LNG journal
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January 2021

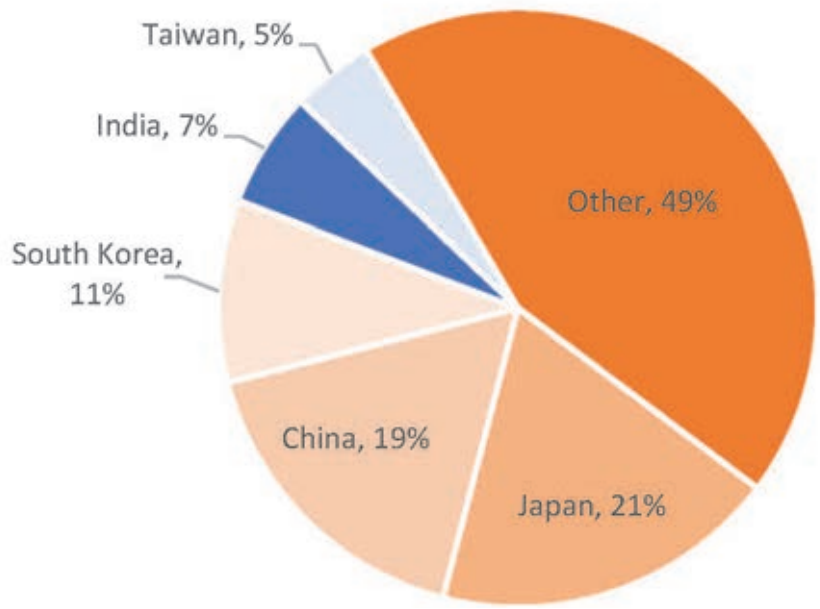
In this issue:

South Asian LNG demand – a giant slowly uncurls

Over the past decade, the number of South Asian LNG importers has steadily expanded. Whilst most remain relatively small, two of the larger ones – India and Thailand – highlight both ambitious plans as well as potential pitfalls. Markets Editor Alexander Wilk reports.

Relatively modest year-on-year economic growth (if not slowdown) alongside a push for decarbonisation and in some instances ample local supply have tempered LNG demand growth in many parts of the world. In the Far East, where China remains the world's fastest growing LNG market, demand in Japan – still the largest LNG market – has been declining whilst South Korean demand struggled to push above the demand level of 2018. As such, we think South Asian LNG demand growth is set to be among the most crucial factors in the continued growth of the global gas industry over the coming decade.

Global LNG Offtake Share, 2020



Source: LNG Journal

For several decades, the three markets of Japan, South Korea and Taiwan have been underpinning LNG trade in the Pacific. Major demand growth in China and more recently in India, however, has challenged the composition of that traditional trio in terms of traded LNG volumes. India's demand exceeded that of Taiwan by almost 8.4 million tonnes (mmt) in 2020. Concurrently, China's demand exceeded that of India by more than 41.8mmt, whilst also surpassing South Korea's annual offtake by more than 28mmt, according to our data for the past year.

As such, even without the inclusion of Taiwan, the four biggest markets accounted for 58 percent of global LNG offtakes in 2020. That proportion increases to 63 percent with the inclusion of Taiwan.

Meanwhile, seven other South Asian countries have begun importing LNG since the early 2010s – Thailand in 2011, Singapore and Malaysia in 2013, Pakistan and Indonesia in 2014 and Bangladesh in 2018. Myanmar began on a small scale in June this year. Concurrently, Hong Kong, Vietnam and Philippines are constructing or planning to construct LNG import facilities in the coming years. Sri Lanka and Cambodia have also been touted as possible importing countries, though plans remain to be firmed up.

Originally, growth in domestic gas production was a primary driver of demand growth in several of these emerging markets with Indonesia and Malaysia having already been major LNG exporters prior to satisfying their respective domestic gas demand with LNG. Shipping gas by tanker avoided the pitfalls of constructing large-scale subsea pipeline networks across the Malay Archipelago.

Pakistan began producing gas in the early 1970s with Bangladesh joining the ranks of gas producers in the early 1980s. Later, Thailand began ramping up production in the mid-1980s, followed by Myanmar in the late 1990s to supplement Thailand's supply.

However, domestic gas production in Bangladesh, Myanmar and Malaysia has plateaued or – as in the case of Indonesia, Pakistan, Thailand and India – has continued to decline. Ageing fields (Indonesia), difficult investment environments (Pakistan & Thailand) or a combination of both in addition to difficult geology that hampered further development drilling (India) and a much lower oil price since 2014 are significant factors in these declines.

In addition, the fields currently in operation tend to be both offshore and relatively small in scope. With relatively little new interest from international hydrocarbon concerns as a result, no significant new discoveries, certainly not economic ones, would appear to be on the horizon for these gas economies.

Although not yet struck by declining production, Myanmar exports the lion's share of its produced gas via pipeline to China, a necessary tradeoff to secure investment and generate government funds. These factors have been driving the need for regional LNG imports. Ironically, a Chinese consortium was instrumental in providing Myanmar with LNG infrastructure as it scrambled to set up emergency LNG-to-power capacity to prevent rolling blackouts in summer.

For LNG import growth to be sustained, however, a key challenge in South Asia remains the provision of

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infrastructure, including regasification facilities and pipelines, as well as meaningful gas market reform. These challenges are particularly showcased in two of the region's most prominent importers – India and Thailand – due to their relatively advanced LNG markets and ambitious plans for increasing gas imports.

India – no silver bullets

Data by the charity Global Energy Monitor shows that 62 Indian coal-fired power projects have been cancelled whilst the Indian government is targeting raising the share of natural gas in the country's energy basket to 15 percent by 2030.

Tricky geology and lacking price incentives.

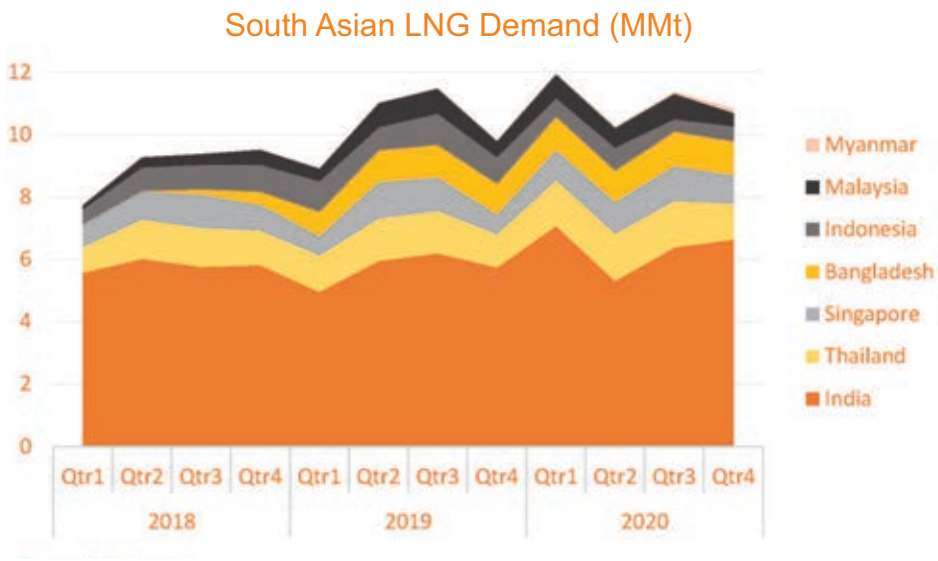
Unfortunately, domestic gas production seems unlikely to be able to match that target. Relatively slow progress in domestic offshore gas exploration and production has led to the government pushing for years to expand India's gas network and LNG import capacity. Although a US$7bln Reliance-BP joint venture (JV) – representing India's largest foreign direct investment in 2011 – was supposed to boost offshore gas production from the prolific Krishna-Godavari Basin, the JV's KG-D6 block proved to be geologically challenging. Notably, the block's geology was among the key rationale for Reliance – an Indian industrial conglomerate – to partner with an international deepwater specialist in the first place.

However, the tricky geology of India's offshore gas resources as well as diminishing investment incentives due to a convoluted national gas price policy and high taxes were largely responsible for a protracted net decline in Indian gas production.

LNG to plug the gap

Accordingly, India's annual LNG imports have grown from 31 percent of the country's natural gas supply in 2012 to more than 50 percent in 2019. This continued growth in LNG imports has been driven by growing consumption that coincided with a protracted decline in domestic natural gas production from c. 4.4bcf/d in 2012 to 2.9bcf/d in 2019. India's annual LNG demand has been growing by an average of c. 4 percent since 2015, our data shows.

This growth was driven by Petronet's Dahej and Cochin terminals, which grew



Source: LNG Journal

imports by 28 percent and 6 percent, respectively. Much of the imported LNG is used as feedstock in the industrial sector, ranging from refineries to heavy industry and fertilizer production. A growing city gas distribution network has enabled further demand growth.

In response to growing demand, India has commissioned six LNG import terminals to date, comprising facilities at Mundra and Dahej in Gujarat, Hazira, Dabhol and Cochin further south along the western coast and Chennai to the east. A seventh – Dhamra LNG – is slated to be the second facility on the country's eastern coast. The Dhamra LNG project is a 5mtpa facility under construction at Dhamra Port south of Kolkata. The $750mln project is being jointly developed by India's Adani Group (50 percent) and French multi-national oil and gas company Total (50 percent). Construction began in 1H 2018. Scheduled to commence operations in 2021, the Dhamra LNG import terminal could be expanded to 10mtpa at a later stage.

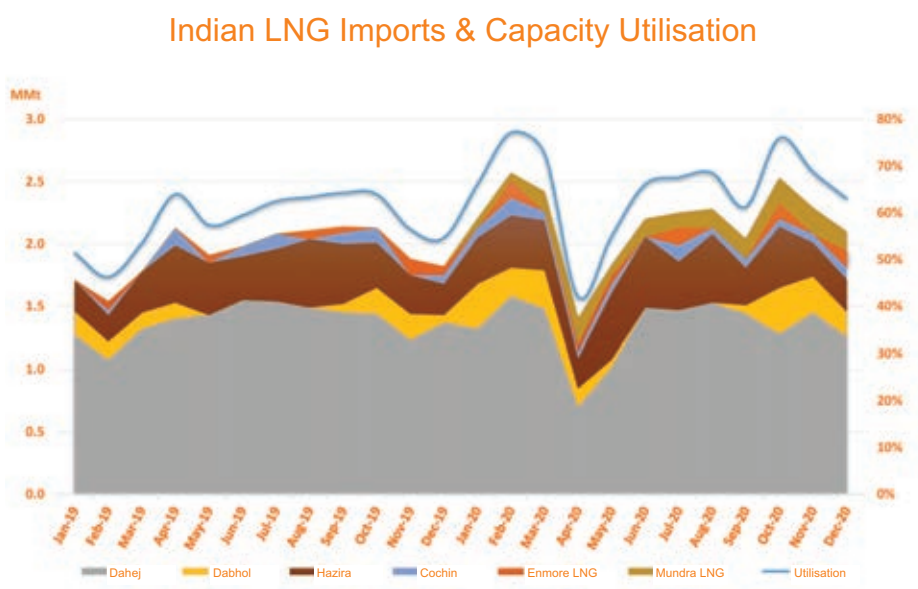
FSRU no silver bullet

In addition, there are three FSRU import terminals still in various stages of planning, construction and commissioning, which are expected to come online by 2023. These units were envisiaged to be swift and cost effective solutions to boost city gas supply. H-Energy, a unit of real estate conglomerate Hiranandani Group, is set to start commercial operations at its FSRU-based LNG terminal at Jaigarh Port in the Ratnagiri district of Maharashtra State. The project is to be implemented in two phases with potential peak capacity of 12mtpa.

Unfortunately, the project has experienced numerous setbacks. The FSRU was originally scheduled to arrive at the LNG jetty at Jaigarh port by Q3 2018 with commercial operations to begin in Q4 2018. However, the terminal's commercial start of operations has been plagued by several delays since the completion of its associated infrastructure – from the original start date to Q1 2019, then to Q4 2019 and later to Q2 2020. The earmarked FSRU was even circling offshore but was eventually turned away and is now earning her keep as an LNG carrier. Overall, the Jaigarh project has been in development since 2015 with formal commissioning rescheduled for Q2 2021 at the time of writing.

Despite these setbacks, H-Energy has plans to station a second FSRU south of Kolkata in the Bay of Bengal. The project was first scheduled for December 2020 but according to H-Energy's website commissioning is now envisaged by 2023. The Digha FSRU project will be located 115 km into the sea within the Kolkata Port Trust boundary limits and will be connected to onshore receiving facilities at Contai through a subsea pipeline. The 3mtpa FSRU is to be supplied by U.S. FSRU specialist Excelerate following a similar two-phase blueprint to the Jaigarh project. Phase I entails an initial city gate station to supply Kolkata directly whilst Phase II will see extensive pipeline works to supply gas further afield and across the border into Bangladesh. H-Energy plans to export up to 2mtpa to Bangladesh under a 20-year contract involving a tolling element to provide optional regasification capacity by 2022. H-Energy envisions a capacity expansion to 5mtpa.

H-Energy also plans to install a third FSRU in Andhra Pradesh alongside an onshore vaporiser with 4mtpa to further expand its supply network on India's eastern shore. No particular FSU seems to have been earmarked at the time of writing but H-Energy plans for approximately 170,000-210,000m3 in



Source: LNG Journal

onboard capacity. The project is also designed to have truck loading facilities. Still in early planning stages, the project is scheduled to be commissioned in Q3 2022.

Nominally, these FSRU solutions could add between 11 and 21mtpa of LNG import capacity, pushing the country's total capacity to between 51 and 61mtpa depending on the degree of expansions. However, we caution that delays are highly likely and not necessarily under the control of H-Energy as even FSRU projects are reliant on available pipeline capacity.

Lacking pipeline capacity

Future growth in Indian LNG imports will hinge on connecting LNG regasification terminals along the coast to demand centres further inland via pipeline. Unfortunately, India continues to struggle to distribute imported LNG to industrial users outside the terminals' immediate vicinity due to a lack of gas pipeline capacity connecting the vast country. Notably, four of the six operational Indian LNG terminals – Mundra, Dahej, Hazira, Dabhol and Cochin – are located on the subcontinent's west coast with the capacity of the sixth – Ennore LNG in Tamil Nadu state – underutilised.

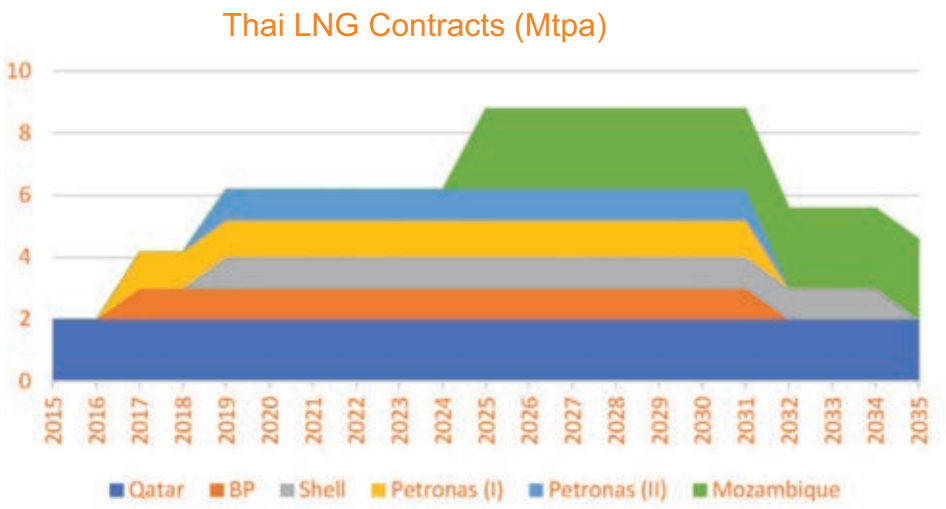
India's northwestern region has comparatively highly developed natural gas infrastructure, and consequently the Dahej and Hazira terminals enjoy close to full capacity utilisation. However, the southern and eastern regions of the country still lack substantial pipeline capacity to move more natural gas from coastal LNG import terminals to major demand centres further inland.

Concerted push across the country will be necessary for lower unit costs to achieve 2030 goal

Although India has almost 17,000km of pipeline in operation, the Ministry of Petroleum and Natural Gas calculates over 14,000km more will be needed to achieve its 15 percent goal by 2030. GAIL – the national gas distributor – originally aimed to complete the ambitious 2,655km Pradhan Mantri Urja Ganga (PMUG) pipeline by the end of 2020 (construction began in May 2019). However, smaller gas pipeline projects such as the Cochin-Mangaluru-Bengaluru connector have suffered from severe delay due to extreme weather and engineering problems, which suggests to us full completion of the much larger PMUG project will be delayed into 2021.

GAIL turned to cryogenic trucks to mitigate pipeline issue

With significant gas pipeline capacity yet to reach most parts of eastern India, GAIL resorted to hiring a fleet of cryogenic trucks to transport imported LNG from the Dahej terminal in Gujarat to the city of Bhubaneshwar in Odisha state south of West Bengal. The truck journey takes roughly a week. Once in Bhubaneshwar, the LNG is regasified to be moved in cascades to CNG dispensing stations or fed into the local pipeline system.



Source: LNG Journal

Steep demand means operation can break even, but highlights lack of capacity

Steep demand growth in industrial centres lacking pipeline connectivity such as Bhopal, Mandideep, Indore and Mangalore allow GAIL's truck operation to break even. However, it also serves as an impressive example of the severe lack of transnational pipeline capacity.

Key to achieving the 2030 goal will be the driving down of the per unit cost of gas. Whilst India offers significant potential to add to global LNG demand growth, without an extensive national pipeline network, that potential will struggle to unfold.

Thailand – restrictive market

Thailand's economy began consuming gas primarily for power generation with the help of the development of domestic gas reserves in 1981. In 2020, electricity production accounted for around 75 percent of total gas demand, i.e. 4.2mmt. The country has two gas contracts totalling 11.35bcm with Myanmar, which covered around 28 percent of total gas demand in 2020. However, 9bcm worth of Burmese supply is due to end in 2025 and the remaining 2.35bcm in 2042. At the time of writing, it was unclear to what extent – if at all – these contracts would be renewed.

Meanwhile, Thailand has steadily expanded its LNG infrastructure, operated by Thai state-run hydrocarbon champion PTT. The Map Ta Phut terminal came onstream in 2011 with initial capacity of 5mtpa. The terminal's second phase was added in 2017 with another 1.5mtpa expansion in 2020. We currently see the possibility of Map Ta Phut's capacity being upgraded to 16.5mtpa by 2025.

Ambitious plans to expand power network requires more fuel

Thailand has seen a push for expanding its national electricity grid in line with similar policies in neighbouring states such as Myanmar to support economic growth in areas further away from coastal boom towns. As such, four companies – Siam Gas and Petrochemical, Ratch Group, Gulf Energy Development and B. Grimm Power have announced ambitious plans to grow gas utilisation. Ratch Group, for instance, is vying for independent gas supply to feed its 1,400MW Hin Kong power plant in Ratchaburi by 2024-25. B. Grimm, meanwhile, plans to import LNG to feed seven 140MW gas-fired power plants currently under construction in more remote areas of Thailand.

Quadrupling of LNG imports as relatively expensive domestic gas reserves dwindle

According to Thailand's latest national gas plan, it will have to import more than 24mtpa by 2027 as commercially viable gas reserves in the Gulf of Thailand and the Gulf of Martaban are expected to be depleted and pollution from burning lignite is to be contained. Costs for locally produced gas, however, have reached $7-8/mmBtu, with a likelihood to rise further as PTT is forced to employ more field support measures to prevent production from collapsing.

Accordingly, several new LNG import projects have been proposed, two of which were in concert with license applications by Thai independent energy producer Gulf Energy and State-backed utility EGAT, aimed at breaking PTT's monopoly on LNG imports. These include an FSRU of 5mtpa in the Gulf of Thailand proposed by EGAT as well as Thai independent energy producer Gulf Energy's joint development with PTT to expand Map Ta Phut by 2025.

In our view, the license approvals are a sign the government intends to liberalise and diversify the country's gas market. EGAT broke PTT's monopoly on LNG imports when it imported its first cargo from Malaysia's Petronas in December 2019 after becoming the first PTT competitor to receive an LNG import licence. Gulf Energy's permit encompasses the import of 0.3mtpa to fuel 19 small-scale gas-fired power plants across the country. In addition, Hin Kong Power – in which Gulf holds a 49 percent stake alongside Thai power producer Ratch Group – has also been granted a licence to independently import 1.4mtpa. These volumes are earmarked to supply a proposed 1.4GW gas-fired power plant in Ratchaburi province from 2024. Finally, PTT is also building its 7.5-9mtpa Nong Fab LNG terminal adjacent to Map Ta Phut, which is due online in 2023. The Energy Regulatory Commission (ERC) is also working with PTT to create an LNG trading hub.

Thailand purchased much of its early LNG on a spot basis or on short term contracts. Currently, the country is supplied by contracts with Qatar, BP, Shell and Petronas amounting to 6.2mtpa, with the earliest expiration date in 2031. All the above contracts have PTT as the buyer.

The Thai government expects LNG imports to rise to 20mtpa by 2025. However, the energy ministry cautioned that increasing use of renewables and growing energy efficiency could temper national LNG demand growth. Nevertheless, PTT is betting on Thailand emerging as Southeast Asia's latest LNG trading hub to better manage its procurement plans, which remain uncertain in the long term. The company plans to use the Nong Fab terminal and the spare capacity at Map Ta Phut to support its LNG trading ambitions.

Thailand's surplus LNG import capacity could allow it to capture a share of Asia's LNG trade, especially among smaller regional newcomers including the Philippines, Myanmar, Vietnam and possibly Cambodia. These countries, many of which are proposing small-to-mid-size LNG-to-power projects, are seeking short-term flexible supply deals as they tentatively enter the market. India is also seeking to expand its LNG infrastructure on its eastern shores. We think this provides compelling commercial potential for PTT, which established an LNG trading desk in Singapore in February 2019.

Despite nominal deregulation, status quo effectively unchanged

However, we also highlight that although under Thailand's third-party access (TPA) rules PTT would have to provide storage capacity to EGAT until the latter's LNG stock has gradually been fed into its thermal power stations, PTT is bound by 'take or pay' clauses regardless of domestic LNG demand. This has led the Thai government to deny EGAT permission to enter into a long-term supply contract of its own with Malaysia's Petronas. Instead, EGAT has been limited to buying relatively small volumes of LNG on the spot market, with the first of two cargoes arriving in December 2019. Meanwhile, EGAT has already been purchasing gas under long-term contracts from PTT, which is likely to have damped enthusiasm in government circles further. As neither PTT nor EGAT are licensed to re-export any excess gas they have bought, Thailand's prime gas supplier has thus remained state-owned PTT. ■

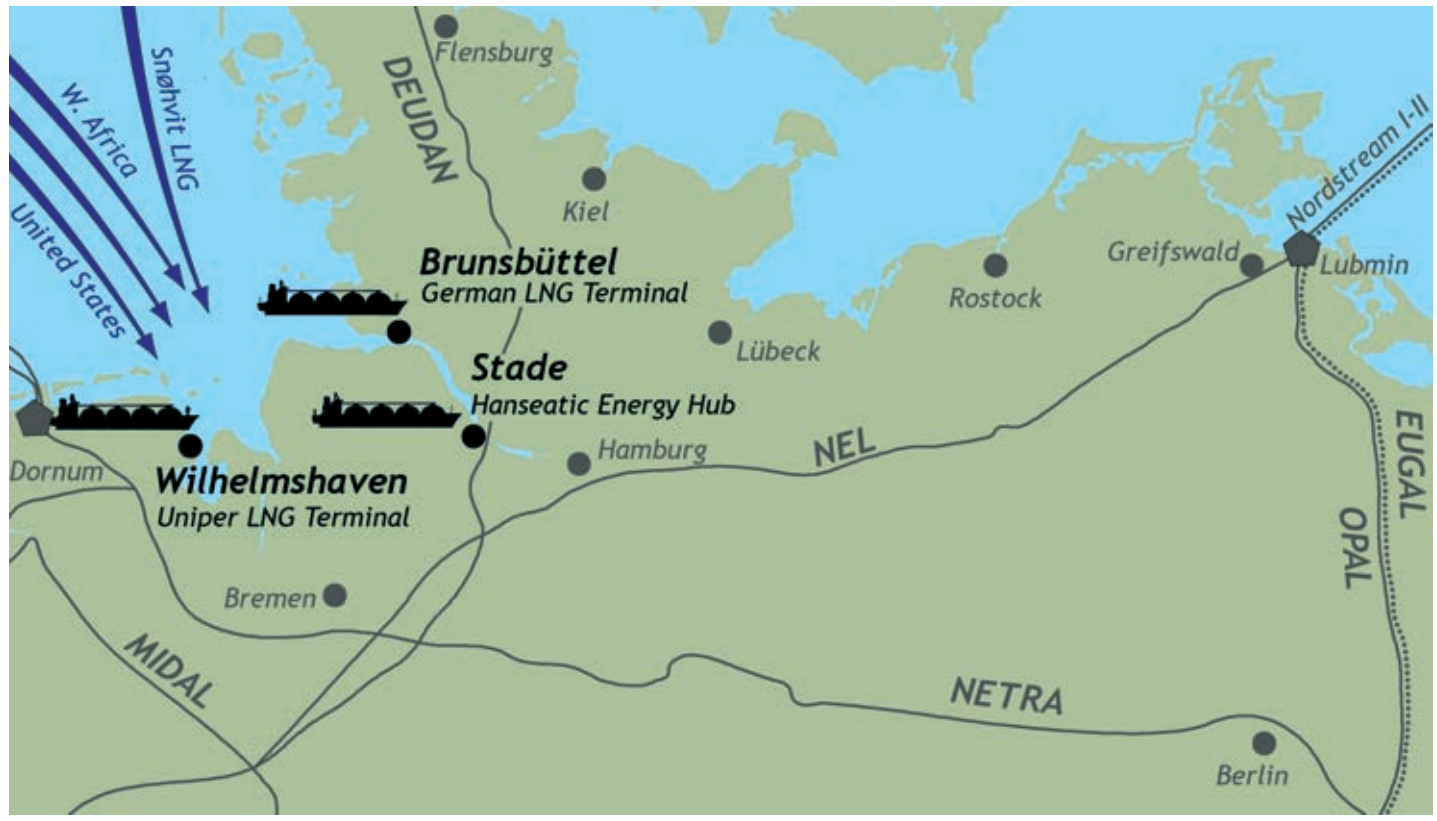
Diverging fortunes for Germany's three rival LNG projects

RWE remains bullish on the Brunsbüttel LNG project on the Elbe River and works towards financial close before June 2021, while Uniper has been forced to re-evaluate its Wilhelmshaven project in the absence of binding bookings. Stade LNG, the largest rival in scale and scope, is holding an open season for non-binding import capacity prior to inviting firm bookings in the first quarter and aspires to take FID around April or May, our Markets Editor Anja Karl investigates.

Hanseatic Energy Hub (HEH), the developer of the 12 Bcm per year onshore Stade LNG project, will run the open season until February 1, 2021, saying it is "confident" the first, non-binding phase will "prove successful." Nine global players already signed letters of intent to take capacity at facility, with more waiting in the wings.

Location is a key advantage of Stade LNG. The onshore regasification project is designated to be built on a brownfield site at the Dow Industrial Park, just 54 kilometres west of Hamburg and a short distance to Gasunie Deutschland's gas pipeline network. The LNG import terminal will cause zero emissions as it can use waste heat from Dow Chemical's processes to regasify the superchilled natural gas.

Provided some of the nine potential offtakers will sign firm bookings at Stade LNG around March 2021, the developer could swiftly take a financial investment decision and get the terminal built and commissioned in about four years' time.



Race is on between Stade and rival Brunsbüttel LNG

Vying to sanction Germany's first LNG import terminal, HEH's Stade LNG has embarked on a race with RWE and developers of the rival Brunsbüttel terminal – while Uniper's Wilhelmshaven project has fallen by the wayside. Partners are busy working towards submitting EPC contracts before the turn of this year, according to RWE's Chief Financial Officer Markus Kreber.

Green hydrogen is not competitive at the moment as a lot of energy is lost when converting electricity generated with renewables to hydrogen

The proposed Brunsbüttel Floating Regas and Storage Unit (FSRU), officially named German LNG Terminal, is being developed at a cost of some €450 million by a consortium of the Dutch TSO Gasunie and the infrastructure firms Vopak and Oiltanking. Once built, the 8 Bcm facility could meet about 10 percent of Germany's gas demand.

In mid-December, Brunsbüttel LNG was granted an exemption from access and tariff regulations for the terminal's entire annual gas throughput. The exemption, granted by the German Network Agency, is valid long-term starting from the terminal's commercial launch date. Such a waiver for tariffs is possible for LNG facilities if the investment improves competition and security of gas supply. "In principle, the decision offers our customers a stable regulatory regime [and is] therefore a crucial element on the way to obtaining the final investment decision," said Rolf Brouwer, Managing Director of German LNG Terminal GmbH, the development company of the Brunsbüttel venture.

By now, financial close has been pushed back to the first half of 2021, according to RWE which plans to offtake most of the terminal's contractual import volumes, largely for power generation purposes.

The project has "a slight delay," CFO Kreber conceded. Financial close was initially intended in late 2019, allowing for construction to commence this year with a view to commissioning the terminal in the fourth quarter of 2022. But by now, the Brunsbüttel FRSU is at least 19 months behind schedule, though its fortunes are far better than those of Unipers' Wilhelmshaven project.

Uniper shelves Wilhemshaven LNG, turns to hydrogen instead

Plans for Wilhelmshaven LNG have been called off as buyers were reluctant to sign up for firm import capacity at the proposed FSRU, meant to be developed in cooperation with Mitsui O.S.K. Lines (MOL) of Japan. An open season was held from late September until the end of October 30, 2020, but resulted in no firm bookings, so Uniper had to go back to the drawing board to reconsider its options.

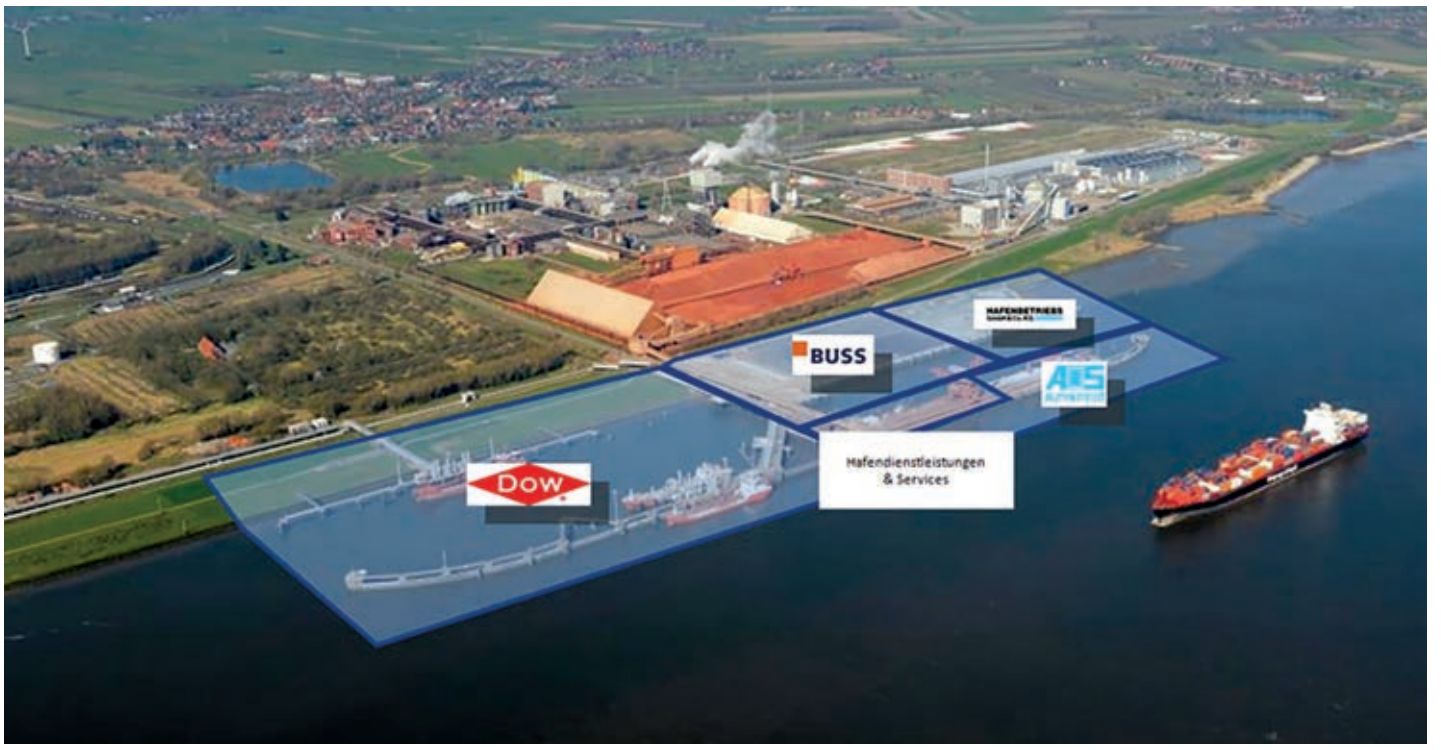
High hopes to get Wilhelmshaven LNG into operation by 2023 have been shattered, but the German utility has been quick to suggest it could import "environmentally friendly gas" at the side instead. Direct imports of hydrogen would be a viable long-term option.

"Economic uncertainties have definitely played a role in the current circumstances. Many companies don't want to make long-term commitments at the moment," Uniper's project manager Oliver Giese commented. "The results of the expression-of-interest procedure show that we need to revise the scope and focus of the planned terminal to ensure it remains attractive to market players and economically predictable for LNG Terminal Wilhelmshaven (LTeW) and Uniper."

By re-evaluating its Wilhelmshaven venture, Uniper is also "adapting individual parameters of the terminal or adding new elements." This indicates potential changes to construction and functionality to make the FRSU suitable for importing hydrogen.

Germany vows to import 96 TWh of green hydrogen

The German government is looking to finance green hydrogen projects in Morocco, Tunisia, Brazil, Chile and South



Fractions of Seaport Stade near Hamburg where HEH seeks to develop an LNG import terminal by 2025

Africa. A stimulus package, agreed by the German Bundestag in November 2020, makes available €7 billion for the market ramp-up of hydrogen technologies in Germany and a further €2 billion for international partnerships.

Most of Germany's future hydrogen supply will be imported as just 14 Terawatt-hours (TWh) can be produced at home by 2030, while total consumption is estimated to top 110 TWh in the long term. To make up the missing 96 TWh, Berlin is busy negotiating deals to finance green hydrogen projects in southern countries, largely based on solar power.

Producing green hydrogen requires large amounts of renewable energy supply – more than what is available in Germany, where geography and climate conditions limit the deployment of wind and solar power sources.

Green hydrogen is not competitive at the moment as a lot of energy is lost when converting electricity generated with renewables to hydrogen. "So, you don't just need a lot of electricity – it is also very expensive due to the German renewables levy," said Andreas Mihm, President of the Federation of German Industries (BDI). The lobby group advocates the use of hydrogen "should begin in transport and parts of the industry sector where there are few technological alternatives to avoid CO2 and where the willingness to pay is comparatively high."

Berlin in "no rush" for LNG projects

The decision of the German government to back LNG imports has been widely seen as half-hearted move to appease the outgoing US President Trump. The German economy and energy minister Altmaier had indicated earlier that Berlin's approval was "a gesture to our American friends" that could ease tensions over the Nord Stream-2 pipeline project, led by Russia's Gazprom.

