

# LNG Fuelling

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## Spain posts record growth in LNG bunkering

LNG bunkering activity in Spain witnessed a meteoric rise in 2020, with the number of refuelling operations quadrupling, according to figures from Spanish gas firm Gasnam.

The company reports that 741 LNG bunkering operations were carried out on ships last year, compared to just 199 in 2019.

“Despite the pandemic, the development of LNG bunkering in Spain has continued to grow exponentially in 2020,” a spokesperson for the firm said.

### Increased transfer flow

The data suggests that 122,058 cubic metres of LNG was supplied in total, with 68.5% of the volume supplied to ferries, 31.1% to cruise ships and 0.4% to other types of ships.

“Operations have continued to gain flexibility and efficiency, more than 75% of the supplies made from tanks have been carried out simultaneously from several trucks, in what is known as multi-truck to ship operations that allow to increase the transfer flow and reduce the time refuelling,” Gasnam notes.

Headquartered in Madrid, Gasnam is a sustainable transport association comprising 142 partners in Spain and Portugal. Its members span multiple sectors, including



Port of Barcelona

energy, automotive, engineering, freight, passenger transport, ports, shipping companies, shipyards, universities and administrations.

### Milestones

EU support for the construction of two new supply vessels and new bunkering tolls instated in Spain last year were highlighted as major milestones, consolidating the country's position as a European benchmark for the supply of LNG to ships.

The number of ports in Spain regularly bunkering LNG to ships also increased last year, rising from six to nine as new infrastructure came online. Refuelling sites are now operational at the ports

of Algeciras, Almería, Barcelona, Bilbao, Denia, Huelva, Malaga, Tenerife and Valencia.

“2020 has been marked by important regulatory modifications that, added to Europe's support for infrastructure development, will be determining factors to accelerate the uptake of this sustainable maritime fuel,” a Gasnam spokesperson commented.

Spain has been a focal point for the European Commission's LNGHive2 strategy, which aims to boost the deployment of LNG as a transport fuel across sectors. Under this strategy, two new LNG supply ships will operate at the ports of Barcelona and Algeciras.



LNG bunkering in Valencia, Spain

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## KR, DSME complete world first STS bunkering

Certification agency Korean Register (KR) and shipbuilder Daewoo Shipbuilding & Marine Engineering (DSME) have completed a record ship-to-ship LNG bunkering operation in Okpo Shipyard, South Korea.

The world first operation involved supply of LNG from the *SM JEJU LNG2* to a 173,400 cubic meter LNG carrier. DSME demonstrated proprietary technology designed to block vapour return to the bunkering vessel as well as venting.

"The collaboration is part of a partnership agreement for LNG

bunkering/transport work with Korean shipyards with the aim of "Developing standards for LNG bunkering procedures in Korea," a spokesperson for KR said.

### Diverse range of potential hazards

KR and DSME have been working

together since signing a memorandum of agreement focused on joint research in the field of LNG bunkering last August.

"Applying its extensive safety engineering technology, KR has identified a

diverse range of potential hazards through its risk assessments for STS LNG loading/transport operations between two ships and has suggested effective ways to reduce that risk to DSME," the partners said in a statement.

### Safer refuelling

Following the successful bunkering gas trial carried out by *SM JEJU LNG2*, the partners are now exploring means to further improve the LNG refuelling process.

The note that a comprehensive study looking at the establishment of 'Control Zones' around refuelling vessels during LNG transportation has already improved

safety work procedures, while DSME has demonstrated 'outstanding' new technology that prevents 'vapour return to the bunkering vessel or venting to atmospheric areas'.

Established in 1960, KR is responsible for promoting safety of life, property and the protection of the marine environment and classes an international fleet of 3,050 vessels. Headquartered in Busan, South Korea it operates a network of 66 offices around the world.

The two partners are also collaborating with a number of industry peers including SM KLC, SM KLCSC, and KOGAS.



STS Bunkering

## Cryo Shipping completes Asian bunkering

Norwegian transport fuel specialist Cryo Shipping has announced the completion of one of the largest LNG bunkering operations in Asia.

The record ship-to-ship (STS) bunkering was completed with the shuttle tanker *Altera Wave* in Malaysian waters of the Singapore Strait.

"We're happy to announce a new milestone achieved by concluding STS LNG bunkering of *Altera Wave*. Thanks to all involved partners, and a special thanks to the *Altera Wave* and *Avenir Advantage* team," Nicolai Olsen, managing director and founder of Cryo Shipping, said.

### Largest LNG-powered merchant ship

The *Altera Wave* is a Crude Oil Tanker built in 2021 with deadweight-tonnage of 103,500 and currently sailing under the Norwegian flag.

"We are a very small player in comparison with some, but we can move quickly," Olsen said in comments to TradeWinds, adding that the vessel bunkered was "the largest LNG-powered merchant ship to be supplied with LNG from a bunker vessel in Asia and Oceania."

It docked with the *Avenir Advantage*, a bunker vessel operated by UK-based fuel supplier Avenir LNG.

"We are very proud to deliver the first dedicated LNG bunker vessel in South East Asia. With the backing of Petronas' LNG supply infrastructure, LNG is undeniably a reliable and cost-effective solution to meeting the sulphur cap regulations... We look forward to working with partners like Petronas to ensure LNG is available as a bunker fuel along all



Altera Wave

key transport corridors," Milorad Doljanin, CEO Avenir LNG Limited, commented at the launch of the *Advantage* last year.

### Growing bunkering tonnage

A sistership to the *Altera Wave* is currently under construction at South Korea's Samsung Heavy Industry shipyard and both are part of a wave of next-generation tankers expected to drive demand for LNG bunkering in 2021 and beyond.

Cryo Shipping forecasts a sharp increase in LNG bunkering tonnage, especially in Europe increases, where the firm plans to operate a time-chartered fleet.

"For the larger bunkering jobs, we need volume. Our budget is to average one job a month in the first six months of this year and scale up in the second half. It is a promising business as long as we can enlarge — and there need to be more vessels available to do that," Olsen added.

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# Brittany Ferries welcomes UK's first LNG-powered ferry

Shipping firm Brittany Ferries has announced the launch of the first LNG-powered ferry to serve the UK.

The *Salamanca* was launched from the CMJL shipyard in Weihai, China at a ceremony on 6 January.

"In spite of Brexit and Covid which have cost our company several hundred million euros already, I am resolved to remain on our path towards eco-responsibility and energy transition," Jean-Marc Roué, President Brittany Ferries, said.

## Wartsila 12V46DF engines

Weighing-in at over 42 000 tonnes, the *Salamanca* will be one of the largest ships ever to serve the company, and will carry 1015 passengers, with over 2.7 kilometres of lane-space to house passenger and freight vehicles.

