

LNG Fuelling

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2nd Quarter 2018

LNG poised to be “marine fuel of the 21st Century”

Record demand for LNG from shipping lines may be set to make it “the marine fuel of the 21st Century”, according to the latest research by consultancy Drewry Maritime.

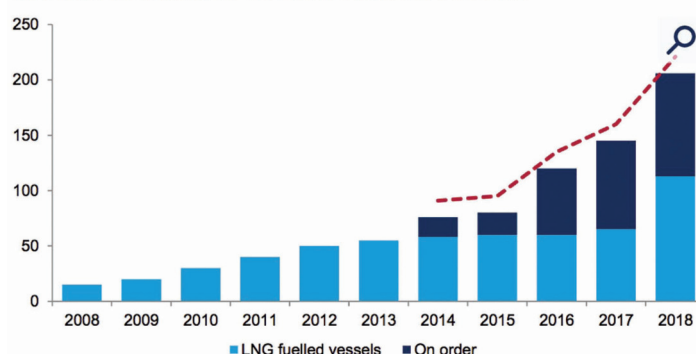
Based on an industry-wide survey of owners by Drewry, the findings suggest that upcoming international Maritime Organisation (IMO) sulphur limits, due to take effect in 2020, are likely to make LNG “even more attractive” with supply and infrastructure growing.

“Many shipowners are still weighing up the dilemma of how to comply with the stringent new rules on sulphur emissions, due to come into force in January 2020... Major owners are now talking about the possibility of a carbon-neutral maritime industry, and that makes LNG even more attractive,” Drewry states.

LNG supply to hit 72 million tonnes by 2022

Drewry’s quantitative modelling generated three scenarios based on estimated total demand generated by LNG as bunker fuel in 2022. These scenarios stem from a low case assuming 5% of the identified fleet retrofits LNG engines, base case assumes 10%,

Growth in number of LNG fuelled vessels



Source: Drewry Maritime Research

and high case presumes 15% of the total fleet.

“Adding the confirmed new LNG projects to the current capacity in the market, we estimate that annual supply will be about 72 million tonnes by 2022,” Drewry reports.

The researchers note that more LNG projects will need to come on-line and more bunkering facilities will need to be completed in a short period of time if the industry is to cope with demand for LNG bunkering.

LNG cheapest long-term alternative

The new research paints a positive outlook for the fuel when compared against the alternatives on a long-term cost basis.

Comparing the pros and cons of LNG against scrapping older tonnage, retrofitting scrubbers, or switching to low-sulphur marine gasoil (LSMGO), Drewry highlights some potential cost barriers in early years but notes that over the longer-term LNG is expected to become the cheapest option. “Scrubbers are increasingly seen as a messy answer [and] for the existing fleet, retrofitting is a risky option... It is likely that owners will opt for LSMGO in the early years, while newbuildings will increasingly be built with LNG-capable engines. That will also provide a breathing space while the necessary infrastructure is built,” the report’s authors said.

The findings are published in Drewry’s latest LNG Forecaster report.



Drewry predicts annual supply will hit 72 million tonnes by 2022

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Fluxys signs Antwerp LNG concession

Belgian gas transmission system operator Fluxys has started operations at the port of Antwerp to deliver LNG fuel for ships and barges.

The firm has taken over the concession for quay 526-528, where it currently operates a mobile fuelling solution, and aims to add a permanent LNG bunkering facility by the end of next year.

“Over the next year and a half Fluxys will construct at quay 526-528 the infrastructure needed for barges and smaller seagoing ships to fill up with LNG at a permanent facility with LNG storage,” a spokesperson for Fluxys said.

Collaboration with G&V Energy

The firm will work closely with Belgian fuel station operator G&V Energy Group over the next 18 months to construct the new LNG filling station and has aims to cre-

ate a solution that will cater both for ocean vessels as well as trucks and road vehicles at the site.

The current mobile system in place at quay 526-528 allows captains to reserve a slot through an online platform and refuel via truck-to-ship transfer and it is expected that new permanent station will complement rather than replace this infrastructure.

“Fluxys already enables barges and smaller seagoing ships to bunker LNG smoothly and flexibly 24/7 using LNG tanker trucks, a procedure known as truck-to-ship bunkering... For ships and heavy duty trucks LNG is the ideal alter-

native in the transition to lower greenhouse gas emissions and better air quality,” a spokesperson for Fluxys commented.

ARA to foster LNG development

The development at Antwerp builds on recent LNG infrastructure development by Fluxys at the port of Zeebrugge to the west of Antwerp. Last year, the firm completed in-

troduced its first LNG bunker vessel Engie Zeebrugge with capacity for 5,000 cubic metres of LNG.

Jointly owned by Fluxys, French energy company Engie, engineering firm Mitsubishi, and shipping line NYK, the bunker ship will support the Gas4Sea joint venture and aims to promote LNG as a fuel throughout the main northern Europe shipping hub of the Amsterdam-Rotterdam-Antwerp (ARA) set of ports.

“The challenge in making LNG grow in the bunker market is to develop sufficient supply infrastructure to support the increasing number of LNG-fuelled ships that are expected to come into operation,” a spokesperson for Engie said. ■



LNG bunkering at the port of Antwerp

Furetank launches LNG-powered *Fure Vinga*

Swedish shipping company Furetank Rederi has taken delivery of the first of six new LNG-fuelled tankers, *Fure Vinga*.