"Nord Stream-2 is a project that has a long life already and much money has been invested," Altmaier said, noting the government's friendly stance towards an LNG import project would be "unrelated" to Berlin's backing of the Russian gas interconnector through the Baltic Sea. Denmark on July 6 gave the Nord Stream 2 consortium permission to utilize Russian pipe-laying vessels with anchors in Danish waters and the Russian pipe-laying vessel 'Akademik Czersky' is now busy completing the pipeline.

Start-up of the second pipeline leg will increase Gazprom's overall transport capacity to nearly 99 Bcm per year which is bound to greatly reduce Germany's need for additional LNG imports.

Low prices for pipeline gas imports have also rendered the economics of building a German LNG import plant less attractive. Germany's Federal Council of Economic Experts, in its baseline scenario, assumes a sharp decline in economic output of -2.8 percent this year but sees a possible increase in output by 3.7 percent over the course of 2021. A 'Recession' scenario, meanwhile, assumes negative economic growth in 2021 and 2022 which will keep demand, prices and emission on very low levels. This could lead to a sharp reduction in electricity as well as related coal and gas demand.

Nord Stream-2 bound to become reality

Importing more Russian gas through the controversial second leg of the Nord Stream pipeline would be "the cheapest option for Germany" as demand is forecast to rise from currently just above 90 Bcm per year to 110 Bcm by 2034. Short-term marginal cost of Russian gas is $2.6 per MMBtu, according to Rystad data, compared to $4 per MMBtu for US LNG.

Moving away from oil-indexed contracts, Gazprom has linked most gas exports to European hub prices, since receiving a large EU anti-trust fine in 2017. Through its electronic trading platform (ETP), the Russian gas giant is now offering European buyers a price closer to market value and ETP-traded gas accounts for about 15 percent of Gazprom's sales.

Russian gas on the ETP has been trading very close to prices at the Dutch TTF hub. Both price benchmarks have dropped to a level close to the short-term marginal cost of US LNG delivered to Europe – and below Gazprom's legacy long-term contract price level.

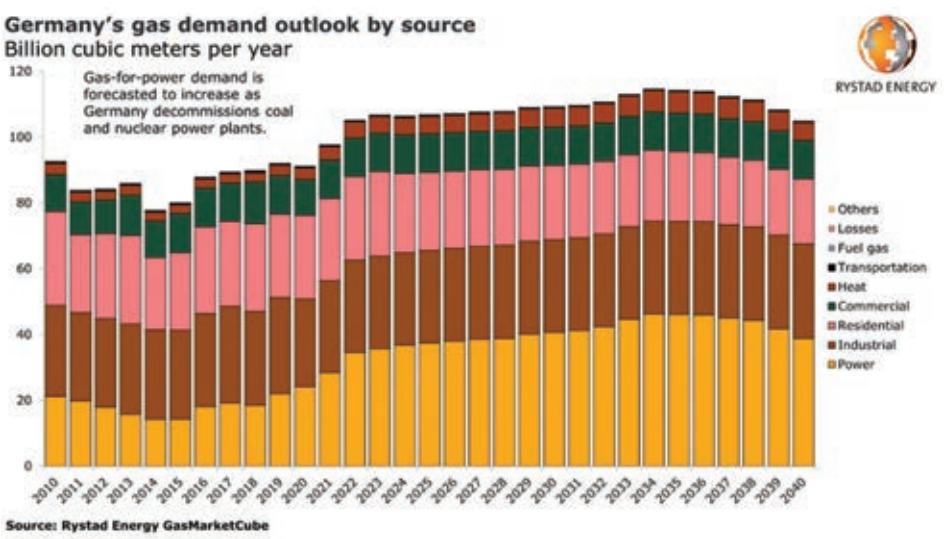
Russia's ETP cheaper than US LNG

Short-term marginal costs for US LNG supplies to Western Europe is currently close to $4 per MMBtu due to the Covid-related demand slump, but European gas prices are forecast to gradually increase towards $7 per MMBtu in 2024 as the market tightens. Hence German buyers would need to pay between $4 and $7 per MMBtu for spot LNG, but if they signed long-term supply agreements with US sellers to reduce supply risk and price volatility, they could be expected to pay around $6 per MMBtu.

Gazprom's offer is significantly cheaper, with short-term marginal costs of Russian supplies to Europe ranging between $2.6 per MMBtu and $4.6 per MMBtu. Rystad Energy estimates the breakeven of gas supplies through Nord Stream 2 would be "on the lower side of this range."

"It would be too speculative to estimate the contracted price for these volumes [through Nord Stream 2], but if they are sold through Gazprom's ETP, they could be expected to have a similar level to TTF prices of $4 per MMBtu during loose market periods and closer to $7 per MMBtu during tighter market periods," said Carlos Diaz, Rystad Energy's Head of Gas and Power Markets Research.

If Nord Stream 2 is sanctioned out of commerciality, it would push up gas prices in the short term but this might well backfire in the long-term. Russia could turn off the gas taps via Ukraine, Diaz warned. "At the end of the day, market participants want reliable and fair-priced gas, and if Russia can provide this for Germany and other western European customers," he said, so "Nord Stream 2 is likely come online in due time." ■

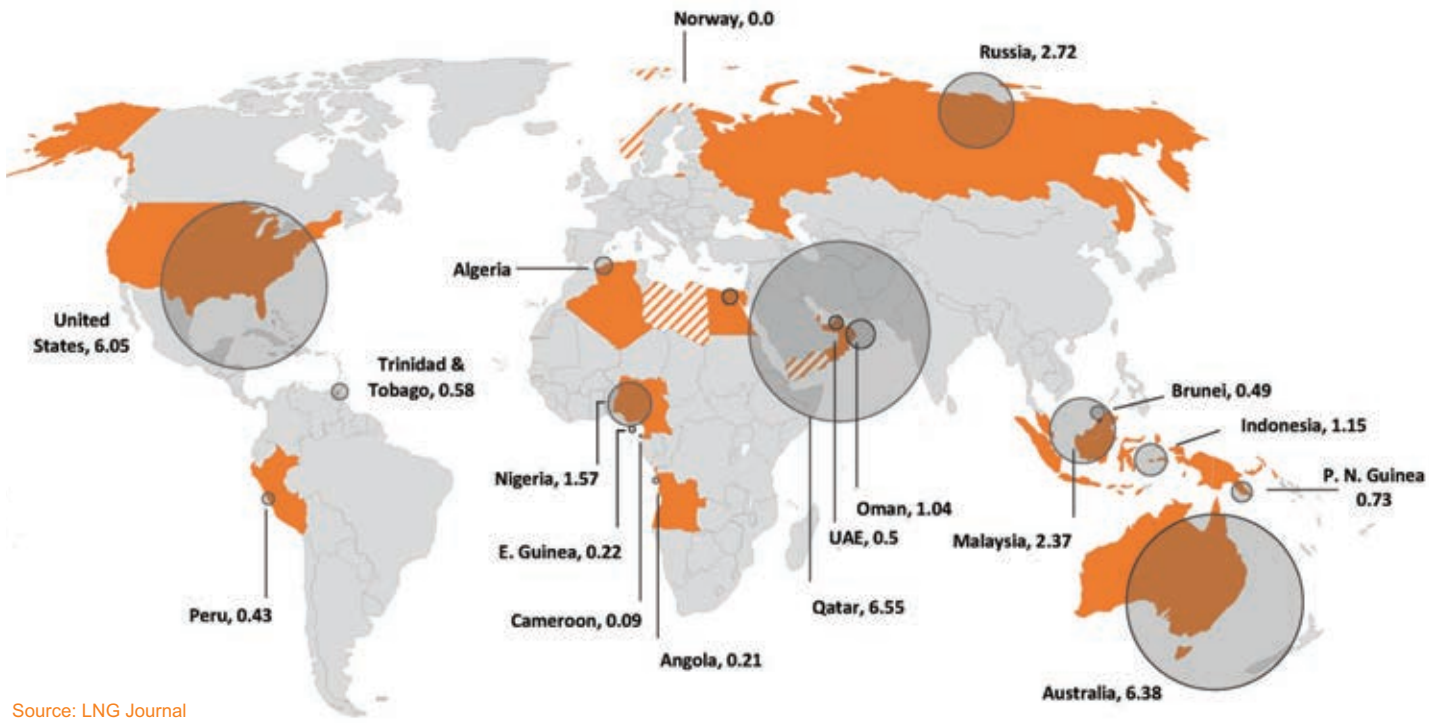


December trade continues to improve on seasonal high demand in Asia

December trade increased over the robust month-on-month growth seen in November, owed to seasonal Far Eastern high demand. However, not all exporters benefitted but the January outlook suggests continued robust demand, our Markets Editor Alexander Wilk reports.

Global LNG trade continued the growth seen in November, which had ended a period of relatively small incremental growth in August and October. December's LNG exports saw even more robust net growth of 2.09mmt (6.9 percent) compared to the 1.94mmt (7.2 percent) seen in November. Notably, Australia struggled to capture Far Eastern demand growth whilst Qatar muscled in. Accordingly, supply growth was led by Qatar, where exports jumped by 0.89mmt (16 percent) to 6.55mmt from 5.66mmt in November. Global LNG demand was carried by a boost in offtakes in Japan, China and South Korea, which together outweighed major seasonal reductions in India and the Middle East. In Europe, importers such as Turkey and the United Kingdom continued to see noticeable demand growth although this was overshadowed by drastic reductions in Belgian and Dutch imports. Similarly, in South America the vanishing demand in Argentina and some Caribbean offtakers such as Colombia tempered regional import growth even as Brazil saw seasonal high demand. Nevertheless, trade performance continued to close the gap on its year-on-year counterpart in December 2020, although there remained a difference of 0.12mmt (-0.4 percent) to December 2019. For refence, that gap stood at 0.44mmt (-1.5 percent) in November, according to our data.

Global LNG Exports – December 2020



Source: LNG Journal

Exports

Month-on-month export performance continued to improve in December, with shipments increasing by 2.08mmt (6.89 percent) compared to the 1.94mmt (7.2 percent) in November. Growth was led by the Middle East, where shipments were up by 1.13mmt (15 percent) over November to reach 8.64mmt. The Atlantic Basin's growth came in as second, improving by 0.52mmt (5 percent) month-on-month. Meanwhile, the Pacific Basin saw exports increase more moderately by 0.44mmt (3.6 percent) in December as Australia did not continue exports on the same level as in November.

Pacific Basin

The Pacific Basin ended the month of December with 12.56mmt in exports, up by 0.44mmt (3.6 percent) compared to the 12.12mmt recorded in November. Consequently, capacity utilisation increased by 3pp to 93 percent.

The Basin's biggest exporter – Australia – shipped 0.21mmt (-3.2 percent) less month-on-month. The country thereby did not continue to increase month-on-month exports as was the case in October and November. In December, exports from QCLNG in particular decreased by 0.15mmt (-21.4 percent) from 0.70mmt to 0.55mmt. This was followed by Ichthys LNG, which saw exports decrease by 0.11mmt (-13.9 percent) to 0.68mmt. Nevertheless, APLNG and Gladstone LNG both compensated for the reduction at QCLNG by increasing exports by 0.04mmt (4.3 percent) and 0.15mmt (36.6 percent), respectively. The plants benefitted particularly from China's robust monthly demand increase. In similar vein, Darwin LNG grew shipments by 0.14mmt (77.8 percent) to supply Japan and thus compensated for the aforementioned reduction at Ichthys LNG.

In western Australia, LNG shipments decreased across all but one producer. Wheatstone LNG decreased exports by 0.09mmt (-12.0 percent) to 0.66mmt alongside Gorgon LNG and Pluto LNG, which also cut their shipments by the same amount to 0.93mmt and 0.33mmt, respectively. Only NWS LNG managed to keep December exports broadly steady at 1.38mmt, supported by robust Japanese demand growth. As to unconventional LNG production, Shell's Prelude FLNG barge continued its prolonged market absence in December. However, we highlight that the floating plant received a cooldown cargo via the Shell-controlled LNGC *Methane Heather Sally* in November and exported its first cargo in almost a year on 8 January. The shipment was en route to Higashi-Ogishima in Japan at the time of writing.

North of Australia, Papua New Guinea's PNG LNG saw shipments increase by 0.09mmt (14.1 percent) to 0.73mmt on one additional cargo shipped over November, according to our data.

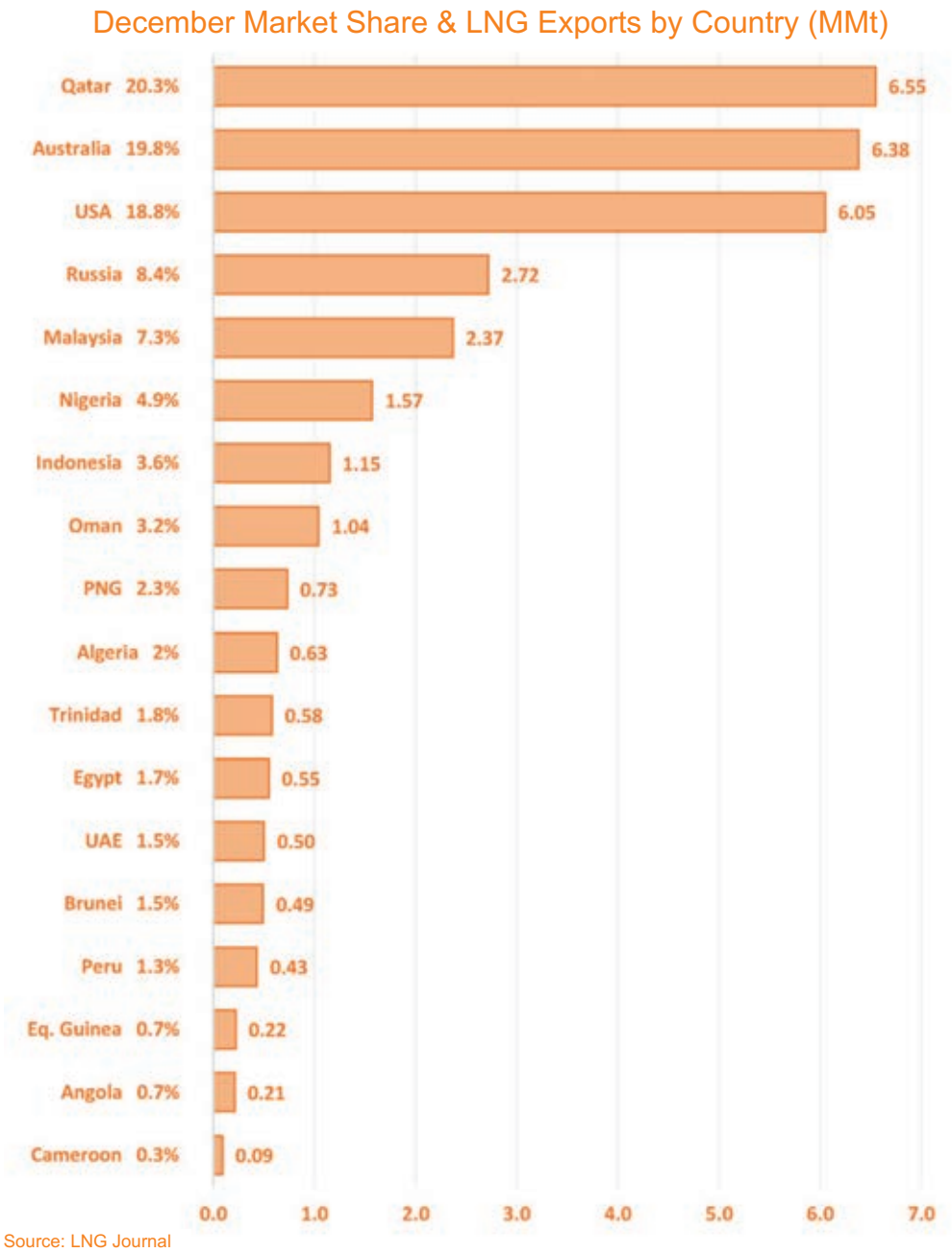
In neighbouring Indonesia, the amount of LNG shipped remained broadly steady, increasing marginally by 0.01mmt (0.9 percent) to 1.15mmt. Meanwhile, Malaysia saw monthly exports jump by 0.52mmt (28.1 percent) in December. Although Malaysia was unable to maintain its market share in Japan, which decreased by 0.12mmt (-12 percent), exports to China and South Korea grew robustly by 0.72mmt (57 percent). In contrast, neighbouring Brunei LNG decreased December shipments by 0.05mmt (-9 percent) to 0.49mmt as it lost market share in China whilst unable to compensate materially elsewhere.

Elsewhere in the Pacific, Russia's Sakhalin-2 LNG resumed export growth from November following a brief decline in October. The plant increased shipments slightly by 0.02mmt (2 percent) to 1.01mmt in December from 0.99mmt in November. That increase mainly derived from a growth in exports to Japan by 0.10mmt, which compensated for almost equal market share losses in South Korea and Taiwan. Concurrently, Peru's Pampa Melchorita plant also increased exports by 0.06mmt (16 percent) to 0.43mmt in December from 0.37mmt in November on higher Japanese demand. At the time writing, we also assumed shipments to China to remain broadly steady, with 0.15mmt of Peruvian shipments still to declare a destination within the Pacific.

Atlantic Basin

The Atlantic Basin's overall shipped LNG continued to increase significantly by 0.52mmt (5 percent) month-on-month in December, although growth lagged the 1.40mmt (15 percent) seen in November. This led to growth in export capacity utilisation by 4pp to 86 percent.

The overall amount of LNG exported within the eastern part of the Atlantic



Source: LNG Journal

Basin – comprising Europe, Russia and Africa (and not including re-exports) – saw a marginal net decrease of 0.02mmt (-0.4 percent) month-on-month in December, as demand for regional exports to the Middle East vanished. The ongoing outage at Snøhvit LNG that was caused by a fire in late October also weighed on the eastern Atlantic's overall growth rate as the plant is not scheduled to return to the market before late January 2021, our shipping data suggests.

It follows that the Atlantic's robust LNG export growth in December was once again driven by the United States where shipments continued to increase by 0.51mmt (9 percent) to 6.05mmt in December. Although, this was a far cry from the 1.28mmt (30.0 percent) month-on-month growth seen in November, the months of September and October provided a relatively low baseline due to bad weather hampering exports. Market visibility at the time of writing indicated US LNG export growth was supported by higher demand within the Atlantic Basin. Notably, shipments amounting to 0.72mmt still had to confirm their destinations within the Basin. At the same time, it seemed US exports to the Far East in December would transpire to have only grown relatively modestly by 0.11mmt (4 percent). However, we highlight that roughly 0.73mmt were still en route to the Pacific without confirmed destinations.

In South America, Atlantic LNG in Trinidad & Tobago continued to slowly increase exports, reaching 0.58mmt in December, up 0.03mmt (5 percent) from 0.55mmt in November. Atlantic LNG shipments benefitted from higher demand in the Caribbean and the Far Eastern, which compensated for a loss in market share in Europe.

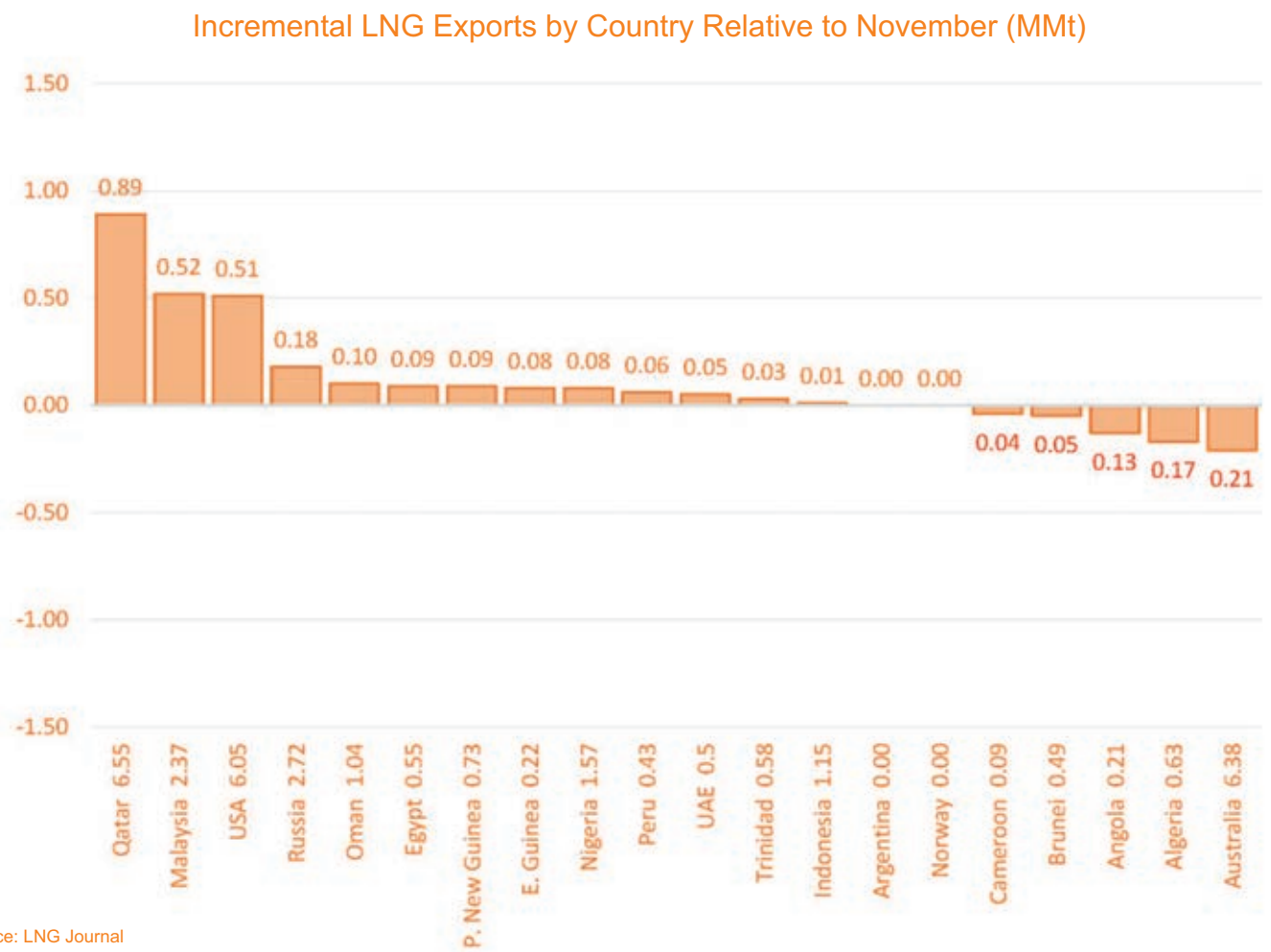
Middle East

Alongside Pacific and Atlantic Basin producers, December shipments from Middle Eastern plants increased by 1.13mmt (15 percent) from 7.51mmt in November to 8.64mmt in December. The increase was underpinned by Qatar flexing its muscle as one of the world's leading LNG exporters although its fellow regional producers in Oman, the UAE and Egypt also kept month-on-month growth apace. As such, the Basin's utilisation of operational export capacity (i.e., excluding Yemen) increased by 15pp to 112 percent in December.

Once more the massive size of the Ras Laffan LNG complex was a determining factor in the degree of overall monthly change to Middle Eastern LNG supply. Qatar's December exports shot up by 0.89mmt (16 percent) following a sharp contraction in November. According to our data, the Ras Laffan LNG complex operated at full capacity in December on 6.55mmt in LNG exports. Higher demand for Qatari gas in South Asia and the Far East in particular supported the country's LNG shipments, increasing by 0.77mmt (17 percent) to 5.19mmt overall. Meanwhile, strong competition from US exporters in Europe contributed to lowering Qatari exports to the continent by 0.26mmt (-30 percent) although given Qatar's high capacity utilisation in December this was unlikely perceived a problem by Qatargas, we think.

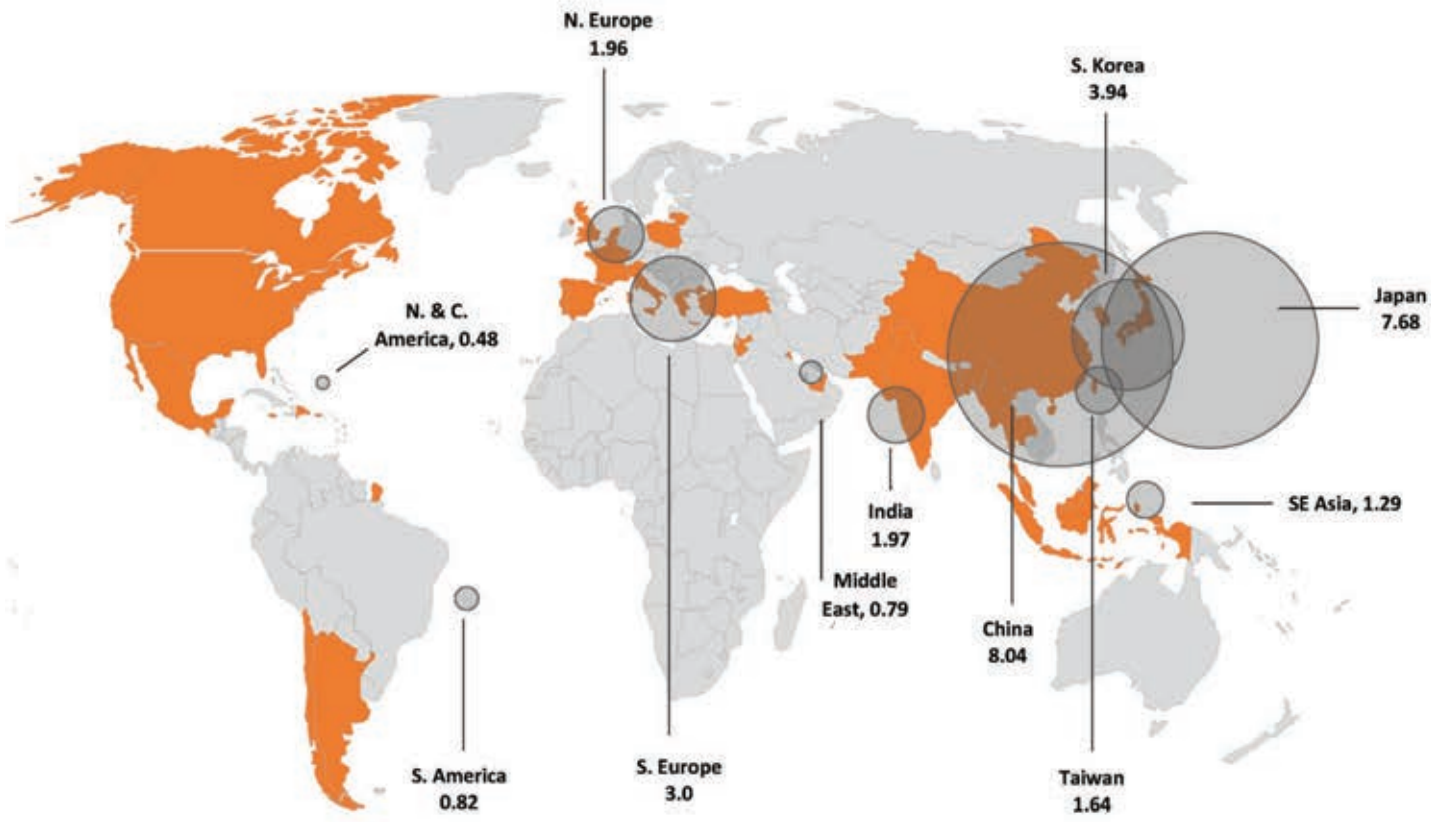
The other active producers on the Arabian Peninsula – Oman and the UAE – saw an overall export increase of 0.15mmt (16 percent) led by Oman. The country once again more than doubled its exports to China to 0.25mmt and, in broad terms, maintained shipments to South Korea at 0.36mmt in December, which together compensated for lower Indian demand.

Importantly for the region, Egypt continued to build on its comeback in November, when Idku LNG shipped 0.46mmt via seven cargoes to China, India, Pakistan, the United Kingdom and the Far East and thereby cushioned a decrease in Qatari exports. In December,



Source: LNG Journal

Global LNG Imports – December 2020



Source: LNG Journal

Egyptian exports expanded again by 0.09mmt to 0.55mmt (20 percent) on stronger Pacific spot demand, both in the Far East and in India.

Imports & Domestic Trade

Global LNG demand was driven by the Pacific Basin, where imports increased robustly by c. 3.42mmt (16 percent) over November to reach 24.82mmt in December. This was contrasted by a small demand reduction in the Atlantic Basin and a seasonal demand retreat in the Middle East, where offtakes decreased by 0.08mmt (-1 percent) and by 0.27mmt (-25 percent), respectively.

Pacific Basin

Pacific Basin imports continued to grow in December, increasing by 3.42mmt (16 percent) to 24.82mmt from the 21.40mmt seen in November. The commensurate overall import capacity utilisation thereby also increased by 8pp to 64 percent even as regional FSRU utilisation decreased by 9pp to 22 percent. As such, demand growth in the Pacific compensated for the seasonal reduction in Middle Eastern offtakes (please see below). Overall Pacific offtakes were underpinned by Japan, which was leading demand growth within the Basin, as well as China and South Korea. Together, these three importers boosted LNG offtakes by 3.41mmt on combined imports of 19.66mmt.

However, India once again stood out by decreasing offtakes by 0.25mmt (-11 percent) to 1.97mmt. As a prominent emerging LNG demand centre in South Asia, India's LNG offtake therefore stood in stark contrast to the significant month-on-month growth of 0.39mmt (21.1 percent) in October. Nevertheless, considering historic data, we think India's demand reduction since October is seasonal rather than structural. As such, we expect the country's January imports to come in significantly above November and December levels.

In Southeast Asia, Indonesia also saw demand decrease by 0.08mmt (-38 percent) to 0.13mmt whilst neighbouring Malaysia saw domestic demand remain broadly steady at 0.14mmt.

However, the roster of typically price-conscious Pacific buyers – including Bangladesh, Thailand, Chile, Mexico, Singapore and Myanmar – collectively increased imports by 0.05mmt. This was primarily due to Myanmar ramping up capacity utilisation at Thanlyin LNG. Nevertheless, growth was tempered by Bangladesh curtailing its monthly LNG intake by 0.10mmt (-29 percent). As with India, however, we anticipate the country's LNG imports to return to month-on-month growth in January. Thailand and Mexico also reduced offtakes by 0.02mmt overall. As such, respective monthly import growth of 0.06mmt by Singapore and Chile only served to compensate for the reductions in Bangladesh and Thailand and Mexico.

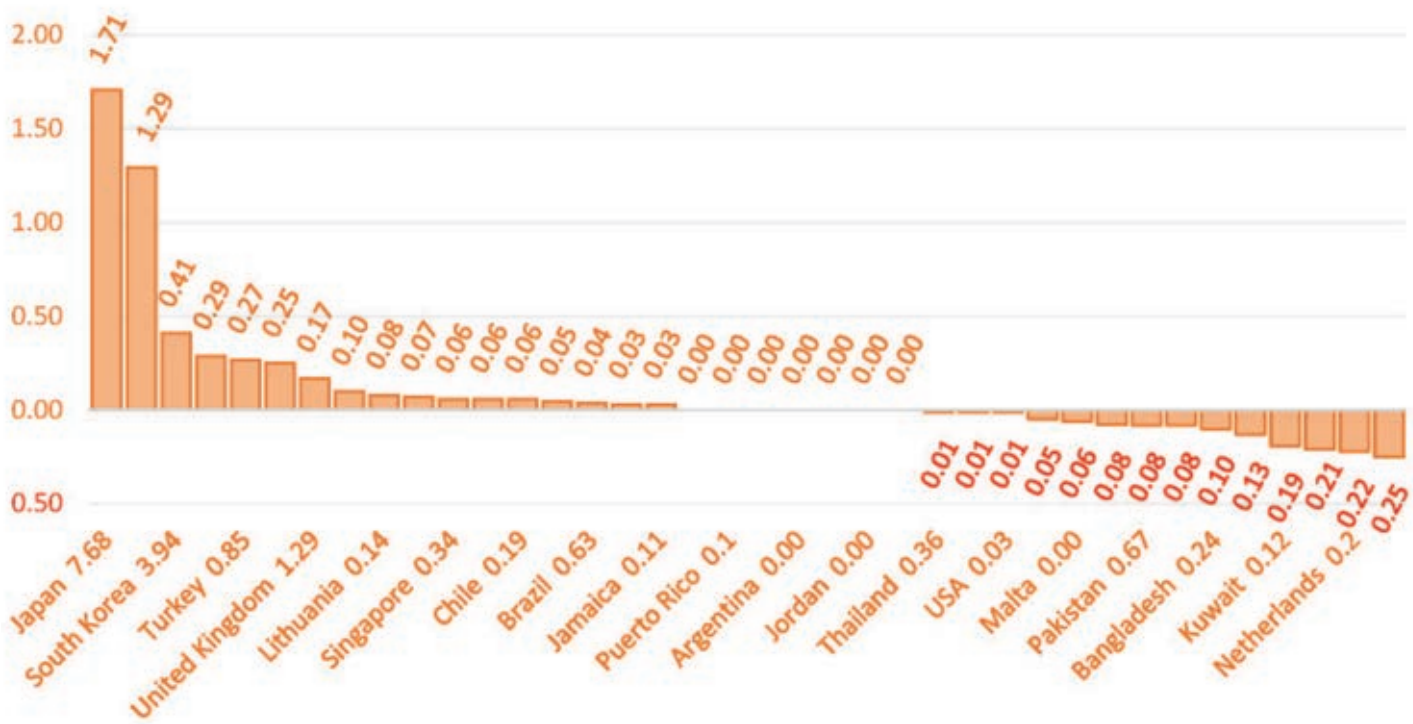
Atlantic Basin

In contrast to their Pacific equivalents, LNG imports in the Atlantic Basin decreased slightly by 0.08mmt (-1 percent) as they decreased from 6.96mmt in November to 6.88mmt in December. The Basin's overall capacity utilisation thereby remained broadly unchanged at 30 percent.

