

LNG Fuelling

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Reganosa to develop Ferrol LNG fuelling capacity

The Spanish Port Authority of Ferrol-San Cibrao is to collaborate with gas specialist Reganosa to develop LNG bunkering capacity.

The port in northwest Spain is keen to develop LNG as a marine fuel and will partner with Reganosa “to equip itself with infrastructures and protocols” for LNG refuelling.

Reganosa will build on its previous experience operating the Murgardos LNG import terminal and is currently completing a feasibility study into the commissioning of an LNG bunkering ship with capacity of up to 10,000 cubic meters.

“Studies and related work are being carried out through the European project LNGas Core Hive, which also involves the main Spanish ports. Having this service offering gives Ferrol an advantage over other cities and promotes the uptake of cruises that have chosen LNG as fuel,” a port spokesperson said.

LNG-fuelled *Aida Prima* scheduled for November call

The port authority announced its plans to develop new infrastructure alongside the news that the LNG-



The *Aida Prima*

fuelled cruise ship, *Aida Prima*, will visit the port on November 9 this year. The flagship of German operator Aida Cruises the arrival will mark a significant expansion of the vessel’s current route between Hamburg, Southampton, Le Havre and Zeebrugge

“*Aida Prima* is the next iteration from the [LNG-fuelled] *Aida Sol*, and when docked in Hamburg is powered by low emission power through a hybrid LNG barge, which functions as a floating power plant... The use of LNG for the operation of auxiliary engines

reduces air pollution on the docks and urban environments around them,” a port spokesperson said.

The *Aida Prima* features three MaK engines MaK M43C M46DF 12V and dual fuel engine that can operate on LNG. The vessel was built by Mitsubishi Heavy Industries shipyard in Nagasaki and has been in operation since 2016.

MALS cuts friction by 7%

Aida Prima is the largest ship in the fleet Aida cruise, with capacity for 3,300 passengers and a crew of 900 members. It features eighteen passenger decks, fifteen restaurants, indoor and outdoor swimming pools, shops, cafes and bars.

The novel design for the *Aida Prima* utilizes Mitsubishi Air Lubrication System technology (MALS) which releases small air bubbles to cover the bottom of the vessel, reducing friction between the hull and the water, and reducing emissions of CO₂ and fuel consumption by up to 7%. The vessel also features fuel injection software to increase savings further. ■



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Incheon reports savings from LNG-fuelled vessel

South Korea's Incheon Port Authority (IPA) has reported fuel savings of up to 24% from its LNG-powered vessel *Econuri*.

According to the IPA's calculation, over a journey of 1,643 kilometers *Econuri* costs about US\$10,900 in LNG fuel costs as compared to US\$24,700 for traditional fuels. The vessel is operated by the IPA and was first introduced in July 2013.

"In preparation for the increase of LNG fuel... We will continue to prepare for the LNG bunkering industry," an IPA spokesperson commented, adding that "the development plan for LNG bunkering facilities in Singapore and the review of Japan's LNG fuel business for ships" were current areas of interest.

The small port vessel weighs 200 tonnes and measures 38 meters in height and 8 meters in width. It can accommodate up to

57 passengers with a cruising speed of speed of 27.7 kilometers per hour.

The *Econuri* has so far carried more than 9,000 people for 395 journeys and IPA therefore calculates significant cost savings.

The port is currently focused on a number of improvements to facilitate LNG bunkering including introduction of truck-to-ship LNG bunkering and safety measures such as the flow of seawater to prevent damage to other vessel designs.

"The *Econuri* features a Type-C LNG fuel tank that is relatively pressure-stable compared to rectangular tank type (square) fuel tanks," a spokesperson for IPA explained.



The *Econuri*

South Korea invests in LNG bunkering future

Authorities in South Korea have to date a wide-range of initiatives to support the uptake of LNG-fuelled transport as a response to the decline of the country's shipbuilding sector. Since 2012, the Korean shipbuilding sector has fallen from the number one spot globally and many of the largest firms are now on the brink of collapse.