The vessel will be powered by two Wartsila 12V46DF engines generating 13 740 kilowatts each. Alternators will be installed on shaft lines to produce energy even at very low speeds.

"Bow thrusters work in harmony with articulated rudders, making it possible to facilitate the tightest turns in the harbour. There is no need for stern thrusters. And when it comes to vibration,



Brittany Ferries' vessel, Portsmouth

passengers will notice just how little there is. Fin stabilisers have already proved effective on sister-ship *Galicia*, minimising roll and smoothing the choppiest of seas through the Bay of Biscay," a spokesperson for Brittany Ferries said.

## Formal commitment

The French firm is headquartered in Roscoff in the north of France

and has long connections in the channel ferry trade. The *Salamanca* is second of three E-Flexer class ships ordered by the group and will join *Galicia*, which entered service in December 2020 and is not currently powered by LNG.

"It is a formal commitment I've made: we will continue, despite these crises, to reduce our carbon footprint, to keep on improving

our fleet and to contribute to the development of the regions we serve. *Salamanca* is a good illustration of this. By renewing our fleet today, we are ensuring a return to growth tomorrow and Brittany Ferries and our partners remain confident in the future," Roué added.

The *Salamanca* will enter service in the spring of 2022 and will be French-flagged. ■



Brittany Ferries *Salamanca*



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# Singapore receives first LNG bunkering vessel

Authorities in Singapore have received the island's first LNG bunkering vessel, the *FueLNG Bellina*.

The vessel will be operated by joint venture developer FueLNG and will provide ship-to-ship LNG bunkering to Shell-chartered tankers and one Hapag Lloyd container vessel.

"This facilitates the adoption of LNG as a marine fuel and the growth of Singapore as a global LNG bunkering hub... It is highly manoeuvrable, minimising tug

utilisation during bunkering operations and in turn reducing fuel consumption and emission," Keppel said in a statement.

## MTD 7500U LNG design

The *FueLNG Bellina* was designed by Keppel's technology division, Keppel Marine and Deepwater Technology (KMDTech), and utilises the MTD 7500U LNG design, featur-

ing a barge-like extended flat surface to provide greater flexibility.

"*FueLNG Bellina* is also the world's first bunkering vessel with Smart Notation for its suite of digital services. Equipped with Keppel O&M's proprietary VesselCare solutions, these smart functions enable remote monitoring and real-time support of vessel operations," the company added in a statement.

The vessel was delivered to the Port of Singapore from Keppel Offshore & Marine Nantong shipyard in southeastern Jiangsu province, China.

## Vision 2030

A joint venture between Keppel Offshore & Marine and Shell Eastern Petroleum, FueLNG is in the process of developing Singapore's first dedicated LNG bunkering facility, as part of the states wide-ranging investment in LNG.

"This extends Keppel's track record in solutions across the gas value chain and is line with Keppel's Vision 2030, which includes seizing opportunities in LNG solutions and renewables," Brian Lee, senior executive at Keppel O&M said.

Keppel O&M is also developing a pioneering floating bunkering facility, set to become operational at the end of 2021. The LNG bunkering facility will be able to receive vessels such as harbour crafts and small vessels from the facility, with a capacity of 3,500 cubic metres.

"Building Singapore's first LNG bunkering vessel and having a dedicated bunkering facility demonstrate our commitment to global customers that LNG as a marine fuel will be readily available in Singapore," Chris Ong, Chairman of FueLNG and CEO of Keppel O&M, said. ■



*FueLNG Bellina*

# Avenir LNG launches record bunker vessel

Integrated distributor Avenir LNG has announced the launch of the largest dual-purpose LNG supply and bunkering vessel in China.

The *Avenir Allegiance* was launched at Zhoushan Changhong International Shipyard in eastern China by CIMC Sinopacific Offshore & Engineering.

"We are delighted to see the latest, and largest, vessel in the Avenir LNG fleet being successfully launched by our partners CIMC SOE. We look forward to taking delivery of the *Avenir Allegiance* later this year," Peter Mackey, CEO Avenir LNG Limited, said.

## Clear commitment

The *Allegiance* will be Cayman Island flagged when it enters commercial operation and is the fourth of six newbuilds delivered to Avenir LNG. The new vessel is scheduled for delivery from CIMC SOE in the third quarter of 2021.

"As the largest LNG bunkering

vessel in the world, the *Avenir Allegiance* is a clear demonstration of our commitment to developing new LNG supply chains globally. She will play a critical role in helping the shipping industry to transition to LNG as a more environmentally sustainable fuel," Mackey added.

Headquartered in the London, Avenir LNG is a fully integrated small-scale LNG supplier and distributor

## Supply chain efficiency

The dual capability of the *Allegiance* will allow the vessel to operate as both an LNG bunkering vessel and an LNG supply vessel as part of Avenir's strategy to utilise 'multi-functional assets' to unlock new LNG markets.

"We can deliver LNG to a broad range of customers from a single

vessel, improving efficiency in the LNG supply chain and ultimately reducing costs to our end-customers," Mackey explained.

The firm previously partnered with state-owned oil and gas firm Petronas to develop the first com-

mercial LNG bunkering operation in Malaysia and offers a range of small-scale LNG solutions, ranging from off-grid power generation and transport to semi-permanent infrastructure to support the use of LNG as a marine fuel. ■



*Avenir Allegiance*

# Crowley launches New Energy division

Marine solutions and energy services firm Crowley Maritime has launched a New Energy division, focused on LNG and offshore wind.

The new unit will build on the firm's expertise in the LNG fuelling sector, expanding its existing microgrid solutions, engineering services and vessel fuel bunkering services.

"The New Energy division is the next evolution in our prioritization of this market with a singular focus on developing and delivering access and support to more sustainable energy sources to our customers. We can draw upon our broad portfolio of engineering and naval architecture, multi-faceted supply chain solutions, and 129 years of maritime transportation to deliver tailored, reliable results," Matt Yacavone, senior vice president at Crowley Shipping, said.

## Innovative solutions

Crowley was the first company to receive an export license for small-scale LNG transportation services from the U.S. Department of Energy and its new division will build on its long-standing expertise

in LNG bunkering.

"At Crowley, we have a strong company culture of environmental stewardship and sustainability in not only our own operations, but in our services to customers. The New Energy division captures our commitment to those cultural principles while delivering the innovative solutions that help customers in these emerging sectors succeed," Tom Crowley, CEO of the group, said.

Headquartered in Florida, the firm is a family and employee-owned and has developed LNG distribution services since 2013, following its acquisition of Carib Energy. Today it is one of the largest developers of LNG fuelling infrastructure in the state and delivers a range of marine solutions, energy and logistics services.