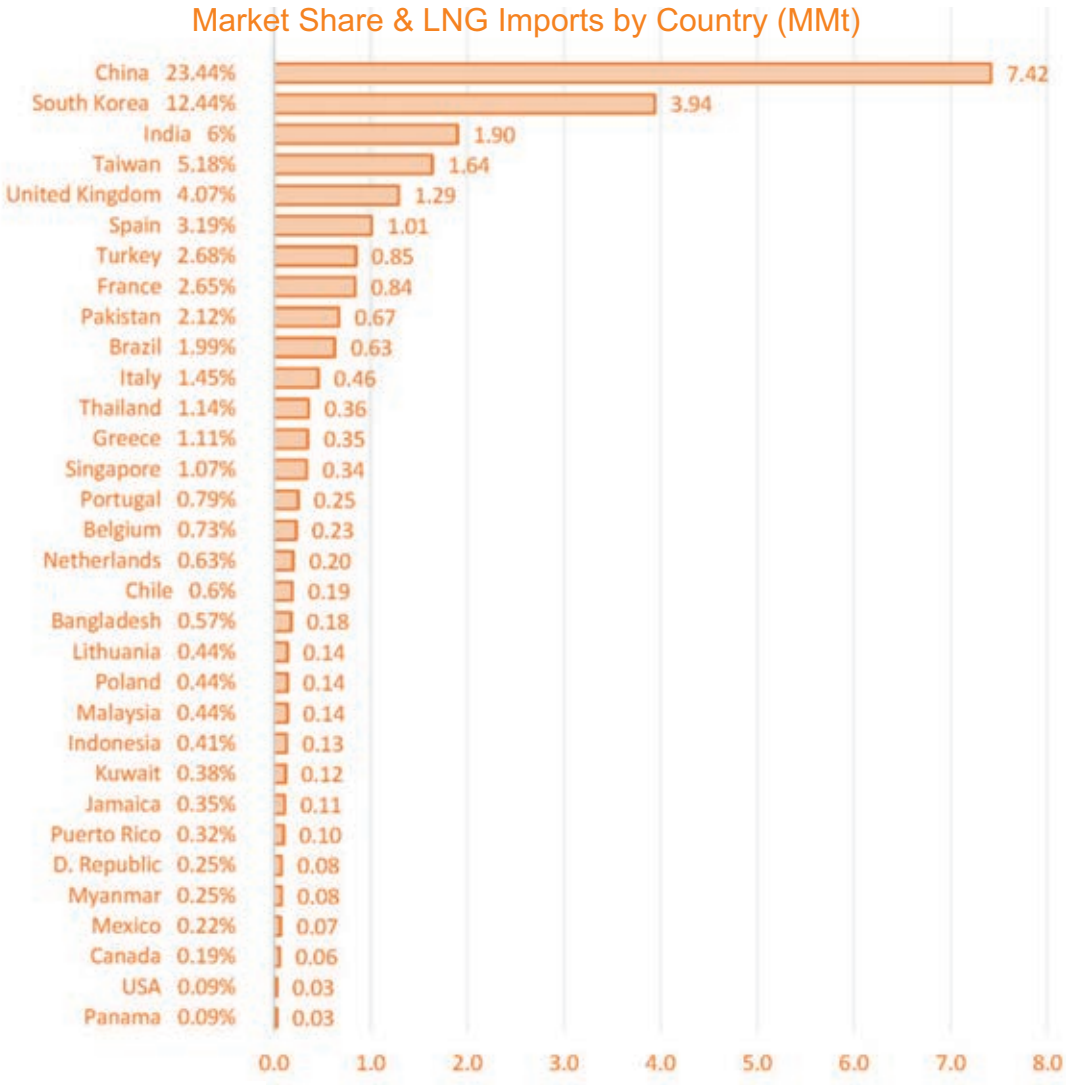
The Atlantic Basin's offtake reduction was driven by a net European demand reduction of 0.18mmt (-3 percent) month-on-month in December. European demand contracted as Belgium, the Netherlands and Italy in particular reduced imports by 0.85mmt combined. Poland, France and Malta also imported 0.27mmt less overall compared to November. Accordingly, these reductions negated robust growth elsewhere in Europe in net terms. This growth was led by Turkey as well as Greece, which together saw increased demand by 0.52mmt. Concurrently, the United Kingdom, Spain, Lithuania and Portugal also added 0.42mmt to the region's demand, albeit not enough to overcome the aforementioned reductions.

As to demand in the western Atlantic, importers in the Caribbean and South America – including Brazil, Panama, Jamaica, Puerto Rico and the Dominican Republic – saw monthly net LNG demand increase by 0.05mmt (6 percent) overall in December and thus continued month-on-month growth from November. In

Incremental LNG Imports by country relative to November (MMt)



Source: LNG Journal



Source: LNG Journal

North America, meanwhile, a 0.06mmt demand increase by Canada compensated for a 0.01mmt demand reduction seen in the United States.

Middle East

As outlined above, demand growth in the Pacific compensated for a notable reduction in the Middle East where offtakes decreased by 0.27mmt (-25 percent) in December – as was also the case in November. In line with the change in season and resulting cooler weather, the region has seen monthly demand shrink since September. Accordingly, Dubai's DUSUP, which had been important for regional LNG offtake growth during the summer, did not import LNG in December and thus did not add to the month's balance. Similarly, Jordan's Aqaba LNG terminal and Israel's Hadera Gateway terminal were also not seen in the market in December. With Egypt re-establishing itself as an export-only LNG player, Middle Eastern demand was left to the FSRUs stationed at Kuwait's Mina al Ahmadi terminal and Pakistan's Port Qasim. Both countries curtailed offtakes in December, with Kuwait slashing imports by 0.19mmt (-61 percent) to 0.12mmt and Pakistan reducing its offtake by 0.08mmt (-11 percent) to 0.67mmt.

Outlook

Total LNG volumes in transit amounted to 13.09mmt 5 January 2021, suggesting the robust demand growth seen in December is likely to continue into January. Our market visibility at the time of writing pegged the delivery horizon on 9 February. We highlight that these volumes will not be the only cargoes to be delivered in that time frame but what was presented by our market visibility at the time of writing. Factors such as different vessel speeds, weather and diversions can greatly affect the arrival of exports.

Pacific Basin

Our data indicates there are currently 10.77mmt destined for the Pacific Basin, with the United States the main source on 3.03mmt. This put the country ahead of Australia, which only had 2.05mmt on the water. Nevertheless, the continent was still in the lead in terms of visible exports to China with 0.74mmt compared to 0.4mmt stemming from US export plants.

Notably, China was also leading the Pacific's roster of importers and expected 2.08mmt to arrive by 9 February. Almost 20 percent of these volumes (0.41mmt) were earmarked for Dalian LNG followed by Guangdong Dapeng LNG with 0.36mmt by 8 February.

Japan came in second, with 1.85mmt due by 26 January, whilst South Korea was expecting 1.07mmt by 4 February. There were also 4.67mmt in transit – almost half of which were shipped from the United States – that still had to confirm their destination within the Basin as an increasing number of US exports are taking routes through the Suez Canal or via the Cape of Good Hope.

India was expecting 0.43mmt by 6 February, according to our market visibility, ahead of Taiwan with 0.32mmt by 28 January.

Atlantic Basin

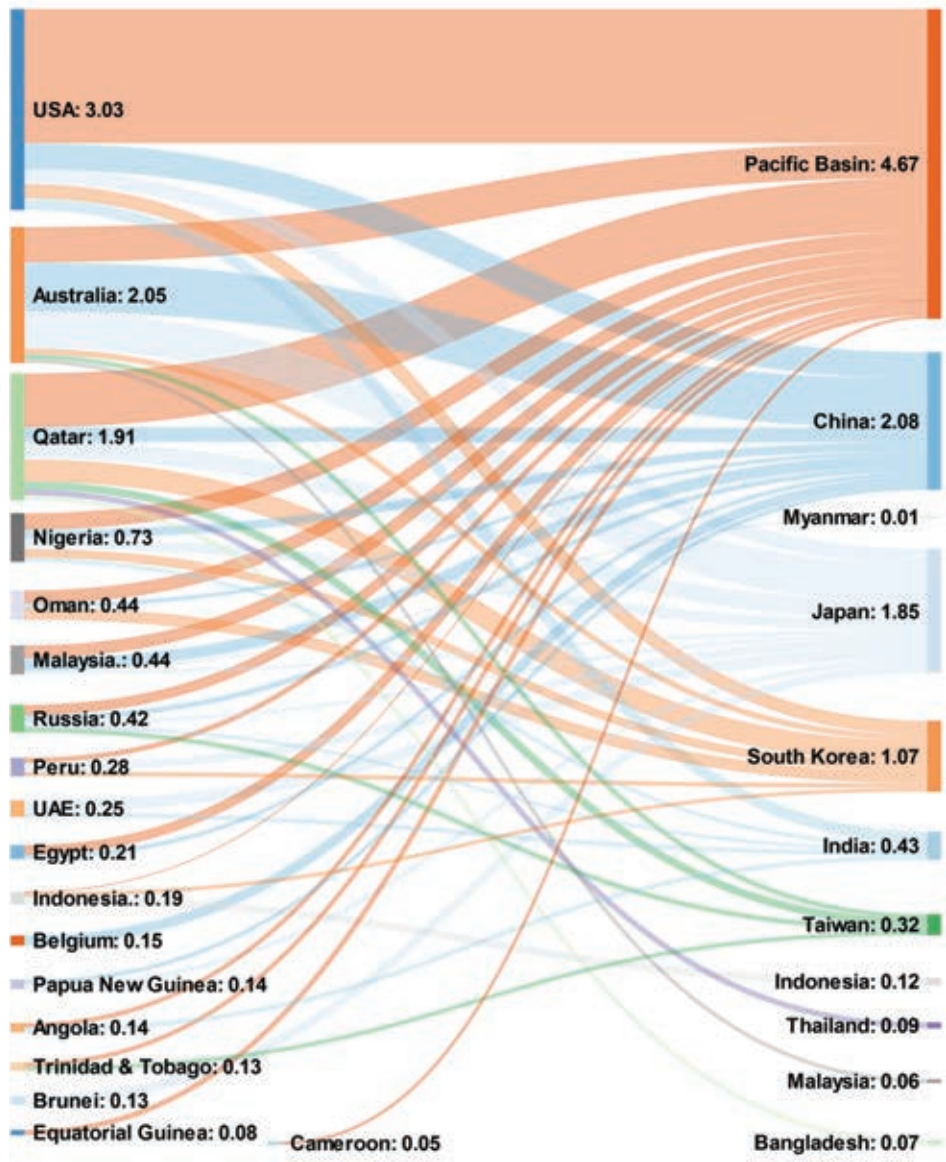
The Atlantic Basin, meanwhile, can expect to receive 2.22mmt by 2 February. Cargoes en route to known Atlantic terminals are led by 0.25mmt worth of orders destined for Turkey with a delivery horizon of 9 January.

As with the Pacific Basin, there are still roughly 1.19mmt of in-transit LNG that have yet to confirm their destination within the Atlantic. However, 0.78mmt are currently broadly destined for Europe by 20 January, much of it likely to arrive in Turkey.

Among Atlantic exporters with LNG deliveries currently pending, the United States is in the lead with 1.17mmt, followed by Russia with 0.42mmt and Qatar with 0.22mmt. These cargoes are onboard, inter alia, the *LNG Schneeweisschen* (0.07mmt), the *Boris Davydov* (0.08mmt) and the *Tembek* (0.10mmt).

Middle East

Meanwhile, our data indicate there is only the cargo aboard the *Al Rekayyat* currently headed to Pakistan as indicated above. In terms of Middle Eastern cargoes under way to destinations outside the Basin, 3.13mmt have a delivery horizon of 1 February, including 2.23mmt that originated in Qatar, with a further 0.44mmt coming from Oman's Qalhat terminal and 0.25mmt from the UAE's Das Island facility via, inter alia, the *Shagra* (0.12mmt), the *Cool Explorer* (0.07mmt) and the *Al Khaznah* (0.06mmt). Notably, at the time of writing, Egypt's Idku LNG plant had three cargoes (0.21mmt) at sea, all destined for the Pacific and the Far East.



For the Record

ABU DHABI National Oil Company's LNG unit has signed a supply agreement with global commodities company Vitol for the sale of 1.8 million tonnes per annum of cargoes for six years and another two-year deal with French major Total for 750,000 tonnes. "We are proud to conclude another significant milestone with Adnoc, an important partner across key business areas," said Pablo Galante Escobar, Vitol's Head of LNG. "For Vitol LNG, this most recent development strengthens our ability to ensure diverse and secure supply to our customers around the world," he stated. Vitol's volumes will be supplied post-2022 and Total's two-year deal will cover 2021 and 2022 LNG volumes. The deals coincided with the Abu Dhabi International Petroleum Exhibition and Convention (ADIPEC) taking place in the United Arab Emirates.

Adnoc LNG produces about 6 MTPA of LNG from its liquefaction plant on Das Island off the coast of Abu Dhabi. Adnoc's stake in the liquefaction company is 70 percent while Japan's Mitsui & Co owns 15 percent, BP of the UK 10 percent and Total 5 percent. "This new supply agreement contributes to the growth and flexibility of Total's LNG portfolio and strengthens our long-standing relationship with Adnoc LNG," said Thomas Maurisse, Total's Senior Vice President for LNG. The UAE is the longest-standing LNG exporter in the Middle East and shipped its first cargo in 1977. Since 2019, Adnoc LNG has been adopting a multi-customer strategy after previously sending 90 percent of its volumes to Japan. This has been reversed as long-term contracts expired and only 10 percent of output is now shipped to Japan and 90 percent is supplied to a range of customers in about eight countries in Asia.

Fatema Al Nuaimi, Chief Executive of Adnoc LNG, said her company was pleased to partner with both Vitol and Total on these major deals as they would create reliable, long-term benefits for Adnoc and the shareholders. "Through collaboration and by adopting a partnership approach, we are driving new growth opportunities for Adnoc and are maximizing the value of our nation's resources," she stated. "These agreements demonstrate the success of our commercial strategy in unprecedented times and confirm the market's growing confidence in demand for natural gas," explained Al Nuaimi. "LNG is a fuel hat can support the transition to clean energy, especially in many Asian markets where switching to gas will result in significant environmental gains," she said.

AIR PRODUCTS posted a rise of 7 percent in fiscal full-year net income to $1.93 billion as it was awarded three major LNG contracts for plants in Mozambique in southeast Africa, Qatar and Algeria. The company fiscal fourth-quarter sales amounted to $2.3 billion, increasing 2 percent, though full-year sales were down 1 percent to $8.9 billion. During the Air Products fiscal fourth quarter net income declined by 5 percent to $495 million compared with $518.7M in the same quarter of 2019. The LeHigh Valley, Pennsylvania-based company said that among its earnings highlights were its big LNG contract wins. Among them, Air Products was selected to supply the LNG process technology and equipment for Mozambique's first onshore LNG production plant at Pemba in the nation's northeast Cabo Delgado province.

It was also chosen by Qatargas for the massive LNG production expansion project at Ras Laffan and by Algerian energy company Sonatrach to supply equipment to its GL1Z LNG facility in Arzew on the Mediterranean coast. Air Products also began construction for Dutch utility Gasunie of three nitrogen plants to condition imported natural gas for its national energy project. The company additionally won on-site supply contracts with next-generation electronics manufacturers in China and Malaysia. During the quarter Air Products executed a successful debt offering of in two tranches for $5 billion, supporting significant opportunities to invest in high-return industrial gas projects. "Despite the challenging Covid-19 environment, the Air Products team around the world demonstrated its commitment by keeping our plants running, supplying customers with essential products and improving our profitability," said Chairman, President and Chief Executive Seifi Ghasemi. "I would like to thank all of our more than 19,000 employees for their unwavering commitment to keep Air Products operating successfully during these difficult times, which we expect to continue during 2021," added Ghasemi. "We were proud to announce landmark gasification and hydrogen for mobility mega-projects to meet the world's increasing energy needs and move us all towards a better future," he stated.

Air Products noted that it had announced the $7-billion Neom project, which will enable Air Products to supply carbon-free hydrogen to power buses and trucks around the world by 2025. This concerns a deal signed in conjunction with ACWA Power of Saudi Arabia and a new smart city planned in the Kingdom for the world-scale green hydrogen-based ammonia production facility powered by renewable energy. The smart-city project was first announced in 2017 and takes its name from the location Neom, a proposed cross-border city in the Tabuk Province of northwest Saudi Arabia. It is planned to incorporate smart-city technologies and also function as a tourist destination. The site is near the Red Sea and the borders of Egypt and Jordan. Air Products will build and operate the ammonia plant as part of the Neom city project. This Saudi technology hub also aims to attract other foreign investors to the area. As part of this, it will use a different legal and tax system to the rest of the country. Air Products will jointly own the plant with the Neom project and ACWA Power. It plans to commission the facility in 2025. The joint venture project is the first partnership for Neom with leading international and national partners in the renewable energy field and Air Products has said it would be a cornerstone for its strategy to become a major player in the global hydrogen market.

AUSTRALIAN Industrial Energy, a company controlled by billionaire businessman Andrew Forrest, has signed a site lease for up to 25 years with New South Wales Ports for the Port Kembla Gas Terminal project to handle LNG shipments and resolve gas shortages in the region. While Australia is the world's largest LNG exporter with 78 million tonnes of shipments being made into the Asia-Pacific region, Australian states like NSW, Victoria and South Australia are short on gas resources. The Port Kembla floating import terminal is one of several planned for the southeast coast of Australia. "This is another crucial step towards securing gas supply certainty for NSW as well as providing local employment opportunities and economic benefits for the Illawarra region," said a statement from the Ports Authority and AIE, part of Forrest's Squadron Energy Group.

The lease signing came just a month after Forrest's Squadron Energy bought Japanese investors out of the AIE joint venture formed to develop the LNG facility at Port Kembla, south of Sydney. The former partners were the world's largest LNG purchaser, JERA Co. Inc. of Japan, and the Japanese trading house Marubeni Corp. Under the new arrangement, Squadron Energy acquired all the AIE interests of JERA and Marubeni, which amounted to 50 percent. Financial details of the transactions were not disclosed. The statement on the Port Kembla lease also explained that the floating LNG terminal would also supply a dual-fuel 800 megawatts power station being developed in the Illawarra region and which would be able to use either LNG or hydrogen as fuel. "The design provides for large-scale dispatchable power and the ability to transition to hydrogen fuel as Fortescue Metals Group (a Forrest company) and other hydrogen suppliers bring industry-scale production online," it explained.

The LNG terminal project is expected to create around 130 to 150 jobs during construction and between 40 to 50 ongoing roles during operation. The lease agreement includes a 10-year initial term with options to extend up to a maximum 25-year term. "AIE will immediately start a site handover process, paving the way for the new gas terminal construction works to commence," it stated. "Construction is forecast to take only 18-20 months, putting the project on track to supply more than 75 percent of NSW's gas needs by the end of 2022," added AIE. Squadron Energy Chief Executive Stuart Johnston said the agreement with NSW Ports further cleared the way for accords between AIE and future gas supply customers to be completed in the coming months. "We have long recognised Port Kembla as the best site for this critical gas project and with the lease for the terminal now agreed, commercial arrangements around future supply contracts can be accelerated with confidence," Johnston added.

The AIE Chairman Michael Masterman said the project demonstrated the important role of natural gas as a transition fuel towards a low-carbon future. "Our commitment to delivering Australia's first gas terminal is about reinforcing grid reliability today and investing in carbon-free technologies that

support a more rapid decarbonisation of the economy," added Masterman. The terminal will be located a 6 kilometres from the existing Eastern Gas Pipeline (EGP) which provides a major natural gas arterial between Victoria and NSW. AIE acknowledged the strict requirements of the Development Consent granted by the NSW State Government, including the environmental guidelines around the marine environment, and said it was committed to meeting these over the lifetime of the project. NSW Ports Chief Executive Marika Calfas welcomed AIE's long-term commitment to Port Kembla. "The gas terminal brings a new trade to Port Kembla and provides significant opportunity for the region. It will also address future energy needs in NSW and other states," said Calfas. "We commend AIE and Squadron Energy's commitment to using local businesses to create value and jobs throughout the Illawarra region," she stated.

BC FERRIES, the ferry company of the Canadian province of British Columbia, is among the leaders in the sector globally for LNG-powered vessels and another of its newbuilds has just entered the water at the Polish Remontowa Shipyard in the Baltic port of Gdansk. The Salish Class vessel is the fourth on order and will operate around the port city of Vancouver. BC Ferries said that unnamed vessel was still in the process of being constructed and finished and was not expected to be ready to commence sea trials off the Baltic coast during late 2021 before making its way to the Pacific Coast of Canada. "Following successful sea trials, the vessel will make the 10,440 nautical mile journey from Gdansk to British Columbia in early 2022 for final preparations," said BC Ferries.

The new 107-metre-long vessel will be used to serve the Southern Gulf Islands in the Strait of Georgia between Vancouver Island and the BC mainland from 2022. The vessel's entry into service would retire the 1965-built and diesel-fuelled "Mayne Queen". The new LNG-powered ferry will have the capacity to carry at least 138 vehicles and up to 600 passengers and crew. BC Ferries noted that it had issued a Request for Expressions of Interest for the construction of the series vessels to leading shipyards in Canada and around the world in July 2018.

Canadian shipyards were invited to participate in the competitive bidding process. "BC Ferries received responses from 16 international shipyards and short-listed three shipyards to proceed to the Request for Proposal (RFP) stage. No Canadian companies submitted a bid," it added. The dual-fuel ferries are capable of running on LNG or ultra-low sulphur diesel. "Using primarily LNG to fuel the new ship will result in reduced emissions and reduced costs for BC Ferries," stated the company. The new ferries were part of the company's move towards a sustainable future by adopting LNG. "In partnership with the First Peoples' Cultural Council, BC Ferries will commission an artist to create designs for the new Salish Class vessel," it added. BC Ferries had announced the successful launch of its third battery electric-hybrid Island Class vessel in October 2020 at the Damen Shipyard in Galati in Romania. Following successful sea trials, the vessel will make its way to Point Hope Maritime in the BC capital of Victoria in the third quarter of 2021 for final preparations. The yet-to-be named ship is the fourth in a series of six Island Class vessels joining the BC Ferries fleet, and the second assigned to the Campbell River -Quadra Island route. Two-ship service is scheduled to begin on the route in 2022, replacing the larger "Powell River Queen".

BEACH ENERGY, the Australian exploration and production company, and Mitsui and Co. of Japan have taken a positive final investment decision for stage-two development of the Waitsia onshore natural gas field that will contribute to equity LNG production in Western Australia by 2023. Beach and Mitsui each own 50 percent of the venture and the operator of the Waitsia field in the onshore Perth Basin is Mitsui subsidiary, Mitsui Exploration and Production (Australia). Beach and Mitsui said they had finalized and signed key commercial agreements with the North West Shelf LNG plant shareholders, the State of Western Australia and the pipeline and project company, Australian Gas Infrastructure Group (AGIG).

The Beach-Mitsui venture and Woodside Petroleum subsidiary, Woodside Burrup Pty Ltd, with gas from the Pluto gas fields, become the inaugural third parties to sign binding commercial access agreements with the North West Shelf LNG partners. The six NWS LNG partners are Australia's Woodside and BHP, UK major BP, Chevron Corp., Royal Dutch Shell and a Japanese partnership comprising Mitsubishi Corp. and Waitsia gas shareholder Mitsui. "First equity LNG sales from Waitsia Stage 2 are expected to commence in in the second half of 2023," said a statement from Beach. "The Gas Processing Agreement and related agreements signed with the NWS LNG will enable up to 1.5 million tonnes of LNG per annum - 0.75MTPA of LNG to Beach) of Waitsia gas to be tolled and processed into LNG through the NWS facilities in Karratha between the second half of 2023 and the end of 2028," stated Beach.

Beach and Mitsui will each market their respective LNG equity interest independently of the NWS LNG plant partners. Beach Managing Director Matt Kay said the approval of the project delivers on a core element of Beach's five-year growth strategy aimed at delivering annual production of more than 37 million barrels of oil equivalent by 2025. "Waitsia is a world class, low cost, onshore gas resource and we are thrilled to be growing the Beach portfolio in Western Australia," Kay explained. "We believe the project offers material value to Beach's shareholders and, through the agreement to export through the North West Shelf facilities, makes Beach an LNG player for the first time in the company's 60-year history," stated Kay. "In addition to royalties, Waitsia will deliver approximately two hundred jobs for Western Australians through the development of our resources, construction of the new gas facility and its ongoing production," he stated.

The Waitsia gas development involves the drilling of up to six wells, construction of a new gas processing facility, planned with preferred contractor Clough Ltd, and associated gas gathering infrastructure. Total capital expenditure to first production is expected to be within the range of A$700M (US$530M) and A$800M, with funding to be supported from the company's operating cash flows and facilities. Delivery of gas to the NWS facilities will occur via the Dampier-Bunbury pipeline. The pipeline connection to the Waitsia facilities is already in place, following its construction as part of the Waitsia Gas Project Stage 1 expansion, announced in July 2019. The Waitsia partners have also entered into a DCA with the State of Western Australia, which includes the approval to export up to 7.5MT of LNG until the end of calendar year 2028. That accord specifies domestic gas marketing obligation of 20 terajoules per day during the export period, which they are currently meeting through their existing gas sales from the Waitsia Gas Project Stage 1 facilities and the Xyris gas processing plant. Other agreements signed by Beach and Mitsui include a Project Development Deed with the State of Western Australia, as well as accords with NWS LNG relating to gas processing, tie-ins, product allocation and cargo lifting and offtake.

CHART Industries, the US LNG equipment-maker and industrial gas company, has completed its acquisition of Sustainable Energy Solutions to offer carbon-capture for projects along with its LNG storage, transportation and liquefaction products. Chart purchased the firm for its trade-marked Cryogenic Carbon Capture (CCC) technology, which eliminates most emissions from fossil fuels while enabling better use of intermittent renewables through grid-scale energy storage. Coupling with SES's CCC technology with Chart's LNG and liquefaction equipment enables the Atlanta-based company to offer "one-stop" solutions offering. The new CCC technology can be matched up with Chart's air-cooled heat exchangers, brazed aluminum heat exchangers, IPSMR® refrigeration-liquefaction system and cryogenic storage and transport equipment.

Chart also explained that effective from the company's year-end and fourth-quarter earnings, Chart will report results in four segments: Heat Transfer Systems, Cryo Tank Solutions, Specialty Products and Repair, Service & Leasing. The SES results will be included in the Specialty Products division, which, in addition to carbon and direct air capture, includes areas such as hydrogen, over-the-road trucking, water treatment and molecules by rail. Chart said that these markets represent total addressable near-term potential of $4.3 billion for existing Chart equipment and technologies. "I am excited to complete the SES acquisition before year-end 2020, as our pipeline of carbon and direct air capture commercial opportunities for 2021 and 2022 is growing," said Jill Evanko, Chart's CEO. "We welcome Larry Baxter, Andy Baxter and the entire SES team to the Chart family," stated Evanko.

CHIYODA Corp., the leading Japanese energy and liquefied natural gas engineering company, said revenues fell while profits rose as it completed its work on the US Cameron LNG plant in Louisiana, while proceeding with two

other projects, Golden Pass in Texas and the Tangguh LNG expansion in Indonesia. Fiscal second-quarter revenues fell to 161.5 billion yen ($1.54Bln) from 174.9Bln yen in the same three months of 2019. Profits in the quarter rose to 5.8Bln yen ($55.5 million) from 4.8Bln in the year-ago period. "Cameron LNG's third and final Train was completed in July 2020, and the project was successfully handed over to the customer," said Chiyoda.

The Japanese company said it expected final investment decisions for large-scale overseas projects in the second half of this fiscal year. Chiyoda forecast full year-end revenues of 280Bln yen, up 58 percent and profits rising 83 percent to 7Bln yen compared with the previous fiscal year. Chiyoda noted that it was currently involved in two ongoing LNG export ventures. This first is the Tangguh LNG expansion in the BP-operated Indonesian liquefaction plant, where Chiyoda is working with two partners, Saipem of Italy and local firm Tripatra. The Tangguh venture, including the building of a third Train, was 88 percent complete. Offshore gas production facilities in the Papua Barat Province of Indonesia are also being modified and a Train with liquefaction capacity of 3.8 million tonnes per annum is under construction. "The scheduled completion date for Tangguh is the third quarter of 2021," said Chiyoda.

Chiyoda is also part of the consortium transforming the existing Golden Pass LNG import terminal in Texas into an export plant for Qatar Petroleum and ExxonMobil. It estimated that Golden Pass was 19 percent complete as engineering, procurement and site construction continued. Its engineering partners are US companies Zachry Group and McDermott International and the three expect to complete the plant by 2025.

CROATIA duly became the latest LNG importing nation at the start of January with a shipment from the US, while Balkan neighbour and aspirant EU country Serbia started up its new Russian natural gas pipeline route from Gazprom on January 1. The first Croatian LNG shipment was possible via a floating storage and regasification unit, "LNG Croatia", located offshore the Adriatic island of Krk and which began processing a cargo delivered by the 155,000 cubic metres capacity vessel "Tristar Ruby". The cargo had been lifted by the Dubai-owned LNG carrier on December 19 from the US Cove Point export plant in Maryland. "The first LNG carrier successfully moored in the special purpose port of the terminal," said the Croatian facility's owners. "After all tests and safety checks were performed, LNG cargo transfer procedures from the LNG carrier to the FSRU vessel 'LNG Croatia' started," explained the statement. "The unloading is lasting until January 3, 2021, after which the tanker 'Tristar Ruby' will leave the terminal area and the special purpose port. This activity marks the start of terminal commercial operations, in accordance with the planned deadlines," added LNG Croatia LLC, the joint venture running the terminal and also involving founder partners, Croatia Elektrprivreda and Plinarco Ltd.

The US cargo delivery from Maryland formally made Croatia an LNG importing nation and the 39th country to receive a cargo from the US since exports started in the Lower 48 States in February 2016 from the Sabine Pass plant in Louisiana. The Croatian import facility is capable of delivering gas to the Croatia's national transmission network, connected with Slovenia, Italy and Hungary, as well as to other countries. The Krk terminal diversifies natural gas supply for Croatia, which has so far relied on Russian pipeline gas from Gazprom and its own limited production. Croatia's LNG debut coincided with neighbouring Serbia receiving supplies from Gazprom on New Year's Day via a new route across Turkey

and Bulgaria, which will also supply Bosnia and Herzegovina.

Natural gas from Gazprom is delivered by the TurkStream gas pipeline stretching across the Black Sea from Russia to Turkey and with design capacity is 31.5 billion cubic metres per annum. The supply route crosses from Turkey via Bulgaria's national gas transmission system to Serbia, where it has been distributed since January 1 among consumers in Serbia and in Bosnia. Deliveries along this route were made possible through the expansion of existing gas transmission capacities and the commissioning of new ones by Bulgartransgaz in Bulgaria and Gastrans Novi Sad in Serbia. "TurkStream is an efficient and reliable gas pipeline that is in high demand from European consumers," said Gazprom Chairman Alexey Miller. "The number of European countries receiving Russian gas via TurkStream has grown to six," added Miller. "Along with Bulgaria, Greece, North Macedonia and Romania, this opportunity is now available in Serbia and in Bosnia and Herzegovina," he stated.

DESFA, the Greek gas transmission system operator whose main shareholders are the gas utilities of Spain and Italy, said it was awarded the contract for operating and maintaining the new onshore liquefied natural gas import terminal under construction in Kuwait and set to start up in 2021. DESFA outbid six other parties short-listed by Kuwait Integrated Petroleum Industries Company (KIPIC) for its new LNG terminal at Al-Zour, an expanded centre for the petrochemicals industry, located some 90 kilometres south of Kuwait City. DESFA is owned by the Spanish gas grid operator and import terminal owner, Enagás, and Italian terminal operator and utility Societa Nazionale Metanodotti (Snam). They bought a majority stake in DESFA from Greece in 2018 as the government sought to balance its books during the financial crisis.

Snam operates two Italian LNG import terminals, the "FSRU Toscana", moored 22 kilometres off the Italian coast between the cities of Livorno and Pisa, and the onshore Panigaglia facility in the northwest near the port of Genoa. Enagás is the owner of four LNG regasification terminals in Spain and has stakes in two others in South America. "The high specialization and know-how of DESFA and of the shareholders Snam and Enagás, who will jointly perform the services, made a decisive contribution to tendering for project," said the Greek company. "The experience gained by DESFA from managing the Greek transmission system and the LNG terminal in Revithoussa, also counted," it added. Snam is already active in the Middle East and recently joined a consortium with four equity funds based in North America and Asia to complete the acquisition of 49 percent of Abu Dhabi National Oil Company (Adnoc) Gas Pipelines. The Al-Zour LNG terminal is one of the largest LNG storage and regasification facilities in the world. It has eight storage tanks, each with 225.000 cubic metres of capacity.

The terminal, in addition to providing natural gas for petrochemicals production, would also meet the growing needs for cleaner fuel and gas-fired electric power in Kuwait. Nicola Battilana, Chief Executive of DESFA, said the Kuwaiti contract was a boost for the Greek utility and gave it a more international dimension. "The undertaking of the project for the provision of operation and maintenance services of the KIPIC LNG terminal by DESFA follows the strategic decision of the company to participate in more international projects," added Battilana. "With this development, DESFA acquires a presence in the Arab world and, in fact, in one of the most impressive projects in the region, which will bring significant financial benefits, as well as top technical experience to the organization," stated the DESFA CEO. The Greek company noted that the Kuwait project adds to DESFA's more competitive position in the region of southeast Europe, where it has taken a stake in the Alexandroupolis floating LNG project to provide a gas hub for eastern Greece and the Balkans.

GHANA was scheduled to become the latest LNG importer by early 2021. The Emerging Africa Infrastructure Fund (EAIF) said it had agreed a loan deal with a project company in West Africa, adding the last block in a financing arrangement for a floating LNG terminal at the port of Tema in Ghana, which has almost been completed. The EAIF is backed for development financing by the governments of the Netherlands, the UK, Sweden and Switzerland as well as finance institutions, private banks and institutional investors. It said US$31million was being lent to the Access LNG project at Tema, near where several power stations are located and are switching from light cycle oil (LCO) and heavy fuel oil (HFO) to natural gas.

Access LNG is a joint venture between Helios Investment Partners, a leading Africa focused private investment firm, and Gasfin Development, an LNG infrastructure company. Gasfin as a partner in the Tema LNG terminal venture said that it expected the facility to be commissioned in late 2020 or early 2021. Gasfin has led the design of the entire project and the fabrication of the floating infrastructure with capacity to deliver 2 million tonnes per annum of LNG. "We are extremely proud of our involvement with Access LNG and to have earned the trust and support of EAIF for this ground-breaking project," said Roland Fisher, a director at Gasfin. "As with all infrastructure developments, the new LNG terminal at Tema has required the concerted effort and alignment of multiple stakeholders to achieve success," added Fisher. The Tema project is designed around a Floating Regas Unit (FRU) working in conjunction with an upgraded 127,500 cubic metres capacity LNG carrier, which will act as floating storage, to deliver 250 million standard cubic feet per day of gas.

The Tema project will also have bunkering, reloading and break-bulk capabilities. The terminal will receive some LNG from Royal Dutch Shell under an agreement with Ghana National Petroleum Corp. The fixed infrastructure portion of the project has been in the construction phase since 2018 and was funded under a separate financing package, covering a breakwater, mooring facilities, a subsea pipeline and an eight-kilometres onshore pipeline to take the gas from the port to Tema's industrial area. "The new terminal at Tema is an innovative approach to securing reliable and cost-efficient gas supply," said Martijn Proos, a director at EAIF. "The investment by EAIF will contribute to reducing carbon emissions, contributing to Ghana's long-term energy needs and strengthening its economic stability and economic development efforts," he explained. "The project gives local and international power and industrial sector investors added confidence in the future of the country, which is good for jobs, good for business, good for communities and good for Ghana," stated Proos.

Ogbemi Ofuya of venture stakeholder Helios Investment said his firm has worked with the EAIF over many years on the financing of projects. "We have benefited from its deep knowledge of Ghana's energy sector and its expertise in port infrastructure developments, gained in other parts of Africa," added Ofuya. "Our project at Tema positions the energy sector in Ghana for both growth and environmental sustainability so that when the world recovers from Covid-19, Ghana will have the energy infrastructure needed to help it compete," stated Ofuya.

GASLOG Ltd, the Greek LNG fleet owner with 35 carriers split with its US affiliate GasLog Partners, reported an increase in third-quarter profits of more than 13 percent as overall revenues slipped because of the expiry of several charters, offset by new agreements in US and UK. The company posted quarterly profits to the end of September of $10.11 million compared with $8.88M in the prior-year period. Revenues were $156.7M for the quarter versus $165.6M for the same three months of 2019. "It was attributable to a decrease of $23.7M from the vessels owned by GasLog's subsidiary, GasLog Partners LP, and mainly due to the expiration of the initial multi-year time charters of the "Methane Jane Elizabeth", the "Methane Alison Victoria", the "Methane Rita Andrea", the "Methane Shirley Elisabeth" and the 18-month time charter of the "GasLog Sydney", the company explained.

