

LNG Fuelling

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EU backs LNG bunker strategy

European Union ministers have adopted a new declaration to expand LNG as a bunker fuel and support the reduction of greenhouse gases.

The 'Valletta Declaration' will ensure that support is in place for the roll out of LNG infrastructure across EU member states and delineate political priorities for the EU's Maritime Transport Policy to support the shipping industry.

"Competitiveness, decarbonisation and digitalisation are the guiding principles that will serve as a basis for the EU's maritime transport policy up to 2020 and beyond. These principles aim to ensure that maritime transport remains an attractive way for transporting goods and people and becomes even more environmentally-friendly. It should also serve as a catalyst for investment and innovation," an EU spokesperson said, commenting on the recent Valletta Declaration.

Wider harmonization needed

The first stage of work will focus on harmonization of standards for LNG bunkering connectors and procedures for LNG bunkering in European ports designed to make it easier for shipowners to use LNG



Signatories at the Valletta summit in Malta

as a fuel in the run-up to the IMO's 0.5% sulphur cap which starts in 2020.

Relevant EU bodies will also seek to develop strategies that will support capacity building through the construction of LNG bunkering facilities and initiatives that can help demonstrate the benefits of decarbonisation to the shipping sector.

The declaration also highlights the "need for full and swift implementation" of the Blue Belt single transport area for shipping

and include a proposed e-Manifest harmonised electronic cargo manifest.

EU to continue 'reaching out' to LNG partners

Despite the positive statement from EU ministers in support of LNG fuelling development the signatories also note that a number of significant challenges lie ahead.

"The European maritime sector faces significant challenges and further action is needed to maintain and further develop attractive and smart, safe, social and sustainable quality shipping," the declaration notes, adding that there is a need to acknowledge "the challenge of global competition and the importance of national taxation regimes and schemes."

Following the recent decision by the U.S. president to withdraw from the Paris climate accord, the EU signatories of the Valletta Declaration also reiterated support for the agreement and their intention to continue "reaching out to third countries and industry". ■



The Valletta declaration supports increased LNG bunkering in Europe

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LNG-fuelled Green Corridor advances Newcastlemax design

Industry consortium Green Corridor has announced results from the first phase of a project to design an LNG-fuelled Newcastlemax vessel.

The Joint Industry Project comprises mining companies BHP, Rio Tinto and Fortescue as well as Mitsui O.S.K. Lines (MOL), SDARI, U-Ming, Woodside, and DNV GL.

The stage one proposals include a demonstration of the commercial potential and technical feasibility of LNG-fuelled bulkers in a "green corridor" connecting iron ore and coal trade between Australia and China.

"An important part of the JIP was conducting the financial feasibility study for the design. We looked at a wide range of capital and operational costs, including LNG and low sulfur fuel oil price sensitivities, as well as conducting a high-level bunker supply chain assessment. Based on this we found that, under the most realistic scenario, the payback period for the design was under 10 years,

and under the optimistic projection just 6.7 years," Mike Utsler, COO of Woodside, said.

LNG tank capacity of 6,000m³

Newcastlemax vessels are amongst the largest bulk vessels currently on the seas and developing LNG-fuelled system to power them poses unique challenges. The vessel class is defined by the largest size able to enter the port of Newcastle, Australia with a maximum length of 300 meters.

The proposed design will feature LNG tanks with volume for 6,000 cubic meters and cargo hold volume with 225,000 cubic metre capacity. The main engines will be a WINGD 6X72 DF MAN B&W 6G70ME-C9.5-GI.

Chinese ship designer SDARI developed the design of the



Green Corridor unveiled designs for an LNG-fuelled Newcastlemax vessel

210,000 deadweight-tonne Newcastlemax bulk carrier based on their Green Dolphin design. The designs put forward by the Green Corridor JIP are now in the process of receiving Approval in Principle (AiP) from standards agency DNV GL.

New measure for LNG-fuelling

The proposed LNG-fuelled vessels will carry raw materials on some of the busiest routes in the world travelling from Western Australia to meet demand from China's

growing industrial sector.

Given the scale of this trade and the size of the individual vessels there are a number of challenges. LNG fuelling infrastructure in place to cope with the size of vessels, the volume of fuel required and frequency of refueling.