The 17,999 deadweight-tonne chemical and product tanker was delivered from Avic Dingheng yard in China to Sweden and is the lead vessel in a series of six identical LNG-fuelled ships under construction for the Gothia Tanker Alliance (GTA) pool.

“We welcome *Fure Vinga* to our alliance! We wish the ship and her crew fair winds and good fortune!”



The *Fure Vinga*

a spokesperson for the GTA said.

Furetank has formed the Gothia Tanker Alliance alongside five other partners in the Nordic region including Rigel, Northern Energy Services, Uni-Tankers, Thun Tankers and Älvtank.

Delivery scheduled by 2019

Fellow Swedish shipowners Älvtank and Thun Tankers have also ordered new-build LNG-powered vessels from Avic Dingheng with Älvtank set to add two newbuild LNG vessels and Thun to add one vessel while Furetank will own the remaining three new tankers.

The first three tankers are due for delivery this year with the remainder scheduled for completion in 2019. All six dual-fuel tankers will operate in the North and Baltic Sea emission control areas under the commercial management of Furetank Chartering.

The design for the vessels was created with naval architect FKAB and all six will be powered by a Wärtsilä 9-cylinder 34DF dual-fuel main engine and gas valve unit, fuelled by a pair of deck-mounted 300-cubic-meter LNG bunker tanks.

The vessels will be bunkered by ship-to-ship transfer from a new 7,500-cubic-metre LNG bunker vessel operated by Nauticor under charter from Bernhard Schulte and Babcock.

LNG framework sways switch to Swedish flag

The new orders Thun Tankers and Älvtank have switched to flying the Swedish flag in response to more favourable operating conditions.

“We had a great cooperation with the maritime trade unions for many years, which has been of great importance for our decision to change into the Swedish flag... With this decision, we can now take even greater responsibility for the development and improvement of Swedish competitiveness,” Lars Höglund, CEO of Furetank, said.

The Swedish merchant fleet is forecast to see a slight rebound in 2018 having decreased from 254 vessels to 89 during the years 2001-2017. ■

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Crowley completes first LNG load at Eagle liquefaction plant

LNG specialist Crowley Maritime has loaded the first LNG fuel at its Eagle LNG Partners liquefaction facility near Jacksonville, Florida.

The firm oversaw loading of executed the first loading of nearly 11 gallons of LNG into an ISO tank container at the site for delivery to Puerto Rico. The container was transported by road to Port of Jacksonville for ocean transport to the Caribbean.

“With the successful LNG tank container loading at the Eagle LNG Partners’ Maxville Facility, Crowley can offer even more flexible services and sourcing locations to supply customers with LNG as a cleaner, safer fuel source. The new plant location means LNG can be easily produced and transported to the port all within the Jacksonville area,” Matt Jackson, vice president at Crowley, said.

Capacity for 200,000 gallons per day

Located in Maxville, west Jacksonville, the new plant has capacity to produce up to 200,000 gallons per day of LNG. Fuel from the plant will supply customers throughout the U.S., Caribbean and Latin America via Crowley’s network.

“The new Maxville LNG Facility

is the first LNG plant to be operational in Jacksonville and features numerous design enhancements to allow us to send out LNG to the Port of Jacksonville and throughout the region safely and efficiently. LNG continues to become the fuel of today and Jacksonville is the epicenter of this transition,” Sean Lalani, president of Eagle LNG Partners, said.

The Maxville LNG Facility will ensure regulation of supply thanks to a 1-million-gallon storage tank and custom-designed fuel loading system for expedient truck delivery to the port of Jacksonville.

Jacksonville aims to become regional LNG hub

The Eagle Partners liquefaction facility is part of a multi-million-dollar investment program in LNG infrastructure in the Jacksonville area where Crowley expects to invest more than US\$550 million in new LNG-fuelled ships, bunker station and terminal improvement.

“This LNG plant is the embodiment of Crowley and Eagle LNG’s commitment to the community in the North Florida region and



Crowley LNG vehicles

Puerto Rico. Having the first commercial load sold to Crowley for routing through the Port of Jacksonville to Puerto Rico is only appropriate,” Lalani added

Headquartered in Florida, Crowley Maritime is a family and employee-owned marine solutions, energy and logistics company and one of the leading developers of LNG fuelling infrastructure in the area.

To support LNG-fuelling activity, Eagle LNG Partners and Crowley have constructed a dockside LNG fuel depot at the JAXPORT Talleyrand Marine Terminal, using cutting-edge technology engineered to feature a compact footprint specifically for ship bunkering operations. ■

NEWS NUDGES

LIQAL to build Remitrans LNG station

Australia’s largest independent LNG equipment developer LIQAL is to build a new LNG refuelling station for the Belgian transport company Remitrans.

“We are sure that LNG is the alternative for diesel in heavy duty and long haul transportation... Remitrans has selected our recently introduced prefabricated refuelling station, whereby the time to market can be reduced by a few months. Great for the turnaround time of the project and for the wallet of our customers,” Joost Jansen, Business Development Manager at 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.

The firm also develops a wide range of alternative fuel technologies alongside LNG dispensers including liquefaction systems, satellite plants and H2 fuelling. ■



Rendition of Eagle LNG Jacksonville plant

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Keppel names first LNG-fuelled tug in SE Asia

Shipbuilder Keppel Offshore & Marine has held a naming ceremony for the first dual-fuel LNG tug in South East Asia.

The vessel was named *KST Liberty* and will be operated by Singapore-based Keppel Smit Towage. The tug features 65-tonne bollard pull and is powered by Azimuth Stern Drive (ASD).

