

LNG Fuelling

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Kanfer, OME announce world's first ammonia-ready LNG bunker vessel

Maritime specialists Oceania Marine Energy (OME) and Kanfer Shipping have announced plans to create the world's first ammonia-ready LNG bunkering vessel.

The ambitious project will see the two partners collaborate on the design of a small-scale LNG-fuelled vessel that will have the potential to be upgraded to operate on ammonia in future. The firms signed a Letter of Intent (LOI) to develop and build the vessel in Australia.

"We strongly believe in the green/blue ammonia as a future fuel and for Australia to become a leading producer. We are proud to be part of the zero-emission marine transportation initiative and supply bunker vessels ready-made for future marine fuels," Stig Hagen, Managing Partner at Kanfer Shipping, commented.

Heavy-tonnage marine traffic

The partners have chosen Australia in the first instance due to its plentiful LNG supply and the strong support already in place from key port authorities.

"Australia is uniquely positioned to be the world leader in providing zero-carbon fuels to the shipping industry," Nick Bentley, Director of Oceania Marine Energy, explained. "At Oceania, we are thrilled to be working with Kanfer Shipping to activate Australia's competitive advantage, connecting its production of sustainable energy with its position at the apex of the Asia-Pacific commodity trade route. The opportunity will drive new avenues of high-grade technical employment, while preserving our environment and ensuring future energy security."

Based in Perth, Australia, Oceania Marine Energy aims to accelerate the energy transition through the development of core facilities



'Green' Ammonia may play a key role in future LNG supply chains

and infrastructure to support zero-carbon fuels, such as green ammonia and methanol.

"The Northwest and Eastern regions of Australia have among the highest levels of heavy tonnage marine traffic in the world, making them ideally suited for adoption of zero emission fuels. We are very excited to work with Oceania and offer solutions for Australia to become an attractive LNG bunkering hub in the region," Hagen added.

The project has received support from the Australian government with Senator Ben Small, Parliament of Australia, noting that the country's "gas-fired COVID recovery... is clearly paying dividends with this exciting private sector announcement... By enabling LNG as a transition fuel, this initiative will enable shipping to reduce its carbon footprint whilst delivering jobs and economic security to our regions, which is an important element of our plan to achieve net zero."

Hybrid technologies

Kanfer holds an exclusive design license with CGR Arctic Marine for solutions enabling liquid gas transportation and the partners now expect to build on this to utilise LNG as a fuel combined with hybrid and peak energy saving technologies from Kongsberg Maritime. With future modification, Rolls-Royce Bergen gas engines will be able to operate on ammonia, with the design allowing future owners to easily switch between loading of either LNG, methanol or ammonia.

"Our LNG solution already gives a net 18% greenhouse gas (GHG) reduction (including methane slip), and it can be converted to ammonia when the technology and infrastructure are ready," Kjell Harloff, Senior Vice President, Engines, Kongsberg Maritime, said.

Headquartered in Tønsberg, Norway, Kanfer Shipping owns a number of proprietary technologies focused on infrastructure for small-scale LNG transport, storage and bunkering operations. ■

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IEA predicts LNG bunker demand to triple

Demand for LNG as a bunker fuel is set to triple between 2020 and 2024, according to the latest research from the International Energy Agency (IEA).

The rapid change will be helped by the implementation of the International Maritime Organization's global sulphur cap, which has phased out high sulphur fuel oil from the shipping sector and accelerated the adoption of LNG as a bunker fuel.

"LNG bunker fuel demand is set to triple from 2020 levels to nearly 7 billion cubic metres by 2024," a spokesperson for the IEA commented. "As of January 2021, LNG-fuelled ships made up about 8% of all vessels on order by one estimate, and the fleet of LNG-propelled vessels (excluding LNG carriers) is projected to expand by nearly 160% between 2020 and 2024."

The IEA's findings suggest that LNG use in marine transport has already increased fivefold since 2016, reaching more than 2 billion cubic metres in 2020. In the

longer-term, the IEA predicts that the IMO's long-term GHG reduction targets may dampen demand for LNG, driving alternatives such as eLNG or bioLNG.

Gas-fuelled future

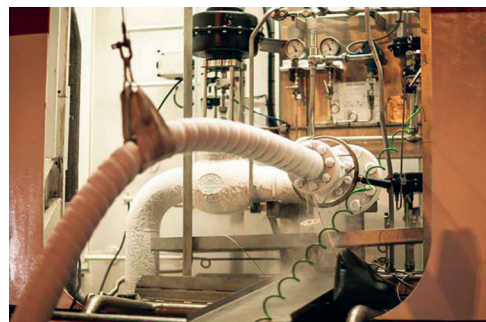
The IEA's findings suggest that gas is set to emerge as a key fuel for the transport sector over the next decade as the number of gas-fuelled vehicles increase. The agency predicts natural gas use in the transport sector will grow at an annual average rate of 5% between 2020 and 2024. More than 60% of this growth is expected to come from road transport, while the remainder is equally split between shipping and pipeline transport.

"The most widespread use of natural gas in the road transport segment is in the form of CNG, with at least six countries having fleets exceeding one million CNG-

fuelled vehicles and expanding," the IEA states, noting that LNG offers more promise in the maritime sector. "LNG consumption for domestic shipping is expected to double during the 2020-24 period, led primarily by China, and - to a lesser extent - Europe."

China and India drive growth

The IEA forecasts that LNG consumption in the road transport sector is dominated by China, which had nearly 600 000 LNG-fuelled trucks and buses in 2020, the largest such fleet in the world. Overall China's use of LNG in road transport is expected to increase by more than 40% in the period from 2020 to 2024, driven by local



LNG hose during refuelling

incentives such as diesel bans and subsidies, and by lower fuel costs compared to diesel trucks.

India is likewise forecast to see uptick in LNG usage, thanks to eased rules for setting up LNG filling stations and plans to build 1,000 stations along the country's main highway corridors.

Headquartered in Paris, the IEA is an autonomous intergovernmental organisation established in the framework of the Organisation for Economic Co-operation and Development. ■

Gasnor signs LNG bunker fuel deal with Wintershall Dea

Nordic gas firm Gasnor has signed a deal with German oil and gas producer Wintershall Dea to secure LNG deliveries for supply vessels on the Norwegian shelf.

The LNG fuel will initially be used to bunker the vessel *Viking Princess*, with LNG delivered from the LNG bunkering terminal at Mongstad Base.

