

# LNG Fuelling

AN LNG JOURNAL PUBLICATION

2 November 2017

## Gothenburg hails LNG bunkering breakthrough

Authorities at the port of Gothenburg have completed the first simultaneous LNG bunkering and ship loading operation at quayside.

The 147-metre-long tanker *Tern Ocean* was refuelled with gas supplied by Skangas at the same time as loading of cargo took place. The dual operations help save time on quayside and improve turnaround for Swedish owner Terntank.

The refuelling operation follows the first ship-to-ship bunkering of LNG at the port less than a month ago and the Gothenburg Port Authority (GPA) reports that LNG bunkering procedures are now so common that they have become “a regular part of operations”.

“Even 5-10 years ago the idea of ships running on liquefied natural gas would have almost been regarded as science fiction. Now we have had seven LNG-bunkering here in less than a month. It would be no exaggeration to describe this as a major breakthrough,” Dan-Erik Andersson, Gothenburg Port Authority Operations Manager at the Energy Port, said.

### Swedish core ports aim for 2025

The GPA is part of a broad alliance of Swedish ports under the EU Alternative Fuels Infrastructure Directive that aim to implement full LNG capabilities by 2025. The



LNG bunkering vessel *Coralius* bunkering *Ternsund* last month

Swedish core ports include Luleå, Stockholm, Copenhagen/Malmö and Trelleborg.

“This development has been driven from different directions. We have shipping companies and energy producers that have had the foresight to invest responsibly in the long term, as well as public agencies that have been compliant with regard to the regulatory framework,” Andersson explained.

### Swedegas investment to support fuel transition

One of the key drivers for this change has been strict regulation for Baltic maritime traffic and imminent legislation from the IMO

and other international bodies to limit emissions.

“The Sulphur Directive introduced in 2015 has spurred us on, and at the Gothenburg Port Authority we have offered incentives in the form of fuel transition discounts and other financial inducements,” Andersson added.

The next phase of development for the Port of Gothenburg, will be the construction of landside pipeline for LNG by Swedish gas grid operator Swedegas next year. The project will also include investment in a larger LNG facility at Gothenburg Energy Port that will supply both the transport and industrial sectors. ■



Gothenburg Energy Port

## FUELLING NEWS AGENDA

### TERMINALS



Sojitz acquires stake in Mugardos LNG terminal

2

### MALTA

Malta to launch LNG bunkering study

3

### PONTOONS

Construction begins on Titan LNG FlexFueler

5

### JAPAN



Japan to fund Asian LNG bunkering growth

6

### LNG ORDERBOOK

LNG-fuelled confirmed newbuilds

7

LNG-fuelled ship fleet

8

LNG small scale fleet

10

# Sojitz acquires stake in Mugardos LNG terminal

Japanese commodities firm Sojitz has acquired LNG firm First State Regasificadora (FSR).

Sojitz' management announced the acquisition along with a name change to Sojitz Regasificadora (SR). The assets of SR include a 15% stake in Regasificadora del Noroeste (Reganosa) which owns the Mugardos LNG terminal, in the northwest of Spain.

"Sojitz will contribute its LNG

expertise and other businesses experience gained through a wide range of general trading operations, to support the further development of the Mugardos LNG Terminal," Sojitz management said in a statement.

The deal marks the first Japanese trading company to enter

into the LNG terminal business in Europe. The remainder of Reganosa is owned 50.69% by Tojeiro Group, 24.31% by the government of Galicia and 10% by Sonatrach.

## Plans to develop LNG bunkering capacity

Currently, LNG delivered to the Mugardos LNG Terminal is supplied to the domestic market in Spain as well as being reloaded and delivered to global markets, in particular to Asia. Sojitz notes that Reganosa plans to use the terminal as an LNG bunkering station for ships using LNG as marine fuel and aims to support growth in this activity going forward.

"Sojitz will continue to develop its global LNG business with a focus on LNG receiving and lique-

faction terminals, and will look at expanding its LNG receiving terminal business into ASEAN and other countries in South Asia," a Sojitz spokesperson commented.