"By having both charterers and ship owners as active partners in the JIP, we are also optimistic that this new design will materialize into firm orders in the near future," Morten Løvstad, Maritime Business Director Bulk Carriers at DNV GL, said. ■

HHI, LR to develop LNG-powered bulk carriers

South Korean shipbuilder Hyundai Heavy Industries (HHI) and technical services firm Lloyd's Register (LR) have signed a partnership agreement to design LNG-powered bulk carriers.

The two firms will collaborate on a joint development project (JDP) aimed at producing blueprints for 180,000 deadweight-tonne class bulk carriers. The LNG-fuelled bulkers will be designed for either short to medium-haul bulk trade such as Australia - Asia as well as long-haul bulk trade such as Brazil - Asia.

"We are really pleased to announce this new joint development project. These HHI designs offer the possibility for owners to comply with emissions regulations worldwide while keeping the investment viable and competitive," David Barrow, LR's Director of In-

novation, Marketing & Sales, said.

Design to be HCSR compliant

The design announced by HHI will be in line with the Harmonised Common Structural Rules and will

mean that LNG is now becoming a serious prospect as a fuel for the very largest ocean vessels.

"We sincerely believe this JDP will bring environmentally-friendly and economical solutions for future bulk carrier designs and be

remembered as a milestone in shipbuilding history. It has always been our great pleasure to launch JDP's with LR and our collaboration will lead to technological improvement aimed towards energy saving and cleaner shipping,"



LR's David Barrow and HHI's Bong-Jun Jang signing the agreement

Bong-Jun Jang, HHI's Senior Executive Vice President, said.

LR extends LNG strategy

Headquartered in London, LR has been at the forefront of LNG fuelling development work, advising several of the largest shipbuilding firms worldwide on new designs. Founded in 1760 as a marine classification society the firm operates across multiple industry sectors.

"It is really important to LR to be able to help support this type of innovation in the market and assist in bringing such solutions from concept to safe and effective adoption," Barrow added. ■

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STX to build LNG-powered vessels for MSC Cruises

Shipbuilder STX France has signed a memorandum of understanding with cruise line MSC Cruises for the construction of two new LNG-powered mega cruise ships.

The ‘World Class’ cruise ships will feature a maximum occupancy of 6,850 guests, the highest passenger capacity in MSC’s fleet. Each vessel will be 200,000 gross register tonnage (GRT) and will measure 330 metres in length by 47 metres of beam.

“Once again, MSC Cruises has chosen to put their trust in our capacity to support their growth and expansion as well as in our ability to conceive, develop and build the world’s most modern and technologically-advanced cruise ships. By adding the new World Class to the four previous ship classes that we have delivered over the past 15 years, the number of vessels in their fleet built by STX France in Saint-Nazaire is set to reach 20,” Laurent Castaing, CEO of STX France, said.

World Class design features panoramic

The proposed design features a “futuristic ‘Y’ shape structure” and vertically positioned “G bow” that will improve stability and hydrodynamics as well as allowing passengers to enjoy panoramic sea views and increase the proportion



STX France Shipyard

of balcony cabins.

The mega cruise ships will contain 2,760 cabins and include family-friendly villages, a panoramic aft, and a glass pool lounge.

The vessels are scheduled for delivery in 2022 and 2024 respectively, with options for 2025 and 2026, and will be equipped with next generation LNG-powered engines as well as a new generation off waste water treatment system.

STX extends LNG shipbuilding expertise

The order for the two new vessels

was announced at the launch of MSC’s newest vessel the *MSC Meraviglia*, which was constructed and delivered by STX.

“Today, as we unveil *MSC Meraviglia*, a new vessel that marks the start of the next phase of our growth, we are delighted to confirm another key component of our ten-year investment plan: the World Class. These new vessels will further expand our partnership with STX France all the way to 2026, with up to seven additional innovative ships to be built during this period,” Pierfrancesco

Vago, Executive Chairman of MSC Cruises, said.

Based in Saint-Nazaire, on the French Atlantic coast, STX France operates three main business divisions, focused on offshore energy, ships and service provision.

In May, Italian shipbuilding company Fincantieri signed a share purchase agreement for the acquisition of 66.66 percent of the share capital of STX France shipyard for €79.5 million. ■

NEWS NUDGES

Gondán to deliver second LNG-fuelled tug

Spanish shipbuilder Astilleros Gondán is set to deliver its second LNG-fuelled escort tug to Norwegian shipowner Østensjø Rederi.

The RASTAR 4000-DF class tugs is designed by Robert Allan and is due to be delivered in the first week of July once sea trials are completed.