"When using LNG-powered supply vessels, the emissions associated with the supply services will be reduced by approx. 30%. *Viking Princess* is equipped with technology that makes it possible to reduce CO₂ emissions by up to 2400 tonnes per year - corre-

sponding to emissions from approx. 1200 cars," a spokesperson for Gasnor commented.

Efficient energy management

The *Viking Princess* is equipped with dual fuel engines that can



Viking Princess

use both Marine Gasoil and LNG as fuel, with onboard battery storage ensuring efficient energy management. The vessel measures 90 metres in length and 21 metres in width.

Headquartered in Kassel and Hamburg, Germany, Wintershall Dea carries out gas and oil exploration and production in a total of 13 countries.

Molgas acquires Gasnor

Earlier this year, Spanish LNG firm Molgas Energía acquired ownership of Gasnor from energy major Shell. The firm's subsidiary Shell Norske transferred its entire

shareholding to Molgas, including all assets and staff.

Managing Director of Norske Shell Marianne Olsnes said: "Gasnor has been a pioneer in downstream LNG, with a leading position in small scale LNG production and distribution in the domestic gas market. Norske Shell will continue to focus on key positions where we can leverage our differentiated capabilities in line with Shell's strategy and Net Zero target."

Gasnor remains headquartered in Avaldsnes, Norway and provides a range of services a downstream LNG company with small-scale LNG production. ■

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Peninsula, Scale Gas announce Gibraltar LNG bunker vessel

Fuel specialists Peninsula Petroleum and Scale Gas are to launch a new LNG bunkering vessel for operation in the Strait of Gibraltar.

The partners signed an agreement covering construction, joint ownership and charter for the vessel, which will be based in Algeciras Port.

“This project is one of many initiatives around Peninsula’s strategic pillars: customer centricity, sustainability and technology,” John A. Bassadone, CEO of Peninsula said, adding that “this vessel will hopefully be the first of many that will offer flexibility and solutions across our global network to our customers.”

12,500m³ capacity

The new vessel will have capacity of 12,500 cubic metres and will be chartered exclusively by Peninsula through an initial seven-year contract. It will refuel via Enagás’ regasification plants, mainly Huelva in Andalusia.

“This agreement is the culmination of a three-year project that consolidates Scale Gas as a relevant player in investment in LNG bunkering infrastructures, one of its major strategic lines,” Oscar

Maciñeiras, CEO of Scale Gas said.

Scale Gas is a subsidiary of Spanish energy company and transmission system operator Enagás and is a key division in the group’s vision to develop the use of LNG as a maritime transitional fuel.

“Having the support of a company like Enagás is an incredibly positive and exciting development. As one of the largest physical suppliers of marine fuels globally, this is the first step of our transition to a more sustainable future,” Bassadone commented.

The vessel will be built by South Korean shipyard Hyundai Mipo and is scheduled for delivery in June 2023.

Funding for the project was partly supplied by the EU’s Connecting Europe Facility, which contributed €11 million via a consortium of Enagás, Scale Gas and the Algeciras Port Authority. The agreement between Peninsula and Scale Gas was further supported by the LNGhive 2 strategy, driven



Oreja of Enagás and Bassadone Peninsula sign agreement

by state-owned ports management Puertos del Estado.

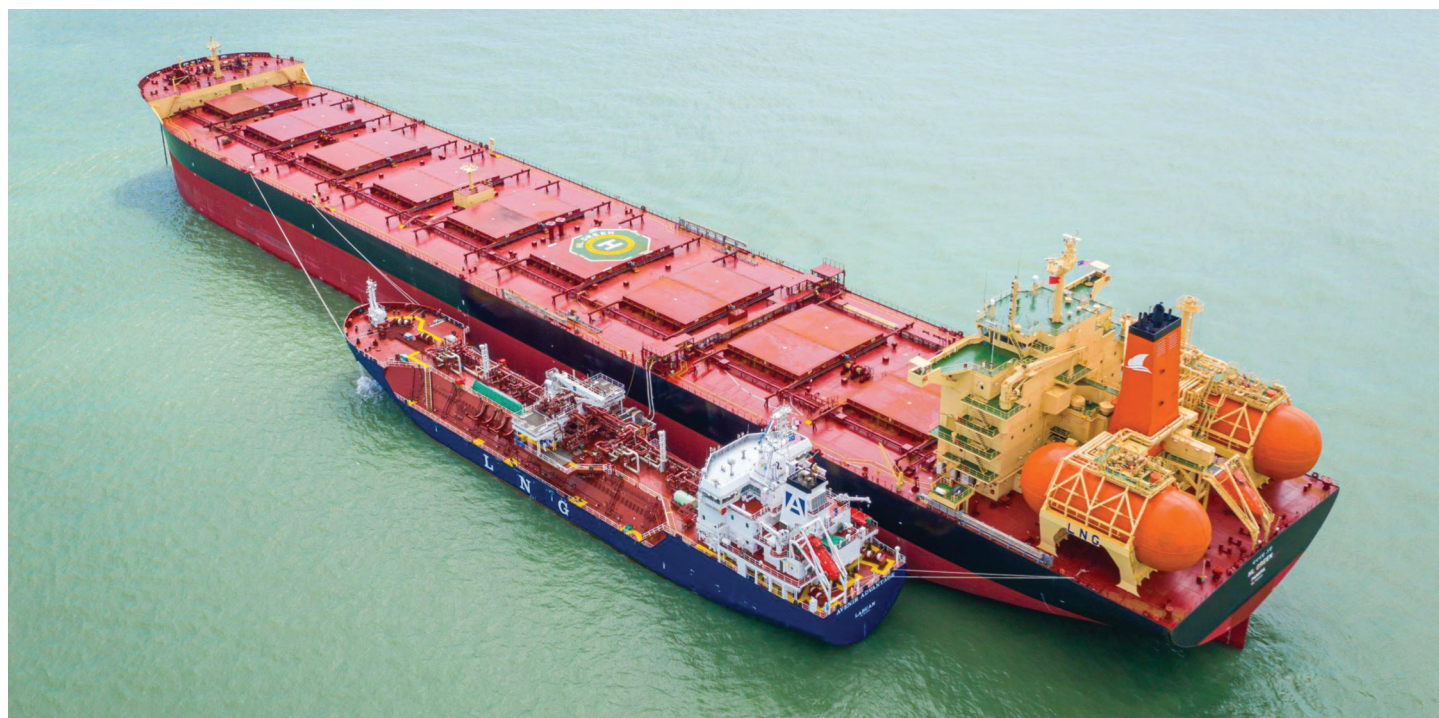
Record bunker of HL Green

Headquartered in Gibraltar, Peninsula operates a global bunker fuel supply chain and provides a variety of services in marine energy storage, supply and solutions. In February the firm completed a world first in Malaysian waters, bunkering the *HL Green*, the world’s largest

LNG-powered bulk carrier.

