LNG Fuelling

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USCG issues LNG fuelling policy guidance

The United States Coast Guard (USCG) has issued new guidelines covering design criteria for LNG fuelling systems and the evaluation of Simultaneous Operations (SIMOPS) during fuel transfer operations at waterfront facilities.

The directives were published in policy letters by the USCG Office of Operating and Environmental Standards (CG-OES) and outline best practice for safe operation of LNG fuelled vessels in U.S. waters.

"The intent of this policy is to afford an avenue of compliance with regard to obtaining Coast Guard approval for the design of natural gas fuel systems... This policy provides uniform guidance for the inspection and certification of vessels that are seeking to install an LNG fuel system if there are equivalency provisions included in the regulations applicable to the vessel," the CG-OES notes.

The USCG has issued two policy letters on LNG bunkering

Policy to incorporate IGF code as baseline

The new design criteria covers revised terminology for clarity in fuel containment system design, a well-defined approach for analysis of alternatives, clarification on risk assessment requirements, new options for protective tank locations and an expanded section on LNG fuel bunkering.

"The improvements adopted by the IGF Code reflect a better understanding of the rapidly evolving nature of new fuel technologies. Continued reliance on what is now an outdated standard is no longer warranted. Therefore, this policy letter update uses the IGF Code as a baseline standard for vessels," a USCG spokesperson commented.

Targeted at Coast Guard Captains of the Port (COTPs), the recent Simops policy letter is the latest step in formalizing procedures for a wider range of LNG bunkering procedures and supporting growth of more complex facilities.

Simops guidelines can include loading and unloading materials and consumables including potable water, lubricants, and fuel other than LNG, gangway and mooring line operations while simultaneously transferring LNG fuel, crew and passenger embarkation/ disembarkation, loading of stores and cargo and discharging waste.

USCG advocates information sharing

The USCG further advocates that vessel operators carrying out LNG fuelling activities should collect and collate "processes and procedures" including risk de-escalation methods and make these available as a means to demonstrate that SIMOPS can be conducted safely and securely.

"Such information should also be shared with the managers of LNG transfer operations and LNG bunkering services, to encourage broad-based development of optimum safety and security measures, and presumably, a building of industry knowledge for best practices," the a spokesperson said. ■

> "The improvements adopted by the IGF Code reflect a better understanding of the rapidly evolving nature of new fuel technologies."
>
> *- USCG*

FUELLING NEWS AGENDA

BSM to manage Baltic GSV

German maritime solutions firm Bernhard Schulte Shipmanagement (BSM) has been awarded a management contract for a new LNG bunkering vessel in the Baltic Sea.

The Gas Supply Vessel (GSV) is currently under construction at Hyundai Mipo Dockyard in Ulsan, South Korea and will have a capacity of 7,500 cubic metres once complete.

"The ship is the sixth booked purpose-built LNG bunker supply ship newbuilding to date,' Jan Warmke, Managing Director at BSM, said.

Representation of proposed LNG Supply Vessel

BSM expands technical team

The GSV is scheduled for delivery in September 2018.and will be utilized for the LNG fuelling of ships, including ferries, containers, cruise vessels and other shore-based gas consumers in the Baltic Sea.

"BSM is currently setting up the shore based management set up and is looking for gas experts to join the technical team. Later this year BSM will also start recruiting Senior seafaring personnel with gas experience," a spokesperson for BSM said.

GSV to feature Babcock FGDV0 technology

BSM has previously partnered with engineering support services firm Babcock to develop new LNG bunkering designs and the recently awarded ship management contract relates to the first vessel to feature Babcock's FGDV0 technology.

The FGDV0 technology will enable the GSV to operate with zero emissions during normal operations and throughout the supply of LNG to the receiving vessel, minimising the environmental impact of ship-to-ship transfers. The GSV will also be equipped with DP2 technology.

"It is noteworthy that many LNG refuelling hubs are in the process of being planned globally with GSVs expected to be more widely used. As such BSM considers the management of GSV as an interesting niche market and is trying to attract more management mandates in this market," Warmke added. ■

Gate Terminal starts operations of new truck loading bays

Authorities at the Netherlands' Gate Terminal have started commercial operations of two new truck loading bays at the LNG terminal in Rotterdam.

