

LNG Fuelling

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Cenex, Air Liquide Plan Gas-Fuelled Truck Trial

Low carbon specialist Cenex is to partner with French LNG fuelling firm Air Liquide to trial a fleet of gas-powered heavy-goods vehicles across the UK as part of ongoing research into emission reduction.

The trial will include a total of 81 dedicated gas-powered heavy goods vehicles, running on LNG, CNG and bio-methane and it is hoped that the research will lead to reductions of CO₂ emissions by up to 70 per cent.

"Without real life road testing by big fleet customers, these technologies will not be able to impact CO₂ emissions in a big way. We look forward to leading this innovative trial, and sharing the results with other HGV fleet operators across Europe and the globe," Daniel Lambert, Commercial Director at Air Liquide, said.

Funded in part by the Office for Low Emission Vehicles in partnership with Innovate UK the initiative will include some of the largest transport operators in the UK including Kuehne + Nagel, Wincanton, ASDA, Brit European, Howard Tenens and Great Bear.

"Cenex have a long history of supporting natural gas and bio-methane use in the transport sector, and we are excited to be part of such an innovative trial demonstrating and assessing the performance of the latest advancements," Steve Carroll,



Five low-emission lorries will be trialled

Head of Transport at Cenex, said.

The initiative will be co-ordinated as part of the Low Emission Freight and Logistics Project and Cenex will manage all data analysis and project dissemination, update a dedicated gas vehicle hub website, and organize informational workshops for participating fleet operators and interested members of the industry.

Cryogenic trailer technology to cut emissions

Alongside the research into trucking technology the project will also analyse the effectiveness of a new cryogenic trailer refrigeration technology.

This liquid nitrogen cooling system will be utilized on a number of the HGVs in the trial and aims to reduce energy demands of refrigeration, further reducing CO₂ and emissions.

"We are excited to work with Cenex, Air Liquide and our other project partners to hopefully demonstrate the impact low-emissions HGV technology can have on the entire industry," John Rogerson, Fleet Operations Manager at ASDA, said.

Cenex is the UK's first Centre of Excellence for Low Carbon and Fuel Cell technologies and operates as an independent not-for-profit consultancy and research organisation.

"Participating fleets will be supported by technical experts who will collate comprehensive data via telematics systems provided by Microlise and PEMS testing by Emissions Analytics, providing a complete analysis of the potential benefits of dedicated gas technology compared to diesel," a spokesperson for Cenex said. ■



Air Liquide truck and forecourt

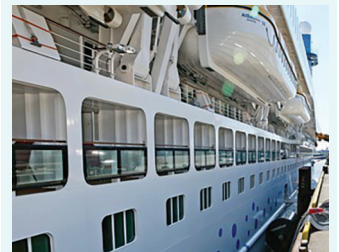
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Rolande loads first LNG truck at Gate terminal

Gas specialist LNG Rolande and authorities at Gate terminal in Rotterdam have completed refuelling of the first LNG-powered truck at the site.

Rolande oversaw the refuelling of the IVECO Stralis NP 400 truck alongside Dutch transport firm Chr. Vermeer Transport and hailed the operation as a milestone for European LNG bunkering in relation to International Carriage of Dangerous Goods by Road (ADR) regulations.

"Until now it was simply not possible in practical terms to transport LNG to an LNG-powered truck. Both sides hope to show by this that there are no obstacles left for transporters to make a transition to LNG due to ADR," a spokesperson for Rolande commented.

Target on carbon positive trucking

Alongside its own onboard tank, the truck also has the capability to haul a customised LNG trailer

making it possible to transport additional LNG.

"LNG lorries are quieter and have lower emissions of particulate matter, NOx and CO2. With the step towards Bio-LNG, where the LNG is produced from residual streams such as waste, manure or sludge, CO2 emissions are even minimized and may even be "carbon positive" in certain cases," Rolande said in a statement.

Truck loading grows to 750 in first half

Earlier this year, port operators Gasunie and Royal Vopak, the two firms behind the joint venture Gate Terminal, started commercial operations of two new truck loading bays at the site, outlining a strategy "to deliver LNG to retail stations, industry and ships".



Rolande LNG truck

The terminal has total annual throughput capacity of 12 billion cubic metres of natural gas and reported approximately 750 trucks loaded in the first half of 2017, a 50% increase in truck loadings in year-on-year comparison.

"The functions of the LNG-terminal are as follows: supply, a buffer between the flow and continuous supply of natural gas,

evaporation, drainage. LNG will be regasified on the terminal, and pressurized for supply to the Dutch gas transport sector," a spokesperson explained.

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

Shell signs LNG bunker charter with Victrol and CFT

Oil and gas major Shell has concluded a time charter agreement with inland transportation firms Victrol NV and Compagnie Fluviale de Transport (CFT) for a new LNG bunkership.

The vessel will have capacity for 3,000 cubic metres of LNG and is expected to be deployed at the port of Rotterdam.