A total of 2,760 cubic metres of LNG was transferred to the vessel, with bunkering operations complete in partnership with Petronas Marine, H-Line, and charterer POSCO.

“Delivery took place safely and was completed within 20 hours, a record time for the quantity supplied, including the cooling down of an LNG tank,” Nacho De Miguel, lead for Peninsula’s LNG business, said. ■



HL Green

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PGN, Pertamina sign LNG bunkering agreement

Indonesian firm Perusahaan Gas Negara (PGN) has signed an agreement with Pertamina International Shipping (PIS) to develop long-term LNG bunkering infrastructure on the island of Java.

The Heads of Agreement between the two firms will include supply of LNG carriers and LNG bunkering facilities. The development will support the growth of the RU IV Cilacap gasification project, near Jakarta, Indonesia.

"PIS is grateful for the support and trust of PT Pertamina (Persero) and PT Perusahaan Gas Negara (PGN) in including PT PIS as the

shipping arm. Hopefully this collaboration can make a good contribution to the holistic development of Pertamina," Riva Siahaan, Commercial Director of PT Pertamina International Shipping, said.

111 MMSCFD

The Cilacap project is set to supply up to 111 million standard cubic feet per day (MMSCFD) once

fully operational, with output ramping up gradually over the next 20 years as the refinery develops.

"This important agreement has gone through a long discussion

involving the working level and management level in each of the gas and shipping sub-holdings. Regarding matters that are still in the process of being finalized, further discussions have been carried out to accommodate the needs of each sub-holding in synergy," he said.

The project is projected to have a Capex cost in the region of US\$152 million and will be implemented under the Small-Scale Land Based Regasification Terminal scheme.

Eco-green vessels

Owned by state-run oil and gas firm Pertamina, the Cilacap refinery is currently the largest such facility in the country and is forecast to be a major hub for future

LNG activity.

PIS is expected to operate several LNG vessels from the site under long-term time charter and will strengthen mutually beneficial synergies between the vested subsidiaries of the Pertamina Group.

"Synergy is needed because, in the future, PGN will play an important role in the energy transition in Indonesia, especially in green energy, which requires significant resources and cannot be done alone. In support of PIS, PGN will supply LNG and LNG bunkering facilities in operating eco-green vessels is in line with the implementation of the global IMO 2020 standard," Nicke Widyawati, President Director of Pertamina, said. ■



Cilacap refinery

Coalition plans French Maritime BioLNG project

An international coalition of industrial firms has announced plans to explore the development of BioLNG production at a large port in France.

The landmark announcement from the Coalition for the Energy of the Future will see the launch of a feasibility study to advance the "production and use of BioLNG for maritime transportation".

The 17-member consortium also announced growth in its membership in July, adding Air Liquide, Kuehne+Nagel, and Rolls-Royce as new members alongside Airbus, AWS, Bureau Veritas, Carrefour, Cluster Maritime Français, CMA CGM Group, Crédit Agricole CIB, ENGIE, Faurecia, Michelin, PSA International, Schneider Electric, TotalEnergies and Wärtsilä.

"As a pioneer in sustainable logistics, we are pleased to join the Coalition," Otto Schacht, Member of the Board of Kuehne + Nagel, said, "We are convinced that a collaborative, cross-industry approach will help to achieve the UN climate goals. Together, we strive to offer innovations for CO₂-neu-

tral transport solutions, such as the new BioLNG project."

Collaborative development

Interest in BioLNG as a fuel for maritime transport has rocketed in the last year and is expected to strengthen as infrastructure increasingly allows for easy drop-in replacement in existing bunkering networks.

"We are pleased to join the coalition at a time when there is so much focus across industries to accelerate decarbonisation and drive the development of technologies that will support sustainable growth in the transport and logistics sectors... We believe that collaboration is essential if we are to achieve the transition to net zero carbon and it is through the power of working together that we will succeed," Adam Morton, Head of Environmental Technology at Rolls-Royce, commented.

Port of Marseille Fos

The new project will focus on the production of liquefied biomethane (BioLNG) within the Port of Marseille Fos. Household waste from the Aix-Marseille-Provence urban region will be used as fuel stock.

The partners expect BioLNG produced at the port will be used to advance green mobility from the port, notably for the CMA CGM Group's LNG-powered vessels.

"This major project represents a virtuous example of circular economy and will benefit from existing infrastructures at the Port of Marseille Fos:

EveRé's (a household waste treatment center) methanation units, Elengy's (a subsidiary of ENGIE) LNG terminals for stocking and delivery, TotalEnergies' bunkering ship and

CMA CGM's LNG vessels," the coalition partners said in a joint statement.

The coalition was launched in late 2019 and since then has progressed with a number of projects, including: test and certification of the first hydrogen heavy truck in the South of France; engineering studies around pyrolysis-based biofuel for shipping; development of an eco-calculator demonstrator; and technical studies on energy balance and electrification rates across transportation routes. ■



Port of Marseille Fos

MPA introduces LNG fuelling incentive

Singapore's Maritime and Port Authority (MPA) has implemented new measures to support LNG fuelling, reducing port dues for qualifying vessels.

The authority has changed its harbour craft port dues to provide a discount for floating storage units (FSUs) and floating storage regasification units (FSRUs) that support LNG refuelling activities or related infrastructure on the island.

"The MPA has introduced a new harbour craft port dues concession to support the deployment of FSUs / FSRUs in Singapore for LNG bunkering and breakbulk activities," a spokesperson for the authority said.

50% discount

Under the new concession terms, the authority will offer a 50% discount on harbour craft port dues, up to S\$600,000 annually per craft, for a period of five consecutive years.

