2013	RoPax	Viking Line	LR
2013	Car/passenger ferry	Torghatten Nord	DNV GL
2013	Tug	Incheon Port Authority	KR
2013	General Cargo	Eidsvaag	DNV GL
2013	RoPax	Fjordline	DNV GL
2013	High speed RoPax	Buquebus	DNV GL
2013	Tug	CNOOC	CCS
2013	Tug	CNOOC	CCS
2013	Car/passenger ferry	Norled	DNV GL
2014	Car/passenger ferry	Norled	DNV GL
2014	Tug	Buksér & Berging	DNV GL
2014	RoPax	Fjordline	DNV GL
2014	Patrol vessel	Finish Border Guard	DNV GL
2014	Tug	Buksér & Berging	DNV GL
2014	Gas carrier	Anthony Veder	BV
2014	Gas carrier	Anthony Veder	BV
2014	PSV	Remøy Shipping	DNV GL
2014	General Cargo	Egil Ulvan Rederi	DNV GL
2014	General Cargo	Egil Ulvan Rederi	DNV GL
2014	PSV	Siem Offshore	DNV GL
2015	PSV	Harvey Gulf Int.	ABS
2015	Ro-Ro	Norlines	DNV GL
2015	Car/passenger ferry	Samsøe municipality	DNV GL
2015	PSV	Simon Møkster Shipping	DNV GL
2015	PSV	Siem Offshore	DNV GL
2015	Ro-Ro	Norlines	DNV GL
2015*	Oil/chemical tanker	Bergen Tankers	LR
2015	Car/passenger ferry	Society of Quebec ferries	LR