"LNG as a marine fuel has an important role to play in the energy mix of the future. With these bunkers and the Gate terminal, we

show that Shell is dedicated to building robust and reliable supply of our customers. With stricter rules for emissions on the horizon, we continue to work with cleaner energy solutions with our customers and partners," Steve Hill, Executive Vice President of Shell Energy, said.



Artist's rendition of proposed LNG bunker barge

Inland waterway demand for LNG

It will join Shell's growing fleet of LNG-ready vessels at the port in order to provide "additional flexibility" for a wider range of customers and meet increased demand from vessels on European inland waterways.

"More and more ship owners and operators choose cleaner burning LNG instead of traditional fuels. This in response to emissions regulations for sulfur and nitrogen oxides, including the recent decision of the International Maritime Organization (IMO) to reduce the sulfur content of marine fuels to 0.5%," Shell said, commenting on

the its commitment to LNG bunkering at the port.

Cardissa adds LNG bunker capacity

The new order follows the arrival of Shell's state-of-the-art LNG bunker vessel *Cardissa* in Rotterdam. The vessel sailed from its fabrication site at STX Offshore & Shipbuilding's yard in South Korea and docked at the port's Gate terminal.

With capacity for 6,500 cubic metres of LNG, the *Cardissa* is operated by Shell Western LNG and was co-financed by the European Union's Connecting Europe Facility. ■

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USCG raises “serious concerns” over LNG SIMOPS

The U.S. Coast Guard (USCG) has issued a policy letter warning marine operators about the risks associated with simultaneous LNG bunkering activities, or SIMOPS.

The Policy Letter and accompanying Field Notice from the USCG outline concerns over safety risks that may stem from a lack of coordination between parties during bunkering or due to insufficient pre-planning when conducting SIMOPS.

“The USCG has serious concerns regarding conducting SIMOPS during LNG bunkering operations and wants to ensure they are conducted safely. To help reduce the risk, the Liquefied Gas Carrier (LGC) National Center of Expertise (NCOE) is encouraging vessel operators to conduct an optional, formal risk assessment of their SIMOPS,” the USCG states in its Field Notice.

The USCG defines SIMOPS as “two or more operations occurring simultaneously, one of which involves LNG bunkering operations”, and where the combination may present heightened safety, environmental and security concerns.

Examples of SIMOPS considered by the USCG include: passenger



LNG bunkering trucks

and crew embarkation/debarkation; loading of stores and cargo; discharging waste; loading and unloading materials and consumables including potable water, lubricants, and fuel other than LNG; gangway and mooring line operations; tour bus operations; hull cleaning, maintenance.

COTP Involvement needed from outset

The Field Notice issued by the USCG aims to provide a tool to aid the operator and Captain of the Port (COTP) to assess and mitigate SIMOPS risk. It details a number of steps for all parties to consider when developing a risk assessment.

“It is important to recognize that this process should be conducted in close coordination with the receiving vessel, particularly on initial operations, and may also include other service providers...depending on the size and complexity of the operation. The USCG encourages LNG suppliers to engage early and often,” the USCG states.

Close coordination is key

The guidance is aimed at a variety of actors beyond the LNG supplier alone and is targeted at operators of port terminals, bunker/stores barges, stevedore employers and emergency response organizations.

“The USCG also encourages LNG suppliers to reach out to other waterway users such as local pilots, recreational and commercial vessel operators, adjacent facility representatives, and state and local agency officials. Early coordination with existing port-wide safety focused groups, such as harbor safety committees, and port authority information sharing meetings can identify local waterway users with an interest,” the Field Notice states. ■