"The company operating the FSU/FSRU will be required to provide an undertaking to MPA that the FSU/FSRU would support LNG bunkering activities or LNG bunkering and breakbulk activities, with an estimate of such volumes over a 5-year consecutive period," the MPA adds.



Floating Storage Unit

To gain the discount, the FSU or FSRU must be licensed as harbour craft and Singapore-flagged and must be deployed at a berth approved by the Port Master and not at anchorage. The vessel will not be allowed to leave the Port of Singapore during the five-year period without approval by the Port Master.

Bunker capacity growth

The MPA has been active in increase LNG bunkering capacity in Singapore this year, awarding a third LNG bunker supplier licence to Total Marine Fuels in February.

The authority notes that the island's first LNG bunker tanker, *FueLNG Bellina*, began bunkering tankers in April and that since March it has been conducting regular ship-to-ship LNG bunkering operations, with simultaneous cargo operations, for ocean-going LNG-fuelled container vessels.

The license signed with Total is part of a wider relationship between the French energy major and Singapore and follows a 10-year agreement signed between Total and state-owned Pavilion Energy to develop an LNG bunker supply chain in the port of Singapore. ■

NEWS NUDGES

GTT to deliver Chengda tanks

French LNG specialist GTT is to design two very large Membrane Full Containment LNG storage tanks for China Chengda Engineering as part of a cooperation agreement related to the Tianjin Nangang LNG terminal.

The order includes two membrane storage tanks, each with a net capacity of 220,000 cubic metres and fitted with GST technology.

"This order for two more LNG storage tanks further confirms that GTT's Membrane full containment technology is becoming a reference solution for LNG land storage tanks due to its efficiency, competitiveness, safety and low environmental footprint," Philippe Berterot-tière, CEO of GTT, said.

GTT will deliver the tanks in the second quarter of 2024 to the Tianjin south port Industrial Zone in China. ■



LNG storage tanks in Singapore

MSC, Shell launch decarbonisation partnership

Shipping line MSC and energy major Shell have signed a far-reaching agreement to decarbonise maritime transport, citing LNG as a promising pathway for emission reduction.

The long-term memorandum of understanding between the partners will see the firms work closely together to accelerate the decarbonisation of the global shipping sector through a variety of new fuels, technologies and infrastructure solutions.

“Shell wants to play a central role in the transition to net zero. Partnering with our customers to develop new technologies and fuels will help accelerate progress. Combining MSC’s experience as one of the world’s largest shipping companies with Shell’s expertise as a global energy supplier will help bring about effective solutions for this vital part of the world economy,” Melissa Williams, President, Shell Marine, said.

Future pathways

Both partners have been at the forefront of LNG development

to date, with MSC placing a long-term charter for eleven LNG containerships in May. The dual-fuelled newbuild vessels will each have capacity of 15,300 teu and be chartered from shipowner Eastern Pacific Shipping.

“Together, the partners will explore opportunities for MSC to use LNG in its fleet, as the lowest emissions fuel widely available today. They will also consider future pathways, including methane slip abatement technologies that will further bring down LNG’s emissions,” a spokesperson for MSC said.

Shipbroker Gibson estimates that there are now more than 40 LNG-powered containerships under construction.

Zero-carbon flexi-fuel concept

The partners see great potential



Representatives of Shell and MSC

beyond traditional liquefaction of natural gas however and under the terms of their MoU will also explore ‘zero-emission fuels of the future’.

This is expected to allow shipping lines to begin “progressing from fossil-based liquefied natural gas (LNG) to bio-LNG or synthetic variants” while also combining with technology such as fuel cells, as the industry approaches “a zero-carbon flexi-fuel concept vessel”.

“To reach that ultimate goal of complete decarbonisation, we must look at a set of solutions,” Bud Darr, EVP Maritime Policy and Government Affairs, MSC Group, explained. “We need significant advances in research and development and fuel development. MSC welcomes partnerships like this with Shell that are designed to facilitate cross-sector information sharing and prove how collaboration is key in defining the best pathway to a net-zero future.” ■

NEWS NUDGES

Hudong-Zhonghua finalises Marseille-Fos bunker vessel

The first LNG bunker vessel to be deployed in a French homeport has been launched in China, following completion of construction at Hudong-Zhonghua shipyard.

The vessel is being built on behalf of joint venture partners TotalEnergies Marine Fuels and Mitsui O.S.K. Lines and will be deployed at the Port of Marseille-Fos, Southern France following sea trial off the coast of Shanghai.

“We are excited to be at the

forefront of making LNG bunkering capabilities readily available in France and the Mediterranean region,” said Jérôme Leprince-Ringuet, Vice-President Marine Fuels at TotalEnergies. “With shipping’s accelerating transition to this cleaner marine fuel, we look

forward to providing our customers with another major European hub for their LNG bunkering needs.”

The vessel will have a capacity of 18,600 cubic metres and is expected to enter operation in Marseille-Fos by the end of the year. ■

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Kanfer orders two LNG bunker vessels

Norwegian transport group Kanfer Shipping has signed an order with Taizhou Yard in China for two new LNG bunker vessels.

The small-scale LNG bunker and distribution ships will each feature 6,000-cubic-metre tank capacity.

“This announcement represents an important step for Kanfer in realizing its goal to provide cost-efficient and environmentally friendly bunker vessels,” Stig Hagen, CEO of Kanfer Shipping, commented. “having strong cooperation with blue-chip shipping companies and LNG terminal owners has positioned Kanfer to move

forward today with these two new LNG bunkering vessels.”

Delivery H223

Both vessels are expected to be delivered in the second half of 2023, with the agreement including the option for additional vessels.

The design for the ships is based on blueprints from CGR Arctic that feature specialized cargo and gas process plants as well as

combination gas electric/hybrid battery technology.

And Azipull thrusters and bow thruster to provide extreme manoeuvrability.

“Taizhou has deep experience in building small-scale LNG carriers and Kanfer’s technological partner, CGR Arctic Marine AS, has worked closely for years with the yard,” Hagen added. “This relationship and their competitiveness have made Taizhou an ideal choice for construction of Kanfer’s 6,000 cbm capacity small-scale vessels.”

Fleet expansion

The launch of Kanfer’s two bunker vessels is part of a wider expansion strategy that will see the company build “a large fleet of small- and medium-scale” LNG distribution and bunkering ships.