Multinational general trading company Sojitz Corporation invests in a broad range of sectors including automobiles, energy, mineral resources, chemicals, foodstuff resources, agricultural and forestry resources, consumer goods, and industrial parks.

"Sojitz has been involved in the LNG business since the 1970s, having gained a wealth of knowledge and experience through LNG liquefaction & marketing activities, LNG trading and LNG import activities into Japan, with notable investments in Indonesia and Qatar," the company states. ■



The Mugardos LNG terminal

# Skangas loads Coral Energy at Melkøya

Nordic LNG specialist Skangas has completed the first small scale LNG loading at a facility on Melkøya island outside Hammerfest in Norway.

The LNG plant, operated by energy major Statoil, delivered a cargo of 100 gigawatt-hours of fuel to Skangas' vessel *Coral Energy*. The vessel is the world's first direct driven dual-fuel ice-class 1A LNG carrier.

"This terminal is an addition to our existing LNG sources. Having several LNG sources supports our customers and us with additional security of supply and it increases our opportunities... In addition, a future possible supply alternative from the northern part of Norway could make it easier to open up for new deliveries along the entire coast of Norway," Kimmo Rahkamo, CEO of Skangas, said.

The 15,600-cubic-metre capacity *Coral Energy* was the first

small-to-medium scale LNG carrier to load at the large-scale jetty at Melkøya LNG plant. *Coral Energy* serves Skangas' customers and terminals with LNG and from Melkøya transports the fuel to the firm's terminal in Lysekil, Sweden.

## No visible surface installations

The Melkøya plant receives and processes natural gas from the Snøhvit field in the Barents Sea via a 160 kilometre gas pipeline. The onshore facility separates condensate, water and CO2 to form LNG. All production facilities are located on the seabed, at depths of 250-345 metres. The seabed facilities are designed to be over-trawable, so that neither

they nor fishing equipment will suffer any damage from coming into contact with each other.

"There are no visible signs of the field; no platform or production vessels in the Barents Sea mark its place... Snøhvit is the first development in the Barents Sea, and the first major development on the Norwegian continental shelf with no surface

installations," a spokesperson for Statoil said.

Joint venture company Skangas is 70% owned by Finnish natural energy gas expert Gasum and 30% owned by Norwegian electricity group Lyse Energi. The firm is one of the largest LNG suppliers in the Nordic region and provides fuel for shipping, industrial and heavy-duty road transport needs. ■



The Skangas Coral Energy

## LNG Fuelling

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

## Publisher

Stuart Fryer

## Editor

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

## Ad sales enquiries

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

## Subscriptions

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

## Production

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

No part of this publication may be reproduced or stored in any form by any mechanical, electronic, photocopying, recording or any other means without the prior written consent of the publisher. Whilst the information and articles in LNG Shipping News are published in good faith and every effort is made to check accuracy, readers should verify facts and statements direct with official sources before acting on them as the publisher can accept no responsibility in this respect. Any opinions expressed in this publication should not be construed as those of the publisher."

# Malta to launch LNG bunkering study

The government of Malta is to explore the development of LNG bunkering infrastructure across the island, following a €600,000 research grant from the European Union.

The Maltese Energy and Water Agency was approved for the grant earlier this year and is now poised to commence a technical study into LNG bunkering next month. The study aims to provide a framework for the government's plans to create up a national LNG fuelling policy.

The funding was delivered under the Connecting Europe Facility programme, as part of a €40 million Europe-wide initiative, Belgian life-cycle consultancy Tractebel Engineering will lead the study, after winning a public call for tenders, with the EWA and Transport Malta to collaborate on project delivery.

Tractebel Engineering is a subsidiary of global power and infrastructure firm GDF Suez Group.

## Research to identify optimal offshore solutions

An initial phase of research will seek to identify optimal offshore and outside port infrastructure solutions as well as key locations for potential LNG stations and storage.