For more information please visit www.dnvgl.com

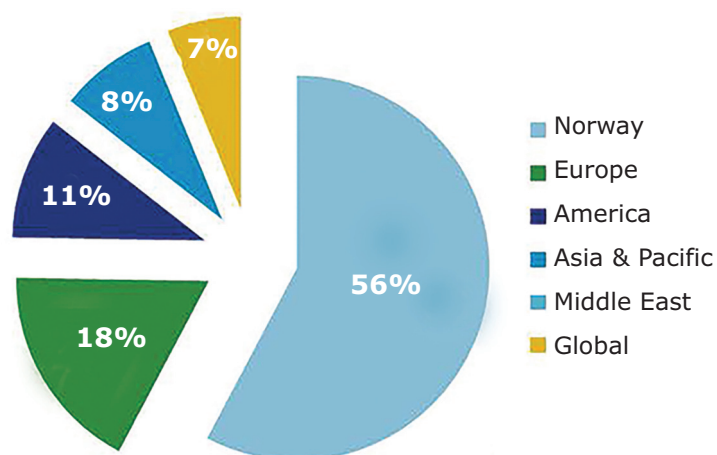
Data last updated: 15 February 2017

* = conversion projects

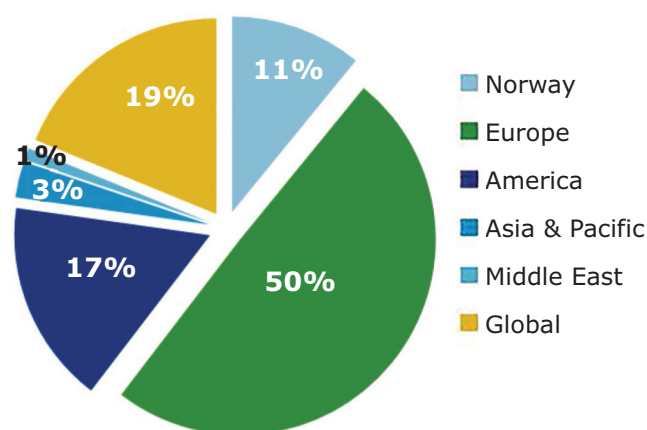
Year	Type of Vessel	Owner	Class
2015	Gas carrier	Evergas	BV
2015	Gas carrier	Evergas	BV
2015	Tug	CNOOC	CCS
2015*	Car/passenger ferry	AG Ems	DNV GL
2015	Tug	NYK	NK
2015	Gas carrier	Chemgas Shipping	BV
2015	Gas carrier	Evergas	BV
2015	PSV	Harvey Gulf Int.	ABS
2015	Container ship	TOTE Shipholdings	ABS
2015	Car/passenger ferry	AG EMS	DNV GL
2015	Bulk ship	Erik Thun	LR
2016	Container ship	TOTE Shipholdings	ABS
2016	Gas carrier	Evergas	BV
2016	PSV	Harvey Gulf Int.	ABS
2016	Bulk ship	Erik Thun	LR
2016	Oil/chemical tanker	Terntank	BV
2016	Gas carrier	Navigator Gas	ABS
2016*	Oil/chemical tanker	Furetank Rederi	BV
2016	Icebreaker	Arctica Shipping	LR
2016	Car/passenger ferry	Boreal Transport Nord	DNV GL
2016	Car/passenger ferry	Boreal Transport Nord	DNV GL
2016	Tug	CNOOC	CCS
2016	Gas carrier	Chemgas Shipping	BV
2016	Car carrier	UECC	LR
2016	Oil/chemical tanker	Terntank	BV
2016	Oil/chemical tanker	Terntank	BV
2016	Car/passenger ferry	BC Ferries	LR
2016	Gas carrier	Evergas	BV
2016	PSV	Siem Offshore	DNV GL
2016	Car/passenger ferry	Seaspan Ferries Corp.	BV
2016	Gas carrier	Navigator Gas	ABS
2016	Ro-Ro	Searoad Holdings	DNV GL
2016	Car carrier	UECC	LR
2017	Gas carrier	Navigator Gas	ABS
2017	Car/passenger ferry	Seaspan Ferries Corp.	BV
2017*	RoPax	Baleària	BV