## Connected supply chain

IN 2018, the group introduced the *El Coquí*, the first combination container/roll-on, roll-off ship to be powered by LNG, investing



Crowley LNG vessel

more than half a billion dollars in LNG fuelling infrastructure. Since then, Crowley has expanded its LNG services to include sourcing and distribution services as well as weekly operations serving the U.S. mainland-to-Puerto Rico liner cargo trade.

The new division will also focus on wind power solutions, tying LNG development to the growing demand for renewable power.

"Crowley takes the one-source concept to the next level as a life-cycle service provider.... Because of the newness of the American market, it's hard for companies to know what they don't know or will need. Facing this uncertainty, Crowley provides a turnkey supply chain solution for piecing these massive projects together," Jeff Andreini, vice president at the New Energy division, said. ■



Crowley LNG tanks

# Novatek expands LNG fuelling network

Gas producer Novatek has announced the expansion of its network of LNG fuelling stations as its Cryogas-Vysotsk site reached a new production milestone.

The firm reported its one millionth tonne of LNG produced at the site, located on the Baltic Sea in the Leningrad region of Russia.

“Cryogas-Vysotsk has a broad and diverse geography of customers as this important project serves the entire Baltic region clean-burning natural gas needs amid tightening environmental requirements for marine and automotive fuels,” NOVATEK’s Chairman of the Management Board Leonid Mikhelson said.

## Domestic demand

Launched as a joint venture between Pao Novatek and financial institution Gazprombank, the Cryogas-Vysotsk project has design capacity of 660,000 tonnes of LNG per annum and includes a 42,000 cubic meters LNG storage tank and offloading berth designed to handle LNG carriers.

“The project has supplied more than 80 trucks to the Russian domestic market as part of Novatek’s

commercial activities to provide clean-burning LNG for the consumers in the Murmansk region and the Company’s network of LNG fuelling stations,” a spokesperson for the firm said.

Alongside its activities as a producer, Novatek has invested in LNG refuelling infrastructure in Russia and beyond as part of an effort to support the wider uptake of the fuel for transport.

## Carbon-neutral LNG fuelling network

In 2018, the firm partnered with Belgian gas transmission system operator Fluxys established to design, build, finance, own and operate a medium-scale LNG transshipment terminal in the port of Rostock, Germany.

Following the success of this partnership the firm’s wholly owned subsidiary, Novatek Green Energy launched its first carbon-neutral LNG fuelling station in 2020 in Rostock, Germany.



Cryogas-Vysotsk

“Novatek is actively developing a network of LNG fuelling stations both in Russia and Europe as natural gas is an environmentally friendly, clean burning energy fuel source... We recently published our environmental and climate change targets<sup>2</sup> for the period up to 2030, which are aimed at making our contribution to solving the issues of global climate change. The launch of a carbon-neutral LNG fuelling station in the port

city of Rostock is another step in our efforts to reduce our carbon footprint and facilitate the energy transition to a low-carbon future,” Lev Feodosyev, Novatek First Deputy Chairman, said.

The firm currently operates a network of six LNG fuelling stations in Europe as well as 19 regasification facilities. It aims to expand this network to provide unbroken LNG supply for heavy-duty transport across Germany and Poland. ■



Novatek facility

A young boy with dark hair, wearing a plaid shirt, is shown in profile, looking down at a tablet computer. The scene is dimly lit, with the light from the tablet screen illuminating his face and shirt. The background is dark, suggesting a nighttime or indoor setting with low ambient light.

# BRIGHTER FUTURE

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# Shell secures Gibraltar LNG bunker licence

Energy major Shell has secured an LNG bunker licence from HM Government of Gibraltar, paving the way for new refuelling infrastructure on the British overseas territory.

The licence was awarded by the Gibraltar Port Authority following a tendering process that began in 2019 and the finalisation of the contract was welcomed by the Minister for the Port, Vijay Daryanani.

"I am pleased to see that Shell has been successful in its applica-

tion and welcome the trust and confidence that Shell continues to place in Gibraltar with the completion of its application," Daryanani said.

## Bunkering hub

Shell has steadily strengthened relations with Gibraltar over the last

five years, since signing an agreement with the government of Gibraltar in 2016 to construct a small-scale regasification unit in Gibraltar to supply LNG fuel to a nearby power station.

"The Gibraltar Port Authority now looks forward to working with

in area, is ideally suited to provide bunkering services for vessels entering and exiting the western Mediterranean.

## Forward thinking approach

The Gibraltar Port Authority has been an active member of the Society for Gas as a Marine Fuel (SGMF) for five years, promoting the use of LNG for shipping via the territory.

"I am delighted that a prestigious entity such as Shell should be operating from Gibraltar Port. Including LNG bunkering as one of the services on offer at our port demonstrates our forward thinking approach to developing the maritime industry, as well as ensuring that Gibraltar is part of the transition to cleaner fuels and reduced environmental impact," Chief Minister, the Hon Fabian Picardo QC MP, commented on the latest licence award. ■



Shell LNG tanks, Gibraltar

Shell to further develop the range of bunkering service as the Port of Gibraltar to include LNG bunkering. This is in line with the aspiration to keep Gibraltar on the leading edge of developments in the bunkering industry and to reinforce our position as a bunkering hub," Daryanani added.

The small headland, measuring just 6.7 square kilometres

# Peninsula launches LNG bunker service

Bunker and lubricant supplier Peninsula Petroleum has announced plans to launch an LNG bunker service as part of its energy transition strategy.

The new business unit will focus on developing a full 'LNG supply proposition' as the first phase of the group's Global Sustainability Initiative.

"This is another major milestone in Peninsula's evolution. We have built a team of very experienced individuals in the sustainability and LNG space who will drive Peninsula's transition to a cleaner future... Initially we are using this expertise to progressively build an LNG bunkering proposition, which will benefit our customers globally," John Bassadone, CEO of Peninsula, said.

The firm is now in advanced discussions with shipyards, governments, maritime authorities, suppliers and customers and reports

an 'extremely positive' response so far.

## Natural progression

The move to LNG indicates the momentum building for LNG bunkering in 2021, with the firm describing itself as 'naturally risk-averse'.

"Building our LNG proposition around customer needs is a natural progression for us as it is a methodology we have followed in conventional bunkering for 25 years. In many cases, customers are opting for dual-fuelled ships and we will be uniquely placed to assist them with all their bunkering needs," Victor Morales, Global Head of Sales & Marketing at Peninsula, said.

Headquartered in Gibraltar, the

firm is part of the Gibunco Group and acts as a physical distributor and reseller of bunker fuel with an international network of offices and operations in the world's busiest ports. The firm was one of the first to offer very low sulphur fuel oil (VLSFO) in 2019.

## Nacho de Miguel to lead

The group's energy transition strategy will be led by new hire Nacho de Miguel as Head of Business Development. He brings experience in the LNG sector, having held senior positions with Union Fenosa.