Analysis will also cover future market demand, attractiveness, economic, environmental, geo-



The FSRU *Toscana* in Malta

graphical, safety and risk aspects as well as possible synergies with the planned Malta-Italy gas pipeline interconnector.

Malta is already home to the Delimara Malta LNG Terminal floating liquefied natural gas (FLNG) regasification terminal. The novel hybrid FLNG supplies natural gas to the 200 megawatt Delimara power plant, which has

been converted from oil to natural gas operation in January 2017

## Tender launched for Malta-Italy interconnector

The proposed pipeline interconnector is likely to give a significant boost to gas use on the island when it connects to the mainland grid. The EWA recently released a

call for tenders for advisory Services in relation to a Preliminary Marine Route Survey.

The tender calls for Management consulting firms to submit bids for work to examine permitting procedures, FEED and EPC Tender Review for the Malta-Italy Gas Pipeline Interconnection. The deadline for bids has been set as 14 November. ■



The island of Malta



# LNG VALUE CHAIN SOLUTIONS

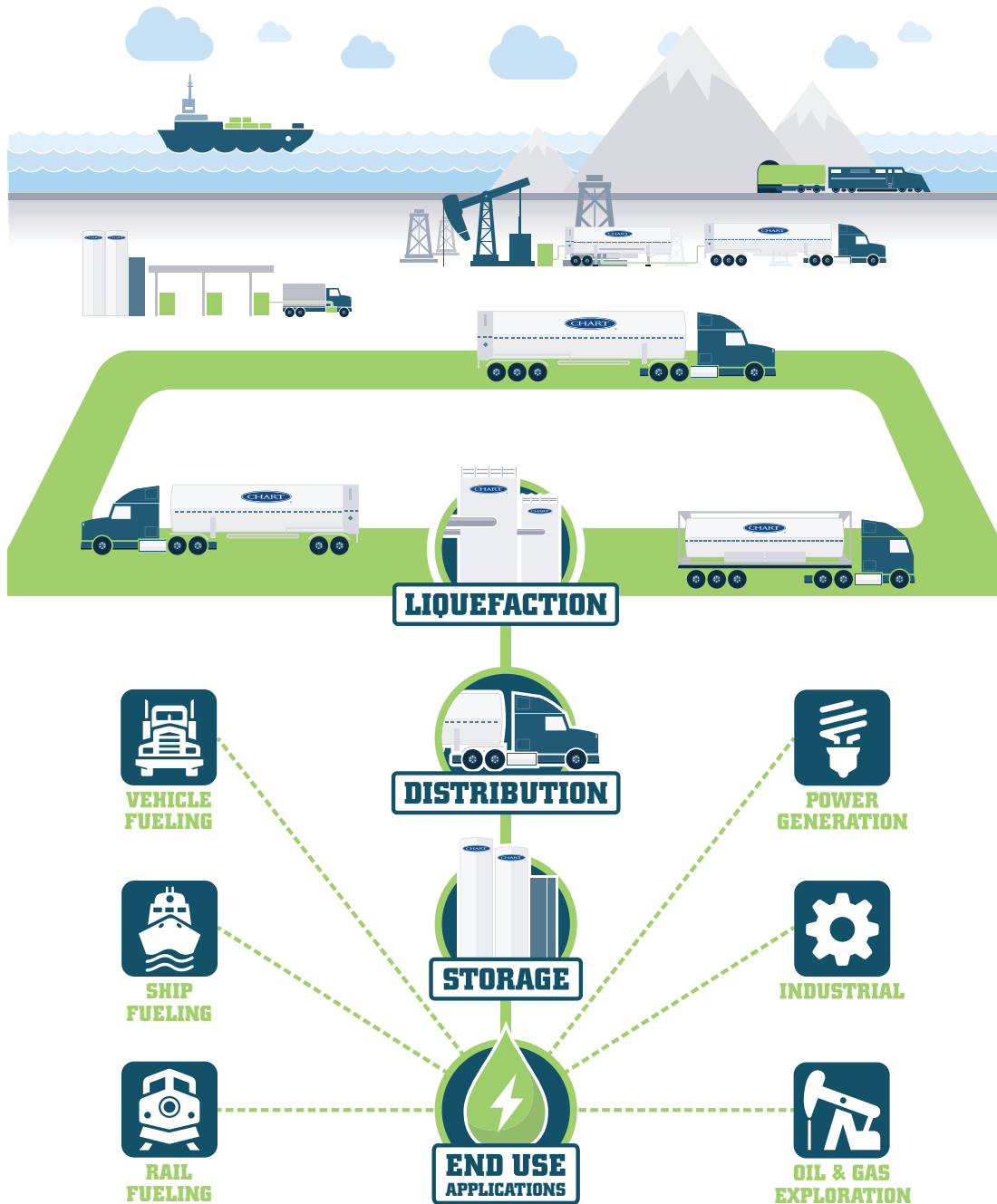


Chart is pioneering the adoption of LNG as a clean-burning, safe and economical fuel alternative for energy, transportation and industry.

[www.ChartLNG.com](http://www.ChartLNG.com)

# LNG bunkering market set for proliferation

The market for LNG bunkering is set to grow solidly over the coming decade reaching record levels by 2025, according to the latest figures from consultancy Transparency Market Research.

The outlook from TMR point to a compound annual growth rate (CAGR) of 63.6% and forecasts a rise to 22,540 kilo tons handled annually by 2025. the forecast describes the increase as a “staggering” growth from just 70 kilo tons of capacity in 2013, and suggests gas may rapidly rise to dominate transport fuelling this century.

“Natural gas is one of the most commonly used fossil fuels for power generation across the globe and is touted to be the fuel of the 21st century owing to its cleaner nature as compared to other popular fossil fuels such as coal and oil,” a spokesperson for TMR said.

Marine transport is identified as one key area of growth with the report noting that future sulphur oxide emission limits are expected

to drive increased uptake. The widening of existing emission control zones (ECA) is also predicted to drive many shipping companies to switch to LNG.