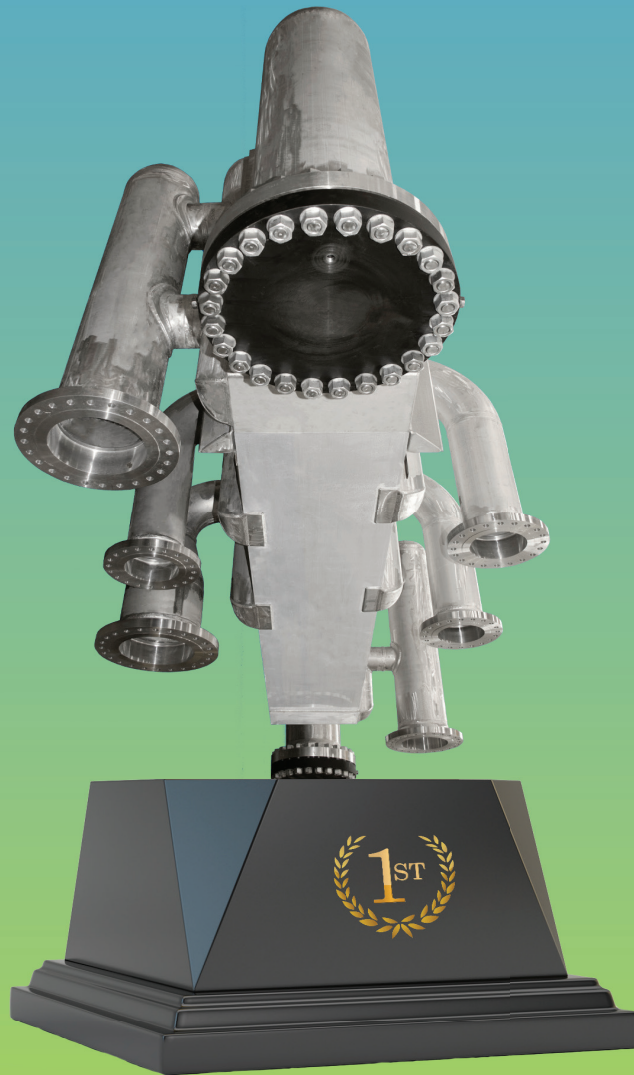
It will be deployed to Hammerfest in northern Norway to support Statoil’s terminal operations.

A third LNG-fuelled escort tug is scheduled to be delivered in the second week of August. ■



STX will build two LNG-powered mega cruise ships higher res

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Greek organisations launch Marine LNG Network

A group of 16 Greek maritime organisations have launched the Marine LNG Network, a partnership designed to create infrastructure for the “smooth and rapid integration” of LNG as a marine fuel.

The new cooperation protocol was signed by a mixture of shipping organisations, standards agencies and energy agencies in Greece and will seek to develop LNG fuelling opportunities via research as well as awareness-raising with public bodies and the wider public.

The agreement was signed by the Hellenic Shortsea Shipowners’ Association (HSSA), the Green Shipowners’ Association of Passenger Shipping Companies (SEEN), Bunkernet, Europa Venture, Certh, Hemexpo, EHMMA, ESFN, DEPA, DESFA, BV, DNV-GL, LR, RINA, ELIME and O.V.Bulou.

“Future energy requirements combined with existing environmental regulations create the modern operating environment of global shipping. The adaptation challenges are particularly important, especially for Short Sea Shipping ships,” Charalambos Simantonis, president of HSSA, said.

Collaboration to advance best practice

Alongside promotion of LNG as a marine fuel of choice the network will also seek to facilitate sharing of best practice amongst members and more systematic cooperation.

Stakeholders with experience in regulatory matters will also actively monitor and develop relevant legislation at international and national level to implement

change and support actions aimed at the “sustainability, efficiency and security” of the LNG supply chain.

“The Marine LNG Network, I believe, will cover and in some cases supplement the LNG information deficit as a shipping fuel in Greece. Through the collaboration of the agencies, we aim to create knowledge, exchange good practices and provide appropriate information for the short sea owner

to have knowledge of the available alternatives,” Simantonis commented.

The new network will be headquartered in the offices of the HSSA and direction of activities will be undertaken by a six-member Coordinating Committee. The first stage of work will involve consultation with Greek governmental ministries and other entities directly and indirectly related to LNG as marine fuel. ■



Representatives at the signing ceremony

Marubeni Joins SEA\LNG coalition

Japanese industrial conglomerate Marubeni is the latest organisation to join LNG fuelling focused industry coalition SEA\LNG.