"I am fortunate to have worked extensively in both bunkers and LNG therefore I welcomed the opportunity to bring this experience and knowledge to Peninsula as it



John A. Bassadone, CEO of Peninsula

develops its worldwide LNG supply business," Miguel commented.

In the longer term, the firm plans investment in 'further viable green energy solutions' as it targets a zero carbon future indicating that the firm plans future pivot away from its core business of bunker fuel oil. ■

## Gasum extends LNG bunkering to ARA

Scandinavian gas specialist Gasum has signed a new LNG bunkering agreement with oil and gas major Equinor, expanding its operations to the Antwerp-Amsterdam-Rotterdam (ARA) region.

The contract builds on the existing partnership between the two firms and will see Gasum provide LNG bunkering services for Equinor across the ARA region.

“We are very proud that Equinor chose Gasum as their partner in the ARA region. Equinor is one of the forerunners using LNG in their operations, and they were our first LNG customer in the maritime segment. This new agreement marks yet another milestone in our co-operation and in Gasum’s growth”, Jacob Granqvist, Gasum’s LNG Maritime Sales Director, said.

### **Coralus and Kairos**

Refuelling operations will be performed by Gasum’s bunker vessels *Coralus* and *Kairos* and form part of Gasum’s decarbonisation strategy to promote LNG and bioLNG alternatives.

“LNG is interchangeable with renewable liquefied biogas (LBG), which means that the two gases can be mixed. Using both LNG and LBG is one of the concrete actions that will take the shipping industry towards a low-carbon future,” a spokesperson for the firm said.

The national Finnish transmission system operator, Gasum has pioneered the use of LNG for the transport supply chain across the

Nordic region and now operates an extensive network of filling stations. The group employs around 350 staff in Finland, Norway and Sweden and generates revenues of more than €1 billion.

### **Decade of co-operation**

The firm has a long history of co-operation with Norwegian national energy firm Equinor, dating back to 2011. Most recently Gasum has provide bunkering services for Equinor oil tankers carrying North Sea crude to Swedish and Baltic ports.

“Co-operation with Equinor in the ARA region extends Gasum’s existing business area with the ability to serve also other customers in the region. This development promotes Gasum’s objective to provide solutions for decarbonizing the shipping industry,” the firm said in a statement.

Headquartered in Stavanger, Norway, Equinor has traditionally been a petroleum explorer but since rebranding from Statoil in 2018 started to invest heavily in alternative energy solutions.

### **First bunkering in Emden**

Gasum also recently announced its first bunkering operation in Emden, Germany, supplying LNG to SIEM Car Carrier’s vessel, *SIEM*



Gasum refuelling

### **Confucius.**

“As one of the most important roll-on/roll-off ports in Europe, Emden serves as an important milestone in extending our services to maritime companies operating in the region. It’s evident that the more popular LNG becomes in maritime transport, we too must become even more flexible and bring our services to wherever they are needed,” Granqvist commented. ■

## NEWS NUDGES

### **2021 a ‘defining year’ for LNG**

Research consultancy Wood Mackenzie predicts that 2021 will be a ‘defining year’ for the LNG industry as policymakers drive forward change around the globe.

“Decarbonising natural gas will become a strategic priority for the gas industry,” Massimo Di Odoardo, vice president at Wood Mackenzie, said. “Following a raft of LNG project cancellations last year, current high prices will have emboldened LNG developers. However, for new projects to be developed, contract activity will need to pick up. Buyers will be looking to assess their portfolio requirements and just how comfortable they are in committing for new long-term firm LNG vs increasing their spot market exposure.” ■



Aurora Spirit

# Shell, Q-LNG commence ATB operations

Energy developers Shell and Q-LNG Transport has commenced operations from its first offshore LNG articulated tug and barge (ATB) in the US.

The Q-LNG 4000 is the first ATB developed by the partners and is designed for the ship-to-ship refuelling, and ship-to-shore transfers.

“As part of Shell’s ambition to be a net-zero emissions energy business by 2050 or sooner, in step with society, we are working with customers across every sector to help them decarbonise,” Grahaeme Henderson, Global Head of Shell Shipping & Maritime, said.

## Marine distribution infrastructure

The new vessel will support small-scale marine distribution infrastructure along the southeast U.S. coast and was initiated as part of Shell’s strategic plan to develop a global LNG bunkering network.

“We believe LNG can play a vital role in reducing emissions

from shipping today, so I’m proud that we have developed the world’s largest LNG fuelling network of ports and bunker vessels on key trading routes. This ATB takes us a step closer to doubling the LNG fuelling network by the mid-2020s and enabling further emissions reductions.”

The new ATB compliments Shell’s existing global network of six LNG bunker vessels. The firm aims to double its LNG bunkering network by the mid-2020s, to around 15 major ports on key international trading routes.

## 4,000 cubic metres capacity

The vessel was fabricated at VT Halter Marine shipyards in Pascagoula, Mississippi, and features capacity of up to 4,000 cubic



**Q-LNG 4000**

metres of LNG.

“I’m pleased to have taken delivery and to begin our long term service contract with Shell Trading. All of my companies, including Q-LNG, are focused on, and will continue to do our part to design, build and operate vessels that will assist with the quest to decarbonize. We look forward to

delivering extremely safe and reliable service, as we have done for Shell all of my career,” Shane Guidry, CEO of Q-LNG, said.

Q-LNG Transport is sister company to Harvey Gulf International Marine. The Q-LNG 4000 was launched in partnership with Shell’s wholly-owned subsidiary Shell Trading Company. ■

# Carnival takes delivery of LNG-fuelled *Mardi Gras*

Cruise ship operator Carnival Corporation has inaugurated its latest LNG-fuelled cruise ship the *Mardi Gras*, following construction in Finland.

The vessel cruise ship can accommodate more than 5,200 guests and a crew of 2,000 and was launched at Meyer Turku shipyard on the southwest coast of Finland.

“We have been working tirelessly this year to get to this exciting day to take delivery of this beautiful ship, and the team at Meyer Turku has been an outstanding partner throughout this process. I cannot wait for our guests and crew to see and experience

*Mardi Gras*,” Christine Duffy, president of Carnival Cruise Line, said.

The ship will feature a three-deck-high atrium with floor-to-ceiling windows as well as BOLT, the first-ever roller coaster at sea.

“We are delivering a beautiful and highly advanced ship with world-class technology such as LNG propulsion, to name just one. With these sophisticated systems, she will be one of the most environmentally friendly ships to sail the

North American waters. I am very proud of our team of shipbuilders and would like to thank everyone involved of their dedication during the building process”, Tim Meyer, CEO of Meyer Turku, said.

## Guest operations in April

Guest operations for the *Mardi Gras* are scheduled to commence in April, when the vessel will enter service in North America. Carnival will operate the *Mardi Gras* on seven-day Caribbean itineraries from Port Canaveral, Florida.