“This factor is expected to have a significant impact on the global bunkering fuel market, which is exploring new and better bunkering fuel options to comply with the increasingly strict regulations being imposed to cut down sulphur emissions in marine environments,” the report’s authors note.

## Container traffic to drive LNG growth

The findings are published in TMR’s *LNG Bunkering Market - Global Industry Analysis, Size, Share, Growth, Trends, and Forecast, 2014 - 2025* report which is



LNG bunker vessel

segmented on the basis of end-user and geography. It considers key end users of LNG bunkering market to be container vessels, bulk and general cargo vessels, tanker vessels, and ferries and offshore support vessels (OSVs).

“Of these, the segment of ferries and offshore support vessels accounts for a dominant share in the global LNG bunkering market. Over the report’s forecast period, the segment of containers is projected to significantly aid the ex-

pansion of the global LNG bunkering market, primarily owing to the rising container traffic in Asia Pacific and Europe,” the report notes.

In terms of geography, Europe emerges as the leading regional market for LNG bunkering due to the presence of a majority of LNG bunkering stations in the region, while North America is projected to benefit from the continuously declining prices of natural gas in the region. ■

# Manufacture of Titan LNG bunker pontoon begins

A manufacturing consortium led by engineering firm Kooiman Marine Group has been contracted to start manufacture of Titan LNG’s FlexFueller LNG bunkering pontoon.

The FlexFueller is designed to supply both inland waterway vessels and larger sea-going vessels and will be deployed initially in the Amsterdam-Rotterdam-Antwerp (ARA) region.

The blueprints for the vessel received principal design approval from certification agency Bureau Veritas earlier this year and the consortium tasked with

the project of building the pontoon includes Kooiman Marine Group, together with subcontractors Marine Services Noord and Cryovat.

“We are very content with this consortium as each party is an evident leader in its own field. Furthermore, they have successfully cooperated in the past already. This will significantly decrease risk

during the building period. I’m confident that we will jointly build this fit for purpose and state-of-art LNG bunkering pontoon,” Ronald van Selm, chief operating officer of Titan LNG, said.