South Korean utility Korea Gas Corporation (Kogas) is to invest US\$9 million to develop LNG bunkering infrastructure at Tongyeong, in South Gyeongsang Province, South Korea and by the year 2025, the government aims to increase South Korean shipyards' market share of newbuild LNG-powered vessels to 70 per cent globally, from the current 60 percent.

Shell welcomes *Cardissa* to Rotterdam

Shell's first LNG bunkering vessel, *Cardissa*, has arrived at its home port of Rotterdam, docking for the first time at the Yukonhaven terminal.

The vessel arrived in Europe last month having sailed from its fabrication site at STX Offshore & Shipbuilding's yard in South Korea. The *Cardissa* has capacity for 6,500 cubic metres of LNG and will be used to load fuel from the third berth at the Dutch Gate LNG terminal in Rotterdam.

Owned by Shell and co-financed

by the European Union's Connecting Europe Facility, *Cardissa* is operated by Shell Western LNG.

Shell, RPA expand LNG fuelling partnership

The Port of Rotterdam Authority (PRA) and Shell expect the addition of the vessel to solidify the port's Gate terminal as a regional

hub for LNG refuelling. The terminal, in the north of the port area, features an extensive LNG breakbulk facility and last month opened a new dedicated berth for LNG bunker vessels.



The *Cardissa*

The PRA estimates that the Gate terminal will handle a throughput capacity of 12 billion cubic meters per annum (bcma), with further plans to extend this to 16 bcma in future. Shell LNG will be the main user of the terminal and completed first bunkering operations at the site via its chartered LNG tanker *Coral Methane*.

"The terminal dovetails with Dutch and European energy policies, built on the pillars of strategic diversification of LNG supplies, sustainability, safety and environmental awareness... the terminal's direct connection to the national natural gas transmission network will consolidate the Netherlands' position as a major European hub for gas trade and distribution," a spokesperson

for Gate terminal said.

Offtake contracts in place

Once fully operational the terminal will consist of three storage tanks, two jetty's and a process area where LNG will be regasified. LNG offtake contracts have already been signed with several of the largest European energy suppliers, including Dong Energy, Eneco, OMV group, Uniper and Shell.

Rotterdam also announced plans to launch an LNG-fuelled dredging vessel, *Ecodeelta*, at the port. The vessel will be delivered in 2018 on behalf of dredging firm Bagger & Aannemingsmaatschappij Van der Kamp and is currently under construction at the Barkmeijershipyard in Friesland.

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Wärtsilä to supply LNG engines for BSH research vessel

Finnish engine manufacturer Wärtsilä is to supply LNG-fuelled engines for a new research vessel being built on behalf of the German government.

The vessel, *Atair*, is currently under construction at the Fassmer shipyard in Germany and will feature two 6-cylinder Wärtsilä 20DF dual-fuel engines capable of running on either LNG or conventional liquid fuels.

The 75-metre-long vessel will be owned by the Federal Maritime and Hydrographic Agency, Bundesamt für Seeschifffahrt und Hydrographie (BSH).

"As the new *Atair* will be the first vessel in our fleet with LNG technology, we rely on the experience and expertise of Wärtsilä with respect to the engines and LNG tank equipment. With Wärtsilä's dual-fuel and SCR technologies, the vessel will fulfil the IMO's Tier III regulations in all operational conditions, whether sailing on LNG or on diesel fuel," Kai Twest, Head of Ships and Equipment Division at BSH, said.

The contract also covers supply of a 6-cylinder Wärtsilä 20 engine, two exhaust cleaning systems, and



Artist's rendition of the *Atair*

a Wärtsilä LNGPac fuel storage, supply, and control system.

SCR technology to reduce emissions

The advanced power train supplied by Wärtsilä will feature its selective catalytic reduction (SCR) technology to provide exhaust

cleaning when the engines are running on conventional marine diesel fuel if the vessel exhausts its supply of LNG on long voyages.