USCG cautioned operators over LNG SIMOPS risks



LNG VALUE CHAIN SOLUTIONS

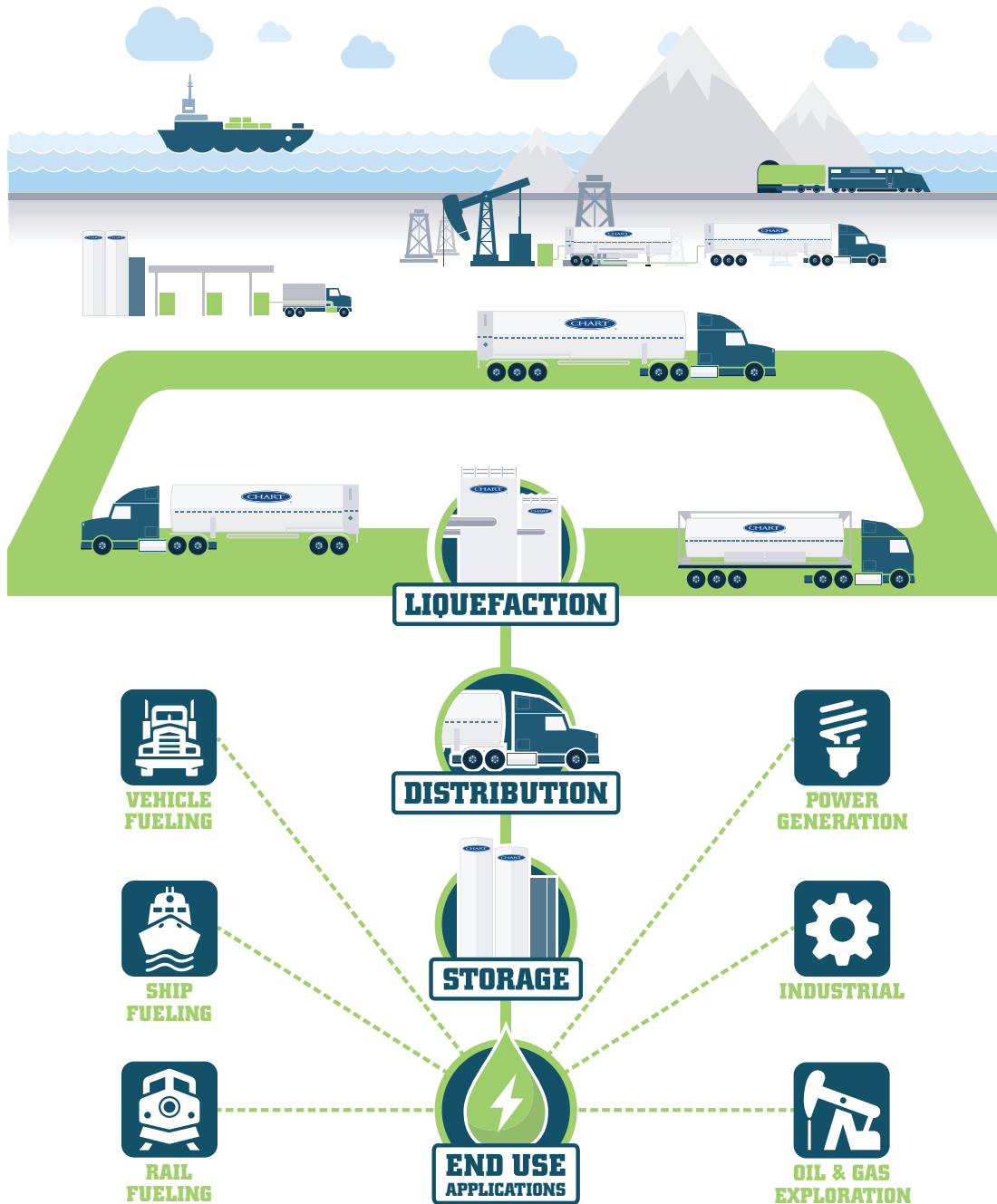


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GLPC, EWUSA plan Fourchon LNG refuelling infrastructure

Authorities at Port Fourchon in Texas have announced plans to develop a 150-acre LNG facility, with capacity to refuel next generation vessels operating in the Gulf of Mexico.

The Greater Lafourche Port Commission (GLPC) and its tenant Energy World USA (EWUSA) plan to construct a mid-scale production and export facility at Port Fourchon which will have capacity to handle 4.5 million-tonnes of LNG per annum.

"We welcome this critical milestone for the Fourchon LNG project by our tenant Energy World, and we are excited to have the

opportunity to add their proposed facility and its services to Fourchon's diverse and extensive list of offerings," Chett Chiasson, executive director at GLPC, said.

The ambitious proposal will include LNG bunkering infrastructure designed to "fuel the next generation of offshore supply vessels (OSVs)" according to a statement from the GLPC.

"We look forward to incorpo-

rating the LNG produced at Port Fourchon into our global supply chain to fuel our own gas-fired power plants right across the Asia-Pacific region as well as providing a clean, green source of fuel for the next generation of US marine vessels," Graham Elliott, Project Director for Energy World, said.

Facility to store 0.5 mtpa of LNG for bunkering

The giant Port Fourchon LNG Facility is expected to cost in the region of US\$888 million to construct and will produce 2 million tons of LNG per year for export in its first phase with a further reserve of up to half a million tonnes of LNG stored for domestic LNG bunkering activities.

"[Energy World Group] is completing two world class LNG facilities in Indonesia, which will be the reference plant for Fourchon LNG, and the very first import terminal in the Philippines. We appreciate

the opportunity to bring this type of new development to Port Fourchon," Elliott commented.

The project will be completed by newly-formed Fourchon LNG, a project company owned by EWUSA. It will be built to the west of Belle Pass on a port-owned property outside of the port's existing developments.

"We are looking forward to working with Energy World and our community to move forward through the regulatory process and keep Port Fourchon at the forefront of the oil and gas service industry," Chiasson added.

GLPC and Energy World are currently completing a Waterway Suitability Assessment with the US Coast Guard to ensure that current and future port activities are not adversely affected by the operation of the potential facility and to pave the way for project approval by the Federal Energy Regulatory Commission (FERC). ■



Artist's rendition of the proposed EWUSA Fourchon LNG Facility

Gondán delivers LNG-fuelled Audax

Spanish shipbuilder Astilleros Gondán has delivered a third LNG-fuelled escort tug, *Audax*, to Norwegian shipowner Østensjø Rederi.