“This is just the start,” Hagen explains, “We see a rapidly expanding market for LNG bunker vessels as the world maritime in-

dustry continues to pivot towards its decarbonisation goals through LNG. The current very modest orderbook for new LNG bunkering vessels makes our decision well-timed, especially now that equivalent, new-built vessels to be delivered in 2022 and 2023 have already been chartered out.

The firm also sees additional need for new LNG bunkering centres as the trading pattern for gas-driven vessels diversifies and different sizes of ships enter the market. Headquartered in south-east Norway, Kanfer Shipping owns a number of proprietary technologies focused on infrastructure for small-scale LNG transport, storage and bunkering operations.

“This is one of the reasons why Kanfer is confident that the timing is advantageous. The designed for purpose vessels offers lower CAPEX as well as OPEX and will be a competitive LNG bunkering vessel in the market,” Hagen concludes. ■



Kanfer LNG bunker vessel

HAM completes Mikkeli LNG fuelling station

Gas services firm HAM Group has completed construction of a new LNG service station in Finland.

The plant was designed, built, and commissioned by HAM Criogénica on behalf of Finnish utility Etelä-Savon Energia (ESE).

“The design made by HAM Criogénica allows an easy expansion of the gas station, with a second LNG dispenser,” a spokesperson for HAM group stated.

80m³ vertical tank

Located in the city of Mikkeli in the South Savonia region of Finland, the new LNG service station features an 80 cubic metre vertical tank and LNG dispenser and is designed for refuelling trucks and heavy vehicles.

“[ESE] will offer its customers the possibility of refuelling LNG, a clean and environmentally friendly

fuel, thanks to the reduction of CO₂ emissions, nitrogen oxides and fine particles. In addition, LNG allows significant savings of 30-50% compared to other less eco-friendly fuels,” a spokesperson for HAM group said.

ESE has been providing light and heat to the Mikkeli region for 120 years and is a strong supporter of low-emission fuels.

Satellite plant

Alongside its role as a refuelling hub for heavy transport vehicles, the station will also act as a satellite plant for nearby industrial facilities owned by ESE.

The plant will deliver Natural Gas to the adjacent factory through forced regasification with a water/glycol and LNG exchanger,

and via a double regulation line.

Registered in Barcelona, HAM Group currently operates refuelling stations across Europe and estimates that it has designed and built one out of every four LNG

service stations that currently exist in the continent. The firm has undertaken more than 300 projects worldwide, with experience building LNG facilities for multiple sectors. ■



HAM LNG station Finland

Wärtsilä to equip Kitimat LNG-fuelled escort tugs

Finnish engine manufacturer Wärtsilä is to supply engines and gas supply systems for two new LNG-fuelled escort tugs in Canada.

The supply agreement was signed with Canadian firm HaiSea Marine, which will operate the advanced escort tugs in the coastal waters of British Columbia.

"This project aligns closely with Wärtsilä's efforts to develop and promote environmentally sustainable technologies, and to support the global decarbonisation of shipping," Mark Keneford, General Manager, Sales, Wärtsilä Marine Power, said.

Green tug fleet

A joint venture between the indigenous Haisla Nation and Seaspan Marine Transportation, HaiSea Marine has a major contract with LNG Canada to build and operate escort and harbour tugs required for their export facility in Kitimat.

The tugs will form part of a new fleet of five of low emission tugboat developed by HaiSea Marine, with two RAstar 4000-DF escort dual fuel tugs and three ElectRA 2800 electric harbour tugs.

The new vessels are all designed by Vancouver BC-based naval architect company, Robert Allan and will be constructed at Sanmar Shipyard in Turkey.

"We are pleased to continue our strong relationship with Seaspan Marine and are proud to have our solutions included in the Robert Allan RAstar design for this project," Keneford added.

The new tug fleet will feature an exhaust after-treatment system in full compliance with IMO Tier III emissions standards and is scheduled to arrive in British Columbia in 2023.

"The RAstar 4000-DF escort tugs will measure 40 metres in length, and with 100 tonnes of bollard pull will be the west coast of Canada's most powerful escort tugs - and among the world's most high-performance escort tugs - with the ability to generate indirect forces in escort of approximately 200 tonnes," a spokesperson for Seaspan said.



The HaiSea RAstar

34DF dual-fuel engines

Under the terms of the contract, Wärtsilä will supply the two RAstar 4000-DF vessels with its 34DF dual-fuel engines, fitted with Wärtsilä's NOx selective catalytic reduction (SCR) system to restrict emissions of nitrogen oxides.

Wärtsilä will also supply its LNGPac fuel storage, supply and control system, featuring Type C pressure vessel and pump-based gas feed solution.

Headquartered in Helsinki, Finland, Wärtsilä's core products in-

clude large combustion engines used in cruise ships and ferries alongside reciprocating internal combustion (IC) engines that can burn a variety of fuels, including LNG. The Wärtsilä equipment is scheduled for delivery to Sanmar in 2022.