"Today's christening of *KST Liberty* marks an important milestone in Singapore's journey to make LNG bunkering available at our port as early as 2020," Loh Ngai Seng, Permanent Secretary at Singapore's Ministry of Transport said at the naming ceremony.

Award-winning design

The vessel is based on a proprietary design from wholly owned subsidiary, Keppel Singmarine and achieved the Outstanding Maritime R&D and Technology Award at the 2015 Singapore International Maritime Awards.

"Our award-winning dual-fuel

tug design offers more economical operations with efficient fuel consumption; a simplified bunkering process; optimised deck space that increases the safety and comfort of the crew; and ease of operations," Abu Bakar, Managing Director at Keppel O&M, said.

Smart design to extend harbour operations.

The tug is expected to greatly extend harbour operations thanks to increased capacity from the fitted LNG tanks which will reduce the need for re-fuelling and enhance operational efficiency as well as substantially reducing CO2 emissions relative to traditional tugs.

"I congratulate Keppel O&M and Keppel Smit Towage for taking the lead, under MPA's LNG Bunkering Pilot Programme, to build and operate Singapore's first LNG-



KST Liberty

fuelled vessel. Such partnerships bring us closer to our goal of cleaner and more sustainable marine fuels," Ngai Seng added.

The tug's smart design features a patented LNG vaporiser and containerised, type-C ISO-certified tanks on the main deck, with re-fuelling carried out by truck to ship operation or via direct replacement of empty tanks.

"This is a state-of-the-art tug, with environmentally-friendly fea-

tures that exceed the requirements of the International Maritime Organisation's (IMO) global cap of 0.5% on the sulphur content of marine fuel that comes into force on 1st January, 2020," Romi Kaushal, Managing Director of Keppel Smit Towage, said.

LNG fuel will be supplied by FuelNG, a joint venture between Keppel O&M and Shell Eastern Petroleum, with bunkering conducted at Jurong Port. ■

Forward maritime orders LNG-fuelled bulkers

LNG technology development consortium Forward Maritime Group has signed a Letter of Intent for 20 LNG-fuelled bulk carrier vessels.

The advanced forward bulk carrier 84-LNG bulk carriers will be constructed by Singapore-listed shipbuilder Jiangsu Yangzijiang Shipbuilding and are scheduled for delivery.

"When delivered, these vessels will be trading under the Forward Ships brand," a spokesperson for Forward Maritime said.

The LNG-focused brand is part of the Project Forward initiative which is a Joint Development Project (JDP) formed and led by

Greek-based transport firm Arista Shipping.

The consortium aims to build and promote 'commercially feasible' LNG-powered dry bulk carriers in compliance with the International Maritime Organization's (IMO) Energy Efficiency Design Index 2025 standards.

Partners in the ambitious LNG project include ship classification society American Bureau of Shipping (ABS), energy firm Shell, fuel supplier Gaztransport & Technigaz (GTT), engine developer Wärtsilä and naval architect Delta-marine

Kamsarmax design to reduce sea transport costs

The partnership foresees the Kamsarmax size bulk carrier design acting as major driver for change to combat global ship emissions through reduction in cost of transportation at sea, modernization of the shipping industry, and definition of new standards for vessel operation.

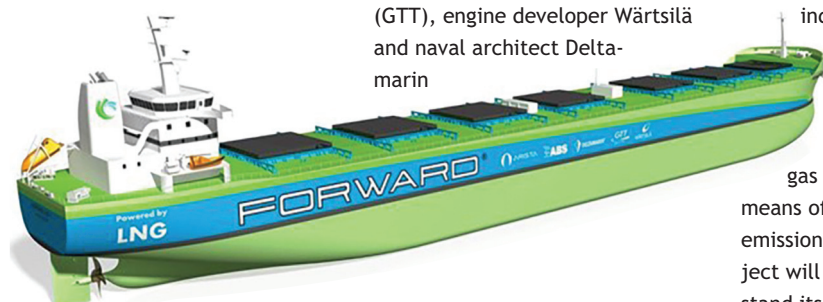
"Project Forward aims to become a milestone for the shipping industry and in particular for owners and operators of cargo ships. Owners must decide within the next 5-10 years whether gas as fuel is a practical means of compliance with lower emissions standards and this project will enable all of us to understand its feasibility," Alexander P.

Panagopoulos, principal of Arista Shipping, said.

Further research to explore long range bunker options

Last year, Shell partnered with Project Forward to launch a research study of bunkering opportunities for LNG-fuelled ships with long sailing ranges. The analysis will study the supply of globally-trading bulk carriers, tankers and container vessels.

"Merchant shipping is under increased pressure of tight emissions regulations from a range of sources and this will continue in future. LNG as a marine fuel, is a cleaner burning fuel for shipping. It can help ship owners and operators to reduce sulphur emissions, particulates and nitrogen oxides," Panagopoulos, added. ■



Project Forward LNG-fuelled bulk carrier

Rotterdam on track for first STS LNG refuelling in June

Authorities at the port of Rotterdam are reportedly planning the first ship-to-ship LNG refuelling operation at the port for June.

The milestone STS bunkering operation is expected to be carried out with short-haul sea vessels in the first instance although this will likely act as a catalyst for a wide range of vessels to refuel in the longer term, according to senior safety adviser at the port, Cees Boon.