GasLog also reported that during the third quarter it took delivery of the "GasLog Westminster", a 180,000 cubic metres capacity carrier with X-DF propulsion and a Mark III Flex containment system. The ship also commenced a seven-year time charter to UK utility and LNG market player Centrica Plc. GasLog added that the company expected to take delivery soon of the "GasLog Georgetown", the first of four vessels to be delivered into multi-year charters with Cheniere Energy, the largest US LNG exporter. GasLog is now based in the Greek port of Piraeus after moving its headquarters a year ago, in November 2019, from Monaco to improve efficiency and to reduce overheads.

On the financing front, GasLog reported the refinancing of all debt to mature in 2021 with four new credit facilities representing a total of around $1.1 billion, strengthening the balance sheet and delivering $30.2M of incremental liquidity. "GasLog progressed on several strategic initiatives during the third quarter, a testament to the

resiliency of our business model," said Peter G. Livanos, Chairman of GasLog. "Our fully contracted newbuilding program continues to deliver on time and on budget," he added. "Our operating and overhead expenses have been reduced considerably with an eye towards further improvement. The group's liquidity has been further bolstered following a sale-and-leaseback with a leading Chinese lessor," stated Livanos.

GasLog noted in its LNG shipping market overview that as of the start of November 2020, the newbuild order book totalled 118 dedicated LNG carriers. The newbuilds represent 22 percent of the on-the-water fleet and of these a total of 83 vessels, or 70 percent, have multi-year charters. A total of 28 LNG carriers have been ordered in 2020, all for long-term business with no vessels were ordered on a speculative basis.

GIIGNL, the France-based International Group of Liquefied Natural Gas Importers, has elected former Gaz de France and Cheniere Energy LNG executive Jean Abiteboul as its new President during its annual General Assembly. Abiteboul succeeds Jean-Marie Dauger, who had held the position since 2016. New President Abiteboul's career started in 1975 with the French utility, Gaz de France, which has now transformed into Engie. The GIIGNL constitutes a forum for exchange of information and experience among its 86 members in 27 countries with the aim of enhancing the safety, reliability, efficiency and sustainability of LNG import activities and in particular the operation of regasification terminals.

Abiteboul's later Gaz de France positions included Executive Vice-President for Supply, Trading and Marketing, President of LNG carrier unit Gaselys and International Executive Vice-President. In 2006, he left Gaz de France to become Senior Vice President International of Cheniere Energy and played a key role in concluding the long-term sale contracts necessary for obtaining the financing of the Sabine Pass LNG export project in Louisiana, and later of the Corpus Christi liquefaction plant in Texas. In 2010, he was appointed President of Cheniere Marketing, a position he occupied until his retirement in November 2016. "I look forward to serving GIIGNL, which plays a key role in advancing the LNG industry and in promoting LNG as a responsible solution for a sustainable energy future," said Abiteboul. The GIIGNL, whose headquarters are in Paris, publishes one of the most authoritative annual reviews in the industry and in the 2020 edition noted that at the start of the year eight new floating terminals and 18 onshore terminals were under development.

GOLAR LNG, the operator of conventional carriers, floating import and export terminals and a power affiliate backed by its fleet of 27 ships, is expanding its floating LNG relationship with US processing technology firm Black and Veatch into activities such as "green" LNG and hydrogen. Golar offers its experience of delivering and operating low-cost floating LNG infrastructure while B&V, based in Overland Park in Kansas, is a leading provider of LNG technology, particularly for topsides of floating LNG production hulls. "Within 2020, Golar and B&V intend to jointly publish a 'thought leadership paper' on our first area of interest for collaboration, floating ammonia production with carbon capture and storage (Floating Blue Ammonia)," said a statement.

Golar also operates with its Golar LNG Partners affiliate whose fleet comprises 10 vessels, including conventional carriers, FSRUs and the converted floating liquefaction hull the "Golar Hilli Episeyo" operating offshore Cameroon. Another hull of an older LNG carrier is being converted for an FLNG project offshore Mauritania and Senegal in West Africa. In subsequent months, Golar and B&V intend to focus on the technical and commercial viability of the most prospective floating applications of the green and blue technologies and areas of interest they intend to investigate. Any project development and implementation that followed the initial studies would be subject to a separate commercial agreement between the two companies. "Replacement of coal, fuel oil and diesel with cleaner burning LNG represents one of the easiest and most cost-effective near-term steps to decarbonize the worlds energy mix," explained Golar Chief Executive Iain Ross.

Golar, whose shareholders include more than 15 major global investment banks and funds, many based in New York, also has a joint venture, formerly known as Golar Power but now called Hygo Energy Transition, with the fund Stonepeak Infrastructure Partners. Its activities are centred on northeast Brazil, including a project in Sergipe, the smallest Brazilian state. Hygo Energy has also signed an accord with the Brazilian state government of Pernambuco to develop an LNG import terminal in the Port of Suape. Additionally, Hygo Energy recently appointed a new Chief Executive to replace the previous incumbent who decided to step down after being caught up in a Brazilian corruption investigation.

Hygo Energy subsequently named Paul Hanrahan, the former President and CEO of power producer and LNG terminal owner AES Corp. from 2002 to 2011, as the new CEO to replace Eduardo Antonello. Golar LNG CEO Ross explained that the shipping company and Hygo Energy were well positioned to expand on their quick delivery infrastructure solutions and emerging use of bio LNG, made from waste flows. "Golar looks forward to working with a likeminded and equally capable partner, in the field of floating ammonia and hydrogen production, carbon capture, and other decarbonisation initiatives," stated CEO Ross. Hoe Wai Cheong, President of Black & Veatch's oil and gas business, said the new collaboration builds on years of delivering commercial and technology innovation with Golar in monetizing natural gas reserves. "Given hydrogen and ammonia's use in many energy-intensive industries we can make meaningful progress in lowering the carbon footprint and help these industries meet new sustainability commitments," stated the head of B&V oil and gas.

HOEGH LNG, the Norwegian LNG carrier fleet operator and floating import terminal project developer, reported stable third-quarter profits as one of its vessels resumed a floating import role at the port of Tianjin in northeast China, while the company was also in line for at least seven other ventures in Australia, the Indian Subcontinent and the Philippines. Hoegh gave its business update in an earnings statement showing third-quarter profits of $81.77 million compared with $82.16M in the same three months of 2019. "I am pleased to report that Hoegh LNG delivered a quarter with stable operations, as shown by a technical availability of close to 100 percent and zero Lost Time Injuries (LTIs) despite the challenging circumstances created by the Covid-19 pandemic," said President and Chief Executive Sveinung J.S. Stohle. "The business development activity level was high in the quarter, and important progress was made both on projects in the existing pipeline, but also on new potential projects," added Stohle.

The company said that the fleet delivered a stable operating performance in the quarter with no off-hire experienced. During the quarter the "Hoegh Esperanza" was located at the port at Tianjin, China, where it operated as a Floating Storage Unit. "The vessel then started floating storage and regasification unit (FSRU) import operations again on the 31st of October 2020," stated Hoegh. Hoegh said its primary objective was to secure more long-term FSRU contracts by the end of 2021 for all the units currently trading on short-term conventional carrier contracts. The company said that after being shortlisted in July 2020 as a bidder for First Gen Corp.'s interim offshore LNG terminal in the Philippines, Hoegh was formally invited to the final tender round for the FSRU in October. "First Gen LNG's parent company has announced receipt of a permit from the Department of Energy, authorising the construction of the project," Hoegh noted.

Hoegh said it was still hopeful of other contracts in Australia. The Australian Industrial Energy (AIE) project announced in October that developer Squadron Energy was now the sole owner of AIE after having acquired the shares in the project of joint venture partners JERA Co. Inc. and Marubeni Corp. of Japan. "The agreements between HLNG and AIE remain unaffected and in place," said the company. Also in Australia, AGL Energy's (AGL) project at Crib Point in the state of Victoria is continuing the environment effects statement process which is expected to be completed during the first half of 2021. In Cyprus, where Hoegh applied for a licence to install an LNG import terminal in April 2020, the group is assessing levels of interest among both national authorities and independent power producers. Hoegh said it was also short-listed for a project in Latin America which aims to confirm the FSRU supplier and agree detailed terms by the end of 2020. "This project is making good progress and expected to reach a final investment decision (FID) by the first quarter of 2021," said the company.

In the Indian Subcontinent, Hoegh added that it was currently involved in two FSRU projects where it has exclusivity in one and is in a formal tender process for the other. Hoegh has entered into a binding commitment to

supply H-Energy, part of the Indian Hiranandani Group, with an FSRU at the port of Jaigarh from as early as the first quarter of 2021. Jaigarh is south of Mumbai in Maharashtra state in India. "The final agreement will be for 10 years with annual termination options after year five. Hoegh will allocate one of its available FSRUs currently trading in the LNG carrier market for the project," said the company. "After some delays caused by Covid-19, both these projects are expected to reach FID by the first quarter of 2021," it added. In addition to these projects, Hoegh said it had a "healthy pipeline of others" at various stages of development, including several short-term FSRU contracts which have short lead times and could contribute to increased contract coverage in 2022.

JGC Corp. of Japan, one of the leading global LNG engineering companies, reported a 12 percent drop in quarterly profits because of market challenges, though reported good progress on the LNG Canada project in British Columbia and was hopeful of new contracts in Qatar and Oman. JGC reported fiscal second-quarter profits of 3.9 billion yen ($36.16 million) compared with $4.4Bln yen in the same three months a year ago. The company, based in Yokohama, has been an industry leader in the construction of LNG production plants in countries such as Australia, Malaysia, Qatar and Russia. JGC's quarterly net sales also declined to 199.4Bln yen ($1.89Bln) from 218.3Bln yen in the prior-year period.

JGC noted that the slowdown in the industry caused by Covid-19 and the oil prices slump had led to delays in final investment decisions. Its outstanding LNG contracts in progress amounted to 555.5Bln yen ($5.28Bln) and included LNG Canada for Royal Dutch Shell and its Asian partners. JGC's joint venture engineering partner is Fluor Corp of the US. "Our progress included the insertion of piling and the completion of the shipment to the site near Kitimat of major equipment," said JGC. The company's other ongoing project is the Coral Floating LNG contract offshore Mozambique for Italian energy company Eni.

JGC said it was still hopeful for contract awards in the months ahead for the Qatar LNG expansion and the LNG bunkering project in the Sultanate of Oman in the Arabian Peninsula. Non-LNG work includes a gas separation plant contract in Saudi Arabia and a new oil refinery modernization in Iraq. "The operating results are in line with the full-year forecast. We have an unchanged outlook concerning the impact of Covid-19 on construction profitability," said JGC. "Our strong financial base is maintained," it added. In its outlook for the rest of the fiscal year, JGC said the market environment remained uncertain. "We will focus on projects likely to proceed and aim for further growth. Several expected projects have been postponed to next fiscal year," said the company. "It will be difficult to attain the target. To lay the groundwork for the future, we will focus on securing FEED orders for projects materializing in the next fiscal year onward," it stated.

KOSMOS ENERGY, the US shareholder in the floating LNG projects offshore the West African nations of Mauritania and Senegal, said in its third-quarter earnings that the ventures were making good progress, while the company posted a net loss. Kosmos is developing FLNG production under the Greater Tortue Ahmeyim project with UK major BP and in the three months to the end of September 2020, the Dallas, Texas-based company generated a net loss of $37 million versus a $16.06M profit in the year-ago quarter. The Kosmos nine-month losses rose to $419.54M compared with a loss of $20M in the same period of 2019. Its third-quarter revenues were $225M, or $41.05 per barrel of oil equivalent, and production expenses came to $84M, or $15.39 per boe. "In Mauritania and Senegal, the partnership continues to make good progress with Phase 1 of the Tortue project expected to be around 50 percent complete by year-end," explained Chairman and Chief Executive Andrew G. Inglis. "The operator (BP) has put significant effort into optimizing Phase 2, which we believe is now the most competitive brownfield LNG expansion globally," said Inglis. "With the prospect of enhanced future returns, now is not the optimal time to reduce our interest in the project and we have established a financing path which funds Kosmos's capital obligations to first gas," he revealed. "This enables Kosmos to retain its current equity stake through to production. With lower costs and an improving LNG market backdrop, the Tortue project is expected to provide an excellent return on investment for Kosmos," stated the CEO.

Kosmos added that by targeting expansion to 5 million tonnes per annum of LNG output and leveraging all the major infrastructure from Phase 1, capital costs for Phase 2 have been reduced and the expected returns from the project enhanced. To fund its current Mauritania-Senegal FLNG interests, Kosmos has established a financing path for its capital obligations to first gas. "Kosmos and BP are engaged in the sale of the floating production storage and offloading (FPSO) unit to a Special Purpose Vehicle (SPV) which we plan to close in the first quarter of 2021 for the capital costs paid so far, which total approximately $160M net, and with the FPSO leased back to the project," said Kosmos. "The SPV is expected to take on the future capital obligations for the FPSO, meaning Kosmos's obligations are reduced by a further $160M, it added. "In addition, Kosmos intends to re-finance the national oil company loans with commercial banks in 2021, which should result in a reimbursement of an additional $100M to Kosmos," stated the company.

The funds provided from these two activities are expected to fund Kosmos's capital obligations in Mauritania and Senegal through 2021. The outstanding capital balance for Phase 1 is planned to be funded by a direct investment in Kosmos's Mauritania and Senegal position with Phase 2 largely funded through Phase 1 cash flows. Kosmos plans to secure this financing by the middle of 2021. The US company's other main operations are offshore Ghana and Equatorial Guinea in West Africa and in the Gulf of Mexico. Kosmos said that with the recently announced Gulf of Mexico financing facility and frontier exploration asset sale to Royal Dutch Shell, it had also taken additional steps to bolster the balance sheet and have ample liquidity to navigate the current period of low and volatile commodity prices.

LIQAL, the Netherlands-based LNG technology developer, said signed an agreement with German engineering, procurement and construction company Flüssiggas-Anlagen GmbH to supply turnkey, high-performance fuelling stations for the German market. "LIQAL and FAS are committed to supporting the transition to LNG and bio-LNG across Europe and to contribute to a greener and cleaner transport sector," said a statement. "The agreement will strengthen collaboration between these European LNG players in one of the largest markets in Europe," they added. The market for LNG as a transport fuel is growing strongly in Germany, due in part to stable tax schemes and a road-tax exemption for LNG-powered trucks until the end of 2023.

Based in Salzgitter in the German state of Lower Saxony, FAS provides project and permit preparations, and installation and servicing solutions for LNG filling stations. The German company has 40 years of experience in the installation of gas service stations and have a large, established network of service staff to carry out regular maintenance. "By working in collaboration with local partners throughout Europe, we can contribute faster to the ultimate goal of switching from polluting diesel to cost-effective LNG and bio-LNG, to help meet Europe's climate goal targets," said LIQAL Chief Executive Jorg Raven. Both companies said that the joint marketing and development of LNG fuelling systems in Germany is key to their new partnership.

They added that they recognize the importance of cross-border cooperation to deliver and expand the network of LNG refuelling stations for heavy road transport operators and truck drivers. "The combined efforts of FAS and LIQAL will allow German gas and transportation companies to provide a full range of services at the highest technological level, in the shortest possible time.," said FAS Director Alexander Schneider. "This cooperation will undoubtedly have a positive impact on the development of the German LNG refuelling station sector," added Schneider. LIQAL, whose headquarters are in the Dutch city of Breda, stated that it expected to have its first physical presence in the German market at the beginning of 2021, through the delivery of several LNG filling station projects that are currently in production. "As Germany scales up to respond to LNG demand and adapt to the energy transformation, both companies are looking forward to a successful and fruitful collaboration," added LIQUAL.

LLOYD'S REGISTER, the UK maritime classification society, has approved a design by a South Korean shipyard for a mid-scale LNG carriers of 30,000 cubic metres capacity with prismatic IMO Type-B storage tank design. The UK class society gave the approval in principle (AiP) for the vessel to Hyundai Mipo Dockyard (HMD), based at the Korean port of Ulsan. Korea Shipbuilding & Offshore Engineering

(KSOE) is the Hyundai Group holding company for three main yards. These are Hyundai Heavy Industries, Hyundai Mipo Dockyard and Hyundai Samho Heavy Industries.

The 30,000 cubic metres capacity LNG carrier design was the result of a joint development project (JDP) between the LR and HMD launched in January 2020. Under the JDP, the UK firm's role was to review the suitability and risks of the design which involved a structural design assessment and fatigue design assessment. This included a crack propagation analysis and a design review in accordance with the latest applicable LR Class Rules and Guidance and IMO regulations, which resulted in the AiP. The International Maritime Organisation has defined three basic LNG tank types, in addition to membrane tanks. They are the IMO Type-A and Type-B tanks, which are non-pressurized, with Type-A employing a prismatic design and full secondary barrier, while the Type-B tank has a spherical design with a partial secondary barrier.

The IMO Type-C tanks is also pressurized and is also generally used on smaller vessels. "Based on LR's certification, we will continue to respond to the strengthening of environmental regulations by IMO, while also pioneering this new LNG carrier design," said HMD design division managing director Young Joon Nam. "Through this AiP, we have developed innovative technology that applies to an IMO type B cargo tank, which offers high space utilisation to the LNG carrier," added Young. "Our design is also expected to gain a competitive edge in terms of its scalable applicability towards the mid-sized LNG carrier market," he stated. Young Doo Kim, the LR northeast Asia technical support office manager, said he was pleased to award the approval. "With the maritime industry focused on ensuring safety and efficiency, it's important we look at alternatives such as the IMO type-B tank, which not only helps shipowners and operators optimise space onboard but also supports the industry's wider emissions ambition," he added.

MCDERMOTT International was awarded a contract to provide front-end engineering and design services for the Ichthys liquified natural gas field development of Japanese energy firm Inpex Corp. offshore Western Australia. The Houston, Texas-based company said the award was for a booster compression module with optional engineering, procurement and construction (EPC) for the project. The booster compression module will be added to the Ichthys LNG central processing facility, located offshore the northwest coast of Western Australia. "This award illustrates McDermott's continuing expertise in complex offshore EPCI," said Ian Prescott, McDermott's Senior Vice President, Asia Pacific. "Our work to date demonstrates our qualifications to deliver smart solutions in challenging environments - and to the highest safety and technical standards," stated Prescott.

McDermott has been a long-standing operator in the Asia-Pacific energy market as well as being involved in the US Gulf Coast LNG export plant build-out. McDermott is also undertaking subsea umbilicals, risers and flowlines (URF) as part of an expansion of the existing Ichthys LNG facilities. Engineering will be completed in McDermott's Asia-Pacific headquarters in Kuala Lumpur, Malaysia, and was already underway. Inpex is operator of the onshore Ichthys plant at Bladin Point near Darwin in Australia's Northern Territory. The company also has a stake in Royal Dutch Shell's Prelude FLNG project offshore northwest Australia, as well as the planned development of an onshore plant in Indonesia.

The Australian Ichthys plant came on stream in 2018 and produces almost 9 million tonnes per annum of LNG from two processing Trains. Shares in Ichthys LNG held by Inpex amount to around 66 percent of equity, while French major Total has 26 percent. Micro-stakes are additionally held by customers CPC Corp. of Taiwan and Japan's main utilities and LNG buyers, JERA Co. Inc., Tokyo Gas, Osaka Gas, Kansai Electric and Toho Gas.

PEMBINA Pipeline Corp., the Canadian infrastructure company, said there was still uncertainty surrounding the future of its Jordan Cove LNG export project in the northwest US state of Oregon as Pembina planned to take a natural gas pipeline one-off charge in the fourth quarter. Pembina, based in Calgary in the Canadian province of Alberta, said the existing tariff rate on firm contracts on the Ruby Pipeline that expire in mid-2021 are well in excess of the current spot rates. "As such, based on the upcoming expiries and prevailing interruptible tariff rates, along with Rockies basin fundamentals, and the ongoing uncertainty with respect to the timing of the ultimate approval of the Jordan Cove LNG Project, which would ultimately be expected to utilize capacity on the Ruby Pipeline, Pembina expects to take a material impairment on its investment in Ruby," explained Pembina.

The impairment will be in the fourth-quarter 2020 earnings when they are issued in early 2021. The pipeline and project company said that as of the end of September 2020, the carrying value of Pembina's investment in the Ruby Pipeline was C$1.3 billion (US$1.02Bln). Pembina owns a 50 percent convertible and cumulative preferred interest in the Ruby Pipeline, which provides for distributions of US$91 million annually. Ruby Pipeline has approximately one billion cubic feet per day of capacity under firm contracts, which expire in 2021 and 2026. Ruby is a Federal Energy Regulatory Commission regulated interstate pipeline delivering natural gas from the Opal Hub in Wyoming to the Malin Hub in Oregon, on the California border. Analysts note that the market conditions are challenging with significant risk from the financial troubles of Pacific Gas and Electric Co. in California, the pipeline's largest customer. "Ruby has served as a reliable source of natural gas supply for the California market, with throughput averaging nearly 700 million cubic feet per day since the beginning of 2018," explained Pembina. "Furthermore, Ruby is a carbon-neutral pipeline and responsible source of natural gas supply to the Pacific Northwest region, providing optimism for its future value," stated the company.

Pembina said it still expected 2021 adjusted gross earnings of C$3.2 billion (US$2.51Bln) to $3.4Bln (US$2.7Bln) and a 2021 capital investment program of C$785 million. The Jordan Cove project includes the separate 230-mile Pacific Connector Pipeline which would traverse four counties in Southern Oregon on the route to the liquefaction plant. The liquefaction plant at Coos Bay and other facilities are planned for a 200-acre site and comprise five small-scale Trains each with 1.5 million tonnes per annum of output for a total of 7.8 MTPA. Jordan Cove has multiple facilities, including two full-containment storage tanks with total capacity of 320,000 cubic metres, gas treating infrastructure, an export jetty and access to more than 25 billion cubic feet per day of gas supply from Western Canada and the US Rockies. Feed-gas for Jordan Cove would be sourced at the Malin Hub, creating a new outlet for natural gas from areas such as the Rockies Basin. The export plant is expected to be visited by about 120 LNG carriers per year and Pembina has signed preliminary accords with Jera Co. Inc. and Itochu Corp. of Japan for the supply of cargoes. Pembina added that it was re-activating the Phase VII Peace Pipeline Expansion and Empress Co-generation Facility growth projects. The previously announced Phase VIII and IX Peace Pipeline expansions were designed to accommodate further customer demand in the Montney area of northeast British Columbia, by debottlenecking constraints, accessing downstream capacity, and further enhancing product segregation on the Peace Pipeline system. "While these two projects remain deferred, the initial contracts supporting the project are still in place and there remain strong indications of interest for incremental capacity," said Pembina. In its previous statement in mid-2020 on Jordan Cove, Pembina said regulatory processes were still ongoing. During the second quarter, the United States Department of Energy announced an issuance order authorizing Jordan Cove to export LNG from the proposed export terminal at Coos Bay in Oregon.

QATAR Petroleum and Pavilion Energy of Singapore have signed a 10-year LNG sale and purchase agreement for the supply of up to 1.8 million tonnes per annum to Singapore with each shipment having full greenhouse-gas quantification from well to discharge port. Their subsidiaries, QP Trading LLC and Pavilion Energy Trading and Supply, said the SPA would start from 2023. Each LNG cargo delivered under this agreement will be accompanied by a statement of its likely GHG emissions. The deal is the result of a tender that Pavilion Energy launched earlier in 2020. In addition to reliable and competitive long-term supply to Singapore, the tender sought a commitment from the supplier to co-develop and implement a GHG quantification and reporting methodology for LNG along its value chain.

Pavilion Energy said it expected this methodology to become standardised as a common industry framework via a statement of GHG emissions, paving the way towards more environmentally responsible and sustainable natural gas strategies. Saad Sherida Al-Kaabi, the Qatari Minister of State for Energy Affairs and President and Chief Executive of Qatar Petroleum said he was

pleased with the SPA after a competitive process. "The agreement reflects our commitment to respond to the needs of our customers, including supply security, price competitiveness and flexibility," Al-Kaabi declared. Pavilion Energy Chairman Mohd Hassan Marican noted that the inaugural LNG cargo Pavilion Energy imported into Singapore for downstream supply in 2018 originated from Qatar. "We are delighted to enhance our strategic relationship with Qatar Petroleum, the world's largest LNG producer," said the Pavilion Chairman. "This partnership will strengthen our core Singapore market and our role as a global energy trader," he stated.

During a signing ceremony, Frédéric H. Barnaud, Group Chief Executive of Pavilion Energy, said the deal illustrated the support of Qatar and Singapore for lower global emissions. "In the context of energy transition towards a low-carbon economy, this partnership is testament to the sustainability drive of both companies and the strong willingness of Pavilion Energy to pursue decarbonisation and offset strategies," added Barnaud. Pavilion Energy launched the world's first tender in March 2020 with carbon neutral ambitions. The methodology is expected to be developed based on internationally recognised standards.

ROYAL VOPAK, the Dutch global energy storage company, has joined with US major ExxonMobil, a leading LNG exporter, to study the liquefied natural gas import possibilities for South Africa to become an LNG importer to boost gas-fired power and clean energy availability. Vopak and ExxonMobil have signed a memorandum of understanding on studying the development of a South African regasification facility. So far no third-parties are involved in the process to make South African an LNG importing nation in the next couple of years. "The two companies will evaluate what infrastructure South Africa needs to access LNG. A shift to this resource would allow the country to take advantage of a reliable cost-effective fuel source, while also reducing emissions," said a joint statement.

Kees van Seventer, President of Vopak LNG, said teaming up with ExxonMobil would allow the development of resilient and efficient LNG infrastructure for South Africa. "With our presence of nearly 25 years in South Africa, we are committed to enhance Vopak's terminal network in the country with sustainable infrastructure solutions," added Seventer. Vopak is an experienced LNG terminal operator and has a 50 percent stake in the Dutch Gate LNG facility in Rotterdam with 540,000 cubic metres capacity of storage. It additionally has a 60 percent shareholding in the Mexican LNG terminal at Altamira in the Gulf of Mexico with 300,000 of tank capacity.

ExxonMobil is a global partner of Qatar Petroleum and has volumes of LNG for export in the three leading supply nations, Australia, Qatar and the United States. "ExxonMobil is excited to work with Vopak to evaluate innovative approaches to bring competitive LNG projects to South Africa," said ExxonMobil LNG Market Development President Irtiza Sayyed. Affiliates of ExxonMobil and Vopak signed the accord to work together on a feasibility study to assess the commercial, technical and regulatory aspects of an LNG terminal in South Africa. ExxonMobil and Vopak plan to evaluate the infrastructure critical for South Africa's needs and to take advantage of the benefits that LNG can bring to the country, including providing a reliable, cost-effective fuel source, as well as an option for reducing emissions. "These benefits can be achieved by repurposing older coal power plants, converting peaking power plants and securing supply for South Africa's industrial sector," they added.

SENER, the engineering and technology group in Spain known in the LNG industry for being a main contractor on the Dutch LNG import terminal in Rotterdam and other projects, has appointed Gabriel Alarcón, up until now General Manager of Technology and Innovation, as Managing Director of Sener Engineering, the area which handles the company's Infrastructure, Energy and Marine activities worldwide. Alarcón's career in Sener began in 1995, since which time, apart from a brief interval at France's Alstom, he has held various positions of responsibility in technical departments, project management, engineering management and general management.

Alarcón has a PhD in Mechanical Engineering from the Polytechnic University of Catalonia (UPC), where for the last 16 years he has worked as an associate professor in Aeronautical Engineering, Industrial Engineering, and Postgraduate programs related to Mechanical Engineering, noise and vibrations. He also has a postgraduate degree in General Management from the IESE business school. "While I do of course feel enthusiastic about taking on the new professional responsibilities with which Sener have entrusted me, in the current situation it is a challenge with an extra dose of excitement," said Alarcón. "I am proud to take on the role of Managing Director of Sener Engineering. We are faced with several circumstances that represent unique opportunities, and we will take advantage of them," he added. "We also have the best team of professionals in Sener's history, which is an impressive feat. We will renew our purpose in society through engineering and technology," stated Alarcón.

Sener Engineering's portfolio of high-tech projects covers a wide range of fields and locations. Sener Engineering's portfolio runs from the Gate LNG terminal through other ventures such as the Noor Ouarzazate thermosolar plants in Morocco, the Toluca-Mexico City train project in Mexico and software for the comprehensive design of small warships, known as corvettes, being built in Spain for the Royal Saudi Navy. On the LNG front, the Gate LNG terminal, which came on line in 2011, recently awarded Sener another contract to provide engineering, procurement and construction management services needed for better maintenance and the improvement of activities in work scheduled for 2021.

SOVCOMFLOT, the Russian shipping line with 31 gas carriers in operation or on order and an overall fleet of 145 vessels, is now listed on the Moscow stock exchange and more than doubled nine-month net profits as it looked ahead to future long-term Arctic LNG charter earnings. SCF, which is now listed on the Moscow stock exchange after an initial public offering in October 2020, reported profits of $249.5 million and a 10.9 percent increase in nine-month revenues to $1.29 billion versus $1.17Bln in the same period of 2019. Third-quarter profits fell 10.8 percent to $23.1M from $25.9M in the same three months of 2019.

Quarterly revenue fell to $347.0M from $376.5M, a decline of 7.8 percent. SCF is involved in servicing large oil and gas projects in Russia and around the world, including the Sakhalin and Yamal LNG export plants in Russia and Tangguh LNG in Indonesia. The group said it continued to grow its long-term industrial business portfolio, with a special focus on operations in harsh environments and ice conditions. More than 80 of the group's ships are ice-class. SCF's portfolio, which provides a long-term fixed income revenue stream, contributed $501.3M to nine-month Time Charter Equivalent revenue, delivering 7.5 percent year-on-year growth. "It came as a result of two new LNG carriers employed under long-term contracts with international energy majors, being delivered and put into operation," it said.

Over 2020, SCF has, either directly or through its Smart LNG joint venture with Russian natural gas and LNG plant operator and developer Novatek, time-chartered 17 ice-breaking carriers to the Arctic LNG II project. "Combined, these 17 time charters add approximately $14 billion of contract backlog attributable to SCF," stated the company. In September 2020, SCF took delivery of the "SCF Barents", a new LNG carrier with 174,000 cubic metres capacity and chartered to Shell under a long-term time-charter agreement. A further LNG carrier, the "SCF Timmerman", is scheduled to be delivered and start operations under a long-term time-charter with Shell in the first quarter of 2021. "SCF demonstrated an exceptionally strong performance with nine-month net profit doubling, compared with last year," said Igor Tonkovidov, SCF's President and Chief Executive. "Furthermore, the Group was able to secure new industrial business with an additional $14Bln of future contracted revenues, booked in the LNG segment just over the past couple of months, fully in line with the group's strategy," added the CEO. "We are on track to achieve the budgetary targets for the full year 2020 and are well equipped to grow the business going forward, with the proceeds from the recent IPO of Sovcomflot shares maintaining our strong focus on decarbonisation and innovations," stated Tonkovidov.

In October, SCF conducted its IPO and sold 408.29 million newly issued ordinary shares of a nominal value of 1 Russian rouble and at a price of 105 roubles ($1.37) per ordinary share and listed them on the Moscow Exchange. The total net proceeds of the IPO, after expenses and stabilisation-related buy-back, was 38 billion roubles ($480M). The free float of SCF amounts to 15.6 percent of the company and the Russian Federation retains an 82.8 percent stake. The proceeds of the IPO are being used for general corporate purposes, including investments in new assets.

TECHNIPFMC, the Franco-US company, said it received a notice to proceed for its Costa Azul LNG engineering, procurement and construction contract following the positive final investment decision taken by Sempra Energy of the US and its Mexican subsidiary for the project on the Pacific Coast of Mexico. TechnipFMC said that Sempra LNG and the San Diego-based company's Mexican unit, Infraestructura Energética Nova (IEnova), gave the go-ahead. "The project will add a natural gas liquefaction facility with nameplate capacity of 3.25 million tonnes per annum to the existing regasification terminal using a compact and high efficiency mid-scale LNG design," explained TechnipFMC.

This addition will allow for natural gas liquefaction and LNG export capability at the Costa Azul facility, which has been operating as a regasification terminal since 2008. "ECA LNG is one of Sempra LNG's strategically located natural gas liquefaction infrastructure projects currently in development in North America," noted TechnipFMC. Sempra operates the Cameron LNG plant in Louisiana and is also developing the Port Arthur liquefaction facility in Texas. TechnipFMC said it had been involved in the Costa Azul project since 2017, including the delivery of the front-end engineering and design. "We are very pleased to have been selected by Sempra LNG and IEnova for this strategic development," said Arnaud Pieton, President of Technip Energies within the TechnipFMC group. "This project is fully aligned with our selective approach through very early stage involvement," explained Pieton. "We look forward to bringing our global project execution capabilities and our extensive LNG track record to this exciting project," he stated.

The Technip Energies division's other recent project work has included Yamal LNG in Russia and Italian oil and gas company Eni's Coral South floating LNG project offshore Mozambique. The company has also been contracted for the Russian Arctic LNG II project by Russia's natural gas company Novatek, operator of Yamal LNG. The TechnipFMC business with offices in Houston and Europe was the result of a merger. TechnipFMC, whose other business comprises subsea and technology activities, had planned to split again in 2020 but cancelled the move in March because of the economic downturn. With the de-merger on hold TechnipFMC has still overhauled its divisions with Onshore-Offshore having been renamed Technip Energies, in-line with the new scope of the business. The company said in its most recent earnings that despite the challenges and a softening of near-term LNG markets, the long-term fundamentals for natural gas, and LNG in particular, remained strong. The two other TechnipFMC divisions are Subsea and Surface Technologies and would be retained under the TechnipFMC banner when the Technip Energies spin-off plan eventually goes ahead.

TEEKAY LNG Partners, whose gas group units own, charter or have stakes in 77 vessels, including 47 liquefied natural gas carriers and 30 liquefied petroleum gas or multi-gas vessels, reported lower third-quarter profits but was optimistic on the coming year. Net income for the three months to the end of September dropped by around 15 percent to $40.27 million versus $47.36M in the same quarter of 2019. However, quarterly voyages revenues were only marginally lower at $148.93M compared with $149.65M in the prior-year quarter. After the end of the quarter Teekay said that in October 2020, it extended the charter contract to early-2022 for the 52 percent-owned LNG carrier, the "Marib Spirit". "The Partnership's LNG fleet is now 100 percent fixed for 2020 and 96 percent fixed for 2021," it added.

The net income fall was attributed to more scheduled dry-dockings and higher planned repairs and maintenance expenses, partially offset by lower net interest expense and a decrease in general and administrative expenses. "We generated strong earnings and cash flow again this quarter, despite a higher than usual number of scheduled dry-dockings," said Mark Kremin, President and Chief Executive of Teekay Gas Group Ltd. "We expect our earnings and cash flows to increase in the fourth quarter of 2020 and we continue to be on track to meeting the 2020 financial guidance we provided earlier this year," he added. "I'm also pleased to report that we are delivering on a number of our strategic priorities," continued Kremin. He noted that during the quarter Teekay LNG reduced its total net debt by nearly $95M, or 8 percent on an annualized basis, and reduced total net interest expense by over $6M, or nearly 9 percent, compared with the previous three months. "We approach the end of the year with the confidence that we have already secured fixed-rate contracts for our LNG fleet covering 96 percent of 2021, providing the Partnership with high fleet utilization and stable cash flows," stated the CEO. "I want to thank our seafarers and onshore colleagues for their continued dedication to providing safe and uninterrupted service to our customers during this Covid-19 pandemic," said Kremin. "I am pleased to report that, with the reopening of many jurisdictions during the summer months, we were able to successfully transition nearly all of our crew members across the fleet," he added.