“Carnival has worked closely Port Canaveral to build a new cruise terminal to accommodate the Excel-class ship and also facilitate the new LNG fuelling process. The inaugural voyage for *Mardi Gras* is scheduled for April 24, 2021,” the firm said in a statement.

## Pent-up demand

The *Mardi Gras* completed its in-

augural LNG bunkering at the Port of Rotterdam in the Netherlands and set sail for its new home port in January.

“Notwithstanding the delays related to the pandemic, there is tremendous enthusiasm and pent-up demand for this ship. Next we will work on the development of her sister ship, *Carnival Celebration*, which arrives in 2022 and has sold very well since inventory opened in October,” Duffy added.

Headquartered in Miami, Florida, Carnival Corporation is one of the world’s largest leisure travel companies, employing workforce of over 150,000 people in nearly 150 countries. The firm operates a fleet of 87 ships visiting over 700 ports around the world and its portfolio includes Carnival Cruise Line, Princess Cruises, Holland America Line, Seabourn, P&O Cruises (Australia), Costa Cruises, AIDA Cruises, P&O Cruises (UK) and Cunard. ■



**The *Mardi Gras***

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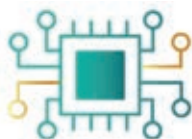
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# Reed Boardall opens bioLNG refuelling station

Cold chain distribution firm Reed Boardall has opened a new bioLNG refuelling station in the UK as part of a comprehensive renewable fuel strategy.

The new facility will be owned and operated by Gasrec, a supplier of gas for the road transport sector. It will be used to fuel Reed Boardall's fleet of 30 Volvo FH LNG 6x2 tractor units.

"We pride ourselves on being a forward-thinking, sustainable operation. Volvo's LNG trucks are proven to vastly reduce CO2 emissions and we have been very impressed with the performance and reliability since first putting the trucks on the road in March 2020. Opening this site reaffirms our

commitment to moving the fleet towards a cleaner, more environmentally-friendly fuel," Graeme Richardson, Managing Director, Reed Boardall Transport, said.

## Boroughbridge headquarters

The facility was unveiled at Reed Boardall's Boroughbridge headquarters and was described as a 'major step' in the firm's strategy to transition its 220-strong fleet away from diesel.

"The government has set very



Gasrec LNG station

stringent targets to reduce carbon emissions by 2030 and we are determined to play our part and meet those goals," Richardson commented.

As a specialist in frozen food distribution, Reed Boardall has established a dedicated fleet of Euro VI diesel trucks and estimates the switch to bioLNG could cut CO2 emissions as much as 95%, while delivering "an impressive 99% reduction" in particulate matter and 90% in NO2 emissions.

## LIQAL design

The new refuelling infrastructure is based around a LIQAL skid-

mounted station and supplies the same fuelling consistency and reliability as a fully-fledged LNG fuelling station.

"We're very excited to be taking our first steps into the UK market and delighted that Gasrec, the UK market leader in LNG transport fuel, acknowledges the benefits of our station design and integrated project approach," LIQAL's Business Development Manager Joost Jansen, said.

Reed Boardall next plans to install a second station in Scotland later in the year, supporting its forthcoming order for a further 40 new Volvo FH LNG tractor units. ■



Gasrec LNG station

## NEWS NUDGES

### Titan, NYK sign Green Zeebrugge charter agreement

Fuel specialist Titan LNG and shipping firm NYK Line have signed a charter agreement for the LNG bunker vessel *Green Zeebrugge*.

The agreement will see Titan LNG charter the vessel from February for the bunkering of LNG in the Amsterdam-Rotterdam-Antwerp (ARA) region.

"We are excited to announce the chartering of the *Green Zeebrugge*. January has proven exceptionally busy, underlining the timeliness of our decision to secure this additional capacity. Titan LNG carried out seven LNG

operations during one weekend, three of which were to large crude shuttle tankers from Equinor, a term contract partner of Titan's. Using the *Green Zeebrugge* we were able to ensure safe and timely deliveries to all the vessels," Michael Schaap, Commercial Director at Titan LNG, commented.

### Venice LNG facility gains approval

Authorities in Italy's Veneto Region have approved plans for the construction and operation of a new LNG terminal and bunkering infrastructure.

Supported by the North Adriatic Sea Port Authority and co-fi-

nanced by the European Commission under the CEF (Connecting Europe Facility) initiative the Venice LNG Facility represents €18.5 million investment and is expected to include significant LNG bunkering infrastructure.

### Wärtsilä Extends Golar dual-fuel maintenance agreement

Engine manufacturer Wärtsilä has signed an agreement with Golar Management Norway for maintenance on 16 dual-fuel LNG carriers.

The five-year extension contract includes four vessels with Wärtsilä 50DF dual-fuel engines and two with 34DF and Wärtsilä

20DF dual-fuel engines.

"We are pleased to continue our long-term partnership with Wärtsilä with this service agreement extension. Wärtsilä's digital remote support capabilities have proved to be of great value for us, saving both time and costs by often eliminating the need to have service people sent onboard in person." Øistein Dahl, Managing Director of Golar Management Norway, said.

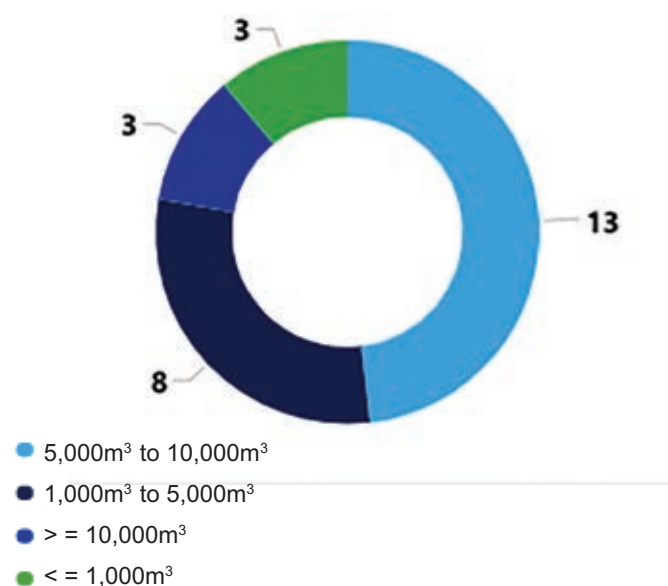
The agreement includes dynamic maintenance planning and asset diagnostics, under a predictive maintenance strategy and is complimented by round-the-clock remote support and advice from Wärtsilä Expertise Centres. ■