The RAsar 4000-DF class tug was designed by naval architects Robert Allan and can operate in extreme sea and weather conditions at temperatures as low to -20 centigrade.

"Built to withstand harsh environments, the vessels are shaped specifically to grant full operational availability at temperatures of 20 degrees below zero and combine environmental sustainability through the use of LNG in most of their operations - complying therefore with IMO Tier III emissions standards- with the flexibility of diesel power to ensure a high level of operational security," a spokesperson for Astilleros Gondán said.

Audax joins Dux and Pax

The *Audax* was delivered to its new owner following extensive sea

trials in the North Sea and will now join its sister vessels, *Dux* and *Pax*, operating at Statoil's LNG production terminal in Melkøya, Hammerfest in northern Norway.

All three vessels feature a 16 meter beam and are 40.2 meters in length. They are the first tugs of this kind built in Europe, with the *Dux* delivered by Gondán in May 2016 and the *Pax* delivered in July this year.

Trio to escort up to 300 LNG ships per year

All three tugs have a free running speed of 15 knots and are capable of high direct pull and escort forces, delivering 107 ton bollard pull and 167 ton steering force. The *Audax* was recently approved by classification society Bureau Veritas.

"The management of the ship-

yard would like to express its huge satisfaction for enjoying this great challenge with a company with the professionalism of Østensjø Rederi A/S, with which it shares a long common trajectory," a Gondán spokesperson commented.

The vessel can accommodate an eight-person crew and has been fitted with noise and vibration reduction technology to achieve

noise levels as low as 45 decibels in the crew's cabins.

"Among their duties, they will conduct approximately 300 LNG ship escorts annually, will assist with berthing operations and will be maintained in readiness for emergency services such as long-line towing, fire-fighting, and oil spill response," Gondán said in a statement. ■



The LNG-fuelled escort tug *Audax*

JAX LNG receives LOA for bunker facility

Fuelling specialist JAX LNG has received approval for its plans to construct a waterfront LNG bunkering facility in Jacksonville.

The U.S. Coast Guard (USCG) issued a formal Letter of Acceptance (LOA) for the project and approval to conduct ship-to-ship LNG bunkering operations via the LNG barge *Clean Jacksonville* and with TOTE Maritime's fleet of Marlin Class ships.

JAX LNG is a joint venture between fuel supplier Pivotal LNG and midstream transportation company NorthStar Midstream, and aims to expand LNG fuelling infrastructure throughout the Gulf and Caribbean region.

"The receipt of this second LOA demonstrates our commitment to our customers, the value of inclusive port stakeholder relationships and exhibits confidence in our rigorous operational risk analysis methodology," Tim Hermann, president of Pivotal LNG.

JAX demonstrates safe LNG handling

The project received its first LOA from the USCG in 2015, and since then JAX LNG has tested and successfully delivered LNG to TOTE Maritime's LNG-fuelled container ships.

Throughout the two-year pre-planning and development phase, Pivotal LNG has also demonstrated its ability to safely conduct simul-



Pivotal LNG will handle 120,000 gallons of LNG per day at the site

taneous LNG bunkering operations, or SIMOPS, while TOTE Maritime loads and off-loads cargo at the port.

LNG bunkering scheduled for early 2018

The liquefaction and storage facility at the Port of Jacksonville will have capacity to produce 120,000 gallons of LNG per day and will be located at Dames Point near the port.

The facility is expected to start operations at the end of 2017, with the first ship-to-ship LNG bunkering operation commencing early in 2018. The LNG fuel produced will form part of Pivotal's existing network, expanding opportunities for LNG fuelling across the region.

"Pivotal LNG and Southern

Company Gas operate a network of LNG production facilities with the capacity to produce over 554,000 gallons per day and the ability to store more than 96 million gallons," a spokesperson for Pivotal said.

Pivotal LNG is a subsidiary of Southern Company which serves approximately 4.6 million natural gas utility customers and operates interstate pipelines, asset management for natural gas wholesale customers and ownership and operation of natural gas storage facilities.

NorthStar Midstream is backed by global investment manager Oaktree which is headquartered in Los Angeles and specializes in opportunistic, value-oriented and risk-controlled alternative investments.

NEWS NUDGES

CMA CGM favours LNG-fuelled ships

Shipping line CMA CGM is reportedly considering the use of LNG fuel to power its latest newbuild containership orders.

The firm has signed a letter of intent with two Chinese shipyards to purchase up to nine 22,000-TEU containerships at an estimated cost of US\$1.5 billion.

If they elect for LNG-fuelled engines it is expected to deliver a significant demand boost for the sector.

Alpha Process and SMT team up

Training specialist Alpha Process has partnered with Stream Marine Training (SMT) to deliver a new vessel fuel handling training programme.

The programme will demonstrate LNG breakaway coupling technology and provide basic training for the use of fuels covered within the IGF Code.

The two-day course has been approved by the Maritime Coastguard Agency (MCA) and is designed to support safety standards and competency in the offshore LNG industry.