"We have worked closely with the Fassmer shipyard and are proud to have once again been selected to supply the machinery and equipment for this important

project," Lars Anderson, Vice President, Engine Sales, Wärtsilä Marine Solutions, said.

As a result of the SCR and LNG-Pac systems on board the vessel will also have Tier III classification for emissions in both modes.

DNV GL 'Silent R' rating

The *Atair* will meet DNVGL classification society's 'Silent R' rating for reduced noise emissions due to double elastic mounting of the engines, allowing the crew to utilize sonar equipment without disturbance from underwater radiated engine noise.

"Our dual-fuel technology is unique when it comes to small bore medium speed engines, and the extended service intervals and economic fuel consumption of the Wärtsilä 20DF engine enable lower operating costs than is possible with high speed engines," Anderson added.

The technology in the *Atair* will build on Wärtsilä's previous experience supplying double elastically mounted main engines equipped with SCR's for the *Sonne* a deep sea research vessel also owned by the German government.



Wartsila 20DF dual-fuel engine



LNG VALUE CHAIN SOLUTIONS

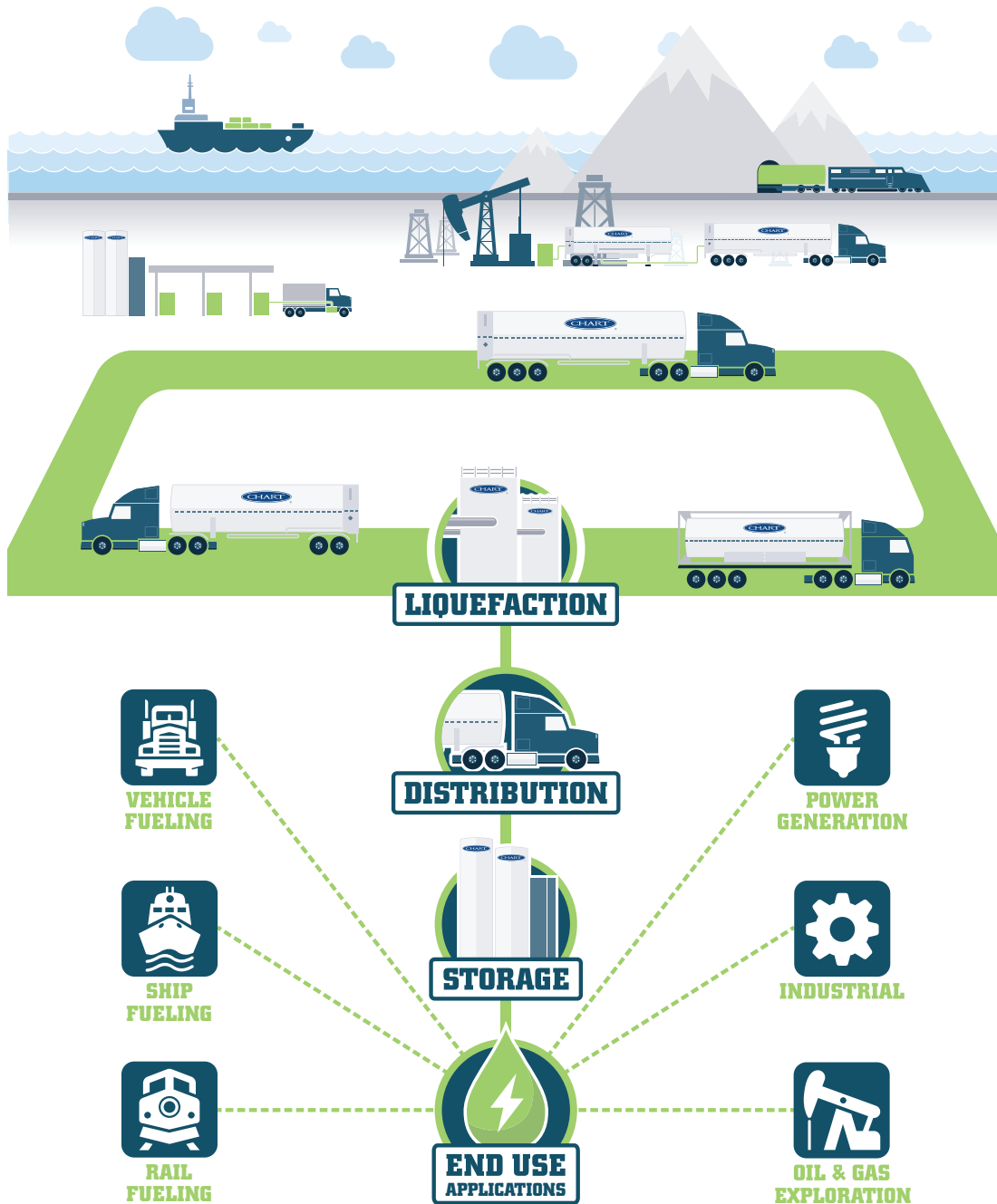


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SEA\LNG adds Mitsui, Novatek and Sumitomo

Multi-sector industry coalition SEA\LNG has added three new members to its consortium, increasing its presence in Japan and Russia.

The association announced that Mitsui & Co, Novatek Gas & Power and Sumitomo Corporation have now joined its efforts to work “towards breaking down the commercial barriers to the adoption of LNG as a clean and economically viable alternative to traditional bunker fuels”.

The addition of the three latest members expands SEA\LNG’s membership list to 28.

“Each of the global organisations brings with them a wealth of knowledge and experience that will be invaluable to SEA\LNG as we work to realise our goal of making LNG an important maritime fuel,” Peter Keller, SEA\LNG chairman and executive vice president of Tote, said.

Japanese bunker trading experience