The truck loading bays are highly automated and "combine best practices for safe operations with an excellent service level" according to port operators Gasunie and Royal Vopak, the two firms behind the joint venture Gate Terminal.

"By adding two new truck loading bays to the existing bay Gate terminal is prepared to efficiently cater for future growth in the demand for LNG distribution via road or containers. This will support the effort of Gate terminal customers to deliver LNG to retail stations, industry and ships," a Gate spokesperson said.

Truck loadings increase 50% y-o-y

The terminal has experienced a 50% increase in truck loadings in year-on-year comparison and reports that approximately 750 trucks were loaded in the first half of 2017.

An acronym for Gas-Access-To-Europe, the Gate terminal has total annual throughput capacity of 12 billion cubic metres of natural gas, which corresponds to more than 130 large LNG tankers docking there every year to provide north-western Europe with gas.

"Cost efficiency and a favourable geographical location for the markets in north western Europe speak in favour of Gate terminal," Hans-Peter Floren, board member of E.ON Ruhrgas commented at the time of the terminal's launch.

Electricity for the Gate Terminal is supplied by E.ON Benelux with water pumped from the E.ON Maasvlakte Power Plants sea water cooling outfall basin for use in gasification processes.

Strong financial backing supports growth case

Last year, Gasunie and Royal Vopak closed a €76 million project financing deal with the European Investment Bank (EIB) to fund construction of new infrastructure and services at the terminal. The funding follows a previous long-term debt financing program for €750 million, originally established in 2008.

"Gate terminal supports the development to use LNG as fuel by investing in infrastructure to allow customers to load LNG in smaller quantities. Trucks are loaded since 2014 on one bay and in September 2016, a third berth was added to load bunker vessels, a Gate spokesperson added. ■

Trucks loading with LNG at Gate Terminal, Rotterdam

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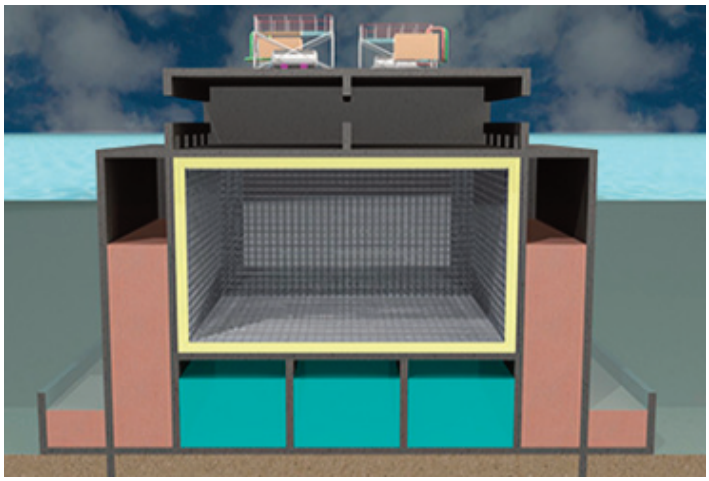
GTT highlights benefits of gravity-based system

Gravity-based LNG bunkering systems could hold a number of advantages, including easier installation and deployment, according to cryogenic membrane designer and LNG bunkering expert Gaztransport & Technigaz (GTT).

The firm underlined several advantages of its new Gravity Based System (GBS), in its recent financial report for the first half of the year. The firm's management drew attention to the cost saving element of the subsea storage solution, which is designed to maximise natural efficiency of the environment.

"Dubbed GBS, this bunkering station consists of a concrete chamber and a membrane containment tank designed by GTT. It sits on the seabed and can be installed in a port or isolated area and requires no additional infrastructure. This reduces installation costs while limiting the environmental impact," Philippe Berterottière, Chairman and CEO of GTT, said.



Artist's rendition of GTT gravity-based system

GTT posts"robust" H117

The new system was launched in April this year and was one of a number of innovations that management cited as responsible for the "very robust commercial activity' it had seen in the first half.