AREA OF OPERATION OF LNG-FUELLED SHIPS

Operating area
ships in operation



Operating area
confirmed orderbook



Updated 15 February 2017
Excluding LNG carriers and inland waterway vessels

WORLD SMALL SCALE LNG FLEET*

Built	Name	CBM	Cargo Type	Trading area	Trading in LNG?	Ship Owner / Operator
1974	Seagas	187	LNG	Sweden	Yes	AGA
1988	Kayoh Maru	1,517	LNG	Japan	Yes	Daiichi
1993	Aman Bintulu / Lucia Ambition	18,928	LNG	Malaysia - Japan	Yes	Perbadanan/NYK
1996	Surya Aki	19,475	LNG	Indonesia - Japan	Yes	MCGC
1997	Aman Sendai	18,928	LNG	Malaysia - Japan	Yes	Perbadanan/NYK
1998	Aman Hakata	18,800	LNG	Malaysia - Japan	Yes	Perbadanan/NYK
2000	Tripura (ex Surya Satsuma)	23,096	LNG	Indonesia - Japan	Yes	MCGC
2003	Pioneer Knutsen	1,100	LNG	Norway	Yes	Knutsen
2003	Shinju Maru No.1	2,540	LNG	Japan	Yes	Shinwa
2005	North Pioneer	2,500	LNG	Japan	Yes	Japan Liquid Gas
2007	Sun Arrows	19,531	LNG	Malaysia - Russia - Japan	Yes	Mitsui
2008	Kakurei Maru	2,536	LNG	Japan	Yes	Hogaki Zosen
2008	Shinju Maru No.2	2,540	LNG	Japan	Yes	Shinwa
2009	Coral Methane	7,551	LNG/LPG/Ethylene	Northwest Europe/Baltics	Yes, sometimes	Anthony Veder
2010	Norgas Creation	10,000	LNG/LPG/Ethylene	Worldwide	No	Norgas Carriers
2010	Norgas Innovation	10,000	LNG/LPG/Ethylene	Worldwide	No	Norgas Carriers
2011	Akebono Maru	3,556	LNG	Japan	Yes	Chuo Kaiun
2011	Norgas Bahrain Vision	12,000	LNG/LPG/Ethylene	Worldwide	No	Norgas Carriers
2011	Norgas Conception	10,000	LNG/LPG/Ethylene	Worldwide	No	Norgas Carriers
2011	Norgas Invention	10,000	LNG/LPG/Ethylene	Worldwide	No	Norgas Carriers
2011	Norgas Unikum	12,000	LNG/LPG/Ethylene	Worldwide	No	Norgas Carriers
2012	Coral Energy	15,600	LNG	Northwest Europe/Baltics	Yes	Anthony Veder
2013	Coral Anthelia	6,500	LNG/Ethylene			Anthony Veder
2013	JX Energy TBN	2,500	LNG	Japan	Yes	JX Energy
2013	Kakuyu Maru	2,500	LNG	Japan	Yes	Tsurumi Sunmarine
2014	LNG-Oil combi**	2,000	LNG	Germany	Yes	Veka
2014	Short Sea LNG Tanker **	4,000	LNG	Germany	Yes	Veka
2015	10 small carriers TBN**	5,000	LNG			Bimantara Group
2015	Jahre TBN**	6,200	LNG	Norway	Yes	Donsotank/Jahre Marine
2015	JS Ineos Ingenuity	27,500	LNG/Ethylene	Markus Hook - Rafnes	Ethane, for Ineos	Evergas
2015	JS Ineos Insight	27,500	LNG/Ethylene	Markus Hook - Rafnes	Ethane, for Ineos	Evergas
2015	JS Ineos Intrepid	27,500	LNG/Ethylene	Markus Hook - Rafnes	Ethane, for Ineos	Evergas
2015	LNG Barge TBN	3,000	LNG	US Coast	Yes	LNG America
2015	LNG bunker barge 1†	2,250	LNG	China	Yes	Anhui Huaqiang Natural Gas
2015	LNG bunker barge 2†	2,250	LNG	China	Yes	Anhui Huaqiang Natural Gas
2015	LNG bunker barge 3†	2,250	LNG	China	Yes	Anhui Huaqiang Natural Gas
2015	LNG Inland bunker**	800	LNG	Germany	Yes	Veka
2015	Norgas TBN**	17,000	LNG/LPG/Ethylene	Worldwide		Norgas Carriers
2015	Norgas TBN**	17,000	LNG/LPG/Ethylene	Worldwide		Norgas Carriers
2015	PetroChina TBN	30,000	LNG	China		PetroChina
2015	TBN	14,000	LNG	China	Yes	Zhejiang Huaxiang
2015	TBN 1	27,500	LNG	China?		Danyang?
2015	TBN 2	27,500	LNG	China?		Danyang?
2015	TBN 3	27,500	LNG	China?		Danyang?
2016	Clean Jacksonville	2,200	LNG	US Coast	Yes	CME
2016	Dalian TBN	28,000	LNG	China	Yes	Dalian Inteh Group
2016	Hai Yang Shi You 301	30,000	LNG	Bali FSU	Yes	CETS (CNOOC)
2016	JS Ineos Indepence	27,500	LNG/Ethylene	Markus Hook - Rafnes	Ethane, for Ineos	Evergas
2016	JS Ineos Innvation	27,500	LNG/Ethylene	Markus Hook - Rafnes	Ethane, for Ineos	Evergas
2016	JS Ineos Inspiration	27,500	LNG/Ethylene	Markus Hook - Rafnes	Ethane, for Ineos	Evergas
2016	LNG Prime	2,250	LNG	Northwest Europe	Yes	Veka Deen LNG
2016	Navigator Aurora	35,000	Ethane/Ethylene	Markus Hood - Stenungsund	Ethane, for Borealis	Navigator
2016	Gaschem Beluga	36,000	Ethane/Ethylene	US - Teeside	Ethane, for Sabic	Gaschem Services
2016	Gaschem Orca	36,000	Ethane/Ethylene	US - Teeside	Ethane, for Sabic	Gaschem Services