The addition of Marubeni expands to SEA\LNG’s membership list to 25 and is expected to “drive forward” LNG as a marine fuel and progress the “energy transition within shipping”.

In under a year the coalition has grown rapidly, almost doubling from the initial 13 members that formed the alliance in July 2016, and the coalition now includes shipping companies, LNG suppliers, infrastructure providers, classification societies, downstream companies, major ports, and original equipment manufacturers.

“Although our company has expertise in multiple sectors, we view LNG as a core business field within our multifaceted service offering. By embracing collaboration with stakeholders in related industries, we remain committed to

safeguarding the global environment in which we operate, and are privileged to be partnering with a likeminded organisation,” Akihiko Sagara, COO of Marubeni Energy Division, said.

“Wealth and breadth” of LNG expertise

Founded over 150 years ago, Marubeni Corporation is one of the oldest members of SEA\LNG and brings extensive expertise of import and export challenges as well as operations in energy, chemicals, power, logistics, and infrastructure projects.

The company is Japan’s fifth largest sogo shosha and has over 40 years experience in bunker fuel trading alongside investments in LNG liquefaction projects, gas-fired power projects



Marubeni is the 25th member of SEA\LNG

and LNG carriers.

“Marubeni has a great wealth and breadth of expertise in relation to LNG and we welcome their knowledge as we continue to support the energy transition in shipping. SEA\LNG will continue to unite organisations that work together to address market barriers to LNG uptake, and to help transform the use of LNG as a marine fuel into a global reality,” Peter Keller, chairman of SEA\LNG and EVP at TOTE, said.

Marubeni joins fellow members

ABS, Bureau Veritas, Carnival Corporation, Clean Marine Energy, DNV GL, Eagle LNG Partners, ENGIE, ENN Group, Gas Natural Fenosa, GE, GTT, JAX LNG, Keppel Gas Technology, Lloyd’s Register, Mitsubishi Corporation, NYK Line, Petronet LNG, Port of Rotterdam, Qatargas, Shell, Total, TOTE., Toyota Tsusho and Wärtsilä.

“Together with our partners, we look forward to collaboratively working towards a cleaner, more efficient shipping environment,” Sagara added. ■

Rolls-Royce to supply Torghatten LNG engines

Engineering firm Rolls-Royce has signed an agreement to supply 15 LNG-powered engines for Norwegian ferry company, Torghatten Nord.

The engines will be installed in five Multi Maritime-designed LNG ferries operating between Bergen and Stord. All 15 engines are C26:33L9AGs, a generating set with nine cylinders in-line.

"Since the introduction of our first marine gas engines ten years ago, Rolls-Royce has delivered more than 700 gas engines on land and at sea accumulating over 25 million running hours of operating experience. We have proved that the Bergen lean-burn, pure gas, medium-speed engine range, combined with efficient hull designs, can help customers, like Torghatten Nord, cut their ships' emissions and fuel bills significantly," Kjell Harloff, vice-president at Rolls-Royce, said.

The vessels are expected to enter service in January 2019.

Bergen C26:33 offer fuel savings

The C26:33L9AGs engines have an operating speed of 1,000rpm and power of 2430kW.

The proprietary engine design



Rolls-Royce will supply 15 engines for the Torghatten Nord ferries

reduces total greenhouse gas emissions by about 20 % compared to a similar diesel engine, according to Roll-Royce, and can avoid the effects of methane slip.

"Engine rooms on gas powered vessels also stay much cleaner, saving operators time and money by reducing the frequency of cleaning tasks and the cost of chemicals. Crews appreciate the clean, safe working environment. The whole LNG System is designed for safety with double walled stainless steel containment," a

spokesperson for Rolls-Royce said.

Two of the vessels will be built at the VARD Brevik, yard in Norway whilst the other three will be built at the Tersan Shipyard, Turkey.

Vard to build LNG ferries for Torghatten Nord

At the start of the year, shipbuilder Vard signed a contract valued at NOK 600 million to build the two LNG-fuelled RoPax MM 125FD vessels. Each ferry will measure 130 meters in length with

a beam of 20.7 meters, and will have a speed of approximately 18 knots.

"We look forward to working together with their team on this exciting project, combining LNG propulsion and battery systems. VARD has long experience in building LNG powered and dual fuel vessels," Roy Reite CEO of Vard, said.