JAX LNG plan view

WORLD LNG-FUELLED CONFIRMED NEWBUILDS

Year	Type of Vessel	Owner	Class
2017	Car/passenger ferry	Society of Quebec ferries	LR
2017	Car/passenger ferry	Society of Quebec ferries	LR
2017	Tug	Drydocks World	
2017	PSV	Siem Offshore	DNV GL
2017	Gas carrier	Evergas	BV
2017	PSV	Siem Offshore	DNV GL
2017*	Ro-Ro	TOTE Shipholdings	ABS
2017	Car/passenger ferry	BC Ferries	LR
2017	Gas carrier	Ocean Yield	DNV GL
2017	Gas carrier	Ocean Yield	DNV GL
2017	Gas carrier	Ocean Yield	DNV GL
2017	Gas carrier	Navigator Gas	ABS
2017	Dredger	DEME	BV
2017	Dredger	DEME	BV
2017*	Container ship	Wessels Reederei	BV
2017	Hopper Barge	Bremenports	DNV GL
2017	HSLC	Fred. Olsen	DNV GL
2017	PSV	Harvey Gulf Int.	ABS
2017	PSV	Harvey Gulf Int.	ABS
2017	Cable layer	DEME Tideway	DNV GL
2017	Gas carrier	Evergas	BV
2017	Gas carrier	Evergas	BV
2017	Tug	Østensjø Rederi	
2017	Tug	Østensjø Rederi	
2017	Tug	Østensjø Rederi	
2017*	Car/passenger ferry	BC ferries	ABS
2017	RoPax	Rederi AB Gotland	DNV GL
2017	Car/passenger ferry	Caronte & Tourist	RINA
2017	Oil/chemical tanker	Groupe Desgagnés	BV
2017	Oil/chemical tanker	Groupe Desgagnés	BV
2017	Oil/chemical tanker	Groupe Desgagnés	BV
2017	Oil/chemical tanker	Groupe Desgagnés	BV
2017	Car/passenger ferry	BC Ferries	LR
2017	Oil/chemical tanker	Terntank	BV
2017	Container ship	Crowley Maritime Corp.	DNV GL
2017	Container ship	Crowley Maritime Corp.	DNV GL
2017	RoPax	Tallink	BV
2017	Container ship	Brodosplit	DNV GL
2018	Container ship	Brodosplit	DNV GL
2018	Bulk ship	ESL Shipping	DNV GL
2018	Bulk ship	ESL Shipping	DNV GL
2018	Tug	Keppel Smit Towage	ABS
2018	Tug	Maju Maritime	ABS
2018*	Car/passenger ferry	BC ferries	ABS
2018	PSV	Harvey Gulf Int.	ABS
2018	Container ship	Brodosplit	DNV GL
2018	Container ship	Brodosplit	DNV GL
2018	Car/passenger ferry	Royal Doeksen	LR
2018	Car/passenger ferry	Royal Doeksen	LR
2018	Car/passenger ferry	CHFS	LR
2018	Car/passenger ferry	CHFS	LR
2018*	Ro-Ro	TOTE Shipholdings	ABS
2018	RoPax	Rederi AB Gotland	DNV GL
2018	General cargo ship	Nordnorsk Shipping	DNV GL
2018	Container ship	Containerships	ABS

Year	Type of Vessel	Owner	Class
2018	Container ship	Containerships	ABS
2018	Container ship	GNS Shipping	ABS
2018	Container ship	GNS Shipping	ABS
2018	Container ship	GNS Shipping	ABS
2018	Container ship	GNS Shipping	ABS
2018	Heavy lift vessel	Heerema Offshore	LR
2018	Oil/chemical tanker	Furetank Rederi	BV
2018	Oil/chemical tanker	Furetank Rederi	BV
2018	Oil/chemical tanker	Furetank Rederi	BV
2018	Dredger	DEME	BV
2018	Bulk ship	POSCO	KR
2018	Dredger	van der Kamp	DNV GL
2018	Car/passenger ferry	Torghatten	
2018	Car/passenger ferry	Torghatten	
2018	Car/passenger ferry	Torghatten	
2018	Car/passenger ferry	Torghatten	
2019	Car/passenger ferry	Torghatten	
2019	Cruise ship	Carnival Corporation	RINA
2019	Cruise ship	Carnival Corporation	RINA
2019	Oil/chemical tanker	Älvtank	BV
2019	Oil/chemical tanker	Älvtank	BV
2019	Oil/chemical tanker	Thun Tankers	BV
2019	RoPax	Baleària	BV
2019	Car carrier	Siem Car Carriers	
2019	Car carrier	Siem Car Carriers	
2019	Emergency response ship	German Transport Ministry	
2019	Emergency response ship	German Transport Ministry	
2019	RoPax	Brittany Ferries	
2019	RoPax	Baleària	
2019	RoPax	Baleària	
2019	Oil/chemical tanker	Rosneft	
2020	Oil/chemical tanker	Rosneft	
2020	Oil/chemical tanker	Rosneft	
2020	Oil/chemical tanker	Rosneft	
2020	Research ship	German Transport Ministry	
2020	RoPax	Viking Line	
2020	Cruise ship	Carnival Corporation	RINA
2020	Cruise ship	Carnival Corporation	
2021	Cruise ship	Carnival Corporation	
2021	Cruise ship	Carnival Corporation	
2022	Cruise ship	Carnival Corporation	RINA
2022	Cruise ship	MSC Cruises	
2022	Cruise ship	RCCL	
2024	Cruise ship	MSC Cruises	
2024	Cruise ship	RCCL	