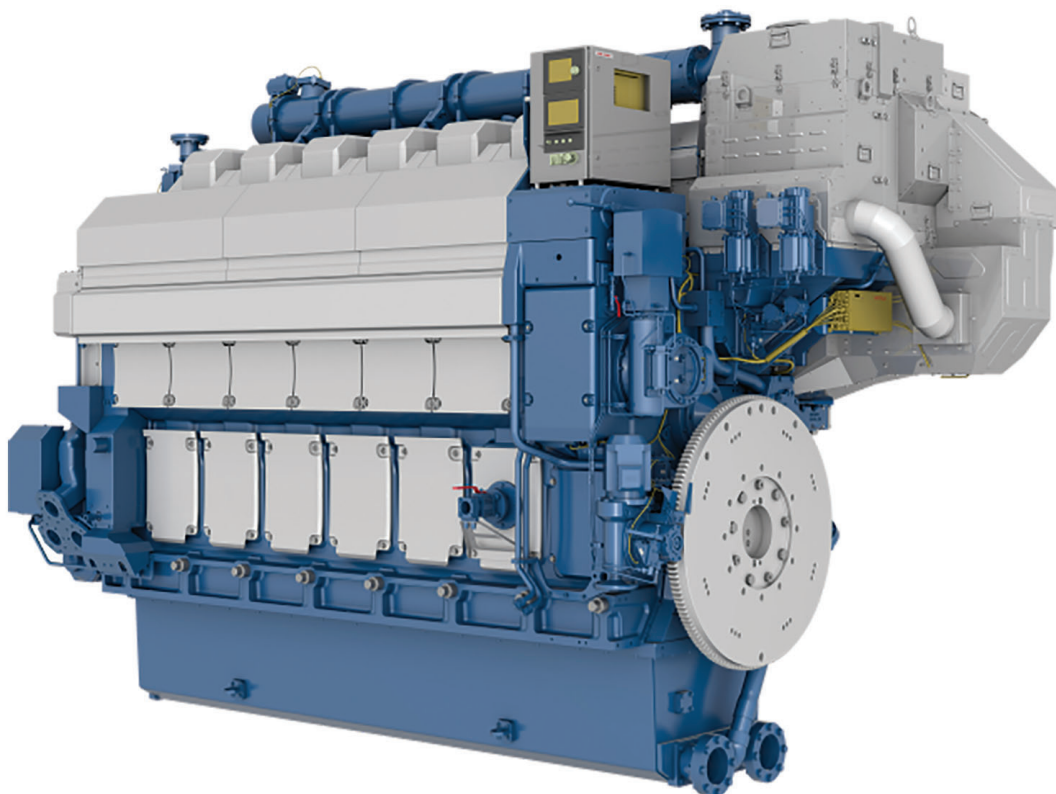
NEWS NUDGES

HAM opens Navalmanzano LLNG station

HAM Group has opened a new LNG fuelling station in Segovia, Spain.

The BENITO gas station was installed in one day in Navalmanzano and features integrated dispenser and payment terminal connected to a tank with capacity for 80 cubic metres of LNG. The station allows heavy vehicles and all types of trucks to refuel with LNG.

"It keeps the liquid sub-cooled and adapts immediately to the optimal temperature of the different brands: Iveco, Scania or Volvo, allowing fast and safe refuelling with an innovative nozzle, designed by HAM, with a "nofrost" system and a double anchoring and closing system, in order to avoid leaks, liquid losses and facilitate its disconnection without emitting gas into the air," a spokesperson for the firm said.



wartsila-34-DF

Sovcomflot secures award for LNG-fuelled tanker

Russian shipping group Sovcomflot (SCF) has signed a charter contract with Sakhalin Energy to provide LNG-fuelled tankers for operation in Russia's Far East.

The agreement covers long-term time charter for the *Korolev Prospect* and *Vernadsky Prospect*, two LNG-fuelled tankers from SCF's 'Green Funnel' series.

"We deeply appreciate the lasting partnership between Sovcomflot and Sakhalin Energy," Igor Tonkovidov, CEO of Sovcomflot, said. "Sovcomflot continuously works to expand and upgrade its fleet serving the Sakhalin-2 project, making it ever more efficient and safe. We are particularly pleased that Sakhalin Energy is

eager to employ our 'Green Funnel' tankers, which will help reduce the carbon footprint of cargo shipping in the Far East. The new long-term time-charters will also contribute to reaching the goals set by our SCF-2025 strategy."

Transition to LNG

Both tankers are now scheduled to undergo extensive upgrade work, with improvements including the installation of a bow loading system and new LNG bunkering systems. These modifications will allow di-

rect fuelling from the Prigorodnoye production complex LNG terminal.

"The transition to LNG as the marine fuel for vessels employed at the Sakhalin-2 project reflects the global trend towards decarbonisation and is an integral part of our 'Green LNG' corporate strategy... carbon neutrality cannot be achieved without the involvement of leading businesses. Our long-standing co-operation with Sovcomflot will help us progress further in this regard," Roman Dashkov, CEO of Sakhalin Energy, said.

The existing shuttle tankers currently employed at Sakhalin-2, will be redeployed to other Sovcomflot customers following delivery of the two LNG-fuelled vessels.

Charter delivery 2024

Under the terms of the deal, the vessels will be delivered to the charterer in 2024 and employed to shuttle crude oil for the Sakhalin-2 project for 10 years, with an extension option for up to three years.

"Adopting LNG as a fuel within

transportation industry, including seaborne transportation of Russia's export cargoes, is meant to play a significant part in increasing the environmental safety of our planet... The Russian government keeps a strong focus on environmental protection, continuously introduces measures to enable the reduction in atmospheric emissions, and lends its support to similar initiatives of the business community," Alexander Novak, Deputy Prime Minister of Russia, said.

SCF vessels have already delivered an estimated 67.5 million tonnes of oil and 55 million cubic metres of LNG to Sakhalin Energy's customers in the Asia-Pacific.

SCF Group is wholly-owned by the Russian government and specialises in the transportation of crude oil, petroleum products, and liquefied gas. The group has a global fleet of 142 vessels, including more than 80 ice class vessels and also provides servicing of offshore oil and gas facilities linked to LNG production.



LNG-fuelled tankers

Petronas completes first LNG bunkering at Pintu Gedung

Maritime specialist Petronas Marine has completed first LNG refuelling operations for its bunker vessel *Avenir Advantage* at the Pintu Gedung anchorage in Port Klang, Malaysia.

The bunkering process saw 865 cubic meters of LNG transferred to the Liberian tanker *Solar Roma*, which was en route to the Mediterranean.

Commenting on the milestone, Head of PETRONAS Marine said, "The expansion of this operation will further strengthen our presence and position us ahead of the curve to capture the increasing market of bunkering solutions. In line with our aspiration to be a one-stop marine fuel solutions partner, we are pleased to have the support of port authorities to offer cleaner fuel for the marine industry," Emry Mohd Tamrin, director of Petronas Marine, said.

Dedicated LBV

The entire refuelling operation

was completed within 12 hours of the *Solar Roma's* arrival at anchorage in Port Klang and marked the first LNG bunkering operation of a dedicated LBV in the country.

Petronas Marine is a division of state-run energy firm Petroliaam Nasional, which is ranked among Fortune Global 500's largest corporations in the world. The firm has chartered the *Avenir Advantage* for a period of three years from a joint venture holding firm comprised of MISC Berhad and Avenir LNG, a fully integrated small-scale LNG supplier.

"We are very proud to deliver the first dedicated LNG bunker vessel in South East Asia. With the backing of Petronas' LNG supply infrastructure... We look forward to working with partners like Petronas



Avenir Advantage during refuelling

to ensure LNG is available as a bunker fuel along all key transport corridors," Milorad Doljanin, CEO of Avenir LNG Limited, said at the launch of the *Advantage*.