"Operationally, we continued our development efforts by providing the market with new technologies intended for related segments, such as LPG transportation and marine gravity based storage... These performances have enabled us to confirm our revenues, net margin and dividend outlook for the whole of the 2017 financial year," Berterottière added.

Order book swells

The company's technology portfolio includes a range of engineering solutions for the offshore LNG industry as well as small, midsize and multi-gas carriers. As of the end of June, 2017, the firm reports that its order book stood at 88 units, including 73 LNG/Ethane carriers, 10 FSRUs, two FLNGs, two onshore storage tanks and one LNG bunker barge.

GTT is one of the world's largest manufacturers of membrane containment systems for the storage of LNG and has backed widespread adoption of the fuel for marine transportation in Europe. ■

NEWS NUDGES

EU research promises 15% reduction in fuel consumption

A new European research project aims to cut fuel requirements for shipping by as much as 15% throught the development of more efficient large length ships.

The EU's FIBRESHIP project aims to replace steel in the construction process of next-generation vessels with new composite materials and create new light commercial vessels, passenger and leisure transport and oceanographic vessels more than 50 meters in length.

The proposal is one of the largest innovation projects funded by the EU and has a budget of €11 million, of which €9 million is funded by the EU's Horizon 2020 Programme.

The project involves 18 international entities representing the European shipping and shipbuilding industry from 11 countries including Cyprus, Denmark, Finland, France, Great Britain, Greece, Hungary, Ireland, Italy, Romania and Spain.

LNG fuelling market set for strong growth in 2017

Global growth rate for the LNG Fuelling Station market is set to reach a five year high in 2017 before falling slightly in 2018, according to segmentation analysis from consultancy Fior Markets.

The findings are published in the firm's Global LNG Fuelling Station Market which highlights Kunlun Energy, Guanghui, Sinopec, Cryostar, CNOOC amongst others as key players in the space.

"The performance analysis of these segments and sub-segments has been included in the report along with detailed evaluation of the trends that will influence the growth prospects of these segments," the report's authors note. ■

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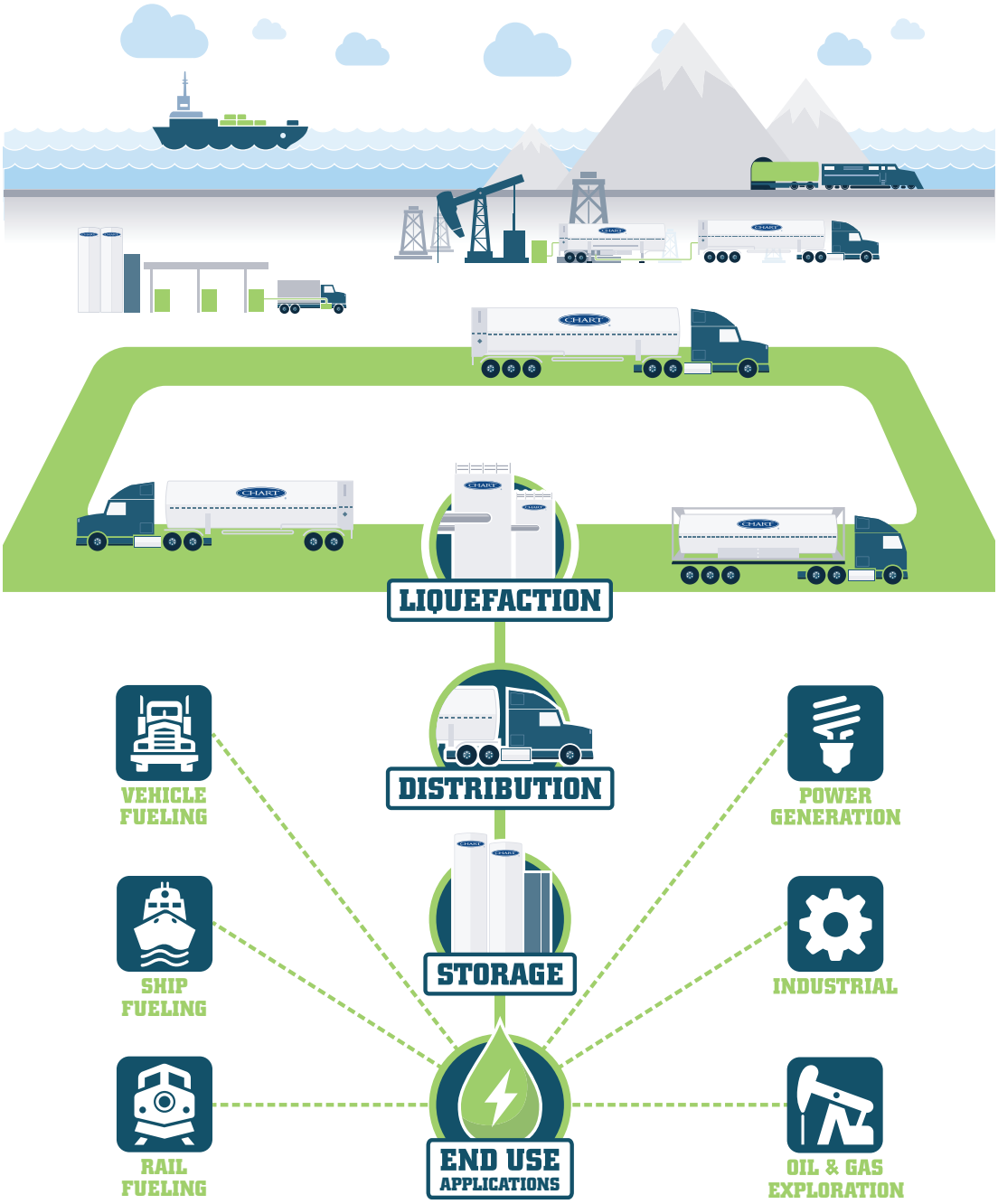