Excluding LNG carriers and inland waterway vessels. For more information please visit www.dnvgl.com

Data last updated : 15 February 2017

* = conversion projects

LNG-FUELLED SHIPS IN OPERATION WORLDWIDE

Year	Type of Vessel	Owner	Class
2000	Car/passenger ferry	Fjord1	DNV GL
2003	PSV	Simon Møkster	DNV GL
2003	PSV	Eidesvik	DNV GL
2006	Car/passenger ferry	Fjord1	DNV GL
2007	Car/passenger ferry	Fjord1	DNV GL
2007	Car/passenger ferry	Fjord1	DNV GL
2007	Car/passenger ferry	Fjord1	DNV GL
2007	Car/passenger ferry	Fjord1	DNV GL
2008	PSV	Eidesvik Shipping	DNV GL
2009	PSV	Eidesvik Shipping	DNV GL
2009	Car/passenger ferry	Tide Sjø	DNV GL
2009	Car/passenger ferry	Tide Sjø	DNV GL
2009	Car/passenger ferry	Tide Sjø	DNV GL
2009	Patrol vessel	Remøy Management	DNV GL
2009	Car/passenger ferry	Fjord1	DNV GL
2010	Patrol vessel	Remøy Management	DNV GL
2010	Car/passenger ferry	Fjord1	DNV GL
2010	Patrol vessel	Remøy Management	DNV GL
2010	Car/passenger ferry	Fjord1	DNV GL
2010	Car/passenger ferry	Fjord1	DNV GL
2010	Car/passenger ferry	Fosen Namsos Sjø	DNV GL
2011	PSV	DOF	DNV GL
2011*	Oil/chemical tanker	Tarbit Shipping	DNV GL
2011	Car/passenger ferry	Fjord1	DNV GL
2011	PSV	Solstad Rederi	DNV GL
2012*	Car/passenger ferry	Fjord1	DNV GL
2012	PSV	Eidesvik	DNV GL
2012	PSV	Olympic Shipping	DNV GL
2012	PSV	Island Offshore	DNV GL
2012	General Cargo	Nordnorsk Shipping	DNV GL
2012	PSV	Eidesvik Shipping	DNV GL
2012	PSV	Island Offshore	DNV GL
2012	Car/passenger ferry	Torghatten Nord	DNV GL
2012	Car/passenger ferry	Torghatten Nord	DNV GL
2012	Car/passenger ferry	Torghatten Nord	DNV GL
2013	PSV	REM	DNV GL
2013	RoPax	Viking Line	LR
2013	Car/passenger ferry	Torghatten Nord	DNV GL
2013	Tug	Incheon Port Authority	KR
2013	General Cargo	Eidsvaag	DNV GL
2013	RoPax	Fjordline	DNV GL
2013	High speed RoPax	Buquebus	DNV GL
2013	Tug	CNOOC	CCS
2013	Tug	CNOOC	CCS
2013	Car/passenger ferry	Norled	DNV GL
2014	Car/passenger ferry	Norled	DNV GL
2014	Tug	Buksér & Berging	DNV GL
2014	RoPax	Fjordline	DNV GL
2014	Patrol vessel	Finish Border Guard	DNV GL
2014	Tug	Buksér & Berging	DNV GL
2014	Gas carrier	Anthony Veder	BV
2014	Gas carrier	Anthony Veder	BV
2014	PSV	Remøy Shipping	DNV GL
2014	General Cargo	Egil Ulvan Rederi	DNV GL
2014	General Cargo	Egil Ulvan Rederi	DNV GL
2014	PSV	Siem Offshore	DNV GL
2015	PSV	Harvey Gulf Int.	ABS
2015	Ro-Ro	Norlines	DNV GL
2015	Car/passenger ferry	Samsøe municipality	DNV GL
2015	PSV	Simon Møkster Shipping	DNV GL
2015	PSV	Siem Offshore	DNV GL
2015	Ro-Ro	Norlines	DNV GL
2015*	Oil/chemical tanker	Bergen Tankers	LR
2015	Car/passenger ferry	Society of Quebec ferries	LR