Both Mitsui & Co. and Sumitomo are well established trading firms in Japan that have been proactive in LNG projects across Asia. Sumitomo and its subsidiaries bring a collective 65 years bunker trading

experience and has a strong presence on pipeline gas trading in the US, as well as LNG trading and operation of LNG carriers.

“We are proud to be joining a coalition whose vision for LNG as a marine fuel aligns well with our mission statement and our business philosophy,” Shuichi Suzuki, Executive Officer at Sumitomo, said.

Mitsui has previously invested in a total of 11 LNG projects, eight of which are in production. The firm has also participated in an LNG bunkering pilot programme in Singapore and collaborated with Gazprom on LNG bunkering studies.

“Mitsui has an excellent track record in the field of LNG and is well positioned to affect change within the entire value chain... We look forward to leveraging our company’s position to work with our fellow members towards promoting sustainable LNG bunkering operations,” Kenichiro Yamaguchi, General Manager at Mitsui, said.



Novatek operation at Yamal

Novatek targets Arctic LNG growth

Russian independent natural gas producer, Novatek aims to “become the world’s biggest exporter of LNG” within the next 10 years by tapping into Arctic gas and as part of its strategy recognizes bunkering as one of the key prospective market segments emerging in the LNG sector.

“We are confident that more shipping companies will opt for LNG to meet these stricter

requirements, and we are ready to facilitate the LNG bunkering market and infrastructure development” Leonid Mikhelson, board member of Novatek, said.

SEA\LNG includes ABS, Carnival Corporation, DNV GL, Eagle LNG Partners, ENGIE, ENN Group, GE, GTT, JAX LNG, Keppel Gas Technology, Lloyd’s Register, Mitsubishi, NYK Line, Port of Rotterdam, Qatargas, Shell, Total, TOTE, Toyota Tsusho, YKIP, Marubeni, and Wärtsilä. ■

LNG Fuelling consortium calls for compliance enforcement

Leaders of LNG fuelling association SEA\LNG have called for greater compliance and enforcement of Marpol VI Regulations ahead of the upcoming 2020 cap on sulphur emissions.