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Tankterminal plans Lokeren LNG truck refuelling station

Dutch fuelling specialist Tankterminal has awarded a contract for the design and turnkey supply of an LNG truck refuelling station in Lokeren, Belgium, to LNG developer LIQAL.

The proposed facility will feature storage capacity of 73 cubic metres and two LIQAL MID LNG dispensers as well as 'on the fly' saturation technology. Situated alongside highway E17 the station will provide fuel for heavy-duty road vehicles on the main corridor between The Netherlands and France.

"We selected LIQAL as our partner because of its hands-on experience in the small-scale LNG industry, its intelligent solutions and they proved to be capable in assisting us in all aspects that are involved in development, realisation and operation of a state-of-the-art LNG fuel station," Olivier Willekens, Business Development Manager at Tankterminal, said.

The new Lokeren station is scheduled to start operation by the end of the year and LIQAL will handle the technical operation and maintenance of the system once commissioned.

Strengthened transport links with Holland and France

The proposed station will expand on Tankterminals existing portfolio of tankcleaning facilities, which includes truck fuel stations in Lokeren, Ghent and at Unidet in Meer. The new site was chosen as it will connect both the Rotterdam to Antwerp highway (A16-E19) and the Paris-Lille to Ghent route (A1-E17).

Although it will initially be fitted with two dispensrs the plans for the station include options to expand to four LNG dispensers in total and also sell CNG via a multi-card system.

Tankterminal facility in Ghent

Cold and saturated LNG supply options

All dispensers are fitted with LIQA's micro-liquefaction technology ensuring unlimited holding time of LNG without the use of N2 and providing end users with cold, as well as saturated, LNG to serve the full range of systems on the market.

"We are very pleased to have the opportunity to cooperate with Tankterminal and, together with other stations that we have in preparation, get a firm foothold in Belgium. Another great proof of the market seeing the benefits of working together with our company and our high-end LNG fuelling technology," Jorg Raven, CEO of LIQAL, said.

Headquartered in Breda in the Netherlands, LIQAL acts as a Design, Build, Maintain and Operate (DBMO) company for turnkey small- and mid-scale LNG systems that serve the European market. ■

Hungary breaks ground on first LNG refuelling station

The foundations for the first LNG filling station in Hungary have been laid as part of the PAN-LNG project and Hungarian Gas Transport Cluster.