For more information please visit www.dnvgl.com

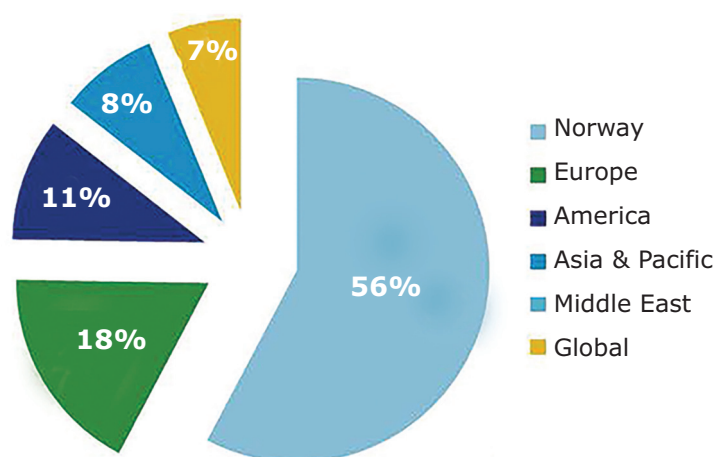
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* = conversion projects

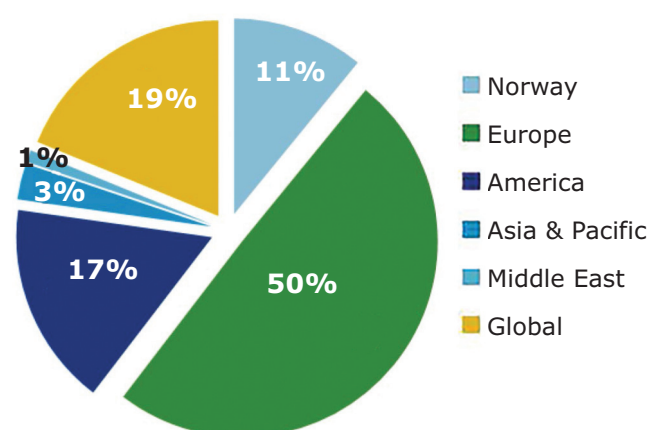
Year	Type of Vessel	Owner	Class
2015	Gas carrier	Evergas	BV
2015	Gas carrier	Evergas	BV
2015	Tug	CNOOC	CCS
2015*	Car/passenger ferry	AG Ems	DNV GL
2015	Tug	NYK	NK
2015	Gas carrier	Chemgas Shipping	BV
2015	Gas carrier	Evergas	BV
2015	PSV	Harvey Gulf Int.	ABS
2015	Container ship	TOTE Shipholdings	ABS
2015	Car/passenger ferry	AG EMS	DNV GL
2015	Bulk ship	Erik Thun	LR
2016	Container ship	TOTE Shipholdings	ABS
2016	Gas carrier	Evergas	BV
2016	PSV	Harvey Gulf Int.	ABS
2016	Bulk ship	Erik Thun	LR
2016	Oil/chemical tanker	Terntank	BV
2016	Gas carrier	Navigator Gas	ABS
2016*	Oil/chemical tanker	Furetank Rederi	BV
2016	Icebreaker	Arctica Shipping	LR
2016	Car/passenger ferry	Boreal Transport Nord	DNV GL
2016	Car/passenger ferry	Boreal Transport Nord	DNV GL
2016	Tug	CNOOC	CCS
2016	Gas carrier	Chemgas Shipping	BV
2016	Car carrier	UECC	LR
2016	Oil/chemical tanker	Terntank	BV
2016	Oil/chemical tanker	Terntank	BV
2016	Car/passenger ferry	BC Ferries	LR
2016	Gas carrier	Evergas	BV
2016	PSV	Siem Offshore	DNV GL
2016	Car/passenger ferry	Seaspan Ferries Corp.	BV
2016	Gas carrier	Navigator Gas	ABS
2016	Ro-Ro	Searoad Holdings	DNV GL
2016	Car carrier	UECC	LR
2017	Gas carrier	Navigator Gas	ABS
2017	Car/passenger ferry	Seaspan Ferries Corp.	BV
2017*	RoPax	Baleària	BV