For more information please visit <http://small-lng.com>

*Includes multi-gas, ethylene and LNG bunker ships with 40,000 cubic metres LNG cargo capacity or less

TBN = To Be Nominated indicates ships are still at construction/planning stage

** = project shelved † = Data to be verified Data last updated = 16th November 2017

Built	Name	CBM	Cargo Type	Trading area	Trading in LNG?	Ship Owner / Operator
2016	Ocean Yield TBN**	36,000	Ethane/Ethylene	US - Teeside	Ethane, for Sabic	Gaschem Services
2017	Cardissa	6,500	LNG	Northwest Europe	Yes	Shell
2017	Yuan He 1	30,000	LNG	China	Yes	CSR
2017	ENGIE Zeebrugge	5,000	LNG	Northwest Europe	Yes	NYK
2017	CME TBN†	2,200	LNG	US Coast	Yes	CME
2017	CME TBN†	2,200	LNG	US Coast	Yes	CME
2017	Coral EnergICE	18,000	LNG	Northwest Europe/Baltics	Yes	Anthony Veder
2017	Coralius	5,800	LNG	Northwest Europe/Baltics	Yes, for Skangas	Anthony Veder
2017	JS Ineos Invention	27,500	LNG/Ethylene	Markus Hook - Rafnes	Ethane, for Ineos	Evergas
2017	JS Ineos Intuition	27,500	LNG/Ethylene	Markus Hook - Rafnes	Ethane, for Ineos	Evergas
2017	LNG-Gorskaya TBN	7,300	LNG	Russia	Yes	LNG-Gorskaya
2017	LNG-Gorskaya TBN	7,300	LNG	Russia	Yes	LNG-Gorskaya
2017	LNG-Gorskaya TBN	7,300	LNG	Russia	Yes	LNG-Gorskaya
2017	Navigator Eclipse	35,000	Ethane/Ethylene	US	Ethane	Navigator
2017	Navigator Nova	35,000	Ethane/Ethylene	US	Ethane	Navigator
2017	Navigator Prominence	35,000	Ethane/Ethylene	US	Ethane	Navigator
2018	Shell Bunker Barge TBN 2	6,500	LNG	Northwest Europe	Yes	Shell
2018	Shell Bunker Barge TBN 3	6,500	LNG	Northwest Europe	Yes	Shell
2018	Shell Bunker Barge TBN 4	3,000	LNG	Northwest Europe	Yes	Shell
2018	Bernhard Schulte TBN	7,500	LNG	Baltic	Yes	Bernhard Schulte
2018	CME TBN†	2,200	LNG	US Coast	Yes	CME
2018	Evergas TBN	32,000	Ethane/Ethylene	Markus Hook - Rafnes	Ethane, for Ineos	Evergas
2018	Evergas TBN	32,000	Ethane/Ethylene	Markus Hook - Rafnes	Ethane, for Ineos	Evergas
2018	Evergas TBN	32,000	Ethane/Ethylene	Markus Hook - Rafnes	Ethane, for Ineos	Evergas
2018	Evergas TBN	32,000	Ethane/Ethylene	Markus Hook - Rafnes	Ethane, for Ineos	Evergas
2019	KLine TBN	7,500	LNG	Korea	Yes	Korea Line
2019	KLine TBN	7,500	LNG	Korea	Yes	Korea Line
2019	Stolt TBN	7,500	LNG	Mediterranean	Yes	Stolt-Nielsen Gas
2019	Stolt TBN	7,500	LNG	Mediterranean	Yes	Stolt-Nielsen Gas
2020	Stolt TBN (option)	7,500	LNG		Yes	Stolt-Nielsen Gas
2020	Stolt TBN (option)	7,500	LNG		Yes	Stolt-Nielsen Gas
2020	Shell Bunker Barge	4,000	LNG	US Coast	Yes	Q-LNG Transport / Harvey Gulf
2021	Stolt TBN (option)	7,500	LNG		Yes	Stolt-Nielsen Gas

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