The current road-plan suggests LNG-fuelled cruise ships may be the next beneficiary of STS services at the port with the first operations scheduled for November followed by larger deep-sea vessels by the end of 2019.

LNG business booms at Rotterdam

The forward-looking outlook from port authorities is in line with burgeoning LNG uptake at the port. Authorities reported the sale of LNG bunker fuel increased over ten-fold year-on-year in 2017.

“The increase in LNG bunkers was mainly due to the *Wes Amelie*, the world’s first container ship that was converted to LNG propul-

sion. The vessel regularly bunkers at the City Terminal at the Prins Willem Alexanderhaven,” a spokesperson for the port said.

The Port of Rotterdam Authority reported that LNG demand reached 1,500 tonnes in 2017, up from just 100 tonnes in 2016.

As the number of methods by which ships can bunker LNG at the port grows it is expected that volumes will rise sharply. Gate terminal, Rotterdam’s main LNG import site, currently handles a throughput capacity of 12 billion cubic meters per annum (bcma), with further plans to extend this to 16 bcma in future and increasing proportion of this is set to be destined for LNG bunkering as the shipping industry switches from marine fuel.

IMO 2020 limits bracket LNG fuelling growth

Following the decision by the International Maritime Organization (IMO) to set the date of 1 January 2020 to implement a global cap on



Gate LNG terminal at the Port of Rotterdam

sulphur emissions from shipping, the sector is rapidly retrofitting and adding newbuild capacity that can run on LNG.

“We anticipate increased and significant investments across the shipping value chain as a result of this decision and the certainty it provides. LNG is an economic, clean and safe marine fuel with increasing global availability, offering ship owners a real opportu-

nity to improve the environmental performance of the industry,” Peter Keller, chairman of industry consortium SEA/LNG, said.

Alongside the implementation of a global sulphur cap the IMO Marine Environment Protection Committee (MEPC) has also announced mandatory data collection requirements and will require shippers to collect and share fuel consumption data.



LNG refuelling operation at Rotterdam

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Volvo completes first refuelling for heavy-duty LNG truck

Automotive manufacturer Volvo has launched its new LNG-fuelled heavy-duty truck in Finland and carried out the first refuelling operations in Turku on the southwest coast of the country.

The pioneering Volvo FH LNG truck is designed for heavy regional and long-haul operations and is the first heavy-duty truck to run entirely on LNG. Refuelling operations were completed at Gasum's Turku gas filling station.

"The tank-to-wheel carbon dioxide emissions of the new Volvo FH LNG truck are at least 20% lower than those from fossil fuel use. As regards heavy-duty fleets, LNG is the best alternative to diesel among the currently available solutions," Vesa Soppi, Volvo Business Solutions Manager, said.

The 6x2 FH LNG truck is manufactured in Gothenburg, Sweden and can be ordered in Finland through Volvo Finland AB dealers.

LNG refuelling infrastructure set to double

Volvo predicts that the market for LNG-fuelled trucking is set for rapid growth, not only in Finland but throughout Europe, as LNG filling station infrastructure proliferates. The current trucks will currently be refuelled at one of Gasum's four Finnish LNG stations in Helsinki, Vantaa, Turku and Jyväskylä however this network is set to more than double this year as traffic grows.



Gasum LNG fuelling station

"The demand for the new model has been a positive surprise, and the first orders have already been submitted to the factory," Soppi commented.

Four new gas filling stations planned this year

Gasum has announced plans to open new gas filling station locations at Kuopio, Lahti, Oulu and Seinäjoki this year and also aims to expand its LNG filling station network to Sweden and Norway in the next 12 months.

"We know that the number of LNG-powered vehicles will increase in Finland. There is clear

demand among our customers for LNG-powered vehicles as enterprises want to cut their costs as well as their emissions in the various parts of the value chain. Volvo is one of Finland's best-selling heavy-duty vehicle manufacturers and this a popular model," Jani Arala, Senior Manager, Sales, Gasum.

Headquartered in Espoo, Finland, Gasum Oy is the gas grid transmission system operator of Finland, and also the main gas importer and seller. The firm has partnered with vehicle manufacturers Iveco, Scania and Volvo and committed to construct around 35 new gas filling stations in total. ■

NEWS NUDGES

Burrup Peninsula LNG terminal approved

An LNG truck-loading terminal in the Burrup Peninsula, Australia has received preliminary planning approval.

The proposed terminal would be supplied by LNG piped directly from Woodside's Pluto gas plant and feature capacity for up to three trucks simultaneously.

It has been granted planning approval by the Kimberley, Pilbara and Gascoyne Joint Development Assessment Panel however it now faces opposition over concerns about its impact on the area's Aboriginal rock art.

APD backs Bahamas LNG

Arawak Port Development, the operator of Nassau Container Port (NCP) and its partners have pledged to "ramp up" LNG bunkering in the Bahamas.

The chief executive of APD, Michael Maura, called for the Bahamas to "get out ahead" of rival Caribbean ports with regard to use of the fuel, calling it "a win-win-win" opportunity.

The news follows Shell's confirmation as the winning bidder for the Bahamas Power & Light (BPL) generation contract with APD and its fuel supplier partner, New Fortress Energy.

AET signs charter with Shell

Tanker firm AET has signed a long-term charter for two newbuild LNG dual-fuelled Aframax tankers with Shell International Trading.

The two 113,000 deadweight-tonne vessels are currently under construction by Samsung Heavy Industries in South Korea and are due for delivery in the third quarter.