AREA OF OPERATION OF LNG-FUELLED SHIPS

Operating area
ships in operation



Operating area
confirmed orderbook



Updated 15 February 2017
Excluding LNG carriers and inland waterway vessels

WORLD SMALL SCALE LNG FLEET*

Built	Name	CBM	Cargo Type	Trading area	Trading in LNG?	Ship Owner / Operator
1974	Seagas	187	LNG	Sweden	Yes	AGA
1988	Kayoh Maru	1,517	LNG	Japan	Yes	Daiichi
1993	Aman Bintulu / Lucia Ambition	18,928	LNG	Malaysia - Japan	Yes	Perbadanan/NYK
1996	Surya Aki	19,475	LNG	Indonesia - Japan	Yes	MCGC
1997	Aman Sendai	18,928	LNG	Malaysia - Japan	Yes	Perbadanan/NYK
1998	Aman Hakata	18,800	LNG	Malaysia - Japan	Yes	Perbadanan/NYK
2000	Tripura (ex Surya Satsuma)	23,096	LNG	Indonesia - Japan	Yes	MCGC
2003	Pioneer Knutsen	1,100	LNG	Norway	Yes	Knutsen
2003	Shinju Maru No.1	2,540	LNG	Japan	Yes	Shinwa
2005	North Pioneer	2,500	LNG	Japan	Yes	Japan Liquid Gas
2007	Sun Arrows	19,531	LNG	Malaysia - Russia - Japan	Yes	Mitsui
2008	Kakurei Maru	2,536	LNG	Japan	Yes	Hogaki Zosen
2008	Shinju Maru No.2	2,540	LNG	Japan	Yes	Shinwa
2009	Coral Methane	7,551	LNG/LPG/Ethylene	Northwest Europe/Baltics	Yes, sometimes	Anthony Veder
2010	Norgas Creation	10,000	LNG/LPG/Ethylene	Worldwide	No	Norgas Carriers
2010	Norgas Innovation	10,000	LNG/LPG/Ethylene	Worldwide	No	Norgas Carriers
2011	Akebono Maru	3,556	LNG	Japan	Yes	Chuo Kaiun
2011	Norgas Bahrain Vision	12,000	LNG/LPG/Ethylene	Worldwide	No	Norgas Carriers
2011	Norgas Conception	10,000	LNG/LPG/Ethylene	Worldwide	No	Norgas Carriers
2011	Norgas Invention	10,000	LNG/LPG/Ethylene	Worldwide	No	Norgas Carriers
2011	Norgas Unikum	12,000	LNG/LPG/Ethylene	Worldwide	No	Norgas Carriers
2012	Coral Energy	15,600	LNG	Northwest Europe/Baltics	Yes	Anthony Veder
2013	Coral Anthelia	6,500	LNG/Ethylene			Anthony Veder
2013	JX Energy TBN	2,500	LNG	Japan	Yes	JX Energy
2013	Kakuyu Maru	2,500	LNG	Japan	Yes	Tsurumi Sunmarine
2014	LNG-Oil combi**	2,000	LNG	Germany	Yes	Veka
2014	Short Sea LNG Tanker **	4,000	LNG	Germany	Yes	Veka
2015	10 small carriers TBN**	5,000	LNG			Bimantara Group
2015	Jahre TBN**	6,200	LNG	Norway	Yes	Donsotank/Jahre Marine
2015	JS Ineos Ingenuity	27,500	LNG/Ethylene	Markus Hook - Rafnes	Ethane, for Ineos	Evergas
2015	JS Ineos Insight	27,500	LNG/Ethylene	Markus Hook - Rafnes	Ethane, for Ineos	Evergas
2015	JS Ineos Intrepid	27,500	LNG/Ethylene	Markus Hook - Rafnes	Ethane, for Ineos	Evergas
2015	LNG Barge TBN	3,000	LNG	US Coast	Yes	LNG America
2015	LNG bunker barge 1†	2,250	LNG	China	Yes	Anhui Huaqiang Natural Gas
2015	LNG bunker barge 2†	2,250	LNG	China	Yes	Anhui Huaqiang Natural Gas
2015	LNG bunker barge 3†	2,250	LNG	China	Yes	Anhui Huaqiang Natural Gas
2015	LNG Inland bunker**	800	LNG	Germany	Yes	Veka
2015	Norgas TBN**	17,000	LNG/LPG/Ethylene	Worldwide		Norgas Carriers
2015	Norgas TBN**	17,000	LNG/LPG/Ethylene	Worldwide		Norgas Carriers
2015	PetroChina TBN	30,000	LNG	China		PetroChina
2015	TBN	14,000	LNG	China	Yes	Zhejiang Huaxiang
2015	TBN 1	27,500	LNG	China?		Danyang?
2015	TBN 2	27,500	LNG	China?		Danyang?
2015	TBN 3	27,500	LNG	China?		Danyang?
2016	Clean Jacksonville	2,200	LNG	US Coast	Yes	CME
2016	Dalian TBN	28,000	LNG	China	Yes	Dalian Inteh Group
2016	Hai Yang Shi You 301	30,000	LNG	Bali FSU	Yes	CETS (CNOOC)
2016	JS Ineos Indepence	27,500	LNG/Ethylene	Markus Hook - Rafnes	Ethane, for Ineos	Evergas
2016	JS Ineos Innvation	27,500	LNG/Ethylene	Markus Hook - Rafnes	Ethane, for Ineos	Evergas
2016	JS Ineos Inspiration	27,500	LNG/Ethylene	Markus Hook - Rafnes	Ethane, for Ineos	Evergas
2016	LNG Prime	2,250	LNG	Northwest Europe	Yes	Veka Deen LNG
2016	Navigator Aurora	35,000	Ethane/Ethylene	Markus Hood - Stenungsund	Ethane, for Borealis	Navigator
2016	Gaschem Beluga	36,000	Ethane/Ethylene	US - Teeside	Ethane, for Sabic	Gaschem Services
2016	Gaschem Orca	36,000	Ethane/Ethylene	US - Teeside	Ethane, for Sabic	Gaschem Services

For more information please visit <http://small-lng.com>

*Includes multi-gas, ethylene and LNG bunker ships with 40,000 cubic metres LNG cargo capacity or less

TBN = To Be Nominated indicates ships are still at construction/planning stage

** = project shelved † = Data to be verified Data last updated = 24th May 2017

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

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