The Teekay earnings report also said that equity income and adjusted gross income increased for the LNG segment of the business. "The increase was primarily due to the deliveries of three ARC7 LNG carrier newbuilds between August and December 2019 to the Yamal LNG Joint Venture and commencement of terminal use payments in January 2020 to the Bahrain LNG Joint Venture," said the company. "These increases were partially offset by lower earnings from the MALT Joint Venture (with Mitsubishi of Japan) as a result of lower charter rates earned upon redeployment of the "Arwa Spirit" and "Marib Spirit" during the second quarter of 2020 and the "Methane Spirit" in July 2020, and the recognition of drydock hire revenue for the "Meridian Spirit" in the third quarter of 2019," added Teekay. In its financing activities, Teekay LNG issued the equivalent of $112M of unsecured, 5-year notes in the Norwegian Bond market in August at an all-in fixed coupon rate of 5.74 percent. "The net proceeds from the bond issuance were used to repay drawings on the Partnership's revolving credit facilities and as a result, the new bond issuance did not increase the Partnership's financial leverage," said the company.

TITAN LNG, a Dutch supplier to the marine and industrial markets with quayside and ship-to-ship delivery of LNG to river barges and sea-going ships in the ports of Amsterdam, Rotterdam and Antwerp, has launched a free-to-use LNG-delivered prices overview. Available on Titan LNG's website, the new LNG delivered price page provides an overview of LNG prices delivered onboard in various quantities and ports, aiming to increase transparency and understanding of the cost of LNG as a marine fuel. Furthermore, it displays up-to-date indicative pricing on a weekly basis in five key LNG fueling locations: Rotterdam, North Sea, Baltic, Mediterranean and Singapore. "Reference prices are available for two different drop sizes - 250 tonnes and 1,000 tonnes - for each region," explained Titan. "The prices presented across three delivery options where applicable, including truck-to-ship, FlexFueler barge, and sea-going bunker vessels," the Dutch company added.

Titan explained that its fuel comparison sheet enables informed decision-making by providing insight into the costs for LNG as a marine fuel - usually priced by € per megawatt hour - compared with other existing fuels in € or US$ per ton or per million British thermal units, delivered now and in the future. "The pre-formulated table (accessed free of charge with premium access) enables users to input relevant market prices, which are automatically converted into the LNG equivalent, allowing owners and operators to follow market trends," said Titan. Moreover, premium access also provides forward curves, illustrating the delta of LNG versus Marine Gasoil in terms of pricing. "One of the biggest hurdles we face in the progress towards a low emissions future is the lack of transparency and understanding of LNG, which already contributes to reducing carbon and eliminates local harmful emissions," said Régine Portocarero, Business Development Manager of Titan. "It is clear that LNG offers a pathway to decarbonisation through Bio-LNG and eventually using green hydrogen converted into E-fuels (Synthetic Liquid Gas)," she added.

Portocarero explained that Titan with its offering was hoping to increase transparency and accuracy around LNG pricing, enabling shipowners and operators to make informed choices. "It's essential that fuels are being compared on an energy equivalent basis - for example if you take 1,000 tonnes of MGO, you only need 815 tonnes of LNG. It takes less fuel to travel the same distance," she added. Titan concluded by saying that it continued to build out its owned or chartered physical infrastructure to facilitate supply across the globe.

"The new shared insights demonstrate that Titan LNG, as an independent supplier, is able to provide practical support and information to the entire shipping community," it stated.

TRANS-ADRIATIC Pipeline (TAP), an 878-kilometres transportation system bringing Caspian natural gas from Azerbaijan to Greece, Albania, via the Adriatic Sea and Italy and whose main

shareholders are among Europe's main LNG terminal and grid operators has begun commercial operations. The TAP, which took over four years to build, is the European leg of the Southern Gas Corridor, a gateway project that will transport 10 billion cubic metres per annum of new gas supplies from Azerbaijan to multiple markets in Europe and as an alternative to Russian gas from Gazprom. TAP's shareholding include the Spanish, Italian, Belgian and French LNG terminal operators Enagás, Snam and Fluxys as well as UK major BP, Swiss trading firm Axpo and the Azerbaijani energy company Socar.

Spanish grid operator Enagás operates a network of five LNG terminals, Snam has two terminals in Italy and Fluxys operates the Zeebrugge LNG facility and has a major stake in Dunkirk LNG in France. These three shareholders in TAP have 55 percent of the equity. The TAP pipeline joint venture required €3.9 billion ($4.6Bln) of project financing. "I am extremely proud of this achievement, made possible thanks to the dedication and commitment of our people and everyone involved, the solid trust and unwavering support of our shareholders, all governments in the value chain and the European Union, as well as the suppliers and contractors," said Luca Schieppati, TAP's Managing Director. Murad Heydarov, Chairman of TAP's Board, said the Southern Gas Corridor is the pioneering carrier of natural gas from Azerbaijan to Europe and using the most modern and reliable systems currently available. "As a key component of the 3,500km Southern Gas Corridor, TAP combines strategic and market competitive features," explained Heydarov. "It ensures that Europe can receive supplies from yet another source, while supporting the key EU objectives of achieving an integrated energy market, and a sustainable, secure and diversified energy mix, contributing to ongoing streams towards clean energy transition," he added.

TAP transports natural gas from the giant Shah Deniz field in which BP has a major stake in the Azerbaijan sector of the Caspian Sea. The TAP pipeline connects with the Trans Anatolian Pipeline (TANAP) at the Turkish-Greek border in Kipoi, crosses Greece and Albania and the Adriatic Sea, before coming ashore in Southern Italy. The aim of TAP is to facilitate gas supplies to Southeast European countries. TAP exits in Greece and Albania together with the landfall in Italy to provide multiple opportunities for further transport of Azerbaijan gas to the wider European markets.

Diary of events

February 2021
American LNG Forum)
February 9-10, 2021
Hotel Marriott Marquis
1777 Walker St, Houston,
Texas, USA
https://americanlngforum.com

May 2021
Canada Gas & LNG Exhibition & Conference 2021
May 11-13, 2021
Vancouver Convention Centre East
999 Canada Pl, Vancouver,
British Columbia
https://www.canadagaslng.com

June 2021
World Gas Conference 2021
June 21-25, 2021
EXCO, Daegu Exhibition & Convention Centre
10, Exco-ro, Buk-gu, Daegu,
South Korea
https://www.wgc2021.org

VENTURE GLOBAL, the US developer of three LNG export plants in Louisiana, said that US engineering firm KBR was awarded the engineering, procurement and construction contract for the first phase of the Plaquemines project on the banks of the Mississippi River. The Plaquemines facility will be constructed at river mile-marker 55 on the west side of the Mississippi, about 30 miles south of New Orleans. Plaquemines will be constructed in two phases, each phase designed with liquefaction and export capacity of 10 MTPA, and possibly more under optimal operating conditions. The most advanced development by Arlington, Virginia-based Venture Global is the Calcasieu Pass export plant in Louisiana, which is expected to come on stream in 2022 along with its associated TransCameron Pipeline.

The EPC contractor for the Calcasieu Pass project is Omaha, Nebraska-based company Kiewit Corp. The third project in the portfolio of Venture Global is the Delta plant, still in the planning stage, with a site also on the Mississippi River. Venture Global said that for the Plaquemines project, Houston, Texas-based KBR would integrate highly modularized, owner-furnished equipment for the 10 MTPA nameplate facility, identical to the systems being delivered and installed at the Calcasieu Pass venture. Analysts note that KBR was chosen for the Venture Global EPC contract even after it announced earlier in 2020 that it was pulling back from taking fixed-priced, on-site LNG and energy projects and was concentrating in the future on securing mostly government contracts. "KBR has an exceptional record in the LNG industry, having designed and delivered approximately a third of the liquefaction capacity worldwide," said Mike Sabel, Executive Co-Chairman and Chief Executive of Venture Global. "They recognize that our innovation of mid-scale, modular Trains manufactured in a factory setting and delivered complete to site is revolutionizing this industry," added Sabel. "Plaquemines LNG will deploy Venture Global's liquefaction Trains 19 through 36, identical to the 18 Trains currently being fabricated and delivered to our Calcasieu Pass LNG project," explained the CEO. "This contract with KBR will allow us to bring a second world-class, mechanically complete LNG production facility to the market, on our schedule and budget," he stated.

The Plaquemines project has signed binding 20-year offtake agreements with two main buyers, the Polish Oil and Gas Company for 2.5 MTPA and French utility EDF for 1 MTPA. Executive Co-Chairman Bob Pender said that the company was delighted to have KBR's experience on board. "As we approach the commencement of early site works for Plaquemines LNG, we are excited to use the experience gained at Calcasieu Pass - where we are already connecting our first liquefaction Trains - to further improve upon the successful approach we've developed," added Pender.

WOODSIDE Petroleum said it had made operational advances in 2020 in the midst of several challenges and was also progressing with its project development offshore Senegal in West Africa. Woodside is operator of Australia's oldest LNG plant, the North West Shelf project in Western Australia in which it has a one-sixth share, and its majority-owned Pluto LNG plant in the same region. Woodside gave an update on all its ventures at a briefing for investors from Chief Executive Peter Coleman. Coleman said that Perth-based Woodside had risen to the challenges of 2020, delivering an "exceptional" operating performance. "Despite the constraints imposed by the pandemic, throughout this year our teams have met the highest standards of safety, reliability and production, allowing us to narrow our full-year output guidance to between 99 and 101 million barrels of oil equivalent," the CEO added. "We've made excellent progress at Sangomar Field Development Phase 1 offshore Senegal and expect to complete our acquisition of Cairn Energy's interest in the joint venture before year-end," he explained.

He described the Sangomar oil development as an attractive, de-risked asset and was also looking to sell down its equity to the right partner at the right price over the course of 2021. Coleman also gave an update on ongoing LNG projects in Western Australia. "The deferral in March this year of the final investment decisions on Scarborough and Pluto Train 2 allowed the project teams to seize the day, extracting additional value by potentially increasing the offshore capacity and optimising the development schedule," stated Coleman. "Scarborough is a globally competitive development which has the potential to be a game-changer for Woodside, producing net cash flow of around $35 billion over its field life," he explained. "We estimate the targeted 20 percent increase in Scarborough's upstream capacity can be achieved at a very modest capital investment, with virtually no cost impact on the downstream," added Coleman.

The CEO told investors and analysts that in terms of both contractor availability and the external LNG market, he expected the timing to be right for a final investment decisions on Scarborough and Pluto Train 2 in the second half of 2021. The Scarborough Joint Venture with Anglo-Australian commodities company BHP is aligned on this schedule, which would put the projects on track for first LNG in 2026. Coleman added that Woodside was also aligned with its joint venture partners on the development of Browse Basin gas backfill for the NWS plant, which currently has a nameplate capacity of 16.3 million tonnes per annum from five Trains. He said work was continuing to move Browse towards the front-end engineering design phase, with a final investment decision targeted from 2023. "Woodside is a resilient hydrocarbon business and our investments in technology and offsets, along with our early-mover activities in hydrogen, build on our existing capabilities in LNG and position us to provide value through the energy transition," he concluded. ■

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WE Tech awarded several LNGC contracts

Technical Editor, Ian Cochran investigates

Finnish-based WE Tech Solutions has received orders to deliver its Solution One Economical Operations systems for at least eight LNGCs in the past few months.

The latest contract calls for the fitting of a system on board two 174,000 cu m LNGCs being built by Hyundai Heavy Industries for Knutsen OAS Shipping, which will be chartered to Polish Oil Mining and Gas Extraction.

WE Tech will commence the delivery of two sets of direct drive permanent magnet shaft generators, variable speed frequency drives and dedicated power management system (DPMS) for each vessel in October, 2021.

Earlier, WE Tech was awarded a contract to deliver its energy efficiency solutions to another six Shell operated LNGCs.

This order was an option to an earlier contract signed in March 2020 to fit eight 174,000 cu m LNGCs for Shell.

All 14 of the LNGCs will be chartered to Shell LNG and are being built for Knutsen OAS Shipping, JP Morgan Asset Management and Korea Line Corp at Hyundai Heavy Industries and Hyundai Samho Heavy Industries.

"Our state-of-the-art variable frequency drive technology together with permanent magnet generators, which have the markets highest efficiency over the full speed and power range can fully satisfy gas carriers' needs," explained Peter Lindström, WE Tech Solutions Sales Manager at the time of signing the Knutsen agreement. "With our solution, the energy efficiency of the machinery reaches unprecedented levels."

"Environmental sustainability has always been one of the fundamentals in our business development. We are glad to work together with WE Tech Solutions to build the most advanced and eco-friendly LNG carriers," added Oliver Smith, Knutsen OAS Shipping Project Manager. "The utilisation of WE Tech's energy efficient solutions keeps Knutsen the frontrunner in technical innovations as we always strive to be."

Equipment for the original eight Shell LNGCs will be delivered from February, 2021.

The original order was the third from South Korean shipbuilders for the Economical Operations Solutions to be fitted on gas carriers since WE Tech entered the South Korean market in 2019. The previous two orders were for LPG carriers.

Shaft generators

In effect, this system supplies the vessels electrical power distribution from shaft generators thus allowing the auxiliary generators to cease operating while at sea, thus saving fuel and emissions.

A permanent magnet rotor is mounted on the intermediate shaft of the propulsion system. Mass and inertia are very low and thus the impact on propulsion system torsional vibration calculations (TVC) remains minimal.

No additional bearings are required, thus the propeller shaft system design remains uncompromised. The generator housing, consisting of a compact, feet mounted stator package, including the rotor and intermediate shaft, is positioned on the generator bed in the propeller shaft line and connected via flanges.

An artist's impression of the recently ordered Knutsen LNGCs

WE Tech solutions utilise variable frequency drive technology (the patented WE Drive), variable speed generator technology, energy storage system, and a dedicated power management system.

There are five integrated solutions available. These are -

Solution One = WE Drive and shaft generator motor.

Solution Two = WE Drive, shaft generator motor and Take me Home system.

Solution Three = WE Drive, shaft generator motor, boost mode.

Solution Four = WE Drive, shaft generator motor, hybrid machinery, DC-link power distribution.

Solution Five = WE Drive, shaft generator motor, hybrid machinery, plus ship wide DC- BUS power distribution.

In the second quarter of 2016, WE Tech fitted an economic operations, Take me Home, efficient power distribution with PM shaft generator systems on board Saga LNG Shipping's mid-scale newbuilding 45,000 cu m 'Saga Dawn'.

Sales Director, Jan Backman told *LNG Journal* that the company is looking to win more orders in the LNGC sector.

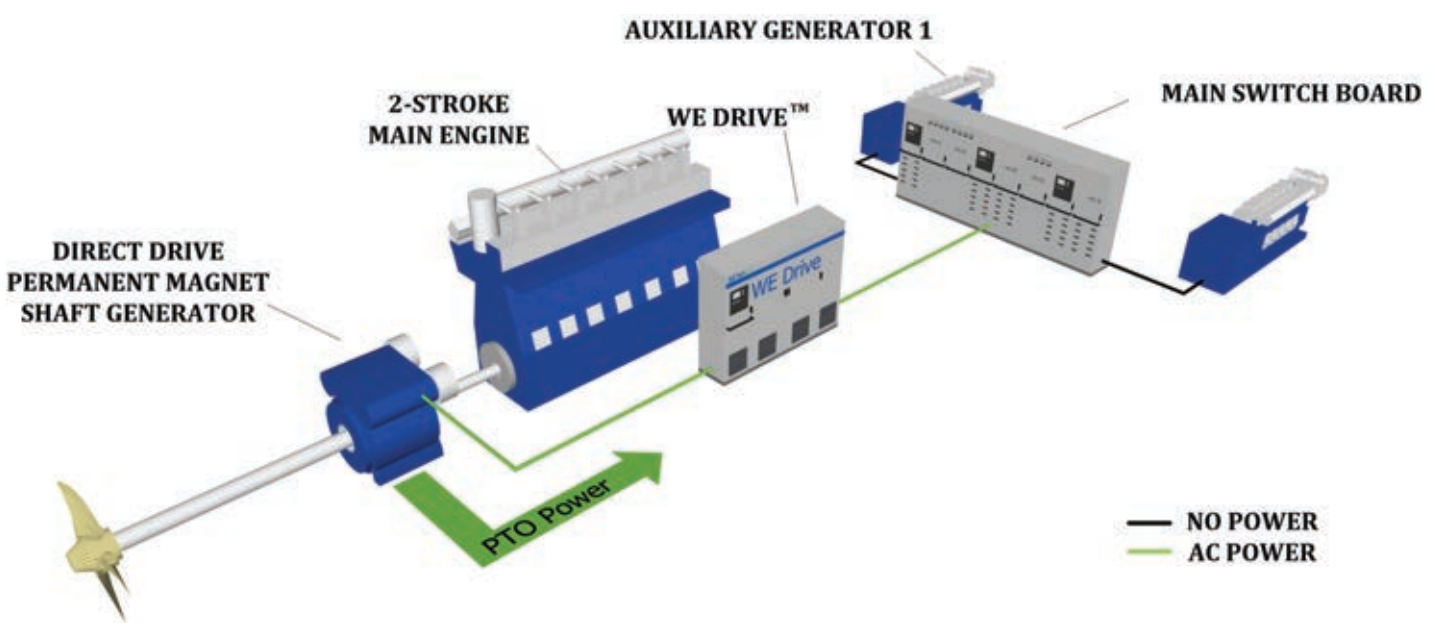
Explaining the advantage to LNGCs, he said that these vessels had a relatively high demand for electrical energy when underway, due to the reliquefaction operations, etc. It is more economical to produce extra energy from the main engine running on LNG than from the auxiliaries, which often burn MDO and are on part-load.

Commenting on the recent orders, he said that it is much easier to install the solution on newbuildings, rather than retrofit existing vessels.

WE Tech had undertaken some retrofits down the years, he confirmed. A system can be retrofitted on all ship types providing that there is enough excess torque from the main engines and there is enough space available for the generator and drives. However, the investment might not be feasible, due to high modification costs, he warned.

In addition, WE Tech is able to provide crew training to operate the equipment and will offer service agreements if required. The company has its own service engineers, but will also use suppliers' sources when needed.

As for expansion, Backman said that the company is currently building up a representation network and the opening of oversees offices could not be ruled out in the future. ■



Schematic of WE Tech's Solution One system

LNG related AiPs come thick and fast

Last year, the major IACS class societies awarded several Approval in Principle's (AiPs) for various gas carrier and equipment concept designs. Technical Editor, Ian Cochran reports

In general, an AiP indicates that a certification body has reviewed the basic design and confirmed that it meets the technical requirements and standards for safety.

For example, last September it was announced that Hyundai Heavy Industries (HHI) had been granted Approval in Principle (AIP) from Bureau Veritas (BV) for its Hi-FL2P (Hyundai innovative Floating LNG to Power solution) concept.

'Hi-FL2P' is an 'All-in-One Type' Floating LNG Power Plant where all equipment and systems that are required for the power generation and transmission including LNG containment, gas supply system, and power plant are installed in one unit to function as a stand-alone power plant.

BV also awarded an AiP for new gas supply system developed for 4-stroke dual-fuel engines to Mitsubishi Shipbuilding Co, Ltd, part of Mitsubishi Heavy Industries (MHI) Group, last year.

This approval was for an LNG fuel gas supply system (FGSS) for marine 4-stroke dual fuel engines. The design comprises an LNG fuel tank, gas supply unit, control systems, and other relevant equipment.

It was developed to be installed primarily on coastal ferries and small to mid-sized cargo ships.

BV's Global Market Leader- Tankers and Gas Carriers, Carlos Guerrero, told *LNG Journal* that in the frame of new regulations, technology and ship's designs are evolving rapidly and thus ship designers have an increased need for class support by way of approvals.

These include LNGCs, FSRUs and FLNGs. In addition, to a certain extent, FSRUs and FLNGs are still considered as tailor made designs for which early assessments may be required.

He added that such approvals could be granted on a first level for conceptual designs with a reduced scope of drawings in the so called AiP, where the main aim is to assure the designer that there are no serious drawbacks to a complete design approval process with regards to class and international regulations - IMO etc.

An AiP is seen as the first approval level - not mandatory but recommended for novel designs or technologies.

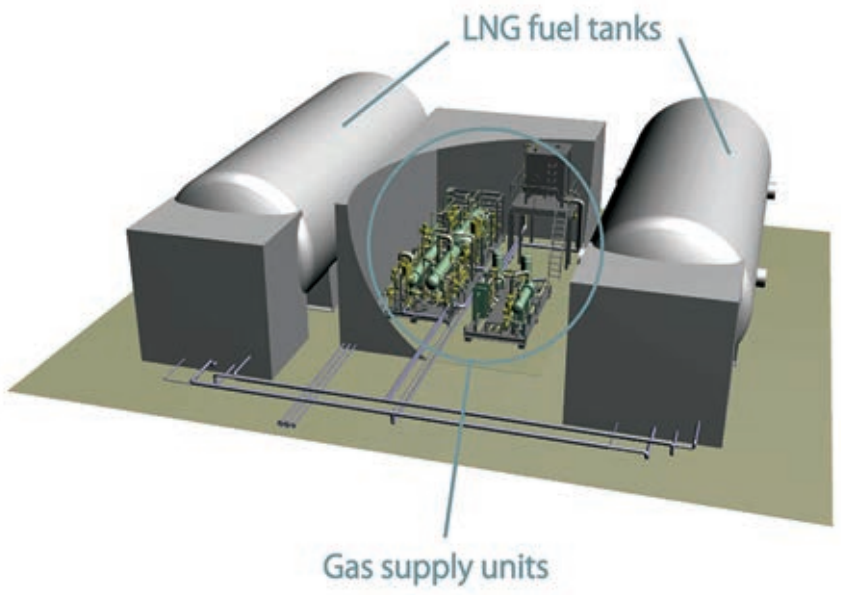
Today there are many new projects related to energy efficiency and environmental protection, as well as other initiatives, such as connectivity and data protection (cyber security).

Starting point

AiPs could involve specific technologies on board a ship to complete designs, meaning that an AiP could be the starting point for Type Approval Certification (TAC), while an AiP for ship design could lead to a Design Assessment (DA) and final class approval if the ship is built and delivered under BV class.

However, AiPs and DAs, etc have been used for many years. For example, in the 1980s, under the banner of Basic Approval, AiPs were developed for LNG membrane cargo containment systems.

At that time, three assessment levels were defined - Basic Approval, Design Approval and Final Approval- as described in a BV paper presented at



BV has issued an AiP for for a new LNG fuel system

Wison received an AiP from DNV GL for its large LNGC design

Gastech in 1986 and a guidance note issued by BV in 1988, he explained.

Also talking exclusively with *LNG Journal*, Johan Petter Tutturen, Business Director Gas Carriers, DNV GL - Maritime, said: "What we are seeing in the LNG carrier market especially, is a real focus on improving efficiency and hence reduce harmful emissions to air. Whether in the form of AIPs (Approval in Principle for new and innovative technologies) or in the utilisation of existing technologies, gas majors especially are teaming up with yards and class societies to keep assets competitive over the long term.

"This innovation is really going on across the board - for example, from cargo containment system (CCS) manufacturers, like GTT, who are looking at how they can reduce the boil off rate. This is in combination with improvements in re-liquefaction systems from the yards and other manufacturers to deal with boil off not being used as fuel.

"Reducing methane slip from main propulsion systems is an ongoing area where manufacturers are targeting improvements. Shaft generators and hybrid/battery solutions are also being introduced to optimise energy use. And we are also seeing that some owners are implementing ALS (air lubricating systems), in a further effort to improve efficiency," he said.

Last April, DNV GL awarded an AiP to Wison Offshore and Marine (WOM) for its 200,000 cu m LNGC design.

This design has an overall length of 300 m and was designed to incorporate a GTT Mark-III FLEX membrane tank system.

In addition, WinGD 6×72DF dual-fuel engines were stipulated designed to operate in most Emission Control Areas (ECA).

Other AiPs announced last year, included Lloyd's Register (LR) award of an AiP to a Hyundai Mipo Dockyard for a 30,000 cu m LNGC designed with an IMO B type tank.

This AiP was as the result of a JDP between the two parties, which commenced in January, 2020. LR's role was to review the suitability and design risks, which involved both a structural and a fatigue design assessment.

Included was a crack propagation analysis and a design review under the latest applicable LR class rules and guidance and IMO regulations, which resulted in the AiP.

In addition, American Bureau of Shipping (ABS) granted an AiP to WOM for its standard 1.3 mill tonnes and 3 mill tonnes per annum FLNG designs.

ABS had also issued an AiP for the design of a wide beam, single row, near-shore LNG FPSO hull with a jetty-moored system developed by Daewoo Shipbuilding & Marine Engineering (DSME).

The 64 m wide barge-shaped hull design features a GTT NO96 single row containment system with a storage capacity of 209,000 cu m. The concept includes a jetty-moored system and around 40,000 tonnes of topside modules, which could produce 3~3.5 mill tonnes per annum of LNG.

Due to a wider beam and different hull configuration compared to existing standard LNGCs, various sloshing model tests were carried out with the 6-DOF sloshing rig, driven by electric servomotors, at DSME's sloshing research centre in South Korea.

Through these extensive tests, DSME verified that the new hull design and the membrane cargo containment system (CCS) can withstand the sloshing impact loads under actual operating conditions, the shipbuilder claimed. ■

Titan progresses (Bio)LNG infrastructure

Bunker provider Titan LNG is on track to begin development of major new (Bio)LNG bunkering infrastructure in 2021 as fuel price spreads have supported increased optimism about the long-term uptake of LNG. Fuelling editor Malcolm Ramsay reports

The Dutch developer secured €11 million in funding last year for its Bio2Bunker project and now sees an improved outlook for LNG fuelling thanks to shifting dynamics brought about widespread lockdowns last year.

"Despite some delays from various shipyards close and far away, we remain optimistic about LNG as a fuel. If anything the owners of existing fleet had an incentive to continue running the LNG powered fleet as much as possible due to the attractive price level of LNG delivered onboard, especially during summer we saw a gigantic spread between LNG and competing fuels underpinning the long term viability," Régine Portocarero, Business Development Manager at Titan LNG, told *LNG Journal*.

Titan Hyperion mothership

The new infrastructure will include construction of the *Titan Hyperion,* an LNG-refuelling 'mothership', serving the Amsterdam-Rotterdam-Antwerp (ARA) region. This will be linked to the firm's growing fleet of FlexFueler bunker vessels.

"Currently, the final investment decisions (FIDs) for the three bio-LNG bunker barges are being prepared, after which the construction of the vessels will start. In the meanwhile, Titan LNG is very much engaged in demonstrating that bio-LNG and electro-LNG (E-LNG or SLG) are viable marine fuels in the future," Portocarero notes.

The firm notes that both bio-LNG, and later E-LNG, can be introduced into the supply chain with no additional infrastructure required, creating the groundwork for zero emission LNG, and 'perfect drop-in fuels' as successors of fossil LNG.

Q1 tender

As the new designs push the boundaries of LNG bunker design, the firm is taking time to ensure that each step is completed to the highest standard

"We have worked hard to get the Grant Agreement in place and signed. Furthermore, the first focus has been put on the development of the *Hyperion*…due to the unique design of the *Hyperion*, some additional design validation is required prior to finalizing the tender process. We expect to send out the tender in the first quarter of 2021," Portocarero explains.

Multi-tank configuration

The firm's newest bunker vessels – the *FlexFueler 003* and *004* - will each be configured with multiple tanks, allowing various fuel sources depending on availability. This system also provides for a gradual shift towards the physical supply of bio-LNG without the need to completely refill tanks.

"The main feedstock and cost-driver for SLG is green hydrogen. As soon as green hydrogen becomes abundantly and economically available, SLG will be the most efficient modus to store and transport the hydrogen in the shipping sector. The infrastructure that is rapidly expanded today can absorb the SLG without any adjustments," Portocarero comments.

Engie Zeebrugge in the port of Emden

Flexfueler 001 bunkering the *Ramelia* vessel

Titan states that the *FlexFueler 003* and *004* will each have a capacity of 1,500 cubic metres or more, while the *Titan Hyperion* will have a capacity of 8,000 cubic metres.

"Our customers in the shipping sector are facing a choice for the future: run on MGO, HFO with scrubbers, or go for (bio)LNG, the only proven alternative fuel that is scalable right now. Titan LNG believes that LNG-fuelled ships are future proof. LNG combined with BLNG and later Synthetic Liquefied Gas (SLG), made by combining green hydrogen and CO2, offer a credible and cost competitive path to decarbonization whilst immediately improving local air quality," the firm states.

Positive fundamentals

"We remain optimistic about the LNG market developments in the immediate future. The fundamentals are bright, as we see a delay rather than a cancellation of orders. The IMO 2020 rules introduced at the start of this year have pushed up demand for cleaner marine fuels. There are more and more vessels running on LNG. An example of this is the recently delivered LNG-powered containership *Jacques Saade*, which is the first in a new fleet of French-flagged 23,000-TEU, LNG-powered containerships, owned by CMA CGM.

While COVID-19 squeezed total cargo throughput at the port of Rotterdam in 2020, LNG bunkering volumes more than trebled and are expected to keep rising. Rotterdam remains one of the biggest ports for LNG bunkering.

It has also long been an advocate of LNG technologies, working with the EU's Connecting Europe Facility (CEF) to invest in LNG infrastructure. Titan LNG's latest project has been co-financed through CEF.

Headquartered in Amsterdam in the Netherlands, Titan is at the forefront of LNG at Rotterdam, having completed the first official bunkering operation with its *FlexFueler 001* vessel in June last year. The firm was the first accredited LNG bunker supplier to deliver by inland water barge at the port and is ISO 9001 certified and an IAPH accredited LNG bunker provider.

A sister vessel to the *FlexFueler 001* was announced in 2019 and entered service in 2020. In October last year, it was announce that the *FlexFueler 002* would be deployed in the Antwerp port and region. Developed in partnership with Belgian gas transmission system operator Fluxys, the barge will be based at Quay 526/528 in Antwerp from February 2021and is part of a strategy to connect resources across the ARA region.