Progressive energy solutions

The *Avenir Advantage* features capacity for 7,500 cubic meters of LNG and alongside its day-to-day role in bunkering vessels will play

a key part in promoting LNG as a cleaner marine fuel in Pasir Gudang, Johor.

"The Petronas LNG bunkering business is a reflection of the Group's commitment to sustainability as a progressive energy and solutions partner and supports the International Maritime Organization (IMO) goal of reducing greenhouse gas (GHG) emissions," Emry commented.



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EPS, Kanda roll-out VR training for LNG bunkering

Maritime group Eastern Pacific Shipping has partnered with technology developer Kanda to bring virtual reality training for LNG bunkering to seafarers.

The shipping line and Kanda have jointly developed the interactive, multi-user VR experience, over the last 18 months, receiving endorsements from shipowners, managers and crew.

“Because of the immersive nature of VR, students can get a feel for the true scale of the vessels they will be working on and the equipment they will be operating, making them better prepared for actual operations. For a generation that has grown up infatuated with high-fidelity videogames, VR training will also appeal much more to seafarers than PowerPoint slides, zoom calls, and lectures,” a spokesperson for EPS said.

Danish firm Kanda develops immersive digital learning applications and is part-funded by EPS. To create unique spaces for corporate learning, the small start-up leverages virtual reality, 3D models and collaborative online interaction.

Oculus headset

The new technology allows users to wear a lightweight Oculus headset from the comfort of their home, manning office, or hotel

room, and step onto the deck of a virtual EPS ship, complete with LNG pump and the manifold equipment.

The connected nature of the technology also allows users to interact with fellow classmates and the instructor through audio and visual avatars, even if the class members are physically in different locations.

“The seafarer could collaborate with other students to complete an LNG bunkering operation, training their muscle memory by using virtual spanners (with haptic feedback so that they feel real) to loosen or tighten bolts in the LNG hoses, while the instructor observes closely, intervening and demonstrating as needed,” EPS sates.

Green credentials

EPS also highlights the green credentials of the new training approach, as seafarers no longer need to fly to places like Singapore, Copenhagen, or Seoul to attend multi-day courses at a maritime academy but can instead train remotely.

Headquartered in Singapore,



VR simulator

EPS operates a fleet of container-ship, dry bulk, and tanker vessels, with a combined 18 million dead-weight-tonnes. The firm employs 5,000 sea and shore staff.

“Training is not limited to narrow simulations but can reflect the most up-to-date equipment and vessel configurations and can

accommodate as many students as needed [and] it’s clean, eliminating the risk of transmitting Covid-19 between seafarers and across international borders (as well as the associated inconveniences of quarantines, Covid testing, and safe-distancing measures),” an EPS spokesperson said. ■



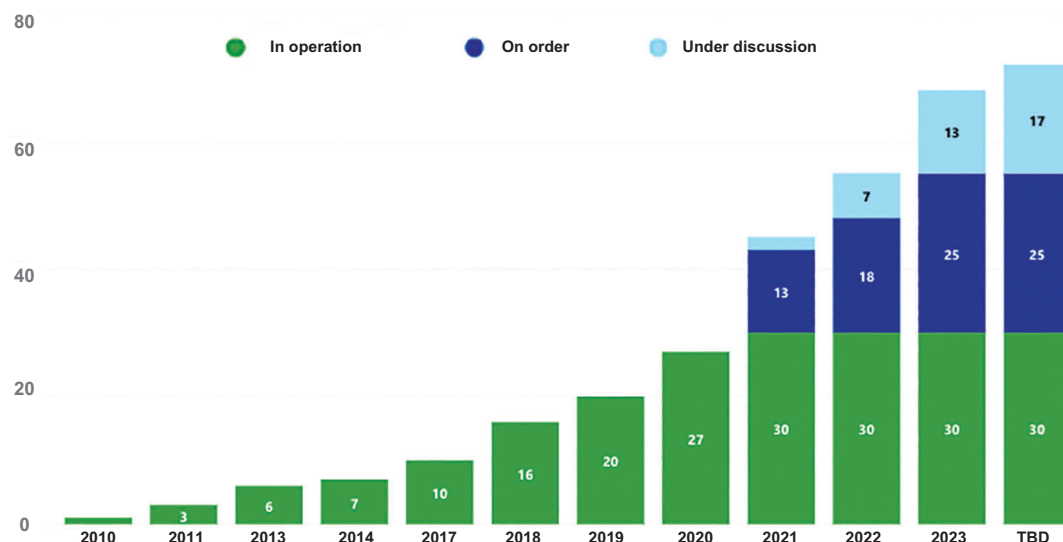
EPS Kanda VR in action

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	2021	Belgium	1480	Titan LNG	Titan LNG
Titan Hyperion	TBD	Decided	2021	Netherlands	8000	Titan LNG	Titan LNG
Titan Krios	Zeebrugge	Under discussion	2023	Belgium	4200	Titan LNG	Titan LNG
PRO1	Houston	Under discussion	Q42022	United States	7600	LNG PRO Bunkers	TBN (Probunkers group)
PRO2	Hong Kong	Under discussion	Q12023	Hong Kong	7600	LNG PRO Bunkers	TBN (Probunkers group)
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
SeaspanLNG bunker vessel	Vancouver	Under discussion	2023	Canada	7600	SeaspanLNG	SeaspanLNG
Peninsula/Enagas LNG bunker vessel	Port of Algeciras	Decided	2023	Gibraltar	12500	Peninsula/Enagas	Peninsula/Enagas
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	2022	Spain	6000	Naturgy	Naturgy
Gas Agility	Northern Europe	In operation	2020	Netherlands	18600	Mitsui OSK Lines Ltd	Mitsui OSK Lines
Gas Vitality (Total / MOL)	Singapore (tbc)	Decided	Q4 2021	--	18600	MOL	Mitsui O.S.K. Lines & Gazocean
SM JEJU LNG2	Busan	In operation	2020	South Korea	7500	Korea Line	Korea Line
Korea Gas (KOGAS) LNG bunker vessel		Decided	2023	South Korea	7500	KOGAS	KOGAS
Pioneer Knutsen		In operation	2020	Norway	1100	Knutsen OAS Shipping	Knutsen OAS Shipping
LNG bunker barge shell	Barcelona	Decided	2022	Spain	5000	Scale Gas / Knutsen JV	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
FueLNG Bellina	Singapore	In operation	2020	Singapore	7500	FueLNG (JV Keppel and Shell)	FueLNG
Fratelli Cosulich Mediterranean Sea	Mediterranean Sea	Decided	2023	Italy	8000	Fratelli Cosulich	Fratelli Cosulich LNG
Clean Jacksonville	Jacksonville Jax LNG	In operation	2018	United States	2200	TOTE	FOSS Maritime
Xinao Putuo Hao	Zhoushan	Decided	2021	China	8500	ENN Energy	ENN Energy
Optimus		Decided	Q4 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 and Toyota Tsusho)	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		In operation	2021	Brazil	7500	Avenir LNG	
Avenir Advantage		In operation	2020	Malaysia	7500	Avenir LNG	
Avenir Aspiration	Not yet decided (being built in China)	Decided	Aug 2021	China	7500	Avenir LNG	
Avenir bunker vessel 3	Oristano, Sardinia	Decided	2021	Europe	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	In operation	2021	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	