AET expects the deal to "cement" its position in the LNG dual-fuel market, following a deal last year to build and operate two LNG dual-fuelled DP2 Offshore Loading Shuttle Tankers for service in oilfields in the North Sea. ■



Volvo LNG truck refuelling

BIMCO announces revised bunker terms

Shipping association the Baltic and International Maritime Council has adopted new standard Bunker Terms that are expected to boost harmonisation across the shipping industry.

The revised contract aims to “reduce the large number of supplier’s terms and conditions” and speed up the contractual process for new bunkering developments.

“A lot of work has gone into developing a contract that strikes the right balance between the needs of the bunker suppliers and the buyers, and I believe we’ve been successful,” says Francis Sarre, Chairman of the BIMCO Documentary Committee.

The new version was approved by BIMCO’s Documentary Committee and includes detailed delivery bunker delivery provisions, for vessels ready to receive fuel within the agreed window and for situations with delays.

A default credit period of 30 days is also included as well as comprehensive provisions regarding claims management for quantity, quality and delay claims and a default limit of invoice value or

US\$500,000, whichever is higher.

LNG fuelling standards mature

The improvements are designed to streamline the process for ship-owners seeking to build on the ISO 20519 LNG bunker standard issued by the International Standards Agency (ISO) last year.

The standard was introduced to provide guidelines for operators to select vessel fuel providers and meet defined safety and fuel quality standards and included a wide range of requirements not covered by the IGC Code, the prevailing international code for the safe carriage by sea of liquefied gases in bulk.

LNG bunkering guidelines are encapsulated by in five broad themes, that cover hardware for liquid and vapour transfer systems, operational procedures, requirements for LNG providers to



BIMCO announced new LNG standards for shipping

deliver an LNG bunker delivery note, requirements to train personnel and requirements

“There was an urgent need for an International Standard to ensure LNG bunkering operations could be conducted safely...The requirements of ISO 20519 can be incorporated as a management objective into existing management programmes and provide verifiable compliance. This is important because the requirement to comply

with ISO standards is often incorporated into business contracts and may also be referenced by local regulations,” Steve O’Malley, chairman of the Ships and Marine Technology committee and the Intermodal and Short Sea Shipping subcommittee SC 11, said.

BIMCO is the largest international shipping association in the world and its members represent around 65 percent of the world’s tonnage. ■

ABS backs Singapore as LNG fuelling hub

Advanced infrastructure for drydocking and modification work in Singapore is set to boost the island-state’s role as a regional LNG hub, according to the American Bureau of Shipping (ABS).

The classification society was positive on the outlook for LNG refuelling and noted the “significant potential” of the market in the long-term.

“Singapore is a growth market because LNG ships require reliable, on-time delivery from drydocking, a service Singapore has been providing and will continue

to do so,” Peter Fitzpatrick, Vice President for Global Marine at ABS, commented.

Drydocking facilities vital for LNG services

The island’s drydocking facilities are supported by one of the most concentrated LNG import and export hubs in the world with

bunkering facilities, a multi-user open access terminal and a deep culture of risk and safety training for crew members.

“In order for the LNG market to grow across the region and elsewhere including China and the U.S., it is very important to have the proper bunkering infrastructure in place,” Nicolas Sartini, CEO of APL, a subsidiary of CMA CGM Group, said.

Pavilion Gas expands bunkering scope

At the start of this year, state-owned LNG supplier Pavilion Gas was awarded a contract by PSA Marine for the supply of LNG bunker fuel in a deal that will see the firm provide LNG for two dual-fuel harbour tugs, due for delivery in 2019.

“We look forward to playing a key role in developing the LNG

bunkering ecosystem in Singapore and the region This is an important step forward for Pavilion Gas as LNG bunkering is a key driver for LNG demand growth,” Seah Moon Ming, CEO of Pavilion Gas and sister firm Pavilion Energy, said.

Pavilion is one of the few companies licensed for both LNG bunkering and LNG import by the Maritime Port Authority of Singapore (MPA) and is currently working to strengthen LNG bunker supply and delivery models in partnership with international players. Pavilion Gas is a subsidiary of state-owned wealth fund Temasek.

“We see LNG overhaul as a growth area for Singapore, and not just drydocking, but major modifications work with a number of significant projects on LNG vessels being undertaken here in the yards,” Fitzpatrick added. ■



Peter Fitzpatrick Vice President Global Marine ABS

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Gazprom Neft plans first Russian LNG bunker barge

Russian oil major Gazprom Neft has announced plans to construct the country's first LNG bunker barge by 2020.

The proposed barge is part of a wider strategy by the state-owned firm to develop LNG as a fuel for transport throughout the maritime sector in the country.

"As part of realising the full potential of its bunkering business Gazpromneft Marine Bunker is developing a project unique to the industry, aiming to build Russia's first LNG-bunkering barge by 2020, as well as taking part in the development of a legal and regulatory framework for the fulfilment of LNG bunkering at Russian ports," a spokesperson for Gazpromneft Neft said.

Arctic LNG bunkering opportunity

With the success of Russia's giant Yamal development in Siberia, Gazprom has increasingly focused on expansion gas-powered transport in the region with LNG bunkering emerging as a growth opportunity.

"A key strategic objective for Gazpromneft Marine Bunker will be fulfilling guaranteed supplies of

bunkering fuels for Gazprom Neft's Arctic projects. The remit of this new sector in the bunkering market includes the Russian Arctic Shelf and the waters of the Northern Sea Route," Gazprom stated.