"We are proud to offer with our partner, Titan LNG, a key logistic link for the shipping industry to switch to cleaner operations in the Antwerp port and region. The prospect of introducing with our newly built bunkering barge fully carbon neutral options in the foreseeable future strengthens us in our commitment to press ahead with the energy transition," Pascal de Buck, CEO of Fluxys, commented. ■

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World LNG Carrier Fleet

LNG Carrier	Capacity m^3	Registered Owner	Builder	Delivery	Flag	Power Plant	Cargo System	No. of Tanks	Original Project
Aamira	268,000	Nakilat SHI 1753 Inc.	Samsung	Apr-10	Marshall Is.	Diesel	TZ Mk. III	10	Qatargas IV
Abadi	135,000	BGC One Nbd Sdn Bhd.	Mitsubishi	May-02	Brunei	Steam	Moss	5	Lumut
Adam LNG	162,000	Adam Maritime Transportation	HHI	Jul-14	Marshall Is.	Diesel	Membrane	4	Oman LNG
Adriano Knutsen	180,000	Hai Feng 1717 Ltd.	HHI	Jul-19	Spain	ME-GI	TZ Mk. III Flex Plus	4	Corpus Christi
Al Aamriya	210,168	J5 Nakilat No. 1 Ltd.	Daewoo	May-08	Marshall Is.	Diesel	GT NO 96	5	RasGas III
Al Areesh	148,786	Al Areesh LLC	Daewoo	Jan-07	Bahamas	Steam	GT NO 96	4	RasGas II
Al Bahiya	210,100	Nakilat DSME 2286 Inc.	Daewoo	Dec-09	Marshall Is.	Diesel	TZ Mk. III	5	Qatargas IV
Al Biddah	137,339	Mitsui/Nippon/Kawasaki/Iino	Kawasaki	Nov-99	Japan	Steam	Moss	5	Qatargas I
Al Daayen	148,853	Al Daayen LLC	Daewoo	Mar-07	Bahamas	Steam	GT NO 96	4	RasGas II
Al Dafna	268,000	Nakilat SHI 1726 Inc.	Samsung	Oct-09	Marshall Is.	Diesel	GT NO 96	10	RasGas
Al Deebel	145,000	Peninsula LNG Transport No. 3	Samsung	Nov-05	Bahamas	Steam	TZ Mk. III	4	RasGas II
Al Gattara	216,200	Overseas LNG H1 Corp.	HHI	Nov-07	Marshall Is.	Diesel	TZ Mk. III	4	Qatargas II
Al Ghariya	210,150	Julia Neptora	Daewoo	Dec-07	Bahamas	Diesel	GT NO 96	4	Qatargas II
Al Gharrafa	216,200	Overseas LNG H2 Corp.	HHI	Jan-08	Marshall Is.	Diesel	TZ Mk. III	5	Qatargas II
Al Ghashamiya	217,591	Nakilat SHI 1696 Inc.	Samsung	Apr-09	Marshall Is.	Diesel	TZ Mk. III	10	Qatargas III
Al Ghuwairiya	263,300	Nakilat Al Ghuwairiya Inc.	Daewoo	Dec-08	Marshall Is.	Diesel	GT NO 96	5	Qatargas II
Al Hamla	216,200	Overseas LNG S2 Corp.	Samsung	Feb-08	Marshall Is.	Diesel	TZ Mk. III	4	Qatargas II
Al Hamra	137,000	Al Hamra Ltd.	STX	Nov-96	Liberia	Steam	Moss	4	Das Island
Al Huwaila	217,000	Al Huwaila Inc.	Samsung	May-08	Bahamas	Diesel	TZ Mk. III	10	RasGas III
Al Jasra	137,227	Mitsui/Nippon/Kawasaki/Iino	Mitsubishi	Jun-00	Japan	Steam	Moss	5	Qatargas I
Al Jassasiya	145,700	Venice Maritime	Daewoo	May-07	Greece	Steam	GT NO 96	4	RasGas II
Al Karaana	210,100	Nakilat DSME 2284 Inc.	Daewoo	Oct-09	Marshall Is.	Diesel	GT NO 96	4	Qatargas III
Al Kharaitiyat	216,300	Nakilat HHI 1909 Inc.	HHI	Jun-09	Marshall Is.	Diesel	TZ Mk. III	4	Qatargas III
Al Kharsaah	217,000	Al Kharsaah Inc.	Samsung	Jun-08	Bahamas	Diesel	TZ Mk. III	10	RasGas III
Al Khattiya	210,150	Nakilat DSME 2283 Inc.	Daewoo	Jul-09	Marshall Is.	Diesel	GT NO 96	4	Qatargas IV
Al Khaznah	135,496	Al Khaznah Inc.	Mitsui E&S	Jul-94	Liberia	Steam	Moss	5	Das Island
Al Khor	137,354	Mitsui/Nippon/Kawasaki/Iino	Mitsubishi	Nov-96	Japan	Steam	Moss	5	Qatargas I
Al Khuwair	217,000	Al Khuwair Inc.	Samsung	Jun-08	Bahamas	Diesel	TZ Mk. III	10	RasGas III
Al Mafyar	266,000	Nakilat SHI 1697 Inc.	Samsung	Apr-09	Marshall Is.	Diesel	TZ Mk. III	5	Qatargas III
Al Marrouna	149,539	Al Marrouna LLC	Daewoo	Sep-06	Bahamas	Steam	GT NO 96	4	RasGas II
Al Mayeda	266,000	Nakilat SHI 1694 Inc.	Samsung	Jan-09	Marshall Is.	Diesel	TZ Mk. III	5	Qatargas III
Al Nuaman	210,100	Nakilat DSME 2285 Inc.	Daewoo	Dec-09	Marshall Is.	Diesel	GT NO 96	4	Qatargas III
Al Oraiq	210,200	J5 Nakilat No. 3 Ltd.	Daewoo	Jun-08	Marshall Is.	Diesel	GT NO 96	18	RasGas III
Al Rayyan	137,420	Mitsui/Nippon/Kawasaki/Iino	Kawasaki	Mar-97	Japan	Steam	Moss	5	Qatargas I
Al Rekayyat	216,293	Nakilat HHI 1910 Inc.	HHI	Jun-09	Marshall Is.	Diesel	TZ Mk. III	4	Qatargas III
Al Ruwais	210,150	Alexandra Neptana	Daewoo	Aug-07	Bahamas	Diesel	GT NO 96	4	Qatargas II
Al Sadd	210,200	Nakilat DSME 2265 Inc.	Daewoo	Mar-09	Marshall Is.	Diesel	GT NO 96	12	Qatargas III
Al Safliya	210,150	Britta Nausola	Daewoo	Sep-07	Bahamas	Diesel	GT NO 96	5	Qatargas II
Al Sahla	216,200	J5 Nakilat No. 5 Ltd.	HHI	Jun-08	Marshall Is.	Diesel	TZ Mk. III	4	RasGas III
Al Samriya	263,300	Nakilat Al Samriya Inc.	Daewoo	Feb-09	Marshall Is.	Diesel	GT NO 96	5	Qatargas II
Al Shamal	217,000	Al Shamal Inc.	Samsung	Apr-08	Bahamas	Diesel	TZ Mk. III	10	RasGas III
Al Sheehaniya	210,100	Nakilat DSME 2264 Inc.	Daewoo	Feb-09	Marshall Is.	Diesel	GT NO 96	12	Qatargas III
Al Thakhira	145,000	Peninsula LNG Transport No. 2	Samsung	Aug-05	Bahamas	Steam	TZ Mk. III	4	RasGas II
Al Thumama	216,200	J5 Nakliat No. 2 Ltd.	HHI	Feb-08	Marshall Is.	Diesel	TZ Mk. III	4	RasGas III
Al Utouriya	215,000	J5 Nakilat No. 8 Ltd.	HHI	Sep-08	Marshall Is.	Diesel	TZ Mk. III	4	RasGas III
Al Wajbah	137,308	Mitsui/Nippon/Kawasaki/Iino	Mitsubishi	Jun-97	Japan	Steam	Moss	5	Qatargas I
Al Wakrah	137,371	Mitsui/Nippon/Kawasaki/Iino	Kawasaki	Nov-98	Japan	Steam	Moss	5	Qatargas I
Al Zubarah	137,573	Mitsui/Nippon/Kawasaki/Iino	Mitsui E&S	Nov-96	Japan	Steam	Moss	5	Qatargas I
Alto Acrux	147,798	Bahamas LNG Transport Ltd.	Mitsubishi	Mar-08	Bahamas	Steam	Moss	4	Darwin LNG
Amadi	154,800	BGC Four Nbd Sdn Bhd.	HHI	Jul-15	Brunei	DFDE	Membrane	4	Lumut
Amali	148,000	BGC Spv Nbd Sdn Bhd.	Daewoo	Aug-11	Brunei	DFDE	GT NO 96	4	Lumut
Amani	154,800	BGC Three Nbd Sdn Bhd.	HHI	Oct-14	Brunei	DFDE	Membrane	4	Lumut
Amberjack LNG	174,000	Xiang Ch17 HK International	HHI	Apr-20	Malta	X-DF	TZ MK. III Flex	4	Portfolio
Amur River	149,700	Seacrown Maritime Ltd.	HHI	Nov-07	Marshall Is.	Steam	TZ Mk. III	4	Sakhalin II
Arctic Aurora	155,000	Fareastern Shipping Ltd.	HHI	Jul-14	Malta	Diesel/Gas-Electric	TZ Mk. III	4	Snøhvit LNG
Arctic Discoverer	142,612	Northern LNG Trans Co. I Ltd.	Mitsui E&S	Feb-06	Bahamas	Steam	Moss	4	Hammerfest
Arctic Lady	147,200	Barents Leasing Ltd.	Mitsubishi	Apr-06	Norway	Steam	Moss	4	Hammerfest
Arctic Princess	147,200	Rb-Quadrangle Leasing Ltd.	Mitsubishi	Jan-06	Norway	Steam	Moss	4	Hammerfest
Arctic Spirit	89,800	Arctic Spirit LLC	Ishikawajima	Dec-93	Bahamas	Steam	IHI SPB	4	Atlantic LNG
Arctic Voyager	142,759	Northern LNG Trans Co. II Ltd.	Kawasaki	Jul-06	Bahamas	Steam	Moss	4	Hammerfest
Aristos I	174,000	Xiang Ch25 HK International	HHI	Nov-20	Malta	X-DF	TZ Mk. III Flex	4	Portfolio
Arkat	148,000	BGC Spv Nbd Sdn Bhd.	Daewoo	Feb-11	Brunei	DFDE	GT NO 96	4	Lumut
Arwa Spirit	165,500	Membrane Shipping Ltd.	Samsung	Aug-08	Marshall Is.	Diesel/Gas-Electric	TZ Mk. III	4	Balhaf

Aseem	155,003	India LNG Transport Co. No. 3	Samsung	Nov-09	Malta	Diesel	TZ Mk. III	4	RasGas
Asia Endeavour	160,000	Chevron Transport Corp. Ltd.	Samsung	Jun-15	Bahamas	Diesel/Gas-Electric	TZ MK. III	4	Gorgon
Asia Energy	154,800	Chevron Transport Corp. Ltd.	Samsung	Oct-14	Bahamas	DFDE	TZ MK. III	4	Gorgon
Asia Excellence	160,000	Chevron Transport Corp. Ltd.	Samsung	Feb-15	Bahamas	DFDE	TZ MK. III	4	Gorgon
Asia Integrity	160,000	Chevron Transport Corp. Ltd.	Samsung	Feb-17	Bahamas	DFDE	TZ Mk. III	4	Wheatstone
Asia Venture	160,000	Chevron Transport Corp. Ltd.	Samsung	Jul-17	Bahamas	Diesel/Gas-Electric	TZ Mk. III Flex	4	Wheatstone
Asia Vision	154,800	Chevron Transport Corp. Ltd.	Samsung	Jul-14	Bahamas	Diesel/Gas-Electric	TZ MK. III	4	Gorgon
Barcelona Knutsen	173,400	Norspan LNG V AS	Daewoo	Jan-10	Spain	Diesel/Gas-Electric	GT NO 96	4	Portfolio
Beidou Star	172,000	Capricorn LNG Shipping Ltd.	Hudong Zhonghua	Sep-15	Hong Kong	Diesel	TZ MK. III	4	PNG LNG
Berge Arzew	138,088	Berge Arzew/Sonatrach Berge	Daewoo	Jul-04	Bahamas	Steam	GT NO 96	4	Arzew
Bilbao Knutsen	138,000	Norspan LNG AS	Izar	Jan-04	Spain	Steam	GT NO 96	4	Portfolio
Bishu Maru	164,700	Trans Pacific Shipping 3 SA	Kawasaki	Dec-17	Panama	TFDE	Moss	4	Wheatstone
Bonito LNG	174,000	Xiang Ch18 HK International	HHI	May-20	Malta	X-DF	TZ MK. III Flex	4	Portfolio
Boris Davydov	172,410	Hai Kuo Shipping 1605 Ltd.	Daewoo	Dec-18	Cyprus	TFDE - Azipod	GT NO 96 GW	4	Yamal
Boris Vilkitsky	172,410	Hai Kuo Shipping 1601 Ltd.	Daewoo	Jun-17	Cyprus	TFDE - Azipod	GT NO 96 GW	4	Yamal
British Achiever	173,644	Ngoti No. 20 Spc B SA	Daewoo	Nov-18	Isle of Man	ME-GI	GT NO 96	4	Freeport
British Contributor	173,644	Hai Kuo Shipping 1533 Ltd.	Daewoo	Dec-18	Isle of Man	ME-GI	GT NO 96	4	Freeport
British Listener	173,644	Hai Kuo Shipping 1535 Ltd.	Daewoo	Jan-19	Isle of Man	ME-GI	GT NO 96	4	Freeport
British Mentor	173,644	Ngoti No. 20 Spc C SA	Daewoo	Mar-19	Isle of Man	ME-GI	GT NO 96	4	Freeport
British Partner	173,400	Ngoti No. 20 Spc A SA	Daewoo	Jun-18	Isle of Man	ME-GI	GT NO 96	4	Freeport
British Sapphire	155,000	Sg Leasing Gems Ltd.	HHI	Jun-08	Isle of Man	Diesel/Gas-Electric	TZ Mk. III	4	Portfolio
British Sponsor	173,644	Ngoti No. 20 Spc D SA	Daewoo	May-19	Isle of Man	ME-GI	GT NO 96	4	Freeport
Broog	137,529	Mitsui/Nippon/Kawasaki/Iino	Mitsui E&S	Apr-98	Japan	Steam	Moss	5	Qatargas I
Bu Samra	266,000	Nakilat Bu Samra Inc.	Samsung	Dec-08	Marshall Is.	DRL	TZ Mk. III	5	Qatargas II
Bushu Maru	180,000	Trans Pacific Shipping 6 Ltd.	Mitsubishi	Jul-19	Bahamas	Reheat Steam Turbine	TZ MK. III Flex	4	Sabine Pass
BW Boston	138,059	BW Gas Global LNG DA	Daewoo	Jan-03	Norway	Steam	GT NO 96	4	Atlantic LNG
BW Brussels	162,400	BW LNG IV Pte Ltd.	Daewoo	Aug-09	Singapore	Diesel/Gas-Electric	GT NO 96	4	Balhaf
BW Everett	138,028	Everett LNG Pte Ltd.	Daewoo	Jun-03	Singapore	Steam	GT NO 96	4	Atlantic LNG
BW Lilac	173,400	Helianthus Navigation Corp.	Daewoo	Mar-18	Malta	ME-GI	GT NO 96	4	Data unavailable
BW Magna	173,000	BW FSRU III Pte Ltd.	Daewoo	Mar-19	Sinapore	DFDE	TZ MK. III Flex	4	Data unavailable
BW Magnolia	173,400	Helen Navigation Pte Ltd.	Daewoo	Feb-20	Singapore	ME-GI	GT NO 96	4	Portfolio
BW Paris	162,400	BW FSRU IV Pte Ltd.	Daewoo	Jul-09	Sinapore	Diesel/Gas-Electric	GT NO 96	4	Balhaf
BW Pavilion Aranda	173,400	BW Diamond LNG Pte Ltd.	Daewoo	Sep-19	Singapore	ME-GI	TZ MK. III Flex	4	Portfolio
BW Pavilion Aranthera	173,400	BW Diamond LNG Pte Ltd.	Daewoo	Jul-20	Singapore	ME-GI	GT NO 96	4	Portfolio
BW Pavilion Leeara	158,629	BW Pavilion Leeara Pte Ltd.	HHI	Jun-15	Singapore	Diesel/Gas-Electric	Membrane	4	Portfolio
BW Pavilion Vanda	155,000	BW Pavilion Vanda Pte Ltd.	HHI	Feb-15	Singapore	DFDE	Membrane	4	Portfolio
BW Tatiana	135,269	FSRU Development Pte Ltd.	Mitsubishi	Dec-02	Marshall Is.	Steam	Moss	5	Atlantic LNG
BW Tulip	173,400	BW LNG I Pte Ltd.	Daewoo	Dec-17	Singapore	ME-GI	GT NO 96	4	Data unavailable
Cadiz Knutsen	138,826	Norspan LNG II As	Navantia	Apr-04	Spain	Steam	GT NO 96	4	Portfolio
Cape Ann	145,130	SRV Joint Gas Two Ltd.	Samsung	Apr-10	Norway	Diesel/Gas-Electric	TZ Mk. III	4	Jaigarh LNG
Castillo De Caldelas	176,300	La Arena Nav SA	Imabari Shipbuilding	Jun-18	Malta	ME-GI	TZ Mk. III Flex	4	Portfolio
Castillo de Merida	176,300	San Isidro LNG I BV	Imabari Shipbuilding	Mar-18	Malta	ME-GI	TZ MK. III Flex	4	Portfolio
Castillo de Santisteban	170,000	Trans Gas Naviera Aie	STX	Jun-10	Malta	Diesel Electric	GT NO 96	4	Portfolio
Castillo de Villalba	138,000	Trans Gas Naviera Aie	Navantia Cadiz	Sep-03	Spain	Steam	GT NO 96	4	Portfolio
Catalunya Spirit	138,000	Teekay Gas III SL	Izar	Jun-03	Spain	Steam	GT NO 96	4	Atlantic LNG
Celsius Copenhagen	180,000	Greenheart Gas Shipco I LLC	Samsung	Nov-20	Marshall Is.	X-DF	TZ Mk. III Flex Plus	4	Portfolio
CESI Beihai	174,000	China Energy Aspiration LNG	Hudong Zhonghua	Jun-17	Hong Kong	TFDE	GT NO 96	4	APLNG
CESI Gladstone	174,000	China Energy Aspiration LNG	Hudong Zhonghua	Oct-16	Hong Kong	TFDE	GT NO 96	4	APLNG
CESI LianYungAng	174,000	China Energy Glory LNG	Hudong Zhonghua	Jun-18	Hong Kong	TFDE	GT NO 97	4	APLNG
CESI Qingdao	174,000	China Energy Hope LNG	Hudong Zhonghua	Feb-17	Hong Kong	TFDE	GT NO 96	4	APLNG
CESI Tianjin	174,000	China Energy Pioneer LNG	Hudong Zhonghua	Jul-17	Hong Kong	TFDE	GT NO 96	4	APLNG
CESI Wenzhou	174,000	China Energy Peace LNG	Hudong Zhonghua	Feb-18	Hong Kong	Diesel-Electric	GT NO 96	4	APLNG
Cheikh Bouamama	75,558	Skikda LNG Trans Corp.	Universal SB	Jul-08	Bahamas	Steam	TZ Mk. III	4	Arzew/Skikda
Cheikh El Mokrani	75,759	Mediterranean LNG Transport	Japan Marine United	Jun-07	Bahamas	Steam	TZ Mk. III	4	Skikda
Christophe de Margerie	170,000	Zelitiko Shipping Co. Ltd.	Daewoo	Nov-16	Cyprus	Diesel/Gas-Electric	GT NO 96 GW	4	Yamal
Clean Energy	149,700	Pegasus Shipholding SA	HHI	Mar-07	Marshall Is.	Steam	TZ Mk. III	4	Portfolio
Clean Horizon	162,000	Sea 43 Leasing Co Ltd.	HHI	Apr-15	Malta	Diesel/Gas-Electric	Membrane	4	Portfolio
Clean Ocean	162,000	Cdbl Ocean Ltd.	HHI	May-14	Marshall Is.	Diesel/Gas-Electric	Membrane	4	Sabine Pass
Clean Planet	162,000	Cdbl Planet Ltd.	HHI	Aug-14	Marshall Is.	Diesel Electric	Membrane	4	Yamal
Clean Vision	162,000	Sea 44 Leasing Co. Ltd.	HHI	Aug-15	Malta	Diesel/Gas-Electric	TZ Mk. III	4	Portfolio
CNTIC VPower Global	28,260	CNTIC VPower LNG Logistics	COSCO (Dalian) Shipyard Co.	Apr-20	Hong Kong	Diesel/Gas-Electric	GT NO 96	4	Portfolio
Cool Discoverer	174,000	Serendipity Maritime Ltd.	HHI	Sep-20	Malta	X-DF	TZ MK. III Flex	4	Portfolio
Cool Explorer	160,000	Safe Port Marine Ltd.	Samsung	Jan-15	Malta	DFDE	TZ Mk. III	4	Spot
Cool Runner	160,000	Priority Maritime Corp.	Samsung	Mar-14	Malta	Diesel Electric	TZ Mk. III	4	Wheatstone
Cool Voyager	160,000	Energy Shipping & Trading SA	Samsung	Oct-13	Malta	TFDE	TZ Mk. III	4	Wheatstone
Coral Encanto	30,000	Maxluck Plus Ltd.	Ningbo Xinle	Jul-20	Marshall Is.	DFDE	Cylinders	2	Portfolio
Corcovado LNG	160,162	Oceanus LNG Alpha LLC	Daewoo	Apr-14	Malta	Diesel Electric	GT NO 96	4	Spot

Creole Spirit	173,400	Hai Jiao 1601 Ltd.	Daewoo	Feb-16	Bahamas	ME-GI	GT NO 96	4	Sabine Pass
Cubal	160,276	Mint LNG IV Ltd.	Samsung	Jan-12	Bahamas	DFDE	TZ Mk. III	4	Soyo
Cygnus Passage	145,400	Cygnus LNG Shipping Ltd.	Mitsubishi	Jan-09	Bahamas	Steam	Moss	4	Sakhalin II
Dapeng Moon	147,200	Yue Gang LNG Shipping Co. Ltd.	Hudong Zhonghua	Jul-08	Hong Kong	Steam	TZ MK. III	4	Pluto
Dapeng Star	147,210	Yue Yang LNG Shipping Co. Ltd.	Hudong Zhonghua	Nov-09	Hong Kong	Steam	TZ MK. III	4	Pluto
Dapeng Sun	147,200	Yue Peng LNG Shipping Co. Ltd.	Hudong Zhonghua	Apr-08	Hong Kong	Steam	GT NO 96	4	North West Shelf
Diamond Gas Metropolis	174,000	Diamond LNG Shipping 4 Ltd.	HHI	Nov-20	Bahamas	X-DF	TZ Mk. III Flex	4	Portfolio
Diamond Gas Orchid	165,000	Diamond LNG Shipping 1 Pte Ltd.	Mitsubishi	Jun-18	Bahamas	STaGE	Sayaringo	4	Cameron
Diamond Gas Rose	165,000	Diamond LNG Shipping 2 Pte Ltd.	Mitsubishi	Aug-18	Bahamas	STaGE	Sayaringo	4	Cameron
Diamond Gas Sakura	165,000	Diamond LNG Shipping 3 Pte Ltd.	Japan Marine United	May-19	Bahamas	STaGE	Sayaringo	4	Cameron
Disha	136,025	India LNG Transport Co. No. 1	Daewoo	Dec-03	Malta	Gas Turbine	GT NO 96	4	RasGas
Doha	137,262	Mitsui/Nippon/Kawasaki/Iino	Mitsubishi	Jun-99	Japan	Steam	Moss	5	Qatargas I
Duhail	210,150	Gabriela Nauranto	Daewoo	Dec-07	Bahamas	Diesel	GT NO 96	4	Qatargas II
Dukhan	137,661	LNG Water Lily Shipping Corp.	Mitsui E&S	Sep-04	Liberia	Steam	Moss	5	Qatargas II
East Energy	122,255	Sinokor Maritime Co. Ltd.	STX	Aug-82	South Korea	Steam	Membrane	4	NLNG
Eduard Toll	172,410	TC LNG Explorer I LLC	Daewoo	Sep-17	Bahamas	TFDE - Azipod	GT NO 96 GW	4	Yamal
Ejnan	145,000	Peninsula LNG Transport No. 4	Samsung	Jan-07	Bahamas	Steam	TZ Mk. III	4	RasGas II
Ekaputra	136,400	Hikmah Sarana Bahari Pt.	Mitsubishi	Jan-89	Indonesia	Steam	Moss	5	Bontang
Elisa Larus	174,000	Caroline 77 Sasu	Hyundai Samho	May-20	France	X-DF	TZ Mk. III Flex Plus	4	Portfolio
Energy Advance	147,624	Tokyo LNG Tanker/Toho LNG	Kawasaki	Mar-05	Japan	Steam	Moss	4	Portfolio
Energy Atlantic	156,000	Spectacle Shipping & Trading	STX	Sep-15	Malta	TFDE	Moss	4	Sabine Pass
Energy Confidence	153,000	Tokyo LNG Tanker/Nippon Yusen	Kawasaki	Apr-09	Japan	Steam	Moss	4	Darwin LNG
Energy Endeavour	173,400	Rossini Navigation SA	Daewoo	Jan-21	Marshall Is.	ME-GI	TZ Mk. III Flex	4	0
Energy Frontier	147,599	Tokyo LNG Tanker Co. Ltd.	Kawasaki	Sep-03	Japan	Steam	Moss	4	Sakhalin II
Energy Glory	165,000	Tokyo LNG Tanker/Nippon Yusen	Japan Marine United	Mar-19	Japan	TFDE	TZ Mk. III Flex Plus	4	Cove Point
Energy Horizon	177,000	Tokyo LNG Tanker/Nippon Yusen	Kawasaki	Aug-11	Japan	Steam	Moss	4	Pluto
Energy Innovator	165,000	Tokyo LNG Tanker/Mitsui OSK	Japan Marine United	Jun-19	Japan	TFDE	TZ Mk. III Flex Plus	4	Cove Point
Energy Liberty	165,000	Tokyo LNG Tanker/Mitsui OSK	Japan Marine United	Oct-18	Japan	TFDE	TZ Mk. III Flex Plus	4	Cove Point
Energy Navigator	145,000	Tokyo LNG Tanker/Mitsui OSK	Kawasaki	May-08	Japan	Steam	Moss	4	Sakhalin II
Energy Pacific	173,400	Ravel Navigation SA	Daewoo	Aug-20	Marshall Is.	ME-GI	TZ Mk. III Flex	4	Portfolio
Energy Progress	147,558	Jovial Shipping Navigation SA	Kawasaki	Nov-06	Bahamas	Steam	Moss	4	Darwin LNG
Energy Universe	166,571	Lusby Shipping SA	Japan Marine United	Aug-19	Panama	TFDE	TZ Mk. III Flex	4	Cove Point
Enshu Maru	164,700	Trans Pacific Shipping 4 SA	Kawasaki	Aug-18	Panama	Reheat Steam Turbine	Moss	4	Wheatstone
Esshu Maru	153,000	Trans Pacific Shipping 2 Ltd.	Mitsubishi	Dec-14	Bahamas	Steam	Sayaendo	4	Portfolio
Etyfa Prometheas	135,269	Enlink Trading FZE	Mitsubishi	Oct-02	Cyprus	Steam	Moss	5	Portfolio
Excalibur	138,034	Solaia Shipping LLC	Daewoo	May-02	Belgium	Steam	GT NO 96	4	Portfolio
Fedor Litke	172,410	Hai Kuo Shipping 1602 Ltd.	Daewoo	May-17	Cyprus	TFDE - Azipod	GT NO 96 GW	4	Yamal
Flex Amber	174,000	Bund 10 Holding Ltd.	HHI	Oct-20	Marshall Is.	X-DF	TZ Mk. III Flex	4	Portfolio
Flex Artemis	174,000	Flex LNG Reliance Ltd.	Daewoo	Aug-20	Marshall Is.	ME-GI	NO-96-GW+FRS	4	Portfolio
Flex Aurora	174,000	Flex LNG Aurora Ltd.	HHI	Jun-20	Marshall Is.	X-DF	TZ Mk. III Flex	4	Portfolio
Flex Constellation	173,400	Flex LNG Constellation Ltd.	Daewoo	Jun-19	Marshall Is.	ME-GI	NO-96-GW+PRS	4	Data unavailable
Flex Courageous	173,400	Flex LNG Courageous Ltd.	Daewoo	Aug-19	Marshall Is.	ME-GI	NO-96-GW+PRS	4	Data unavailable
Flex Endeavour	172,400	Triple H No. 3 Ltd.	Daewoo	Jan-18	Malta	ME-GI	NO-96-GW+PRS	4	Portfolio
Flex Enterprise	172,400	Triple H No. 4 Ltd.	Daewoo	Jan-18	Malta	ME-GI	NO-96-GW+PRS	4	Data unavailable
Flex Freedom	173,400	Flex Freedom Ltd.	HHI	Jan-21	Marshall Is.	ME-GI	NO-96-GW+FRS	4	Portfolio
Flex Rainbow	174,000	Xiang Ch13 HK International	Samsung	Jun-18	Marshall Is.	ME-GI	TZ Mk. III Flex	4	Spot
Flex Ranger	174,101	Flex LNG Ranger Ltd.	Samsung	Jun-18	Marshall Is.	ME-GI	TZ Mk. III Flex	4	Portfolio
Flex Resolute	173,400	Flex LNG Resolute Ltd.	HHI	Sep-20	Marshall Is.	ME-GI	NO-96-GW+FRS	4	Portfolio
Fraiha	210,100	J5 Nakilat No. 6 Ltd.	Daewoo	Aug-08	Marshall Is.	Diesel	GT NO 96	18	RasGas III
Fuji LNG	149,172	Aletheia Owning Co Ltd.	Kawasaki	Mar-04	Malta	Steam	Moss	4	Sabine Pass
Fuwairit	138,200	Camartina Shipping Co.	Samsung	Jan-04	Bahamas	Steam	TZ Mk. III	4	RasGas II
Galicia Spirit	140,624	Teekay Gas II SL	Daewoo	Jul-04	Spain	Steam	GT NO 96	4	Portfolio
Gaslog Chelsea	153,000	Gas-Fifteen Ltd.	Hanjin (Busan)	Jun-10	Bermuda	Diesel/Gas-Electric	Sayaendo	4	Portfolio
Gaslog Geneva	174,000	Gas-Thirteen Ltd.	Samsung	Oct-16	Bermuda	TFDE	TZ Mk. III	4	Portfolio
Gaslog Genoa	174,000	Gas-Twenty Two Ltd.	Samsung	Mar-18	Bermuda	X-DF	TZ Mk. III Flex Plus	4	Portfolio
GasLog Georgetown	174,000	Ceres Shipping Ltd.	Samsung	Nov-20	Bermuda	X-DF	Membrane	4	Portfolio
Gaslog Gibraltar	174,000	Gas-Fourteen Ltd.	Samsung	Nov-16	Bermuda	TFDE	TZ Mk. III	4	Portfolio
Gaslog Gladstone	174,000	Gas-Twenty Three Ltd.	Samsung	Mar-19	Bermuda	X-DF	TZ Mk. III Flex Plus	4	Portfolio
Gaslog Glasgow	174,000	Gas-Twelve Ltd.	Samsung	Jul-16	Bermuda	TFDE	TZ Mk. III	4	Portfolio
Gaslog Greece	174,000	Gas-Eleven Ltd.	Samsung	Mar-16	Bermuda	TFDE	TZ Mk. III	4	Portfolio
Gaslog Hong Kong	174,000	Gas-Twenty Five Ltd.	HHI	Mar-18	Bermuda	X-DF	TZ Mk. III Flex	4	Portfolio
Gaslog Houston	174,000	Gas-Twenty Four Ltd.	HHI	Dec-18	Bermuda	X-DF	TZ Mk. III Flex	4	GoM
Gaslog Salem	155,000	Gas-Ten Ltd.	Samsung	May-15	Bermuda	Diesel/Gas-Electric	Membrane	4	Portfolio
Gaslog Santiago	155,000	Gas-Four Ltd.	Samsung	Mar-13	Bermuda	Diesel/Gas-Electric	TZ Mk. III	4	Portfolio
Gaslog Saratoga	155,000	Gas-Nine Ltd.	Samsung	Dec-14	Bermuda	Diesel/Gas-Electric	Membrane	4	Spot
Gaslog Savannah	155,000	Gas-One Ltd.	Samsung	May-10	Bermuda	Diesel	TZ Mk. III	4	Portfolio
Gaslog Seattle	155,000	Gas-Seven Ltd.	Samsung	Oct-13	Bermuda	TFDE	TZ Mk. III	4	Portfolio

Gaslog Shanghai	155,000	Gas-Three Ltd.	Samsung	Feb-13	Bermuda	Diesel/Gas-Electric	TZ Mk. III	4	Portfolio
Gaslog Singapore	155,000	Gas-Two Ltd.	Samsung	Aug-10	Bermuda	Diesel/Gas-Electric	TZ Mk. III	4	Portfolio
GasLog Skagen	155,000	Gas-Six Ltd.	Samsung	Aug-13	Bermuda	TFDE	TZ Mk. III	4	Portfolio
Gaslog Sydney	155,000	Gas-Five Ltd.	Samsung	Jun-13	Bermuda	DFDE	TZ Mk. III	4	Portfolio
Gaslog Wales	180,000	Gas-Thirty One Ltd.	Samsung	May-20	Bermuda	X-DF	TZ Mk. III Flex Plus	4	Portfolio
Gaslog Warsaw	180,000	GasLog Hellas-1 ENE	Samsung	Jul-19	Greece	X-DF	TZ Mk. III Flex Plus	4	Spot
Gaslog Westminster	180,000	Gas-Thirty Ltd.	Samsung	Jul-20	Bermuda	X-DF	TZ Mk. III Flex Plus	4	Portfolio
Gaslog Windsor	180,000	Gas-Twenty Eight Ltd.	Samsung	Apr-20	Bermuda	X-DF	TZ MK. V	4	Portfolio
Gemmata	135,269	National Australia Finance	Mitsubishi	Feb-04	Singapore	Steam	Moss	5	Peru LNG
Georgiy Brusilov	172,410	Hai Kuo Shipping 1801 Pte Ltd.	Daewoo	Nov-18	Cyprus	TFDE - Azipod	GT NO 96 GW	4	Yamal
Georgiy Ushakov	172,652	DY Tankers Ltd.	Daewoo	Sep-19	Bahamas	ME-GI	GT NO 96 GW	4	Yamal
Ghasha	137,000	Ghasha Inc.	Mitsui E&S	Jun-95	Liberia	Steam	Moss	5	Das Island
Gigira Laitebo	177,419	Cleopatra LNG Shipping Co. Ltd.	HHI	Feb-10	Bahamas	DFDE	TZ Mk. III	4	RasGas
Global Energy	74,100	Global Energy Armateur SNC	STX	Jan-04	France	Diesel/Gas-Electric	CS1	4	Portfolio
Global Energy	74,100	Global Energy International	STX	Jan-04	Marshall Is.	Diesel/Gas-Electric	CS1	4	Portfolio
Golar Arctic	140,648	Golar LNG 2216 Corp.	Daewoo	Oct-03	Marshall Is.	Steam	GT NO 96	4	Jamaica LNG
Golar Bear	160,000	Cool Bear Shipping Ltd.	Samsung	Sep-14	Marshall Is.	Diesel/Gas-Electric	TZ Mk. III	4	Spot
Golar Celsius	160,000	Noble Celsius Shipping Ltd.	Samsung	Oct-13	Marshall Is.	Diesel/Gas-Electric	TZ Mk. III	4	Spot
Golar Crystal	159,800	Oriental Fleet LNG 01 Ltd.	Samsung	Sep-14	Marshall Is.	TFDE	Membrane	4	Spot
Golar Frost	160,000	Golar LNG NB12 Corp.	Samsung	Oct-14	Marshall Is.	Diesel/Gas-Electric	Membrane	4	Portfolio
Golar Glacier	162,000	Hai Jiao 1401 Ltd.	Hyundai Samho	Nov-14	Marshall Is.	TFDE	Membrane	4	Spot
Golar Grand	145,700	Golar Grand Corp.	Daewoo	Jan-06	Marshall Is.	Steam	GT NO 96	4	Gorgon
Golar Ice	160,000	Hai Jiao 1406 Ltd.	Samsung	Jan-15	Marshall Is.	Diesel Electric	Membrane	4	Spot
Golar Kelvin	162,000	Hai Jiao 1405 Ltd.	Hyundai Samho	Jan-15	Marshall Is.	DFDE	Membrane	4	Spot
Golar Maria	145,700	Golar LNG 2234 LLC	Daewoo	Jun-06	Marshall Is.	Steam	GT NO 96	4	Spot
Golar Mazo	135,255	Faraway Maritime Shipping	Mitsubishi	Dec-99	Liberia	Steam	Moss	5	Bontang
Golar Penguin	160,000	Oriental Fleet LNG 02 Ltd.	Samsung	Sep-14	Marshall Is.	TFDE	Membrane	4	Spot
Golar Seal	160,000	Compass Shipping 1 Corp. Ltd.	Samsung	Sep-13	Marshall Is.	Diesel/Gas-Electric	TZ Mk. III	4	Spot
Golar Snow	160,000	Hai Jiao 1402 Ltd.	Samsung	Jan-15	Marshall Is.	Diesel/Gas-Electric	Membrane	4	Spot
Grace Acacia	149,700	Algawin Shipping Inc.	HHI	Feb-07	Bahamas	Steam	TZ Mk. III	4	Spot
Grace Barleria	149,700	NYK Line	HHI	Apr-07	Japan	Steam	TZ Mk. III	4	Portfolio
Grace Cosmos	150,000	Algahunt Shipping Inc.	HHI	Feb-08	Bahamas	Steam	TZ Mk. III	4	Portfolio
Grace Dahlia	177,000	NYK Line	Kawasaki	Sep-13	Japan	Steam	Moss	4	Spot
Grand Aniva	145,000	NYK-SCF LNG Shpg No. 2 Ltd.	Mitsubishi	Jan-08	Cyprus	Steam	Moss	4	Sakhalin II
Grand Elena	145,580	NYK-SCF LNG Shpg No. 1 Ltd.	Mitsubishi	Oct-07	Cyprus	Steam	Moss	4	Sakhalin II
Grand Mereya	147,000	Ice Gas LNG Shipping Co. Ltd.	Mitsui E&S	Mar-08	Cyprus	Steam	Moss	4	Sakhalin II
Hanjin Muscat	138,366	H-Line Shipping Co. Ltd.	Hanjin (Busan)	Jul-99	South Korea	Steam	GT NO 96	4	Oman LNG
Hanjin Pyeongtaek	130,636	H-Line Shipping Co. Ltd.	Hanjin (Busan)	Sep-95	South Korea	Steam	GT NO 96	4	Bontang
Hanjin Ras Laffan	138,214	H-Line Shipping Co. Ltd.	Hanjin (Busan)	Jul-00	South Korea	Steam	GT NO 96	4	RasGas I
Hanjin Sur	138,333	H-Line Shipping Co. Ltd.	Hanjin (Busan)	Feb-00	South Korea	Steam	GT NO 96	4	Oman LNG
Hispania Spirit	145,500	Teekay Gas Naviera SL	Daewoo	Aug-02	Spain	Steam	GT NO 96	4	Peru LNG
Hoegh Giant	165,000	Hoegh LNG Giant Ltd.	HHI	Jan-17	Marshall Is.	Diesel/Gas-Electric	TZ MK. III Flex	4	Portfolio
Hongkong Energy	138,000	Ocean Trinity Sh No. 27 SA	Daewoo	Feb-04	Marshall Is.	Steam	GT NO 96	4	North West Shelf
Hyundai Aquapia	137,415	Hyundai LNG Shipping Co. Ltd.	HHI	May-00	South Korea	Steam	Moss	4	Oman LNG
Hyundai Cosmopia	137,415	Hyundai LNG Shipping Co. Ltd.	HHI	Feb-00	South Korea	Steam	Moss	4	RasGas I
Hyundai Ecopia	149,745	KLT 1 International SA	HHI	Nov-08	Panama	Steam	TZ Mk. III	4	Balhaf
Hyundai Greenpia	125,000	Hyundai LNG Shipping Co. Ltd.	HHI	May-96	South Korea	Steam	Moss	4	MLNG
Hyundai Oceanpia	135,000	Hyundai LNG Shipping Co. Ltd.	HHI	Jun-00	South Korea	Steam	Moss	4	Oman LNG
Hyundai Peacepia	174,000	HIb SA	Daewoo	Jun-17	Panama	ME-GI	TZ Mk. III Flex	4	Sabine Pass
Hyundai Princepia	174,000	HIa SA	Daewoo	May-17	Panama	ME-GI	TZ Mk. III Flex	4	Sabine Pass
Hyundai Technopia	137,415	Hyundai LNG Shipping Co. Ltd.	HHI	Jul-99	South Korea	Steam	Moss	4	RasGas I
Hyundai Utopia	125,182	Hyundai LNG Shipping Co. Ltd.	HHI	Jun-94	South Korea	Steam	Moss	4	Donggi Senoro
Iberica Knutsen	138,000	Norspan LNG III AS	Daewoo	Aug-06	Norway	Ultra Steam Turbine	GT NO 96	4	Portfolio
Ibra LNG	147,000	Areej LNG Carrier SA	Samsung	Jul-06	Panama	Steam	TZ Mk. III	4	Oman LNG
Ibri LNG	147,569	Dune LNG Carrier SA	Mitsubishi	Jul-06	Panama	Steam	Moss	4	Oman LNG
Ish	137,000	Ish Inc.	Mitsubishi	Nov-95	Liberia	Steam	Moss	5	Das Island
K. Acacia	138,017	Korea Line LNG Co. Ltd.	Daewoo	Dec-99	South Korea	Steam	GT NO 96	4	Oman LNG
K. Freesia	138,015	Korea Line LNG Co. Ltd.	Daewoo	Aug-00	South Korea	Steam	GT NO 96	4	RasGas I
K. Jasmine	145,878	Kolt JV No. 1 SA	Daewoo	May-08	Panama	Steam	TZ MK. III	4	Sakhalin II
K. Mugungwha	151,812	Kolt JV No. 2 SA	Daewoo	Nov-08	Panama	Steam	TZ MK. III	4	Oman LNG
Kinisis	173,400	Danae Gas Shipping Inc.	Daewoo	Oct-18	Liberia	ME-GI	TZ Mk. III Flex	4	Portfolio
Kita LNG	147,895	Oceanus LNG Beta LLC	Daewoo	May-14	Malta	Diesel Electric	GT NO 96	4	Spot
Kmarin Diamond	155,000	Sg Leasing Gems Ltd.	Hyundai Samho	Jul-08	Isle of Man	Diesel/Gas-Electric	TZ Mk. III	4	Portfolio
Kmarin Emerald	155,000	Sg Leasing Gems Ltd.	HHI	May-07	Isle of Man	DFDE	TZ Mk. III	4	Portfolio
Kumul	170,000	Gemini LNG Shipping Ltd.	Hudong Zhonghua	Dec-15	Hong Kong	Diesel	TZ MK. III	4	PNG LNG
La Mancha Knutsen	176,300	Norspan LNG IX AS	HHI	Sep-16	Spain	ME-GI	Membrane	4	Portfolio
La Seine	174,000	Xiang Ch16 HK International	HHI	Feb-20	Malta	X-DF	TZ MK. III Flex	4	Portfolio