The ferries will operate in the Halhjem-Sandvikvåg crossing under a five-year contract with the Norwegian government. Torghatten Nord currently has 33 ferries and 10 express boats in operation in Norway. Its fleet includes four LNG ferries, also equipped with Bergen gas engines, built at Polish yard Remontowa, which operate on two routes serving Lofoten.

“Engine rooms on gas powered vessels also stay much cleaner, saving operators time and money by reducing the frequency of cleaning tasks and the cost of chemicals”

Rolls-Royce spokesperson

NEWS NUDGES

MHI, MHPS develop Sox scrubber

Engineering firms Mitsubishi Heavy Industries Ltd (MHI) and Mitsubishi Hitachi Power Systems Ltd (MHPS) have jointly developed a marine scrubber that they claim removes sulfur oxides (SOX) from inexpensive heavy fuel oil to a level equivalent to more expensive low-sulfur fuels such as LNG.

One of the main competitive

advantages of LNG as a fuel has been its low emissions profile which makes it more compatible with future International Maritime Organization (IMO) sulfur content limits.

"Deliveries of the scrubber are expected from 2020 and, in preparation, both companies will seek certification from selected countries while conducting extensive tests on ships," a spokesperson for

the partnership said.

Conrad announces LNG bunker barge losses

Shipbuilder and repairer Conrad Shipyard has reported a sharp impairment due to its LNG bunker barge.

"The net loss for the nine-month period was primarily the result of a \$12.5 million gross loss recorded on the LNG bunker barge... Although we have in-

curring losses on the LNG barge, we believe we have developed resources to position our company as a leader in LNG marine-related construction in North America," Johnny Conrad, President and CEO of Conrad, said.

The firm reported a total net loss of US\$858,000 for the nine months ended September 30, 2016 compared to net income of US\$7.2 million for the same period in 2015.

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

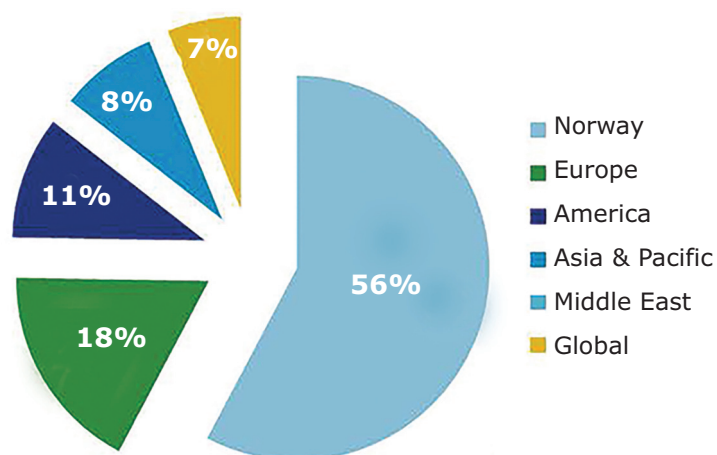
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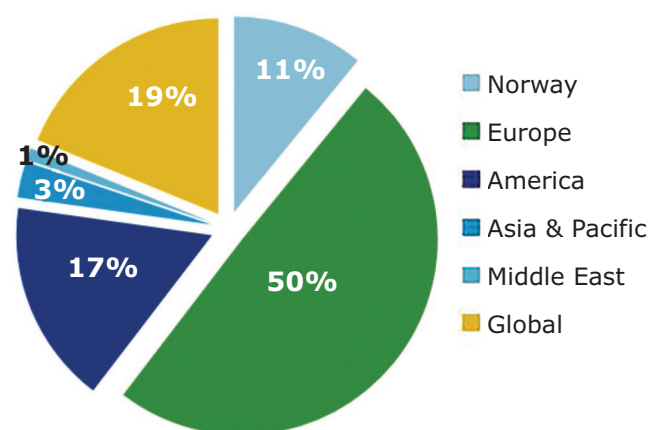
Year	Type of Vessel	Owner	Class
2015	Gas carrier	Evergas	BV
2015	Gas carrier	Evergas	BV
2015	Tug	CNOOC	CCS
2015*	Car/passenger ferry	AG Ems	DNV GL
2015	Tug	NYK	NK
2015	Gas carrier	Chemgas Shipping	BV
2015	Gas carrier	Evergas	BV
2015	PSV	Harvey Gulf Int.	ABS
2015	Container ship	TOTE Shipholdings	ABS
2015	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 = 24th May 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
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	Coralus	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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