To achieve this Gazprom expects to develop "entirely new" bunkering infrastructure capable of operating in the conditions of the Far North, with an "Arctic-class" bunkering fleet.

Land transport to link to LNG

As one of the world's largest producers of natural gas, Russia is also eyeing land-based transport solutions and as such the government has started to invest in an array of new projects beyond the maritime sector.

These include the first LNG-fuelled Russian rail fleet which

Gazprom announced at the start of this year in partnership with Sverdlovsk, a subsidiary of rail operator Russian Railways.

With the growth of a nationwide refuelling network for LNG, Sverdlovsk Railway expects to increase its fleet of LNG-powered trains from the current three to as much as 22 units or more by 2023.

"In accordance with the Program, Russian Railways plans to increase the fleet of mainline gas turbine locomotives and gas turbine shunters powered by LNG... Pursuant to the Program, manufacturers (Sinara Group and Transmashholding) will take measures to improve the designs of gas-powered locomotives [and] a new series of gas-powered vehicles will be developed," a Gazprom representative commented. ■

"A key strategic objective for Gazpromneft Marine Bunker will be fulfilling guaranteed supplies of bunkering fuels...."

- Gazprom

NEWS NUDGES

Jamaica launches first LNG-fuelled vehicles

Gas distributor IGL has introduced the first LNG-powered vehicles to Jamaica with the addition of three tractor heads at Devon House in St. Andrew.

"Jamaica's National 2030 Development Plan recommends that, as a country, we create prosperity through the sustainable use and management of our natural resources... LNG gas-fired power is more competitive when long-term costs associated with climate change and the impact of air pollution, both on people and the environment, are included," IGL General Manager, Wayne Kirkpatrick said.

Fuel for the new vehicles will be supplied by developer New Fortress Energy which is also converting Jamaica Public Service's (JPS) Bogue plant in St James from diesel fuel to LNG.

"I want to congratulate IGL.... I truly appreciate the move, or any initiative that seeks to reduce our carbon footprint," Science, Energy and Technology Minister, Andrew Wheatley, said. ■



Gazprom Neft worker

Sinanju orders Singapore's first LNG bunker tanker

Shipping line Sinanju Tankers has placed an order for Singapore's first LNG-fuelled bunker tanker.

The order was placed through Sinanju's partner for the project, Japanese conglomerate Mitsui Group, and the tanker will be built by Singaporean shipyard Keppel Offshore & Marine.

"Sinanju aims to kickstart a green initiative for bunker tankers operating in Singapore, for our vessels to emit less air pollutants while boosting the local use of

LNG as a bunker fuel," Ju Kai Meng, managing director of Sinanju Tankers Holdings, said.

Delivery by 2020

The new tanker is due to be delivered at the end of 2019 and its introduction at the world's largest bunkering port is expected to pave the way for new advanced LNG bunkering operations on the island.



Sinanju's new tanker will operate via Singapore

"Operating a dual-fuel powered bunker tanker will also add impetus for our staff and crew to familiarize themselves with the Technical Reference for LNG Bunkering (TR56:2017) and be skilled with the safe and efficient handling of LNG when re-fueling this vessel. We will be in good stead when embarking on ship-to-ship LNG bunkering as our next milestone," Ju Kai Meng added.

The 7,900 deadweight-tonne vessel will be fitted with a 55 cubic-meter LNG tank ondeck, connected to a fuel gas supply system designed to deliver gas directly to the engine and while it will be dual-fuel capable the firm expects to operate it predominantly from LNG.

MPA investment to drive growth

Earlier this year, the Maritime and Port Authority of Singapore (MPA)

announced plans to invest S\$12 million to boost LNG bunkering at the Port of Singapore.

"As the world's largest bunkering hub, MPA will support future demand by promoting the development of ship-to-ship LNG bunkering in the Port of Singapore. This will provide the industry greater confidence in the availability of LNG supply across key shipping routes," Andrew Tan, Chief Executive of MPA, said.

The MPA also places to introduce several new measures under its Maritime Singapore Green Initiative (MSGI) to drive uptake of LNG as a fuel. This strategy is backed by the government which has long pushed to develop the island as a regional LNG hub via investment from its sovereign wealth fund Temasek to develop infrastructure and attract foreign LNG specialists to the island. ■

Chart to build Croatian LNG vehicle fuelling station

Cryogenic storage specialist Chart Ferroxx has been awarded a contract to develop Croatia's first LNG vehicle fuelling station.

The contract includes all design, manufacture and commissioning operations for the proposed facility and work on the project is now underway. The station is scheduled to be commissioned and fully operational by late 2018.

"The skidded design incorporates our recently introduced 60 cubic-metre horizontal cryogenic storage tank together with many other innovative features for enhanced reliability and economy," a spokesperson for Chart said.

Saturation on the Fly technology

The bunker station will also incorporate Chart's proprietary Saturation on the Fly (SoF) vaporization technology, making the station capable of refuelling every LNG vehicle design available on the market today.

"Regardless of whether they're

equipped with spark ignited or compression engines... SoF eliminates additional pre-cooling and also improves the station's overall heat management. Additional energy efficiencies are realized through re-engineering of the station's panel pipework and our in-house, MID certified, dispenser technology is a further integral part of the total solution," the company states.

The Saturation on the Fly concept eliminates additional pre-cooling and utilizes a single dispenser system connected to the LNG tank for quick start and optimized flexibility and saturated or cold liquid from zero to eight bar.