## LNG BUNKER VESSELS

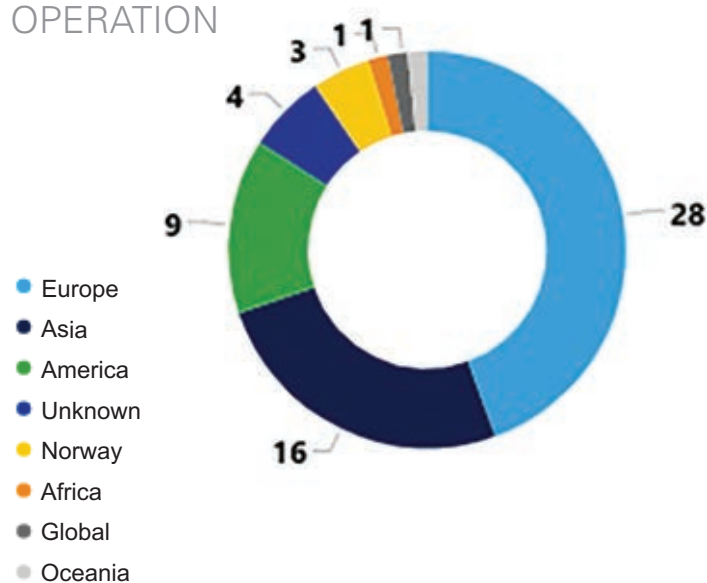
| Vessel Name                               | Home Port                                | Project status   | Delivery year | Country       | LNG Tank Capacity | Owner                                                                                      | Operator                                           |
|-------------------------------------------|------------------------------------------|------------------|---------------|---------------|-------------------|--------------------------------------------------------------------------------------------|----------------------------------------------------|
| Yidu inland river LNG bunker barge        | Yidu port                                | In operation     | 2014          | China         | 500               | Xilan Natural Gas Group                                                                    | Xilan Natural Gas Group                            |
| FlexFueler 001                            | Amsterdam                                | In operation     | 2019          | Netherlands   | 1480              | Titan LNG                                                                                  | Titan LNG                                          |
| FlexFueler 002                            | Antwerp                                  | In operation     | 2020          | Belgium       | 1480              | Titan LNG                                                                                  | Titan LNG                                          |
| Titan Hyperion                            | TBD                                      | Under discussion | 2021          | Netherlands   | 8000              | Titan LNG                                                                                  | Titan LNG                                          |
| PRO1                                      | Houston                                  | Under discussion | Q4 2022       | United States | 7600              | LNG PRO Bunkers                                                                            | TBN (Probunkers group company)                     |
| PRO2                                      | Hong Kong                                | Under discussion | Q12023        | Hong Kong     | 7600              | LNG PRO Bunkers                                                                            | TBN (Probunkers group company)                     |
| Coralius                                  | Risavika                                 | In operation     | 2017          | Norway        | 5600              | Sirius Veder Gas                                                                           | Sirius Rederi                                      |
| Cardissa                                  | Rotterdam                                | In operation     | 2017          | Netherlands   | 6500              | Shell                                                                                      | Shell                                              |
| Coral Methane                             | Rotterdam                                | In operation     | 2018          | Netherlands   | 7551              | Anthony Veder                                                                              | Shell                                              |
| NYK Western Japan LNG bunker vessel       | Setouchi & Kyushu areas of western Japan | Under discussion | 2020          | Japan         |                   | NYK, Kyushu Electric Power Co. Inc., Saibu Gas Co. Ltd. & Chugoku Electric Power Co., Inc. | NYK, Kyushu Electric Power Co., Inc., Saibu Gas Co |
| Green Zeebrugge                           | Zeebrugge                                | In operation     | 2017          | Belgium       | 5100              | NYK                                                                                        | NYK                                                |
| Kairos                                    | Lithuania                                | In operation     | 2018          | Lithuania     | 7500              | Bernhard Schulte                                                                           | Nauticor                                           |
| Naturgy LNG bunker vessel                 | Barcelona                                | Under discussion | 2020          | Spain         | 6000              | Naturgy                                                                                    | Naturgy                                            |
| Gas Agility                               | Northern Europe                          | In operation     | 2020          | Netherlands   | 18600             | Mitsui OSK Lines Ltd                                                                       | Mitsui OSK Lines Ltd                               |
| SM JEJU LNG2                              | Busan                                    | In operation     | 2020          | South Korea   | 7500              | Korea Line                                                                                 | Korea Line                                         |
| Pioneer Knutsen                           |                                          | In operation     | 2020          | Norway        | 1100              | Knutsen OAS Shipping                                                                       | Knutsen OAS Shipping                               |
| TBN 1                                     |                                          | Decided          | 2022          | Spain         | 5000              | Knutsen OAS Shipping                                                                       | Knutsen OAS Shipping                               |
| Q-LNG 4000                                | Port Canaveral, FL                       | In operation     | 2020          | United States | 4000              | Q-LNG                                                                                      | Harvey Gulf International Marine                   |
| Q-LNG ATB Bunker Barge 8000               | TBD                                      | Under discussion | TBD           | United States | 8000              | Q-LNG                                                                                      | Harvey Gulf International Marine                   |
| Dmitry Mendelev                           |                                          | Decided          | Q3 2021       | Europe        | 5800              | Shturman Koshelev LLC                                                                      | Gazpromneft Marine Bunker Ltd (Gazpromneft)        |
| FueLNG Bellina                            | Singapore                                | In operation     | 2020          | Singapore     | 7500              | FueLNG                                                                                     | FueLNG                                             |
| Clean Jacksonville                        | Jacksonville Jax LNG                     | In operation     | 2018          | United States | 2200              | TOTE                                                                                       | FOSS Maritime                                      |
| ENN LNG bunker vessel                     | Zhoushan                                 | Decided          | 2020          | China         | 8500              | ENN Energy                                                                                 | ENN Energy                                         |
| Optimus                                   |                                          | Decided          | Q1 2021       | Europe        | 6000              | Eesti Gaas                                                                                 | Elenger                                            |
| FUKUOKA FUKUOKA 1350                      | Yokohama                                 | Decided          | 2021          | Japan         | 2500              | Ecobunker shipping                                                                         | Ecobunker shipping                                 |
| Kaguya                                    | Chubu region (Central Japan)             | In operation     | 2020          | Japan         | 3500              | CLS (JV established by K Line, JERA, NYK & Toyota Tsusho Corp.)                            | CLMF (JV by CLS partners)                          |
| Oizmendi                                  | Huelva                                   | In operation     | 2018          | Spain         | 600               | Cepsa                                                                                      | Cepsa                                              |
| Seagas                                    | Stockholm (Louden)                       | In operation     | 2013          | Sweden        | 187               | Gasum                                                                                      | AGA                                                |
| Avenir Accolade                           |                                          | Decided          | 2020          | Brazil        | 7500              | Avenir LNG                                                                                 |                                                    |
| Avenir Advantage                          |                                          | In operation     | 2020          | Malaysia      | 7500              | Avenir LNG                                                                                 |                                                    |
| Avenir bunker vessel 3                    | Oristano, Sardinia                       | Decided          | 2021          | Europe        | 7500              | Avenir LNG                                                                                 |                                                    |
| Avenir bunker vessel 4 (Location unknown) | Not yet decided (being built in China)   | Decided          | Aug 2021      | China         | 7500              | Avenir LNG                                                                                 |                                                    |
| Avenir bunker vessel 5 (Location unknown) | Not yet decided (being built in China)   | Decided          | Jun 2021      | China         | 20000             | Avenir LNG                                                                                 |                                                    |
| Avenir bunker vessel 6 (Location unknown) | Not yet decided (being built in China)   | Decided          | Sep 2021      | China         | 20000             | Avenir LNG                                                                                 |                                                    |
| Bergen LNG                                | Bergen                                   | Decided          | 2020          | Norway        | 850               | Bergen Tankers                                                                             |                                                    |
| Bunker Breeze                             | Algeciras                                | In operation     | 2018          | Spain         | 1200              | Suardiaz Energy Shipping                                                                   |                                                    |
| Clean Canaveral                           | Jacksonville, FL                         | Decided          | 2022          | United States | 5400              | Polaris New Energy                                                                         |                                                    |
| Coral Anthelia                            |                                          | In operation     | 2013          | Jamaica       | 6500              | Anthony Veder                                                                              |                                                    |