Lalla Fatma N'Soumer	145,000	Algeria Nippon Gas	Kawasaki	Oct-04	Bahamas	Steam	Moss	4	Arzew
Lena River	155,000	Solana Holding Ltd.	HHI	Sep-13	Marshall Is.	DFDE	TZ Mk. III	4	Portfolio
Lijmiliya	263,300	Nakilat Lijmiliya Inc.	Daewoo	Dec-08	Marshall Is.	Diesel	GT NO 96	5	Qatargas II
LNG Abalamabie	162,000	Bonny Gas Transport Ltd.	Samsung	Jul-16	Bermuda	DFDE	TZ Mk. III	4	NLNG
LNG Abuja II	162,000	Bonny Gas Transport Ltd.	Samsung	Mar-16	Bermuda	DFDE	TZ Mk. III	4	NLNG
LNG Adamawa	141,000	Bonny Gas Transport Ltd.	HHI	Apr-05	Bermuda	Steam	Moss	4	NLNG
LNG Akwa Ibom	141,000	Bonny Gas Transport Ltd.	HHI	Oct-04	Bermuda	Steam	Moss	4	NLNG
LNG Alliance	154,472	NYK Armateur	STX	Mar-07	France	Diesel/Gas-Electric	CS1	4	Portfolio
LNG Aquarius	126,300	Hanochem Shipping Pt.	General Dynamics	Jan-77	Indonesia	Steam	Moss	5	Bontang
LNG Barka	155,982	Lloyds TSB General Leasing 3	Kawasaki	Dec-08	Bahamas	Steam	Moss	4	Oman LNG
LNG Bayelsa	137,500	Bonny Gas Transport Ltd.	HHI	Mar-03	Bermuda	Steam	Moss	4	NLNG
LNG Benue	145,952	BW Gas LNG Carriers Pte Ltd.	Daewoo	Apr-06	Bermuda	Steam	GT NO 96	4	NLNG
LNG Bonny Ii	174,000	Bonny Gas Transport Ltd.	HHI	Dec-15	Bermuda	Diesel/Gas-Electric	TZ Mk. III	4	NLNG
LNG Borno	149,600	Okra Shipping No. 1	Samsung	Aug-07	Bermuda	Steam	TZ Mk. III	4	NLNG
LNG Cross River	141,000	Bonny Gas Transport Ltd.	HHI	Aug-05	Bermuda	Steam	Moss	4	NLNG
LNG Dream	145,000	OJV Cayman 1 Ltd.	Kawasaki	Sep-06	Bahamas	Steam	Moss	4	North West Shelf
LNG Dubhe	174,000	Arctic Red LNG Shipping Ltd.	Hudong Zhonghua	Nov-19	Hong Kong	ME-GI	GTT NO96 L03+	4	Yamal
LNG Ebisu	147,546	LNG Ebisu Shipping Corp.	Kawasaki	Jul-08	Bahamas	Steam	Moss	4	Pluto
LNG Enugu	145,926	BW Gas LNG Carriers Pte Ltd.	Daewoo	Oct-05	Bermuda	Steam	GT NO 96	4	NLNG
LNG Finima II	162,000	Bonny Gas Transport Ltd.	Samsung	Dec-15	Bermuda	DFDE	TZ Mk. III	4	NLNG
LNG Fukurokuju	164,700	LNG Fukurokuju Shipping Corp. .	Kawasaki	Jul-16	Bahamas	Steam	Moss	4	APLNG
LNG Imo	148,452	Bergesen LNG XI Pte Ltd.	Daewoo	Jun-08	Bermuda	Steam	GT NO 96	4	NLNG
LNG Jamal	135,333	Jamal Shipholding SA	Mitsubishi	Oct-00	Japan	Steam	Moss	5	Oman LNG
LNG Juno	180,000	Mog-X LNG Shipholding SA	Mitsubishi	Oct-18	Bahamas	STaGE	Moss	4	Freeport
LNG Jupiter	153,000	Lloyds TSB Equipment No. 7 Ltd.	Kawasaki	Jul-09	Bahamas	Steam	Moss	4	PNG LNG
LNG Jurojin	160,000	LNG Jurojin Shipping Corp. .	Mitsubishi	Nov-15	Bahamas	Steam	Moss	4	Portfolio
LNG Kano	148,565	Bergesen LNG IX Pte Ltd.	Daewoo	Jan-07	Bermuda	Steam	TZ MK. III	4	NLNG
LNG Kolt	153,595	KLT 5 International SA	Hanjin (Busan)	Dec-08	Panama	Steam	TZ Mk. III	4	Portfolio
LNG Lagos II	174,000	Bonny Gas Transport Ltd.	HHI	Jan-16	Bermuda	DFDE	TZ Mk. III	4	NLNG
LNG Lerici	65,000	Portovenere & Lerici Pte Ltd.	Sestri Ponente	Apr-98	Singapore	Steam	GT NO 96	4	Malaysia LNG
LNG Lokoja	148,471	Bergesen LNG VIII Pte Ltd.	Daewoo	Nov-06	Bermuda	Steam	GT NO 96	4	NLNG
LNG Maleo	127,544	Nippon/Mitsui/Kawasaki	Mitsui E&S	Jan-89	Japan	Steam	Moss	4	North West Shelf
LNG Mars	155,693	Osaka Gas Int. & Mitsui OSK	Mitsubishi	Oct-16	Japan	Steam	Moss	4	PNG LNG
LNG Megrez	174,000	Arctic Indigo LNG Shipping Ltd.	Hudong Zhonghua	Nov-20	Hong Kong	ME-GI	GTT NO96 L03+	4	Yamal
LNG Merak	174,000	Arctic Yellow LNG Shipping Ltd.	Hudong Zhonghua	Jan-20	Hong Kong	ME-GI	GTT NO96 L03+	4	Yamal
LNG Ogun	149,000	Okra Shipping No. 2	Samsung	Jul-07	Bermuda	Steam	TZ Mk. III	4	NLNG
LNG Ondo	148,478	Bergesen LNG X Pte Ltd.	Daewoo	Sep-07	Bermuda	Steam	TZ MK. III	4	NLNG
LNG Oyo	145,842	BW Gas LNG Carriers Pte Ltd.	Daewoo	Jan-06	Bermuda	Steam	GT NO 96	4	NLNG
LNG Phecda	174,000	Arctic Orange LNG Shipping Ltd.	Hudong Zhonghua	Sep-20	Hong Kong	ME-GI	GTT NO96 L03+	4	Yamal
LNG Pioneer	138,121	M&S Shipping 3 SA	Daewoo	Jul-05	Bahamas	Steam	GT NO 96	4	Das Island
LNG Port-Harcourt II	162,000	Bonny Gas Transport Ltd.	Samsung	Dec-15	Bermuda	DFDE	TZ Mk. III	4	NLNG
LNG Portovenere	65,000	Portovenere & Lerici Pte Ltd.	Sestri Ponente	Apr-97	Singapore	Steam	GT NO 96	4	Portfolio
LNG River Niger	141,000	Bonny Gas Transport Ltd.	HHI	Jul-06	Bermuda	Steam	Moss	4	NLNG
LNG River Orashi	145,914	BW Gas LNG Carriers Pte Ltd.	Daewoo	Nov-04	Bermuda	Steam	GT NO 96	4	NLNG
LNG Rivers	137,200	Bonny Gas Transport Ltd.	HHI	Jun-02	Bermuda	Steam	Moss	4	NLNG
LNG Sakura	177,000	LNG Sakura Shipping Corp.	Kawasaki	Feb-18	Bahamas	TFDE	Moss	4	Freeport
LNG Saturn	155,300	Mog-IX LNG Shipholding SA	Mitsubishi	Feb-16	Bahamas	Ultra Steam Turbine	Moss	4	Gorgon
LNG Schneeweisschen	180,000	LNG Rose Shipping Corp.	Daewoo	Sep-18	Panama	TFDE	TZ Mk. III Flex	4	Freeport
LNG Sokoto	137,425	Bonny Gas Transport Ltd.	HHI	Sep-02	Bermuda	Steam	Moss	4	NLNG
LNG Unity	154,472	Global LNG Armateur SAS	STX	Nov-06	France	Diesel/Gas-Electric	CS1	4	Portfolio
LNG Venus	153,000	Osaka Gas Int. & Mitsui OSK	Mitsubishi	Nov-14	Japan	Steam	Sayaendo	4	North West Shelf
LNG Vesta	127,386	Europe LNGT Co. Ltd.	Mitsubishi	Jun-94	Liberia	Steam	Moss	4	Portfolio
Lobito	160,276	Mint LNG III Ltd.	Samsung	Nov-11	Bahamas	DFDE	TZ Mk. III	4	Soyo
Lusail	145,000	Peninsula LNG Transport No. 1	Samsung	May-05	Bahamas	Steam	TZ Mk. III	4	RasGas II
Macoma	145,400	Compass Shipping 9 Corp. Ltd.	Daewoo	Sep-17	Bahamas	ME-GI	GT NO 96	4	Portfolio
Madrid Spirit	138,000	Teekay Gas IV SL	Navantia	Dec-04	Spain	Steam	GT NO 96	4	Atlantic LNG
Magdala	173,400	Hai Jiao 1606 Ltd.	Daewoo	Feb-18	Bahamas	ME-GI	GT NO 96	4	Portfolio
Magellan Spirit	165,500	Magellan Spirit Aps	Samsung	Apr-09	Denmark	Diesel/Gas-Electric	TZ Mk. III	4	Portfolio
Malanje	160,276	Mint LNG II Ltd.	Samsung	Oct-11	Bahamas	DFDE	TZ Mk. III	4	Soyo
Maran Gas Achilles	174,000	Adonis Investment Corp.	Hyundai Samho	Jan-16	Greece	DFDE	TZ Mk. III	4	Portfolio
Maran Gas Agamemnon	174,000	Doris Navigation Inc.	Hyundai Samho	May-16	Greece	DFDE	TZ Mk. III	4	Portfolio
Maran Gas Alexandria	161,870	Greenmare Navigation Corp.	Hyundai Samho	Oct-15	Greece	DFDE	Membrane	4	QCLNG
Maran Gas Amphipolis	174,000	Nestor Navigation Corp.	Daewoo	Aug-16	Greece	DFDE	Membrane	4	Portfolio
Maran Gas Andros	173,400	Crusandel Marine Co.	Daewoo	Nov-19	Greece	ME-GI	GT NO 96	4	Freeport
Maran Gas Apollonia	161,870	Ilida Shipping Co. Ltd.	Hyundai Samho	Jan-14	Greece	Diesel Electric	TZ Mk. III	4	Punta Europa
Maran Gas Asclepius	145,000	Sea Satin Corp.	Daewoo	Jul-05	Greece	Steam	GT NO 96	4	RasGas II
Maran Gas Chios	170,000	Pleione Inc.	Daewoo	Mar-19	Greece	ME-GI	TZ Mk. III Flex	4	Data unavailable

Maran Gas Coronis	145,700	Jopica Shipping Co.	Daewoo	Jul-07	Greece	Steam	TZ MK. III	4	RasGas II
Maran Gas Delphi	159,800	Ada Shipholding Inc.	Daewoo	Feb-14	Greece	Diesel Electric	TZ Mk. III	4	Portfolio
Maran Gas Efessos	159,800	Acrogiali Shipping & Trading	Daewoo	Jun-14	Greece	DFDE	Membrane	4	Portfolio
Maran Gas Hector	174,000	Dylan Corp.	Hyundai Samho	Nov-16	Greece	Diesel/Gas-Electric	TZ Mk. III	4	Portfolio
Maran Gas Hydra	173,400	Hai Jiao 1802 Ltd.	Daewoo	Feb-19	Greece	ME-GI	GT NO 96	4	Sabine Pass
Maran Gas Leto	174,000	Cherise Maritime Ltd.	Hyundai Samho	Mar-16	Greece	DFDE	TZ Mk. III	4	Portfolio
Maran Gas Lindos	161,870	Olivia International Shpg Corp.	Daewoo	Jul-15	Greece	DFDE	Membrane	4	Punta Europa
Maran Gas Mystras	155,900	Blueskies Shipping Co. Ltd.	Daewoo	Aug-15	Greece	DFDE	Membrane	4	QCLNG
Maran Gas Olympias	174,000	Cygnus Enterprises Inc.	Daewoo	Feb-17	Greece	ME-GI	GT NO 96	4	Portfolio
Maran Gas Pericles	173,400	Anguilla Navigation Corp.	Hyundai Samho	Aug-16	Greece	DFDE	TZ Mk. III	4	Portfolio
Maran Gas Posidonia	161,870	Felicite Navigation Inc.	Hyundai Samho	May-14	Greece	DFDE	Membrane	4	Punta Europa
Maran Gas Psara	173,595	Highseas Shiptrade Co.	Daewoo	May-20	Greece	ME-GI	GT NO96	4	Portfolio
Maran Gas Roxana	174,000	Elisa International Ltd.	Daewoo	Jan-17	Greece	ME-GI	TZ Mk. III	4	Portfolio
Maran Gas Sparta	159,800	Lettuce Maritime Corp.	Hyundai Samho	Apr-15	Greece	DFDE	Membrane	4	QCLNG
Maran Gas Spetses	173,400	Hai Jiao 1801 Ltd.	Daewoo	Jul-18	Greece	ME-GI	TZ Mk. III Flex	4	GoM
Maran Gas Troy	155,000	Helianthus Navigation Corp. .	Daewoo	Sep-15	Greece	DFDE	Membrane	4	Data unavailable
Maran Gas Ulysses	173,400	Ariel Sails Navigation SA	Hyundai Samho	Jan-17	Greece	Diesel/Gas-Electric	TZ Mk. III	4	Portfolio
Maran Gas Vergina	174,000	Santa Lucia Enterprises Inc.	Daewoo	Dec-16	Greece	ME-GI	GT NO 96	4	Portfolio
Maria Energy	174,000	Canyon Trading Corp.	HHI	Sep-16	Liberia	Diesel/Gas-Electric	TZ Mk. III	4	Data unavailable
Marib Spirit	165,500	Membrane Shipping Ltd.	Samsung	Apr-08	Marshall Is.	Diesel/Gas-Electric	TZ Mk. III	4	Balhaf
Marshal Vasilevskiy	170,000	Gazprom Flot LLC	HHI	Jan-19	Russian Fed.	Diesel/Gas-Electric	Membrane	4	Kaliningrad LNG
Marvel Crane	177,000	Rosewood Shipping Pte Ltd.	Mitsubishi	Mar-19	Singapore	STaGE	Moss	4	Cameron
Marvel Eagle	155,000	Mevius Lines SA	Kawasaki	Oct-18	Panama	Reheat Steam Turbine	Moss	4	Cameron
Marvel Falcon	174,000	Tea Tree Shipping Pte Ltd.	Samsung	Apr-18	Singapore	TFDE	TZ Mk. III Flex	4	Cameron
Marvel Hawk	177,000	Comet Arrow Gas Transport	Samsung	Dec-18	Singapore	TFDE	TZ Mk. III Flex	4	Cameron
Marvel Heron	177,000	Heron Gas Shipping SA	Mitsubishi	Sep-19	Panama	STaGE	Moss	4	Cameron
Marvel Kite	177,000	Comet Gyro Gas Transport Pte	Samsung	Jan-19	Singapore	TFDE	TZ Mk. III Flex	4	Cameron
Marvel Pelican	156,265	Pelican Gas Shipping SA	Kawasaki	Dec-19	Panama	Reheat Steam Turbine	Moss	4	Cameron
Megara	173,400	Hai Jiao 1607 Ltd.	Daewoo	Jul-18	Bahamas	ME-GI	GT NO 96	4	Portfolio
Mekaines	266,000	Nakilat SHI 1695 Inc.	Samsung	Apr-09	Marshall Is.	DRL	TZ Mk. III	5	Qatargas III
Merchant	138,000	Ocean Tiger Shipping Ltd.	Samsung	Jul-03	Marshall Is.	Steam	TZ Mk. III	4	Portfolio
Meridian Spirit	165,500	Meridian Spirit Aps	Samsung	Jan-10	Denmark	Diesel/Gas-Electric	TZ Mk. III	4	Hammerfest
Mesaimeer	216,312	Nakilat HHI 1908 Inc.	HHI	Mar-09	Marshall Is.	Diesel	TZ Mk. III	4	Qatargas III
Methane Alison Victoria	145,000	Gas-Nineteen Ltd.	Samsung	Apr-07	Bermuda	Steam	TZ Mk. III	4	Punta Europa
Methane Becki Anne	170,000	Gas-Twenty Seven Ltd.	Samsung	Sep-10	Bermuda	TFDE	TZ Mk. III	4	Singapore
Methane Heather Sally	145,000	Gas-Twenty One Ltd.	Samsung	Jan-07	Bermuda	Steam	TZ Mk. III	4	Punta Europa
Methane Jane Elizabeth	145,000	Gas-Seventeen Ltd.	Samsung	Jun-06	Bermuda	Steam	TZ Mk. III	4	Idku
Methane Julia Louise	170,000	Southern Route Maritime SA	Samsung	Apr-10	Bermuda	TFDE	TZ Mk. III	9	Singapore
Methane Kari Elin	138,267	Lombard Corporate December 1	Samsung	May-04	Bermuda	Steam	TZ Mk. III	4	Singapore
Methane Lydon Volney	145,000	Gas-Eighteen Ltd.	Samsung	Aug-06	Bermuda	Steam	TZ Mk. III	4	Idku
Methane Mickie Harper	170,000	Methane Services Ltd.	Samsung	Dec-10	Bermuda	Diesel/Gas-Electric	TZ Mk. III	4	Singapore
Methane Nile Eagle	145,000	Egypt LNG Shipping Ltd.	Samsung	Dec-07	Bermuda	Steam	TZ Mk. III	4	Idku
Methane Patricia Camila	170,000	Methane Services Ltd.	Samsung	Oct-10	Bermuda	TFDE	TZ Mk. III	4	Singapore
Methane Princess	138,000	Methane Services Ltd.	Daewoo	Aug-03	Bermuda	Steam	GT NO 96	4	Portfolio
Methane Rita Andrea	145,000	Gas-Sixteen Ltd.	Samsung	Apr-06	Bermuda	Steam	TZ Mk. III	4	Idku
Methane Shirley Elisabeth	145,000	Gas-Twenty Ltd.	Samsung	Feb-07	Bermuda	Steam	TZ Mk. III	4	Punta Europa
Methane Spirit	165,500	Methane Spirit LLC	Samsung	Feb-08	Bahamas	Diesel/Gas-Electric	TZ Mk. III	4	Atlantic LNG
Milaha Qatar	145,500	Milaha Qatar GmbH & Co. KG	Samsung	Apr-06	Malta	Steam	TZ Mk. III	4	RasGas II
Milaha Ras Laffan	138,270	Milaha Ras Laffan GmbH & Co.	Samsung	Apr-04	Malta	Steam	TZ Mk. III	4	RasGas II
Min Lu	147,100	Min Lu LNG Shipping Co. Ltd.	Hudong Zhonghua	Aug-09	Hong Kong	Steam	GT NO 96	4	Tangguh
Min Rong	145,000	Min Rong LNG Shipping Co. Ltd.	Hudong Zhonghua	Feb-09	Hong Kong	Steam	GT NO 96	4	Tangguh
Mozah	266,000	Nakilat Haloul Inc.	Samsung	Aug-09	Marshall Is.	Diesel	TZ Mk. III	5	Qatargas II
Mraweh	137,000	Mraweh Ltd.	STX	Apr-96	Liberia	Steam	Moss	4	Das Island
Mubaraz	137,000	Mubaraz Ltd.	STX	Dec-95	Liberia	Steam	Moss	4	Das Island
Murex	173,400	Hai Jiao 1605 Ltd.	Daewoo	Jul-17	Bahamas	ME-GI	GT NO 96	4	Portfolio
Murwab	210,100	J5 Nakilat No. 4 Ltd.	Daewoo	Jun-08	Marshall Is.	Diesel	GT NO 96	18	RasGas III
Myrina	173,400	Xiang Ch1 HK International	Daewoo	May-18	Bahamas	ME-GI	GT NO 96	4	Portfolio
Neo Energy	150,000	Sea Optima SA	HHI	Jan-07	Liberia	Steam	Moss	4	Portfolio
Neptune	145,130	SRV Joint Gas Ltd.	Samsung	Nov-09	Norway	DFDE	TZ Mk. III	4	Portfolio
Nikolay Urvantsev	172,658	Dy Maritime Ltd.	Daewoo	Jul-19	Hong Kong	ME-GI	GT NO 96 GW	4	Yamal
Nikolay Yevgenov	172,410	TC LNG Explorer III LLC	Daewoo	Apr-19	Bahamas	ME-GI	GT NO 96 GW	4	Yamal
Nikolay Zubov	172,410	Hai Kuo Shipping 1606 Ltd.	Daewoo	Nov-18	Cyprus	TFDE - Azipod	GT NO 96 GW	4	Yamal
Nizwa LNG	147,684	Oryx LNG Carrier SA	Kawasaki	Dec-05	Panama	Steam	Moss	4	Oman LNG
Nohshu Maru	180,000	Trans Pacific Shipping 5 Ltd.	Mitsubishi	Feb-19	Bahamas	Reheat Steam Turbine	Moss	4	Data unavailable
Northwest Sanderling	127,525	BHP/BP/Chevron/Japan & Others	Mitsubishi	Jan-89	Australia	Steam	Moss	4	North West Shelf
Northwest Sandpiper	125,042	BHP/BP/Chevron/Japan & Others	Mitsui E&S	Jan-93	Australia	Steam	Moss	4	North West Shelf
Northwest Snipe	127,500	BHP/BP/Chevron/Japan & Others	Mitsui E&S	Jan-90	Australia	Steam	Moss	4	North West Shelf

Northwest Stormpetrel	127,500	BHP/BP/Chevron/Japan & Others	Mitsubishi	Dec-94	Australia	Steam	Moss	4	North West Shelf
Oak Spirit	173,400	Sea 64 Leasing Co Ltd.	Daewoo	Mar-16	Bahamas	ME-GI	GT NO 96	4	Sabine Pass
Ob River	149,700	Lance Shipping SA	HHI	May-07	Marshall Is.	Steam	TZ Mk. III	4	Sakhalin II
Oceanic Breeze	155,300	Oceanic Breeze LNG Transport	Mitsubishi	Apr-18	Marshall Is.	Reheat Steam Turbine	Moss	4	Ichthys
Onaiza	210,150	Nakilat DSME 2266 Inc.	Daewoo	Apr-09	Marshall Is.	Diesel	GT NO 96	12	Qatargas III
Ougarta	170,000	Hyproc Shipping Co.	HHI	Mar-17	Algeria	DFDE	TZ Mk. III Flex	4	Arzew
Pacific Arcadia	145,400	Bahamas LNG Shipping Ltd.	Mitsubishi	Oct-14	Bahamas	Steam	Moss	4	PNG LNG
Pacific Breeze	180,000	Pacific Breeze LNG Transport	Kawasaki	Mar-18	Marshall Is.	TFDE	Moss	4	Ichthys
Pacific Enlighten	145,400	Pacific Hope Shipping Ltd.	Mitsubishi	Mar-09	Bahamas	Steam	Moss	4	North West Shelf
Pacific Eurus	137,000	Pacific Eurus Shipping	Mitsubishi	Mar-06	Bahamas	Steam	Moss	4	Das Island
Pacific Mimosa	155,300	Kaede Shipholding SA	Mitsubishi	Mar-18	Japan	Reheat Steam Turbine	Moss	4	Wheatstone
Pacific Notus	137,006	Pacific LNG Shipping	Mitsubishi	Sep-03	Bahamas	Steam	Moss	5	Darwin LNG
Palu LNG	159,800	Oceanus LNG Gamma LLC	Daewoo	Nov-14	Malta	TFDE	GT NO 96	4	Spot
Pan Africa	174,000	Pan Africa LNG Transportation	Hudong Zhonghua	Jan-19	Hong Kong	TFDE	GT NO 96	4	QCLNG
Pan Americas	174,000	Pan Americas LNG Trans	Hudong Zhonghua	Jan-18	Hong Kong	TFDE	GT NO 96	4	QCLNG
Pan Asia	174,000	Pan Asia LNG Transportation	Hudong Zhonghua	Sep-17	Hong Kong	TFDE	GT NO 96	4	QCLNG
Pan Europe	174,000	Pan Europe LNG Transportation	Hudong Zhonghua	Jul-18	Hong Kong	TFDE	GT NO 96	4	QCLNG
Papua	170,000	Aquarius LNG Shipping Ltd.	Hudong Zhonghua	Nov-14	Hong Kong	DFDE	TZ MK. III	4	PNG LNG
Patris	174,000	Artemis Gas 1 Shipping Inc.	Daewoo	Jan-18	Liberia	ME-GI	GT NO 96	4	Freeport
Pearl LNG	174,000	Cardiff LNG Delta Owning LLC	HHI	Aug-20	Malta	X-DF	NO-96-GW+PRS	4	Portfolio
Point Fortin	154,200	Los Halillos Shipping Co. SA	Koyo Dockyard	Jan-10	Panama	Steam	TZ Mk. III	4	Portfolio
Polar Spirit	89,800	Polar Spirit LLC	Ishikawajima	Jun-93	Bahamas	Steam	IHI SPB	4	Atlantic LNG
Portovyy	138,107	Global LNG Ltd.	Daewoo	Aug-03	Malta	Steam	GT NO 96	4	Portfolio
Prachi	162,000	India LNG Transport Co. No. 4	HHI	Nov-16	Singapore	Diesel/Gas-Electric	TZ Mk. III	4	Gorgon
Prism Agility	180,000	HHI ENS1 Shipholding SA	HHI	May-19	Panama	X-DF	TZ Mk. III Flex Plus	4	Portfolio
Prism Brilliance	180,000	HHI ENS2 Shipholding SA	HHI	May-19	Panama	X-DF	TZ Mk. III Flex Plus	4	Portfolio
Pskov	170,200	Scalpay Shipping Ltd.	STX	Sep-14	Liberia	DFDE	GT NO 96	4	Portfolio
Puteri Delima	130,400	Puteri Delima Sdn Bhd.	STX	Jan-95	Malaysia	Steam	GT NO 96	4	MLNG II
Puteri Delima Satu	137,100	Puteri Delima Satu L Pte Ltd.	Mitsui E&S	Oct-02	Malaysia	Steam	GT NO 96	4	MLNG III
Puteri Firus Satu	137,100	Puteri Firus Satu	Mitsubishi	Aug-04	Malaysia	Steam	GT NO 96	4	MLNG III
Puteri Intan	137,100	Puteri Intan Sdn Bhd.	STX	Aug-94	Malaysia	Steam	GT NO 96	4	MLNG II
Puteri Intan Satu	137,100	Puteri Intan Satu L Pte Ltd.	Mitsubishi	Aug-02	Malaysia	Steam	GT NO 96	4	MLNG III
Puteri Mutiara Satu	137,100	Puteri Mutiara Satu	Mitsui E&S	Apr-05	Malaysia	Steam	GT NO 96	4	MLNG III
Puteri Nilam	130,400	Puteri Nilam Sdn Bhd.	STX	Jul-95	Malaysia	Steam	GT NO 96	4	MLNG II
Puteri Nilam Satu	137,100	Puteri Nilam Satu L Pte Ltd.	Mitsubishi	Jul-03	Malaysia	Steam	GT NO 96	4	MLNG III
Puteri Zamrud	130,400	MISC Bhd.	STX	Jun-96	Malaysia	Steam	GT NO 96	4	MLNG II
Puteri Zamrud Satu	137,100	Puteri Zamrud Satu L Pvt Ltd.	Mitsui E&S	Feb-04	Malaysia	Steam	GT NO 96	4	MLNG III
Qogir	174,000	Xiang Ch15 HK International	Samsung	Jun-20	Malta	X-DF	TZ MK. III Flex	4	Portfolio
Raahi	138,076	India LNG Transport Co. No. 2	Daewoo	Oct-04	Malta	Steam	GT NO 96	4	RasGas
Ramdane Abane	126,130	Hyproc Shipping Co.	STX	Jun-81	Algeria	Steam	GT NO 85	5	Arzew
Rasheeda	266,000	Nakilat SHI 1754 Inc.	Samsung	Aug-10	Marshall Is.	Diesel	TZ Mk. III	10	Qatargas IV
Rias Baixas Knutsen	180,000	Knutsen OAS Espana SL	HHI	Sep-19	Spain	ME-GI	TZ Mk. III Flex Plus	4	Corpus Christi
Ribera Del Duero Knutsen	173,400	Norspan LNG VIII AS	Daewoo	Dec-10	Norway	DFDE	GT NO 96	4	Portfolio
Rioja Knutsen	170,000	Norspan LNG X As	HHI	Dec-16	Spain	ME-GI	TZ Mk. III	4	Portfolio
Rudolf Samoylovich	172,410	TC LNG Explorer II LLC	Daewoo	Aug-18	Bahamas	ME-GI	GT NO 96 GW	4	Yamal
Saga Dawn	45,000	Saga LNG Shipping Pte Ltd.	China Merchants H.I.	Aug-19	Singapore	Diesel/Gas-Electric	TZ MK. III Flex	4	Data unavailable
Salalah LNG	147,000	Tiwi LNG Carrier SA	Samsung	Dec-05	Panama	Steam	TZ Mk. III	4	Oman LNG
SCF Barents	174,000	Heliconia Maritime SA	HHI	Sep-20	Liberia	DFDS	TZ Mk. III Flex	4	Portfolio
SCF La Perouse	174,000	Albus Shipping Ltd.	HHI	Feb-20	Liberia	X-DF	NO-96-GW+PRS	4	Portfolio
SCF Melampus	170,200	Pabbay Shipping Ltd.	STX	Jan-15	Liberia	Diesel Electric	Membrane	4	Portfolio
SCF Mitre	170,200	Ensay Shipping Ltd.	STX	Apr-15	Liberia	Diesel Electric	Membrane	4	Portfolio
Sean Spirit	174,162	HHI Hull No. S856 LLC	Hyundai Samho	Dec-18	Bahamas	ME-GI	TZ Mk. III Flex	4	Freeport
Seishu Maru	138,000	Trans Pacific Shipping 1 Ltd.	Mitsubishi	Sep-14	Bahamas	Steam	Moss	4	PNG LNG
Senshu Maru	127,167	Nippon/Mitsui/Kawasaki	Mitsui E&S	Feb-84	Japan	Steam	Moss	5	Bontang
Seri Alam	145,572	MISC Bhd.	Samsung	Jul-05	Malaysia	Steam	Moss Seri-C	4	Bintulu
Seri Amanah	145,709	MISC Bhd.	Samsung	Mar-06	Malaysia	Steam	TZ Mk. III	4	Bintulu
Seri Anggun	145,731	MISC Bhd.	Samsung	Oct-06	Malaysia	Steam	TZ Mk. III	4	North West Shelf
Seri Angkasa	145,130	MISC Bhd.	Samsung	Dec-06	Malaysia	Steam	TZ Mk. III	4	Bintulu
Seri Ayu	145,894	MISC Bhd.	Samsung	Oct-07	Malaysia	Steam	TZ Mk. III	4	Bintulu
Seri Bakti	152,944	MISC Bhd.	Mitsubishi	Apr-07	Malaysia	Steam	TZ MK. III	4	Gladstone
Seri Balhaf	152,000	MISC Bhd.	Mitsubishi	Jan-09	Malaysia	Steam	TZ MK. III	4	Bontang
Seri Balqis	152,000	MISC Bhd.	Mitsubishi	Mar-09	Malaysia	Steam	TZ MK. III	4	NLNG
Seri Begawan	152,900	MISC Bhd.	Mitsubishi	Nov-07	Malaysia	Steam	TZ MK. III	4	Bintulu
Seri Bijaksana	152,300	MISC Bhd.	Mitsubishi	Apr-08	Malaysia	Steam	TZ MK. III	4	Bintulu
Seri Camar	150,000	Seri Camar L Pte Ltd.	HHI	Feb-18	Malaysia	Ultra Steam Turbine	Moss	4	Pacific Northwest
Seri Camellia	159,800	Seri Camellia L Pte Ltd.	HHI	Sep-16	Malaysia	Steam	Moss Seri-C	4	Pacific Northwest
Seri Cemara	150,200	Seri Cemara L Pte Ltd.	HHI	Apr-18	Malaysia	Reheat Steam Turbine	Moss	4	Portfolio