The International Maritime Organisation (IMO) regulations require a global sulphur cap of 0.5% from 2020 but SEA\LNG has voiced concern that not enough is being

done to ensure that these limits are imposed.

“Shipping has made significant progress in reducing its environmental impact from harmful emis-

sions, but more needs to be done... Effective and consistent enforcement, across all jurisdictions of the IMO emissions regulations, will be essential to ensure more environmentally friendly shipping and a level playing field for all shipping companies,” SEA\LNG chairman Peter Keller commented.

“Clear obligation” to regulation

While acknowledging the challenging economic environment for shippers, SEA\LNG called on Port State Authorities to recognize their “clear obligation” to create the groundwork for the IMO regulations in the lead up to 2020 and to enforce them thereafter.

“We recognise that there are barriers and limitations, but ... We do, however, require a greater sense of urgency and commitment... While enforcement has always been a difficult issue, now is the time for all IMO members to understand the importance of this regulation and ensure that it is implemented and enforced as envisioned,” Keller added.

The consortium noted the positive momentum in the sector with six LNG bunker vessels expected to be in operation by the end of 2017, up from just one at the start of the year, and the role this infrastructure will play in delivering fuel in a way that is “normal” for shipowners. ■



LNG called for port authorities to enforce regulations

Samskip to acquire Nor Lines LNG-fuelled vessels

Global logistics company Samskip has announced it will acquire two LNG-fuelled vessels as part of a “major expansion” that will see the firm take control of Norwegian shipping line Nor Lines.

NEWS NUDGES

Teekay orders LNG-fuelled tankers

Marine transportation and storage specialist Teekay Offshore has entered into conditional shipbuilding contracts with Samsung Heavy Industries for two LNG-fuelled vessels.

The two Suezmax-size, DP2 shuttle tanker newbuildings will be based on the New Shuttle Spirit design and are expected for delivery in 2019 and 2020.

“These new vessels will provide shuttle tanker services in the North Sea under the Partnership’s existing Master Agreement with Statoil, which will free up required vessel capacity to service Teekay Offshore’s contract of affreightment (CoA) portfolio in the North Sea,” a spokesperson for Teekay said.

Damen to sponsor Russian LNG conference

Shipbuilder Damen has partnered with the Russian Ministry of Transport and Ministry of Industry and Trade to sponsor an upcoming conference on LNG Fleet and LNG Bunkering in Russia.

The conference will be held in Moscow in October 2017 and is organised by Krylov State Research Center and PortNews.

Delegates will discuss the accumulation and systematization of data related to the use of LNG in shipping, problems associated with development of the LNG fuelling sector and key stakeholders for seaborne and river LNG uptake in Russia.

The acquisition includes the LNG-vessels, *Kvitnos* and *Kvitbjørn*, as well as Nor Lines’ terminal activities, warehousing and haulage services. Five out of Nor Lines’ seven multipurpose vessels will also be transferred under a time charter arrangement to Samskip.

“We are pleased to complete our divestment of Nor Lines and entrust the business to Samskip, in a strategic solution for a specialized business that needs to be part of a larger structure to develop and thrive. We believe that Samskip will be a good home for Nor Lines, and a good solution for our employees and customers,” Ingvald Løyning, Chief Executive of DSD, said.

Boost to Aalesund hub

The existing 170 employees of Nor Lines, based in 14 locations throughout Norway, will continue business as usual under the Nor Lines brand name. Samskip subsidiary frigoCare expects the deal will boost volumes via its cold

store and terminal in Aalesund, which serves as an important hub in both Samskip’s container system and Nor Lines vessel system.

Samskip currently transports around 90,000 TEU a year between Norway and Northern Europe and expects this figure to rise further as it expands its presence in Norway.

Samskip promises financial turnaround

The deal follows several years of poor financial performance from Nor Lines. The firm has seen weak profitability on average annual turnover of €110 million, according to current owner the DSD Group.