Vessel Name	Home Port	Project status	Delivery year	Country	LNG Tank Capacity	Owner	Operator
Coral Anthelia		In operation	2013	Jamaica	6500	Anthony Veder	
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	
Kanfer Shipping LNG bunker vessel 1	Not yet decided	Decided	2023	--	6000	Kanfer Shipping	
Kanfer Shipping LNG bunker vessel 2	Not yet decided	Decided	2023	--	6000	Kanfer Shipping	
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 (MOL)	
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	2022	Europe	4000	Venture led by DEPA	
Shell LBV	Singapore (tbc)	Decided	2022	Singapore	18000	Korea Line LNG	
Shell LBV Gulf of Mexico	Gulf of Mexico	Decided	2023	United States	18000	Pan Ocean	
SM JEJU LNG1		In operation	2019	--	7500	Jeju LNG 1 SA	
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	2023	Australia	12000		

YEARLY DEVELOPMENT OF LNG BUNKER 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	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	Triputra	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	Coral Furcata	10,000	LNG/LPG/Ethylene	Worldwide	No	Anthony Veder
2011	Coral Fungia	10,000	LNG/LPG/Ethylene	Worldwide	No	Anthony Veder
2011	Akebono Maru	3,556	LNG	Japan	Yes	Chuo Kaiun
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	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
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	PetroChina TBN	30,000	LNG	China		PetroChina
2016	Hai Yang Shi You 301	30,000	LNG	Bali FSU	Yes	CETS (CNOOC)
2016	Clean Jacksonville	2,200	LNG	US Coast	Yes	CME
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
2017	Coralius	5,800	LNG	Northwest Europe/Baltics	Yes, for Skangas	Anthony Veder
2017	Coral EnergICE	18,000	LNG	Northwest Europe/Baltics	Yes	Anthony Veder
2017	Coral Encanto	30,000	LNG	China	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	Oizmendi	600	LNG	Bilbao	Yes	Itsas Gas
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 = 28th April 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	Green Zeebrugge	5,000	LNG	Northwest Europe	Yes	NYK
2017	Cardissa	6,500	LNG	Northwest Europe	Yes	Shell
2018	Kairos	7,500	LNG	Baltic	Yes	Bernhard Schulte
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	Bunker Breeze	1,200	LNG	Barcelona	Yes	Suardiaz Energy Shipping
2018	HUA XIANG 8	13,720	LNG	China	Yes	Zhejiang Huaxiang
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	Avenir LNG
2020	Avenir Accolade	7,500	LNG	Mediterranean	Yes	Avenir LNG
2020	Avenir Aspiration	7,500	LNG		Yes	Avenir LNG
2020	Kaguya	3,500	LNG	Japan	Yes	CLS
2020	CNTIC VPOWER Global	28,000	LNG	Myanmar	Yes	Dalian Inteh Group
2020	Ecobunker Tokyo Bay	2,500	LMG	Japan	Yes	Ecobunkers
2020	Optimus	6,000	LNG	NWE	Yes	Elenger
2020	ENN TBN	8,500	LNG	China	Yes	ENN
2020	FueLNG Bellina	7,500	LNG	Singapore	Yes	FueLNG
2020	SM Jeju LNG2	7,500	LNG	Korea	Yes	Korea Line
2020	Q-LNG 4000	4,000	LNG	US Coast	Yes	Q-LNG Transport/Harvey Gulf
2020	Flexfueller 002	1,480	LNG	Antwerp	Yes	Titan LNG
2021	Avenir Ascension	7,500	LNG		Yes	Avenir LNG
2021	Avenir Allegiance	20,000	LNG	Worldwide	Yes	Avenir LNG
2021	Bergen LNG	850	LNG	Norway	Yes	Bergen Tankers
2021	Dmitry Mendeleev	5,800	LNG	Russia	Yes	Gazprom Neft
2021	JMU TBN	2,500	LNG	Japan	Yes	JMU
2021	Ravenna Knutsen	30,000	LNG	Mediterranean	Yes	Knutsen OAS
2021	PE TBN	12,000	LNG	Singapore	Yes	MOL
2021	TBN	18,600	LNG	Mediterranean	Yes	MOL
2021	TG TBN	500	LNG	Korea	Yes	Trans Gas
2022	Veder TBN	30,000	LNG	Worldwide	Yes	Anthony Veder
2022	Avenir Achievement	20,000	LNG	Worldwide	Yes	Avenir LNG
2022	Kuntsen TBN	5,000	LNG	Spain	Yes	Knutsen OAS
2022	Clean Cañaveral	5,400	LNG	USG	Yes	PNE
2023	Cryopeak TBA	4,000	LNG	West Canada	Yes	Cryopeak
2023	Kuntsen TBN	12,500	LNG	Spain	Yes	Knutsen OAS
2023	SM Jeju LNG3	7,500	LNG	Korea	Yes	Korea Line
2023	Pan Ocean TBN	18,000	LNG	USG	Yes	Pan Ocean Co
2024	Avenir TBN (option)	20,000	LNG	Worldwide	Yes	Avenir LNG
2024	Avenir TBN (option)	20,000	LNG	Worldwide	Yes	Avenir LNG
2026	Avenir TBN (option)	20,000	LNG	Worldwide	Yes	Avenir LNG
2026	Avenir TBN (option)	20,000	LNG	Worldwide	Yes	Avenir LNG

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

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