An inauguration ceremony at the site near the country's M0 highway marked the first step in a €1.2 million project to connect trans-European LNG trucking networks with LNG infrastructure. The project is backed by the Hungarian Gas Transport Cluster Association (MGKKE) and the European union's TEN-T initiative.

"Soon another 4 stations offering both LNG and CNG will be established in our country, along the main highways," Henrik Domanovszky, president of MGKKE, said.

Further investment is scheduled to be delivered for the project in September this year, expanding the scope to create a transnational LNG refuelling network for both trucks and buses.

"It means that from autumn, it will be possible to fill LNG-powered trucks on one of the most important transit routes of the country. Also, another high-capacity station will be in service for CNG-fuelled vehicles", Domanovszky said.

MGKKE predicts "dozens of new stations" to come

The PAN-LNG project is a continent wide initiative to improve LNG filling station infrastructure, financed by the Connecting Europe Facility (CEF). The funding is aimed at supporting construction of new LNG-fuelling stations as well as all other ancillary infrastructure needed to manage the supply of LNG as a transport fuel for industry.

"LNG-Tech is responsible for the technical details of the construction of the public LNG and CNG filling station…Though it will be the first establishment in Central-Europe - without considering Poland here - in service of LNG-fuelled vehicles, in the following years, dozens of new stations will open in the region," Domanovszky explained.

MGKKE representatives at the ground-breaking ceremony

Headquartered in Budapest, the MGKKE is an industry association representing LNG specialists, developers, utilities and research organisations.

Its 26 members include Blue Green Way, BR.CAR, BPR Consulting, CO4-Group, IVECO, Truck Danube in Hungary, ECO SMART, First Hungarian Biogas, EURO TRADE, CNG Gas, Metropolitan Public Area Maintenance, Ganzair Compressor Engineering, Gardaland, Gilbarco, Gyorscsatlakozok, Heténi, Iris Energy, LNG-Tech, Hungarian Biogas Association, Mebaterv, ÖkoProTec, Porsche Hungária, Rev and Partners Gas, Szent Istvan University, TÜV Rheinland and UTB Envirotec. ■

CMAL receives tank for first LNG-fuelled ferry

Fuel storage equipment for Scotland's first LNG-powered ferry has been delivered to Port Glasgow, marking a "significant milestone" according to operator Caledonian Maritime Assets.

The 88-tonne fuel tank was transported to Ferguson Marine Engineering shipyard in Port Glasgow on the River Clyde. The pressurised tank is the single largest component required for the construction of the vessel and is built from double-skinned stainless steel and perlite insulation.

"The tank is hugely impressive. Its arrival reminds us of the scale of the project we're delivering. The design and build of these dual fuel vessels is a highly complex technical project, the first of its kind in Scotland – and indeed the UK," CMAL projects director, Andy Crossan, commented.

With a capacity of 147 cubic metres the tank will be fitted into the first of two identical LNG-fuelled ferries for CMAL. The vessels will be capable of operating on both LNG and marine gas oil (MGO) and will each measure 102 metres in length.

The ferries will be powered by Wärtsilä's dual fuel engines

LNG tank arrives from Shanghai

The LNG tank was supplied by Finnish equipment manufacturer Wärtsilä which will also supply dual fuel engines to power the vessel. The tank was shipped to Scotland from Shanghai, China via the Suez Canal and Antwerp.

"This was a highly challenging engineering process to secure the safe delivery of the first LNG tank into the yard. Our team, working with our partners and suppliers, has been involved in planning the transport and delivery logistics of this for the past two months and it's fantastic to finally see its arrival," Crossan added.

Once in service the ferries will operate on the Ardrossan to Arran and the Skye Triangle routes. CMAL owns and operates ferries, ports and harbours across the west coast of Scotland and has designed the vessels to provide a fully flexible, year-round service.

The first ferry, *Glen Sannox*, is set to enter service in the second half of 2018. The vessel was named following a public competition to select the name. ■

The LNG tank arriving at Ferguson's Shipyard

NEWS NUDGE

Black & Veatch to develop Indian LNG import FSRU

Engineering firm Black & Veatch has been awarded the contract for the first LNG floating storage and regasification unit (FRSU) in India to be used as an import terminal.