Proven design to fuel expansion

The new LNG station will be the first in this area of the Adriatic to be constructed by Chart but will

build on the company's previous experience developing LNG infrastructure in Northern Europe where it has successfully completed several projects throughout the Baltics.

"Chart's proven ergonomic design includes our latest technology for maximum safety, accuracy and operational convenience, with the "Dynaflow" LNG dispenser engineered to operate to an ambient

temperature of -40°C," a spokesperson for Chart said.

Based in the Czech Republic, Chart Ferroxx is a subsidiary of Luxembourg-based Chart industries which operates international engineering and manufacturing facilities in Australia, China, the Czech Republic, Germany and the United Kingdom as well as eight U.S. states. ■



Chart Ferroxx LNG Bunker station

Japanese consortium study LNG bunkering in Tokyo Bay

A consortium of Japanese industrial firms has committed to a joint study on ship-to-ship LNG bunkering in Tokyo Bay.

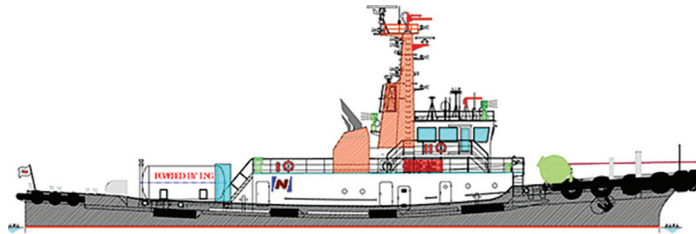
Japanese trading house Sumitomo Corp announced the deal stating it had signed a memorandum of understanding with Uyen Transtech and Yokohama-Kawasaki International Port Corp to explore the possibility of advanced bunkering infrastructure in the bay.

The focus of the research is expected to be the commercial feasibility of LNG bunkering vessels with all three firms to remain open to possible participation in an LNG business venture.

LNG investment environment strengthens

Last year, the government of Japan announced plans to invest US\$10 billion to support Asian LNG growth and improve uptake of LNG bunkering. The country's first LNG bunker station is planned for the port of Yokohama in Kanagawa Prefecture on the south of Honshu island.

At the start of 2018, Japanese shipping firms K Line, Chubu Elec-



Rendering of MOLs proposed LNG tugboat

tric, Toyota Tsusho, and NYK Line initiated plans to create a joint LNG bunkering business with discussions underway on the commercialization of LNG as a transport fuel.

"LNG is expected to become an important alternative to heavy fuel oil, because of its relatively low emissions of air-polluting substances and greenhouse gases... The group hopes that the use of LNG will enable their ships to meet increasingly stringent international regulations on emissions," the shipping firms said in a joint statement.

Rival shipping line MOL also expects to deploy LNG-fuelled asset following a deal with Kanagawa Dockyard to construct the first LNG-fuelled tugboat to operate in Osaka Bay, Japan.

"MOL and Osaka Gas will... co-operate in the measures of LNG fuel supply development project conducted by Port and Harbor Bureau of Osaka Prefectural Government at the Sakai-senboku Port," a spokesperson for MOL said.

The partners will also research the practicalities of an LNG fuel supply system with a detachable, portable LNG fuel tank. ■



Tokyo Bay

NEWS NUDGES

Bernhard Schulte pans scrubber technology

Transport group Bernhard Schulte Shipmanagement has ruled out using scrubber technology to meet upcoming International Maritime Organization's global sulphur caps, favouring the outlook for LNG fuelling infrastructure instead.

The firm expects LNG-fuelled tanks to be a 'very good option' for newbuilds and predicts that the retrofitting of scrubber technology on smaller ships will be mostly unviable.

"For the existing fleet of the Schulte Group we are looking at all the options on a case-by-case basis... Most of the time the decision will be to go for 0.5%-sulphur compliant fuel. A lot of the ships are relatively small; fitting scrubber technology is not really viable in our view," Angus Campbell, corporate director of energy projects at Bernhard Schulte, said.

Vancouver LNG bunker price hits two-year low

The spot price for LNG bunker fuel in Vancouver has hit its lowest level in almost two years.

Authorities reported that LNG-380E fell to US\$240 per metric tonne, the lowest since US\$218.5/MT reported in February 2016.

The LNG-380E price measures the amount of LNG required to deliver the energy equivalent of one metric tonne of IFO380 bunker fuel. ■

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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