| Vessel Name                                           | Home Port             | Project status   | Delivery year | Country       | LNG Tank Capacity | Owner                                              | Operator |
|-------------------------------------------------------|-----------------------|------------------|---------------|---------------|-------------------|----------------------------------------------------|----------|
| Coral EnergiCE                                        | Risavika              | In operation     | 2018          | Europe        | 18000             | Anthony Veder                                      |          |
| Coral Energy                                          | Risavika              | In operation     | 2013          | Europe        | 15000             | Anthony Veder                                      |          |
| Coral Favia                                           |                       | In operation     | 2010          | Russia        | 10000             | Anthony Veder                                      |          |
| Coral Fraseri                                         | Unknown               | In operation     | 2019          | Global        | 10000             | Anthony Veder                                      |          |
| Coral Fungia                                          |                       | In operation     | 2011          | Russia        | 10000             | Anthony Veder                                      |          |
| Coral Furcata                                         |                       | In operation     | 2011          | --            | 10000             | Anthony Veder                                      |          |
| Cryopeak LNG                                          | Vancouver             | Under discussion | 2022/3        | Canada        | 4000              | Cryopeak                                           |          |
| DEPA Limassol                                         | Limassol              | Under discussion | 2022          | Greece        | 4000              | DEPA                                               |          |
| DEPA Piraeus                                          | Piraeus               | Under discussion | 2022          | Greece        | 4000              | DEPA                                               |          |
| Domestic LNG bunkering vessel in China                | To be decided (China) | Under discussion | 2021          | China         | 6000              | CNOOC                                              |          |
| Domestic LNG bunkering vessel in China                | To be decided (China) | Under discussion | 2021          | China         | 12000             | CNOOC                                              |          |
| FlexFueler 003                                        | Zeebrugge             | Under discussion | TBD           | Belgium       | 1480              | Titan LNG                                          |          |
| FlexFueler 004                                        | Lubeck                | Under discussion | TBD           | Germany       | 1480              | Titan LNG                                          |          |
| FSU and LNG Bunker Barge, Port of Coega, South Africa | Port of Coega         | Decided          | 2021          | South Africa  | 145000            | DNG Energy                                         |          |
| LNG bunker & feeder vessel Reganosa                   | Mugardos              | Decided          | 2023          | Spain         | 10000             | Reganosa                                           |          |
| LNG bunker barge GALP                                 |                       | Decided          | 2022          | Portugal      |                   | GALP                                               |          |
| LNG bunker vessel Swinoujscie                         | Swinoujscie           | Under discussion | 2023          | Poland        |                   | Polskie LNG                                        |          |
| LNG London                                            | Rotterdam             | In operation     | 2019          | Netherlands   | 2998              | LNG Shipping (Victrol & Sogestran)                 |          |
| MOL LNG bunker vessel                                 | Singapore             | Decided          | 2021          | Singapore     | 12000             | Mitsui OSK Lines Ltd                               |          |
| Polaris ATB No. 2                                     | Jacksonville, FL      | Under discussion | TBD           | United States |                   | Polaris New Energy                                 |          |
| Port of Algeciras LNG-bunkering vessel                | Port of Algeciras     | Under discussion | 2023          | Spain         | 12500             | Enagás                                             |          |
| Poseidon Med II bunkering barge                       | Revithoussa           | Decided          | 2020          | Europe        | 4000              | Venture led by DEPA                                |          |
| Shell LBV                                             | Undecided             | Under discussion | 2022          | --            | 18000             | Shell have sent out tender but ownership undecided |          |
| Small LNG bunkering vessel in South Korea             |                       | Decided          | 2021          | South Korea   | 500               | Ministry of Oceans and Fisheries                   |          |
| Woodside Western Australia LNG bunker vessel          | Dampier               | Under discussion | 2021          | Australia     | 12000             |                                                    |          |