## Design increases initial capacity to 1,480 CBM

The FlexFueller001 has been scheduled to officially launch in the first quarter of 2018 but will now be slightly delayed due to upgrades to the design that will increase capacity and flexibility.

“Due to the substantial increase in upcoming demand for LNG as a bunker fuel in the ARA region, we had the opportunity to outfit the pontoon directly with four tanks. It was an easy trade-off between becoming operational slightly deferred and reaching maximum capacity of 1,480 cubic meters from the start directly,”

Michael Schaap, commercial director at Titan LNG, said.

Designers from Marine Services Noord have worked closely with Titan’s engineers in recent months to create a compliant and practical maritime piping system while Cryovat will add its expertise in LNG fuel tank design.

“To us, the FlexFueller is the logical last mile solution for in-port operations. It copies the usual modus of operations in the existing bunkering market, paramount for adoption by ship owners,” Rinus Kooiman, general manager of the Kooiman Marine Group, said.

Titan LNG is part of the IVECO Schouten Group and provides fuel solutions for industrial companies and shipping lines. Its sister company Rolande LNG, serves LNG fuelling station operator for road transportation. ■



Titan LNG representatives at production launch meeting

# Japan to fund Asian LNG bunkering growth

The government of Japan has announced plans to invest US\$10 billion to support Asian LNG growth and improve uptake of LNG bunkering.

The funding will go to develop new demand centres and will be backed by Japan's Ministry of Economy, Trade and Industry (METI). As part of the initiative, METI will deliver widespread industry training, for LNG producers

and consumers.

"Japan will continue to work towards developing liquid LNG markets in Asia, seek specific actions towards creating LNG demand by new LNG utilization measures such as LNG bunkering, and contribute to building international consensus on the benefits of LNG," Hiroshige Seko, minister for METI, said.

The minister is looking abroad for growth due to contractual over-commitment and slow domestic demand growth but expects downstream market deregulation to improve the outlook.

"I would like to encourage leaders of Asian countries to seriously consider expanded use of natural gas as a choice of smart energy...I would like to request LNG producers to think harder on ways to improve the attractiveness of LNG, including proposals of more rational and flexible trade conditions," Seko commented.

## Yokohama LNG bunker station

The Japanese government has been a long-term supporter of LNG

as a fuel since it pared back the role of nuclear in the country's energy mix in response to the Fukushima disaster in 2011.

A recent feasibility study commissioned by the government outlined plans to develop Japan's first LNG bunker station at the port of Yokohama in Kanagawa Prefecture on the south of Honshu island. The proposed facility would be funded via a public-private investment.

## Multi-phase market liberalization

The initiative is part of the second phase of ongoing market liberalization efforts by METI and follows an agreement signed with India last week, aimed at facilitating flexibility in LNG contracts and establishing reliable LNG spot price indices.

"A global LNG market is being developed... LNG swaps trades based on the JKM are now growing five times from the previous year, and as many as 16 cargoes of LNG were traded in July alone. This fact indicates that the JKM has established itself as a confident



Hiroshige Seko

LNG price benchmark in Asia," Seko added.

A first phase of LNG liberalization over the last year has resulted in domestic power and gas retail sectors opening up to increased competition and a further phase is now planned to divide up operation of formerly monopolistic power-generation plants and transmission and distribution systems by 2020 and of gas pipeline operations by 2022. ■

## NEWS NUDGES

### Chart, Shell open Waddinxveen station

Cryogenic storage specialist Chart Industries and Shell have opened an LNG truck refuelling station in Waddinxveen, the Netherlands.

The station, near Rotterdam, will deliver conventional fuels and LNG to the general public and Shell's fleet customers.

The station features MID-certified Dynaflow 3000 dispenser facilitates venting and fuelling.

### Volvo plans LNG-powered trucks

Scandinavian truck manufacturer Volvo has announced plans to introduce Euro 6-compliant heavy-duty trucks fuelled by LNG.