The contract was awarded by developer Swan LNG, a subsidiary of Swan Energy and will see the construction of LNG facilities capable of handling 5 million metric tonnes of LNG per annum (MMTPA).

The FSRU will be moored to a fixed jetty and regasify fuel for a new plant located at Jafrabad in Gujarat as well as enabling distribution by pipeline and road tanker.

"The Indian oil & gas team is a Black & Veatch centre of excellence that has helped the company deliver the world's first commercially proven FLNG facility.... These world-class skills will now be used to develop India's domestic LNG import infrastructure," a spokesperson for Black & Veatch said. ■

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	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

DNV·GL

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	Samsoe 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

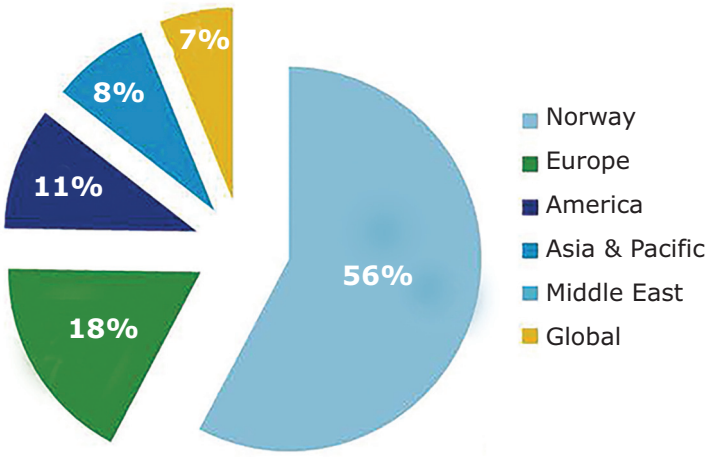
For more information please visit www.dnvgl.com
Data last updated: 15 February 2017
* = conversion projects

DNV·GL

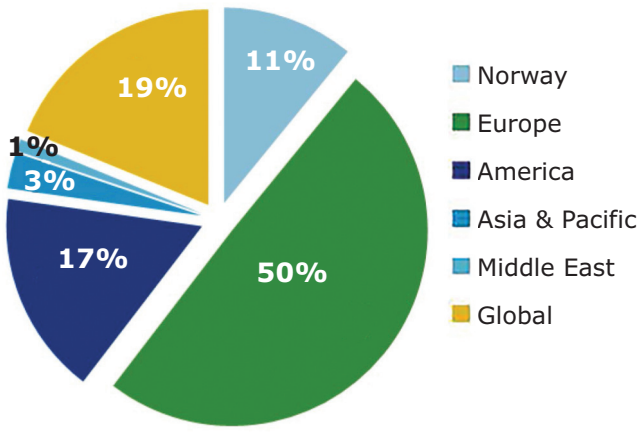
Year	Type of Vessel	Owner	Class
2015	Gas carrier	Evergas	BV
2015	Gas carrier	Evergas	BV
2015	Tug	CNOOC	CCS
2015*	Car/passenger ferry	AG Ems	DNV GL
2015	Tug	NYK	NK
2015	Gas carrier	Chemgas Shipping	BV
2015	Gas carrier	Evergas	BV
2015	PSV	Harvey Gulf Int.	ABS
2015	Container ship	TOTE Shipholdings	ABS
2015	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

For more information please visit www.dnvgl.com
Data last updated: 15 February 2017
* = conversion projects

DNV·GL

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	Triputra (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 Innvovation	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

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*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 = 24th May 2017

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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
2016	Shell Bunker Barge TBN 1	6,500	LNG	Northwest Europe	Yes	Shell
2016	Shell Bunker Barge TBN 2	6,500	LNG	Northwest Europe	Yes	Shell
2016	Shell Bunker Barge TBN 3	6,500	LNG	Northwest Europe	Yes	Shell
2016	Shell Bunker Barge TBN 4	3,000	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	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
2021	Stolt TBN (option)	7,500	LNG		Yes	Stolt-Nielsen Gas

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