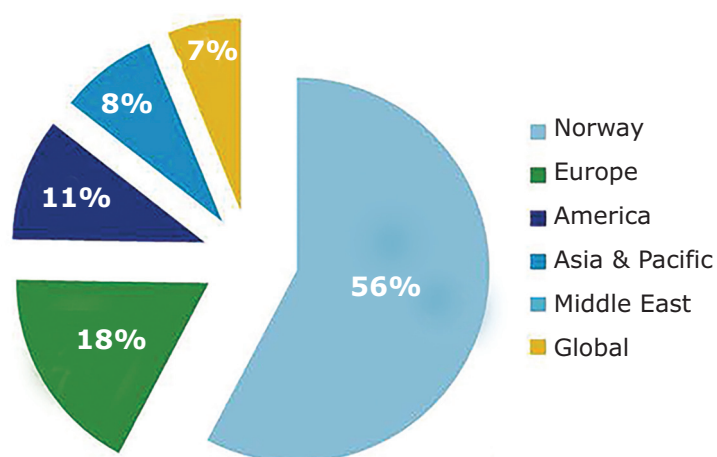
Data last updated: 15 February 2017

* = conversion projects

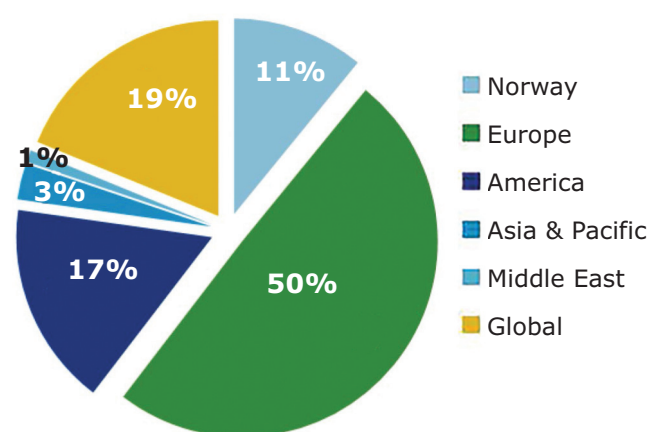
Year	Type of Vessel	Owner	Class
2015	Gas carrier	Evergas	BV
2015	Gas carrier	Evergas	BV
2015	Tug	CNOOC	CCS
2015*	Car/passenger ferry	AG Ems	DNV GL
2015	Tug	NYK	NK
2015	Gas carrier	Chemgas Shipping	BV
2015	Gas carrier	Evergas	BV
2015	PSV	Harvey Gulf Int.	ABS
2015	Container ship	TOTE Shipholdings	ABS
2015	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	Teekay
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	Teekay
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 = 12th February 2018

Built	Name	CBM	Cargo Type	Trading area	Trading in LNG?	Ship Owner / Operator
2016	Ocean Yield TBN**	36,000	Ethane/Ethylene	US - Teeside	Ethane, for Sabic	Gaschem Services
2017	Cardissa	6,500	LNG	Northwest Europe	Yes	Shell
2017	Yuan He 1	30,000	LNG	China	Yes	CSR
2017	ENGIE Zeebrugge	5,000	LNG	Northwest Europe	Yes	NYK
2017	CME TBN†	2,200	LNG	US Coast	Yes	CME
2017	CME TBN†	2,200	LNG	US Coast	Yes	CME
2017	Coral EnergICE	18,000	LNG	Northwest Europe/Baltics	Yes	Anthony Veder
2017	Coralius	5,800	LNG	Northwest Europe/Baltics	Yes, for Skangas	Anthony Veder
2017	JS Ineos Invention	27,500	LNG/Ethylene	Markus Hook - Rafnes	Ethane, for Ineos	Evergas
2017	JS Ineos Intuition	27,500	LNG/Ethylene	Markus Hook - Rafnes	Ethane, for Ineos	Evergas
2017	LNG-Gorskaya TBN	7,300	LNG	Russia	Yes	LNG-Gorskaya
2017	LNG-Gorskaya TBN	7,300	LNG	Russia	Yes	LNG-Gorskaya
2017	LNG-Gorskaya TBN	7,300	LNG	Russia	Yes	LNG-Gorskaya
2017	Navigator Eclipse	35,000	Ethane/Ethylene	US	Ethane	Navigator
2017	Navigator Nova	35,000	Ethane/Ethylene	US	Ethane	Navigator
2017	Navigator Prominence	35,000	Ethane/Ethylene	US	Ethane	Navigator
2017	Oizmendi	600	LNG	Bilbao	Yes	Itsas Gas
2018	Shell Bunker Barge TBN 2	6,500	LNG	Northwest Europe	Yes	Shell
2018	Shell Bunker Barge TBN 3	6,500	LNG	Northwest Europe	Yes	Shell
2018	Shell Bunker Barge TBN 4	3,000	LNG	Northwest Europe	Yes	Shell
2018	Bernhard Schulte TBN	7,500	LNG	Baltic	Yes	Bernhard Schulte
2018	CME TBN†	2,200	LNG	US Coast	Yes	CME
2018	Evergas TBN	32,000	Ethane/Ethylene	Markus Hook - Rafnes	Ethane, for Ineos	Evergas
2018	Evergas TBN	32,000	Ethane/Ethylene	Markus Hook - Rafnes	Ethane, for Ineos	Evergas
2018	Evergas TBN	32,000	Ethane/Ethylene	Markus Hook - Rafnes	Ethane, for Ineos	Evergas
2018	Evergas TBN	32,000	Ethane/Ethylene	Markus Hook - Rafnes	Ethane, for Ineos	Evergas
2019	KLine TBN	7,500	LNG	Korea	Yes	Korea Line
2019	KLine TBN	7,500	LNG	Korea	Yes	Korea Line
2019	Stolt TBN	7,500	LNG	Mediterranean	Yes	Stolt-Nielsen Gas
2019	Stolt TBN	7,500	LNG	Mediterranean	Yes	Stolt-Nielsen Gas
2020	Stolt TBN (option)	7,500	LNG		Yes	Stolt-Nielsen Gas
2020	Stolt TBN (option)	7,500	LNG		Yes	Stolt-Nielsen Gas
2020	Shell Bunker Barge	4,000	LNG	US Coast	Yes	Q-LNG Transport / Harvey Gulf
2020	Total TBN	18,600	LNG	NWE	Yes	MOL
2021	Stolt TBN (option)	7,500	LNG		Yes	Stolt-Nielsen Gas

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 = 12th February 2018

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