The proposed designs will produce an estimated 20 to 100 percent less CO2 emissions than diesel. They will be available in 420hp or 460hp engines for heavy regional and long-haul operations.

"With our new trucks running on liquefied natural gas or biogas, we can offer an alternative with low climate impact that will also meet high demands on performance, fuel efficiency and operating range. This is a combination that our customers in regional and long haulage require," said Lars Mårtensson, director of environment and innovation at Volvo Trucks.



LNG bunker truck at Japan's Yokohama port

## 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](http://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](http://www.dnvgl.com)

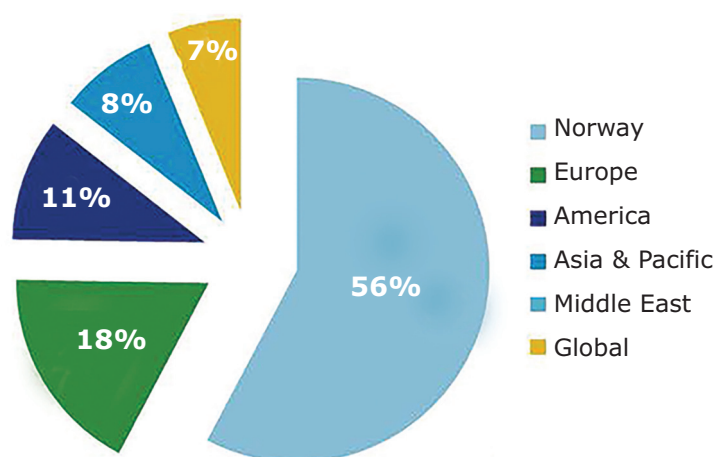
Data last updated: 15 February 2017

\* = conversion projects

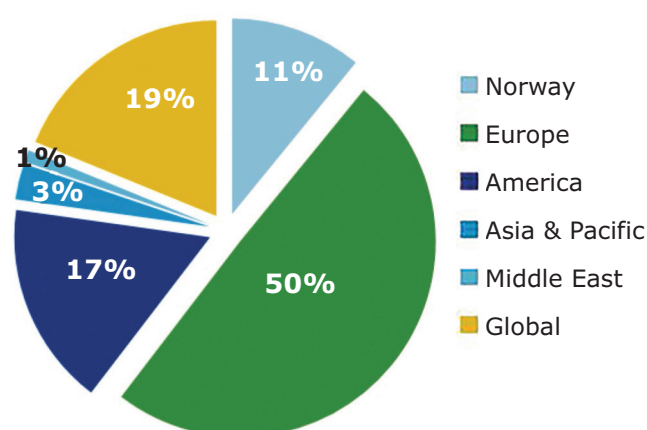
| Year  | Type of Vessel      | Owner                 | Class  |
|-------|---------------------|-----------------------|--------|
| 2015  | Gas carrier         | Evergas               | BV     |
| 2015  | Gas carrier         | Evergas               | BV     |
| 2015  | Tug                 | CNOOC                 | 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     |

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

Small-LNG.com

## LNG Journal & Gas to Power Journal Subscription Package



The journals' comprehensive coverage is dedicated to the entire gas-value-chain. In addition to our LNG Journal & Gas to Power Journal Daily newsletters, each platform provides exclusive, accurate and up-to-date news and analysis divided in the following sector-focused publications:

- LNG Journal - Monthly issues
- Gas to Power Journal - Daily e-newsletter + PDF
- LNG Unlimited - Weekly magazine + PDF
- LNG Shipping News - Fortnightly e-newspaper + PDF
- LNG Fuelling - Fortnightly e-newspaper + PDF
- LNG North America - Monthly e-newspaper + PDF

United Kingdom GBP 750  
Europe and Africa EUR 925  
Asia and Americas USD 1150

\*Multiuser options under request\*  
\*\*new subscribers only

For further information on subscribing please contact us at [elena@lngjournal.com](mailto:elena@lngjournal.com) or + 44 20 7017 3416