“Nor Lines’ financial performance has been disappointing in

recent years, but we are confident that by combining our respective strengths and refocusing the business we will create synergies, improve efficiency and provide customers with enhanced services.” Ásbjörn Gíslason, CEO of Samskip Logistics, said.

Samskip also owns a 50% share in Bergen based Silver Sea AS, which operates a fleet of 14 reefer vessels. Samskip’s combined annual turnover after the Nor Lines takeover will make it a major player in the market.

“The Nor Lines takeover represents a major opportunity for Samskip. It is a natural but significant extension of our shipping and logistics activities in Norway which will further broaden our customer offerings,” Gíslason added. ■



We believe that Samskip will be a good home for Nor Lines, and a good solution for our employees and customers



- Ingvald Løyning, Chief Executive, DSD



The LNG-fuelled vessels *Kvitbjørn* and *Kvitnos*

LNG Bunkering market to reach US\$8.2 billion by 2023

The global LNG Bunkering market is expected to reach US\$8.2 billion by 2023, according to figures

from Statistics MRC.

The firm expects a growing marine logistic sector, cost efficient LNG products, and imposition of environmental regulations to be key factors delivering

market growth of 64.7% CAGR.

Statistics MRC figures suggest that the rapid growth will see the sector increase from a base line of just US\$249 million in 2016.

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

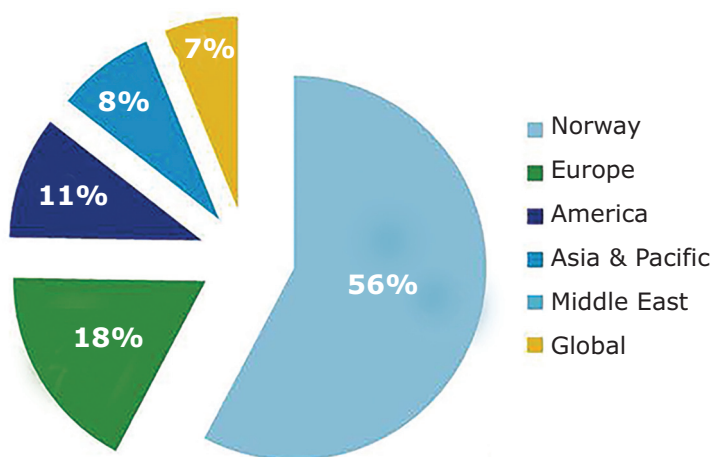
Data last updated: 15 February 2017

* = conversion projects

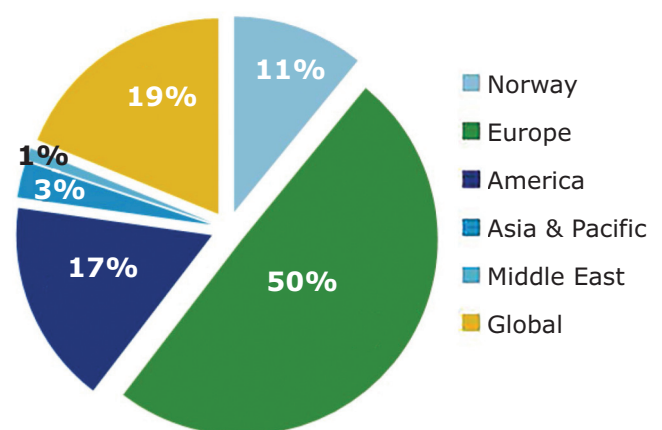
Year	Type of Vessel	Owner	Class
2015	Gas carrier	Evergas	BV
2015	Gas carrier	Evergas	BV
2015	Tug	CNOOC	CCS
2015*	Car/passenger ferry	AG Ems	DNV GL
2015	Tug	NYK	NK
2015	Gas carrier	Chemgas Shipping	BV
2015	Gas carrier	Evergas	BV
2015	PSV	Harvey Gulf Int.	ABS
2015	Container ship	TOTE Shipholdings	ABS
2015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