## BUNKER VESSELS BY TANK CAPACITY



## BUNKER VESSELS BY AREA OF OPERATION



## 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         | 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  | Pelita Energy        | 18,800 | LNG              | Malaysia - Japan          | Yes               | Perbadanan/NYK        |
| 2000  | Tripura              | 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  | Coral Favia          | 10,000 | LNG/LPG/Ethylene | Worldwide                 | No                | Anthony Veder         |
| 2010  | Coral Fraseri        | 10,000 | LNG/LPG/Ethylene | Worldwide                 | No                | Anthony Veder         |
| 2011  | Akebono Maru         | 3,556  | LNG              | Japan                     | Yes               | Chuo Kaiun            |
| 2011  | Coral Furcata        | 10,000 | LNG/LPG/Ethylene | Worldwide                 | No                | Anthony Veder         |
| 2011  | Coral Fungia         | 10,000 | LNG/LPG/Ethylene | Worldwide                 | No                | Anthony Veder         |
| 2011  | Vision Spirit        | 12,000 | LNG/LPG/Ethylene | Worldwide                 | No                | Teekay                |
| 2011  | Unikum Spirit        | 12,000 | LNG/LPG/Ethylene | Worldwide                 | No                | Teekay                |
| 2012  | Coral Energy         | 15,600 | LNG              | Northwest Europe/Baltics  | Yes               | Anthony Veder         |
| 2013  | JX Energy TBN        | 2,500  | LNG              | Japan                     | Yes               | JX Energy             |
| 2013  | Kakuyu Maru          | 2,500  | LNG              | Japan                     | Yes               | Tsurumi Sunmarine     |
| 2013  | Coral Antheia        | 6,500  | LNG/Ethylene     |                           |                   | Anthony Veder         |
| 2015  | LNG Barge TBN        | 3,000  | LNG              | US Coast                  | Yes               | LNG America           |
| 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  | PetroChina TBN       | 30,000 | LNG              | China                     |                   | PetroChina            |
| 2016  | Clean Jacksonville   | 2,200  | LNG              | US Coast                  | Yes               | CME                   |
| 2016  | LNG Prime            | 2,250  | LNG              | Northwest Europe          | Yes               | Veka Deen LNG         |
| 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  | Hai Yang Shi You 301 | 30,000 | LNG              | Bali FSU                  | Yes               | CETS (CNOOC)          |
| 2017  | Oizmendi             | 600    | LNG              | Bilbao                    | Yes               | Itsas Gas             |
| 2017  | Green Zeebrugge      | 5,000  | LNG              | Northwest Europe          | Yes               | NYK                   |
| 2017  | Coralius             | 5,800  | LNG              | Northwest Europe/Baltics  | Yes, for Skangas  | Anthony Veder         |
| 2017  | Cardissa             | 6,500  | LNG              | Northwest Europe          | Yes               | Shell                 |
| 2017  | LNG-Gorskaya TBN     | 7,300  | LNG              | Russia                    | Yes               | LNG-Gorskaya          |
| 2017  | LNG-Gorskaya TBN     | 7,300  | LNG              | Russia                    | Yes               | LNG-Gorskaya          |

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 = 8th February 2021

| Built | Name                     | CBM    | Cargo Type   | Trading area             | Trading in LNG?   | Ship Owner / Operator       |
|-------|--------------------------|--------|--------------|--------------------------|-------------------|-----------------------------|
| 2017  | LNG-Gorskaya TBN         | 7,300  | LNG          | Russia                   | Yes               | LNG-Gorskaya                |
| 2017  | Coral EnergiCE           | 18,000 | LNG          | Northwest Europe/Baltics | Yes               | 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  | Coral Encanto            | 30,000 | LNG          | China                    | Yes               | Anthony Veder               |
| 2018  | HUA XIANG 8              | 13,720 | LNG          | China                    | Yes               | Zhejiang Huaxiang           |
| 2018  | LNG London               | 3,000  | LNG          | Northwest Europe         | Yes               | Shell                       |
| 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  | Kairos                   | 7,500  | LNG          | Baltic                   | Yes               | Bernhard Schulte            |
| 2018  | Bunker Breeze            | 0      | LNG          | Barcelona                | Yes               | Suardiaz Energy Shipping    |
| 2019  | SM Jeju LNG1             | 7,500  | LNG          | Korea                    | Yes               | Korea Line                  |
| 2019  | Gas Agility              | 18,600 | LNG          | NWE                      | Yes               | MOL                         |
| 2019  | Flexfueller 001          | 1,480  | LNG          | Amsterdam                | Yes               | Titan LNG                   |
| 2020  | Avenir Advantage         | 7,500  | LNG          | Mediterranean            | Yes               | Stolt-Nielsen Gas           |
| 2020  | Avenir Accolade          | 7,500  | LNG          | Mediterranean            | Yes               | Stolt-Nielsen Gas           |
| 2020  | SM Jeju LNG2             | 7,500  | LNG          | Korea                    | Yes               | Korea Line                  |
| 2020  | CNTIC VPOWER Global      | 28,000 | LNG          | Myanmar                  | Yes               | Dalian Inteh Group          |
| 2020  | Q-LNG 4000               | 4,000  | LNG          | US Coast                 | Yes               | Q-LNG Transport/Harvey Gulf |
| 2020  | Avenir Aspiration        | 7,500  | LNG          |                          | Yes               | Stolt-Nielsen Gas           |
| 2020  | FueLNG Bellina           | 7,500  | LNG          | Singapore                | Yes               | FueLNG                      |
| 2020  | Kaguya                   | 3,500  | LNG          | Japan                    | Yes               | CLS                         |
| 2020  | Optimus                  | 6,000  | LNG          | NWE                      | Yes               | Elenger                     |
| 2020  | ENN TBN                  | 8,500  | LNG          | China                    | Yes               | ENN                         |
| 2020  | Flexfueller 002          | 1,480  | LNG          | Antwerp                  | Yes               | Titan LNG                   |
| 2020  | Ecobunker Tokyo Bay      | 2,500  | LMG          | Japan                    | Yes               | Ecobunkers                  |
| 2021  | Stolt TBN (option)       | 7,500  | LNG          |                          | Yes               | Stolt-Nielsen Gas           |
| 2021  | Knutsen TBN              | 30,000 | LNG          | Mediterranean            | Yes               | Knutsen OAS                 |
| 2021  | Dmitry Mendelev          | 5,800  | LNG          | Russia                   | Yes               | Gazprom Neft                |
| 2021  | PE TBN                   | 12,000 | LNG          | Singapore                | Yes               | MOL                         |
| 2021  | JMU TBN                  | 2,500  | LNG          | Japan                    | Yes               | JMU                         |
| 2021  | TBN                      | 18,600 | LNG          | Mediterranean            | Yes               | MOL                         |
| 2021  | TG TBN                   | 500    | LNG          | Korea                    | Yes               | Trans Gas                   |
| 2022  | Stolt TBN                | 20,000 | LNG          | Worldwide                | Yes               | Stolt-Nielsen Gas           |
| 2022  | Stolt TBN                | 20,000 | LNG          | Worldwide                | Yes               | Stolt-Nielsen Gas           |
| 2022  | Clean Cañaveral          | 5,400  | LNG          | USG                      | Yes               | PNE                         |
| 2023  | Cryopeak TBA             | 4,000  | LNG          | West Canada              | Yes               | Cryopeak                    |
| 2022  | Kuntsen TBN              | 5,000  | LNG          | Spain                    | Yes               | Knutsen OAS                 |
| 2023  | Kuntsen TBN              | 12,500 | LNG          | Spain                    | Yes               | Knutsen OAS                 |
| 2024  | Stolt TBN (option)       | 20,000 | LNG          | Worldwide                | Yes               | Stolt-Nielsen Gas           |
| 2024  | Stolt TBN (option)       | 20,000 | LNG          | Worldwide                | Yes               | Stolt-Nielsen Gas           |
| 2026  | Stolt TBN (option)       | 20,000 | LNG          | Worldwide                | Yes               | Stolt-Nielsen Gas           |
| 2026  | Stolt TBN (option)       | 20,000 | LNG          | Worldwide                | Yes               | Stolt-Nielsen Gas           |

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\*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

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