Seri Cempaka	162,000	Seri Cempaka L Pte Ltd.	HHI	Aug-17	Malaysia	Steam	Moss Seri-C	4	Pacific Northwest
Seri Cenderawasih	162,000	Seri Cenderawasih L Pvt Ltd.	HHI	Feb-17	Malaysia	Steam	Moss Seri-C	4	Pacific Northwest
Sestao Knutsen	136,947	Norspan LNG IV AS	Navantia Cadiz	Oct-07	Spain	Steam	TZ MK. III	4	Portfolio
Sevilla Knutsen	173,400	Norspan LNG VI AS	Daewoo	May-10	Spain	Diesel/Gas-Electric	GT NO 96	4	Portfolio
Shagra	268,000	Nakilat SHI 1751 Inc.	Samsung	Nov-09	Marshall Is.	Diesel	TZ Mk. III	10	Qatargas IV
Shahamah	135,496	Shahamah Inc.	Kawasaki	Oct-94	Liberia	Steam	Moss	5	Das Island
Shen Hai	147,200	Shanghai LNG Shipping Co. Ltd.	Hudong Zhonghua	Dec-12	Hong Kong	Steam	TZ MK. III	4	Bintulu
Shinshu Maru	180,000	Trans Pacific Shipping 7 Ltd.	Kawasaki	Feb-19	Bahamas	DERST	Moss	4	Freeport
Simaisma	145,889	Greenwell Corp.	Daewoo	Jul-06	Greece	Steam	GT NO 96	8	RasGas II
Singapore Energy	138,000	KSF Global No. 6 SA	Samsung	Feb-03	Marshall Is.	Steam	TZ Mk. III	4	Portfolio
SK Audace	174,000	Milestone LNG Transport SA	Samsung	Aug-17	Panama	X-DF	TZ Mk. III	4	Portfolio
SK Resolute	180,000	Great Shale LNG Transport SA	Samsung	Nov-17	Panama	X-DF	TZ Mk. III	4	Ichthys
SK Serenity	174,000	Shikc 1 Shipholding SA	Samsung	Feb-18	Panama	TFDE	KC-1	4	Sabine Pass
SK Spica	174,117	Shikc 2 Shipholding SA	Samsung	Mar-18	Panama	TFDE	KC-1	4	Sabine Pass
SK Splendor	138,370	SK Shipping Co. Ltd. -Krs	Samsung	May-00	South Korea	Steam	TZ Mk. III	4	Oman LNG
SK Stellar	138,375	Stellar Shipholding SA	Samsung	Dec-00	Panama	Steam	TZ Mk. III	4	RasGas I
SK Summit	138,003	SK Shipping Co. Ltd. -Krs	Daewoo	Aug-99	South Korea	Steam	GT NO 96	4	RasGas I
SK Sunrise	138,306	Methane Navigation SA	Samsung	Aug-03	Panama	Steam	TZ Mk. III	4	RasGas II
SK Supreme	138,225	SK Shipping Co. Ltd. -Krs	Samsung	Feb-00	South Korea	Steam	TZ Mk. III	4	RasGas I
SM Eagle	174,000	SMKLC LNG1 SA	Daewoo	May-17	Panama	ME-GI	TZ Mk. III Flex	4	Sabine Pass
SM Seahawk	174,000	SMKLC LNG2 SA	Daewoo	Jun-17	Panama	ME-GI	TZ Mk. III Flex	4	Sabine Pass
Sohar LNG	137,248	Energy Spring LNG Carrier SA	Mitsubishi	Oct-01	Panama	Steam	Moss	5	Oman LNG
Sohshu Maru	177,000	Trans Pacific Shipping 8 Ltd.	Kawasaki	Jul-19	Bahamas	DERST	Moss	4	Freeport
Solaris	155,000	Gas-Eight Ltd.	Samsung	Jul-14	Bermuda	Diesel/Gas-Electric	Membrane	4	Spot
Sonangol Benguela	160,500	Sonangol Benguela Ltd.	Daewoo	Dec-11	Bahamas	Steam	GT NO 96	4	Soyo
Sonangol Etosha	160,500	Sonangol Etosha Ltd.	Daewoo	Sep-11	Bahamas	Steam	GT NO 96	4	Soyo
Sonangol Sambizanga	160,500	Sonangol Sambizanga Ltd.	Daewoo	Aug-11	Bahamas	Steam	GT NO 96	4	Soyo
Southern Cross	172,000	Aries LNG Shipping Ltd.	Hudong Zhonghua	Jul-15	Hong Kong	DRL	TZ Mk. III	4	PNG LNG
Soyo	160,276	Mint LNG I Ltd.	Samsung	Aug-11	Bahamas	DFDE	TZ Mk. III	4	Soyo
Spirit Of Hela	177,000	Nefertiti LNG Shipping Co. Ltd.	Hyundai Samho	Nov-10	Bahamas	Diesel Electric	TZ Mk. III	4	PNG LNG
Stena Blue SKy	145,700	Blue Shipping KB	Daewoo	Aug-06	U.K.	Steam	GT NO 96	4	Spot
Stena Clear Sky	171,800	Clear Sky KB	Daewoo	May-11	U.K.	Diesel/Gas-Electric	GT NO 96	4	Portfolio
Stena Crystal SKy	171,800	Crystal Sky KB	Daewoo	May-11	U.K.	Diesel/Gas-Electric	GT NO 96	4	Portfolio
Symphonic Breeze	145,394	Reborn Maritime SA	Kawasaki	Dec-07	Bahamas	Steam	Moss	4	Portfolio
Taitar No. 1	145,000	NIMIC No. 1 SA	Mitsubishi	Oct-09	Panama	Steam	Moss	4	RasGas
Taitar No. 2	145,000	NIMIC No. 2 SA	Kawasaki	Dec-09	Panama	Steam	Moss	4	RasGas
Taitar No. 3	145,000	NIMIC No. 3 SA	Mitsubishi	Dec-09	Panama	Steam	Moss	4	RasGas
Taitar No. 4	147,000	NIMIC No. 4 SA	Kawasaki	Aug-10	Panama	Steam	Moss	4	RasGas
Tangguh Batur	145,700	LNG North-South Shipping Co.	Daewoo	Dec-08	Singapore	Steam	TZ MK. III	4	Tangguh
Tangguh Foja	155,000	Ocean1919 Shipping No. 1 SA	Samsung	Nov-08	Panama	DFDE	TZ Mk. III	4	Tangguh
Tangguh Hiri	155,000	Tangguh Hiri Finance Ltd.	HHI	Dec-08	Bahamas	DFDE	TZ Mk. III	4	Tangguh
Tangguh Jaya	155,000	Ocean1919 Shipping No. 2 SA	Samsung	Dec-08	Panama	DFDE	TZ Mk. III	4	Tangguh
Tangguh Palung	155,000	Ocean1919 Shipping No. 3 SA	Samsung	Mar-09	Panama	DFDE	TZ Mk. III	4	Tangguh
Tangguh Sago	155,000	Tangguh Sago Finance Ltd.	Hyundai Samho	Dec-08	Bahamas	Diesel/Gas-Electric	TZ Mk. III	4	Tangguh
Tangguh Towuti	145,700	LNG East-West Ship Singapore	Daewoo	Oct-08	Singapore	Steam	TZ MK. III	4	Tangguh
Tembek	216,200	Overseas LNG S1 Corp.	Samsung	Nov-07	Marshall Is.	Diesel	TZ Mk. III	4	Qatargas II
Tessala	170,000	Hyproc Shipping Co.	HHI	Feb-17	Algeria	Diesel/Gas-Electric	TZ Mk. III Flex	4	Arzew
Torben Spirit	173,400	Sea 168 Leasing Co. Ltd.	Daewoo	Nov-16	Bahamas	ME-GI	GT NO 96	4	Portfolio
Trader	138,000	Lloyds Industrial Leasing	Samsung	Nov-02	Isle of Man	Steam	TZ Mk. III	4	Portfolio
Traiano Knutsen	180,000	Hai Kuo Shipping 1901 G Ltd.	HHI	Jul-20	Norway	ME-GI	TZ Mk. III Flex Plus	4	Portfolio
Trinity Arrow	154,982	Cypress/Luster/Los Halillos	Koyo Dockyard	Feb-08	Panama	Steam	TZ Mk. III	4	Portfolio
Trinity Glory	154,000	Cypress/Luster/Los Halillos	Koyo Dockyard	Nov-08	Panama	Steam	TZ Mk. III	4	Bontang
Tristar Ruby	155,000	Sg Leasing Gems Ltd.	HHI	Apr-08	Liberia	Diesel/Gas-Electric	TZ Mk. III	4	Portfolio
Umm Al Amad	210,200	J5 Nakilat No. 7 Ltd.	Daewoo	Sep-08	Marshall Is.	Diesel	GT NO 96	18	RasGas III
Umm Al Ashtan	137,000	Umm Al Ashtan Ltd.	STX	May-97	Liberia	Steam	Moss	4	Das Island
Umm Bab	145,000	Sea Trade International	Daewoo	Nov-05	Greece	Steam	GT NO 96	4	RasGas II
Umm Slal	266,000	Shi Hull No. 1676 Inc.	Samsung	Nov-08	Marshall Is.	DFDE	TZ Mk. III	5	Qatargas II
Valencia Knutsen	173,400	Norspan LNG VII AS	Daewoo	Sep-10	Spain	DFDE	GT NO 96	4	Portfolio
Velikiy Novgorod	170,200	Boreray Shipping Ltd.	STX	Dec-13	Liberia	DFDE	GT NO 96	4	Portfolio
Vivit Americas LNG	180,000	Cardiff LNG Zeta Owning LLC	HHI	Oct-20	Malta	X-DF	TZ Mk. III Flex	4	Portfolio
Vladimir Rusanov	174,000	DY Maritime Ltd.	Daewoo	Jan-18	Hong Kong	ME-GI	GT NO 96 GW	4	Yamal
Vladimir Vize	172,000	Dy Maritime Ltd.	Daewoo	Sep-18	Hong Kong	ME-GI	GT NO 96 GW	4	Yamal
Vladimir Voronin	172,652	TC LNG Explorer IV LLC	Daewoo	Jul-19	Bahamas	ME-GI	GT NO 96 GW	4	Yamal
Wilforce	155,900	Compass Shipping 84 Corp. Ltd.	Daewoo	Sep-13	Norway	DFDE	GT NO 96	4	Data unavailable
Wilpride	155,900	Compass Shipping 85 Corp. Ltd.	Daewoo	Nov-13	Norway	DFDE	GT NO 96	4	N/A
Woodside Chaney	174,000	Lamkos Seaways Ltd.	Daewoo	Jul-19	Greece	ME-GI	TZ MK. III Flex	4	Portfolio
Woodside Charles Allen	173,400	Newberry Shiptrade Ltd.	Daewoo	Oct-20	Greece	ME-GI	Membrane	4	Portfolio

Woodside Donaldson	165,500	Malt Singapore Pte Ltd.	Samsung	Oct-09	Singapore	Diesel/Gas-Electric	TZ Mk. III	4	Pluto
Woodside Goode	159,800	Armour Co. Ltd.	Daewoo	Nov-13	Greece	Diesel Electric	GT NO 96	4	RasGas
Woodside Rees Withers	173,400	Franklin Navigation Co.	Daewoo	Oct-19	Greece	ME-GI	GT NO 96	4	Data unavailable
Woodside Rogers	159,800	Margie Seaway Corp.	Daewoo	Jul-13	Greece	Diesel/Gas-Electric	GT NO 96	4	Pluto
Yakov Gakkel	172,658	TC LNG Explorer VI LLC	Daewoo	Nov-19	Bahamas	ME-GI	GT NO 96 GW	4	Yamal
Yamal Spirit	174,000	Xiang Ch2 HK International	Hyundai Samho	Jan-19	Bahamas	ME-GI	TZ Mk. III Flex	4	Freeport
Yari LNG	159,800	Oceanus LNG Delta LLC	Daewoo	Nov-14	Malta	TFDE	GT NO 96	4	Spot
Yenisei River	155,000	Navajo Marine Ltd.	HHI	Jul-13	Marshall Is.	DFDE	TZ Mk. III	4	Yamal
YK Sovereign	127,125	SK Shipping Co. Ltd. -Krs	HHI	Dec-94	South Korea	Steam	Moss	4	MLNG
Zarga	268,000	Nakilat SHI 1752 Inc.	Samsung	Jan-10	Marshall Is.	DRL	TZ Mk. III	5	Qatargas IV
Zekreet	137,482	Mitsui/Nippon/Kawasaki/Iino	Mitsui E&S	Dec-98	Japan	Steam	Moss	5	Qatargas I

Fleet – LNG Bunkering

Name	Built	Capacity	Registered Owner	Builder	Flag	Engine Type	Cargo System	No. of tanks	Project
Seagas	Sep-74	170	Linde Gas AB	Havyard Leirvik	Sweden	Diesel	Cylinder	1	Stockholm Viking Line
Coral Methane	Apr-09	7,551	Coral Methane Shipping BV	AVIC Dingheng	Netherlands	Gas-Diesel	Cylinder	4	Portfolio
Oizmendi	Jul-09	600	Itsas Gas Bunker Supply SL	Astilleros Zamakona	Spain	Diesel	Cylinder	2	Huelva
Green Zeebrugge	Feb-17	5,000	LNG Link Investment AS	Hanjin Heavy Industries	Belgium	Diesel/Gas-Electric	Cylinder	2	Zeebrugge
Cardissa	Jun-17	6,500	Shell Western LNG BV	STX	Netherlands	Diesel/Gas-Electric	Cylinder	1	Portfolio
Coralius	Aug-17	5,800	Sirius Veder Gas AB	Bodewes Shipyards	Sweden	DFDE	Cylinder	4	Portfolio
Kairos	Oct-18	7,500	Uranos Vermogensverwaltung	Hyundai Mipo	Cyprus	Gas-Diesel	Type C	4	Portfolio
Bunker Breeze	Oct-18	6,050	Molucas Naviera AIE	Astilleros Zamakona	Spain	Gas-Diesel	Cylinder	4	Algeciras
LNG London	Apr-19	3,000	LNG Shipping S.A.	Severnav S.A.	Belgium	LNGPac	Cylinder	6	ARA
SM Jeju LNG 1	Sep-19	7,500	Jeju LNG 1 S.A.	Samsung	Panama	Diesel/Gas-Electric	KC-1	1	Portfolio
SM Jeju LNG 2	Jan-20	7,500	Jeju LNG 2 S.A.	Samsung	Panama	Diesel/Gas-Electric	KC-1	1	Portfolio
Gas Agility	Apr-20	18,600	Emerald Green Maritime Ltd.	Hudong Zhonghua	Malta	DFDE	TZ Mk III Flex	2	Rotterdam
Kaguya	Sep-20	3,469	Central LNG Shipping Japan	Kawasaki	Japan	Gas-Diesel	Cylinder	1	JERA TPS
Avenir Advantage	Oct-20	7,500	Avenir L Pte Ltd.	Keppel Nantong	Malta	Gas-Diesel	Type C	2	Portfolio
Avenir Accolade	Nov-20	7,500	Stolt-Nielsen Gas Ltd.	Keppel Nantong	Malta	Gas-Diesel	Type C	2	Portfolio
FueLNG Bellina	Nov-20	7,500	FueLNG Pte Ltd.	Kappel Nantong	Singapore	Diesel/Gas-Electric	Cylinder	2	Portfolio
Dalian No. 1	Dec-20	8,330	Xinao Marine Shipping Co. Ltd.	Dalian Yard	China	Gas-Diesel	Cylinder	2	Portfolio
Marine Vicky	Jan-20	9,900	Sinanju Tankers Pte. Ltd.	Keppel Nantong	Singapore	Gas-Diesel	TBC	TBC	Portfolio
Imperial Gas 92	Oct-17	3,800	Imperial Logistics International BV & Co. KG	Centromost	Germany	Diesel	Cylinder	TBC	Portfolio
Imperial Gas 93	Nov-17	3,800	Imperial Logistics International BV & Co. KG	Centromost	Germany	Diesel	Cylinder	TBC	Portfolio

Fleet – Small-scale/Multipurpose

Name	Built	Capacity	Registered Owner	Builder	Flag	Engine Type	Cargo System	No. of tanks	Project
Akebono Maru	Jun-11	3,500	Chuo Kaiun K.K.	Higaki	Japan	Diesel	Cylinders	2	Japan coastal trade
Aman Sendai	May-97	18,928	Asia LNG Transport	NKK	Malaysia	Steam	TZ Mk. III	3	Malaysia LNG
Coral Acropora	Dec-12	6,573	Coral Acropora Shipping	AVIC Dingheng	Netherlands	Gas-Diesel	Cylinders	4	Portfolio
Coral Actinia	Jan-13	6,573	Coral Actinia Shipping	AVIC Dingheng	Netherlands	Gas-Diesel	Cylinders	4	Portfolio
Coral Alicia	Dec-12	6,573	Coral Alicia Shipping	AVIC Dingheng	Netherlands	Gas-Diesel	Cylinders	4	Portfolio
Coral Anthelia	May-13	6,500	Coral Anthelia Shipping	AVIC Dingheng	Netherlands	Gas-Diesel	Cylinders	4	Portfolio
Coral Energice	Feb-18	18,000	Anthony Veder Chartering	Neptun Werft	Netherlands	Gas-Diesel	TZ MK. III Flex	2	Portfolio
Coral Energy	Dec-12	15,600	Anthony Veder Rederijzaken	Meyer Werft	Netherlands	Gas-Diesel	IMO Type C	3	Portfolio
Coral Fraseri	Jan-10	10,000	Innovation Shipping Co.	Wuzhou Shipbuilding	Singapore	Diesel	Cylinders	2	Portfolio
Coral Furcata	Nov-11	10,000	Conception Shipping Company	Wuzhou Shipbuilding	Singapore	Diesel	Cylinders	2	Portfolio
Kakurei Maru	Nov-08	2,536	Tsurumi Sunmarine Co.	Higaki	Japan	Diesel	Cylinders	2	Japan coastal trade
Kakuyu Maru	Nov-13	2,538	Tsurumi Sunmarine Co.	Kawasaki	Japan	Diesel	Cylinders	1	Japan coastal trade
Lucia Ambition	Dec-93	18,927	Asia LNG Transport	NKK	Malaysia	Steam	TZ Mk. III	3	Malaysia-Hainan
Seoul Gas	Jul-98	4,365	Chemgas Schiffahrts GmbH & Co. mt Oste KG	Severnav Shipbuilding	Liberia	Diesel	Cylinders	2	S. Korea-China
Coral Favia	Jul-10	10,000	Somargas II Pvt. Ltd.	Wuzhou Shipbuilding	Singapore	Diesel	Cylinders	2	Baltic portfolio
Coral Fungia	Jan-11	10,000	Somargas II Pvt. Ltd.	Wuzhou Shipbuilding	Singapore	Diesel	Cylinders	2	Baltic portfolio
Unikum Spirit	Jun-11	12,000	DHJS Hull No.2007-001 LLC	AVIC Dingheng	Singapore	Diesel	Cylinders	2	Kuantan
North Pioneer	Nov-05	2,500	Japan Liquid & Gas Transport Co. & Japan Railway Agency	Shin Kurushima	Japan	Diesel	Cylinders	2	Japan coastal trade
Pioneer Knutsen	Mar-04	1,100	Knutsen Kyst LNG K/S	Bijlsma Lemmer B.V. Scheepswerf	Norway	LNG-Diesel	Cylinders	2	Norway coastal trade
Shinju Maru No. 1	Aug-03	2,538	JRTT & NS United Coastal Tankers	Kawasaki	Japan	Diesel	Cylinders	2	Japan coastal trade
Shinju Maru No. 2	Oct-08	2,536	Chuo Kaiun K.K.	Higaki	Japan	Diesel	Cylinders	2	Japan coastal trade
Sun Arrows	Sep-07	19,531	Maple LNG Transport Inc.	Kawasaki	Bahamas	Diesel	Moss	3	Malaysia LNG
Surya Aki	Feb-96	19,538	MCGC International Limited & Hiroshima Gas Co.	Kawasaki	Bahamas	Steam	Moss	3	Thanlyin LNG
Triputra	Dec-00	23,097	Nusantara Shipping	NKK	Indonesia	Steam	TZ Mk. III	3	Pertamina Portfolio
Vision Spirit	Sep-11	12,000	I.M. Skaugen Marine Services	AVIC Dingheng	Singapore	Diesel	Cylinders	2	Portfolio
Hai Yang Shi You 301	Apr-15	30,000	COSL	Jiangnan Shipyard	China	Gas-Diesel	Membrane	4	Hainan LNG shuttle

Any observations, additions or suggested revisions to the LNG journal World LNG Carrier Fleet list should be sent to editor@lngjournal.com

LNG Import Terminals

Explanatory Notes

- The tables do not include the following types of LNG facilities :
  - Small marine satellite terminals receiving LNG from liquefaction plants in their own country (such as exist in Norway) or which receive LNG transhipped from nearby reception terminals in their own country (such as in Japan)
  - Satellite LNG storage facilities that receive LNG transported only by road or rail
- Expansions of LNG reception terminals are only shown if they involve new storage tanks
- Where there is a blank in the table the information is uncertain or unknown.

Any comments on the tables, and corrections / additional information from terminal shareholders and project developers would be most welcome, and should be sent to John McKay e-mail editor@lngjournal.com

Country	Location (Project)	Owners	Start up	Storage Tanks	Storage Capacity
Belgium	Zeebrugge	Fluxys	1987	4	380,000
Canada	Canaport Saint John	Irving Oil, Repsol	2009	3	480,000
Chile	Quintero	ENAP, Metrogas, Enagas	2009	3	334,000
	Mejillones	Engie, Ameris Capital AGF	2010	1	175,000
China	Beihai LNG, Guangxi	Sinopec	2015	4	640,000
	Dalian	PetroChina	2011	3	480,000
	Dapeng ND Guangdong	CNOOC	2018	4	640,000
	Dongguan, Guangdong	Jovo Group	2013	2	160 000
	Fujian LNG (Xiuyu)	CNOOC, Fujian I&D Corp.	2008	2	640,000
	Guangdong	CNOOC,BP	2006	3	480,000
	Haikou, Hainan LNG	CNOOC	2014	3	480,000
	Ningbo, Zheijang	CNOOC, Zhejiang Energy	2012	3	480,000
	Qidong, Jiangsu	Guanghui Energy	2018	1	60,000
	Qingdao, Shandong	Sinopec	2014	3	480,000
	Rudong	PetroChina	2011	3	530,000
	Shanghai	CNOOC, Shenergy Group	2009	3	495,000
	Shanghai, Mengtougou	Shanghai Gas	2008	3	120 000
	Shenzen, Diefu	CNOOC	2016	2	320,000
	Tangshan, Hebei	PetroChina	2013	3	480,000
	Tianjin North	Sinopec	2017	2	320,000
	Yuedong, Guangdong	CNOOC	2016	2	320,000
	Zhoushan Zhejiang	Enn Group	2018	2	320,000
	Zhuhai, Gaolan	CNOOC	2013	3	480,000
Dominican Republic	Punta Caucedo	AES Andres	2003	1	160 000
Finland	Pori	Gasum Skangas	2016	1	30,000
	Tornio	Gasum Skangas	2018	1	30,000
France	Fos Tonkin	Elengy	1972	3	150,000
	Montoir-de-Bretagne	Elengy	1980	3	360,000
	Fos Cavaou	Engie, Total	2010	3	330,000
	Dunkirk LNG	EDF, Fluxys, Total	2016	3	570,000
Gibraltar	Gasnor	Shell	2018	1	5,000
Greece	Revithoussa	DEPA	2000	3	225,000
India	Dabhol	GAIL, NTPC (Ratnagiri Gas & Power)	2009	3	480,000
	Dahej	Petronet LNG	2004	4	592,000
	Hazira	Shell India, Total	2005	2	320,000
	Kochi, Kerala	Petronet LNG	2013	2	320,000
	Mundra	Gujarat State Petroleum, Adani Group	2018	2	320,000
	Kamarajar (Ennore), Tamil Nadu	Indian Oil, DFC, ICICI Bank	2019	2	360,000
Indonesia	Arun	Pertamina	2015	5	507,000
Italy	Panigaglia	Snam	1969	2	100,000
	Porto Levante (offshore GBS)	ExxonMobil, Qatar Petroleum, Edison Gas	2009	2	250,000
Jamaica	Montego Bay	New Fortress	2018	1	7,000
Japan	Negishi	Tokyo Gas	1969	14	1,180,000
	Sodegaura	Tokyo Gas JERA Co. Inc	1973	35	2,660,000
	Ohgishima	Tokyo Gas	1998	4	850,000
	Higashi-Ohgishima	JERA Co. Inc.	1984	9	540,000
	Futtsu	JERA Co. Inc.	1985	10	1,360,000
	Yokkaichi LNG	JERA Co. Inc.	1988	4	320,000
	Kawagoe	JERA Co. Inc.	1997	6	840,000
	Yokkaichi Works	Toho Gas	1991	2	160,000
	Chita LNG Joint	Toho Gas, Chubu Electric	1978	4	300,000
	Chita LNG	Toho Gas, Chubu Electric	1983	7	640,000
	Chita - Midorihama	Toho Gas	2001	3	600,000
	Senboku I	Osaka Gas	1972	4	180,000
	Senboku II	Osaka Gas	1977	18	1,585,000
	Himeji	Osaka Gas	1984	8	740,000
	Himeji LNG	Kansai Electric	1979	7	520,000
	Yanai	Chugoku Electric	1990	6	480,000
	Niigata	Nihonkai LNG, Tohoku Electric	1984	8	720,000
	Oita	Oita Gas, Kyushu Electric	1990	5	460,000
	Tobata	Kitakyushu LNG	1977	8	480,000
	Fukuoka	Saibu Gas	1993	2	70,000
	Sodeshi	Shizuoka Gas	1996	3	337,200
	Hatsukaichi	Hiroshima Gas	1996	2	170,000
	Kagoshima	Nippon Gas	1996	2	136,000
	Shin-Minato	Sendai City Gas	1997	1	80,000
	Nagasaki	Saibu Gas	2003	1	36,000
	Sakai	Kansai Electric, Cosmo OII	2006	3	420,000
	Mizushima	Nippon Oil, Chugoku Electric	2006	2	320,000

LNG Import Terminals (continued)

Country	Location (Project)	Owners	Start up	Storage Tanks	Storage Capacity
	Sakaide	Shikoku Electric, Cosmo Oil	2011	1	180,000
Japan (continued)	Ishikari LNG	Hokkaido Gas, Hokkaido Electric	2012	2	380,000
	Okinawa	Okinawa Electric Power	2012	2	280,000
	Naoetsu	Inpex	2013	2	360,000
	Joetsu	JERA Co. Inc.	2011	3	540,000
	Hachinohe LNG	Nippon Oil	2015	2	280,000
	Hitachi LNG	Tokyo Gas	2015	1	230,000
	Soma Fukushima	Japan Petroleum Exploration	2017	1	225,000
Korea	Boryyeong	GS Energy, SK E&S	2017	3	200,000
	Incheon	Kogas	1996	20	2,880,000
	Kwangyang	POSCO SK E&S	2005	4	530,000
	Pyeong-Taek	Kogas	1986	23	3,360,000
	Samcheok	Kogas	2014	3	600,000
	Tong-Yeong	Kogas	2002	17	2,620,000
	Jeju	Kogas	2019	2	90,000
Malaysia	Pengerang Johor	Petronas Gas	2017	2	400,000
Mexico	Altamira	Vopak, Enagas	2006	2	300,000
	Energia Costa Azul	Sempra LNG	2008	2	320,000
	Manzanillo	Samsung, Kogas, Mitsui	2012	2	300,000
Netherlands	Gate LNG	Gasunie, Royal Vopak	2011	3	540,000
Panama	Costa Norte	AES	2018	1	130,000
Phillipines	Pagbilao LNG	Energy World Corp.	2017	1	130,000
Poland	Swinoujscie	Baltic Gaz System	2015	2	320,000
Portugal	Sines	REN Atlantico	2004	3	390,000
Puerto Rico	Penuelas	EcoElectrica	2000	1	160,000
Singapore	Singapore	Singapore Energy Authority	2013	3	540,000
Spain	Barcelona	Enagas	1969	8	840,000
	Huelva	Enagas	1988	5	610,000
	Cartagena	Enagas	1989	5	587,000
	Bilbao	Enagas, EVE	2003	3	450,000
	Sagunto	GNF, Osaka Gas, Oman Oil	2006	4	600,000
	Mugardos, El Ferrol	Reganosa, Sonatrach, Sojitz Corp.	2006	2	300,000
	El Musel, Gijón,	Enagas	2013	2	300,000
Sweden	Lysekil	Gasum	2014	1	30,000
	Nynashamn	AGA Gas	2011	1	20,000
Taiwan	Yung-An	CPC	1990	6	690,000
	Tai-Chung	CPC	2009	5	800,000
Thailand	Map Ta Phut	PTT LNG	2011	2	320,000
Turkey	Marmara Ereglisi	Botas	1994	3	255,000
	Izmir	EgeGaz	2006	2	280,000
USA	Everett	Suez LNG NA	1971	2	155,000
	Lake Charles	Shell, ETE	1982	4	425,000
	Freeport	Freeport LNG Development	2008	2	320,000
	Golden Pass, TX	Qatar Petroleum, ExxonMobil	2010	5	775,000
	Pascagoula, MS	Gulf LNG, Kinder	2012	2	320,000
UK	Isle of Grain	National Grid	2005	8	1,000,000
	South Hook	ExxonMobil, Qatar Petroleum,Total	2009	5	775,000
	Dragon LNG, Milford Haven	Shell, Petronas	2009	2	310,000

LNG Import Terminal Projects

Country	Location/Project	Owners/Project Developers	Start up	Storage Tanks	Storage Capacity
China	Shenzhen	CNPC Yudean Power	2021	2	120,000
	Tianjin (Nangang)	Beijing Energy	2022	10	2,000,000
	Yangjiang	CNPC Yudean Power	2023	2	120,000
	Zhangzhou Fujian	CNOOC	2022	2	160,000
India	Dhamra Odisha	Indian Oil, Adani, GAIL	2020	2	320,000
	Jaigarh	Hiranandani Group	2021	2	320,000
	Kodinar	Hindustan Petroleum Corp.	2022	1	160,000
Japan	Himuka	Diagas Group-Osaka Gas	2022	1	65,000

LNG FSRU Import Facilities

Country	Location (Project)	Owners	Start up
Argentina	Escobar GasPort	Excelerate/Enarsa	2011
Bangladesh	Moheshkhali	Excelerate, PetroBangla	2018
	Cox's Bazar	Summit Power International, Excelerate Energy	2019
Brazil	Pecem, FSRU	Petrobras	2009
	Guanabara Bay FSRU	Petrobras	2009
	Salvador, Bahia FSRU	Petrobras	2013
	Porto Sergipe FSRU	Golar LNG/Stonepeak	2020
	Porto do Acu FSRU	GNA	2020
China	Tianjin FSRU	CNOOC, Hoegh, various	2013
Croatia	Hrvatska LNG	MVM	2021
Colombia	Cartagena FSRU	Promigas, Sociedad Portuaria El Cayao	2016
Egypt	Ain Sokhna, Suez	EGAS, BW Gas	2015
Indonesia	Lampung	Hoegh LNG, PGN LNG	2014
	Nusantara (Jakarta Bay)	Golar LNG, Pertimana	2012
	Benoa LNG	PT Pertagas Niaga	2016
	Amurang	Karadeniz	2020
Israel	Hadera Gateway	Israel Electric	2013
Italy	Livorno	OLT Offshore LNG Toscana	2013
Jamaica	Old Harbour	Golar FSRU, New Fortress	2019
Jordan	Aqaba, Jordan	Golar LNG	2015
Kuwait	Mina Al-Ahmadi	KPC	2009
Lithuania	Klaipeda	Klaipedos Nafta Hoegh LNG	2014
Malaysia	Malacca FSRU	Petronas	2012
Malta	FSU Armada Mediterrana	ElectroGas	2016
Myanmar	Thanlyin	CNTIC Vpower	2020
Pakistan	Port Qasim	Excelerate, Engro Corp	2015
	Port Qasim	BW-Mitsui, PGP Consortium	2017
Russia	Kaliningrad FSRU	Gazprom	2020
Turkey	Aliaga FSRU, Turquoise FLNG	Etki LNG	2016
	Dortyol FSRU Challenger	Botas	2018
UAE	Ruwais, Abu Dhabi	Gasco (UAE)	2016
	Jebel Ali Port, Dubai	DSA (UAE)	2010

LNG Export Projects

Country	Location/Project	Project Developers	Planned Start Up	Number of Trains	Capacity In MTPA
AUSTRALIA	Pluto LNG expansion	Woodside	2021+	2	10.0
CANADA	Bear Head LNG, Nova Scotia	LNG Ltd.	2024	4	8.0
	Goldboro LNG, Nova Scotia	Pieridae Energy	2024	2	10.0
	Kitimat LNG, BC	Woodside, Chevron	2024	2	10.0
	LNG Canada, BC	Shell, Mitsubishi, Kogas, PetroChina, Petronas	2024	2	12.0
	Kwispaa FLNG, Vancouver	Steelhead LNG	2024	4	12.0
	Vancouver Tilbury	WesPac Midstream	2021	1	3.25
	Woodfibre LNG, Squamish	Pacific Oil & Gas Co	2020	2	2.1
EQ.GUINEA	Equatorial Guinea Fortuna FLNG	Ophir, Golar LNG, GEPetrol	2020+	1	2.0
INDONESIA	Sengkang LNG	Energy World Corp.	2019	4	2.0
MALAYSIA	Rotan FLNG (Sabah)	Petronas, Murphy Oil	2021	1	1.5
MOZAMBIQUE	Area 1 Onshore	Anadarko Petroleum and partners	2023+	2	10.0
	Area 4 Onshore	Eni and partners	2023+	2	10.0
	Area 4 FLNG	Eni and partners	2022	1	3.4
NIGERIA	NLNG Train 7	NNPC, Shell, Eni, Total	2022+	1	7.0
PAPUA NEW GUINEA	Elk-Antelope LNG	Total, ExxonMobil Oil Search, Petromin	Studies		
RUSSIA	Sakhalin II expansion	Gazprom, Shell, Mitsui, Mitsubishi	2021	studies	
	Vladisvostok LNG	Gazprom, Itochu, various	2023+	2	10.0
	Arctic LNG II Siberia	Novatek, Total	2023	3	19.8
USA	Alaska LNG Nikiski	Alaska Gasline Development Corp.	2023+	3	20.0
	Annova LNG, Brownsville	Exelon Corp.	2023+	6	6.0
	Commonwealth LNG, Louisiana	Commonwealth LNG LLP	2023+	8	9.0
	Delfin LNG, Louisiana	Delfin	2023+	3	9.0
	Driftwood LNG, Louisiana	Tellurian, Total and others	2023	6	27.6
	Galveston Bay LNG	NextDecade	2023+	6	27.0
	Golden Pass, Texas	Qatar Petroleum, ExxonMobil	2024	3	15.6
	Jacksonville, St John's River	Eagle LNG, Ferus Natural Gas Fuels	2021+	small	TBC
	Jordan Cove, Coos Bay	Pembina Corp.	2024	2	7.8
	Lake Charles, Louisiana	Shell, ETE	2024	3	15.0
	Magnolia LNG	Louisiana LNG Ltd.	2023+	4	8.0
	Port Arthur LNG	Sempra	2023+	2	10.0
	Rio Grande LNG	NextDecade	2023+	6	27.0
	Sabine Pass LNG, Louisiana	Cheniere	2016-19	1	4.5
	Texas LNG Brownsville	Chandra, Meyer, Samsung, others	2023+	2	4.0
	VG LNG (Cameron Parish)	Venture Global	2022	5	12.0
	VG LNG (Plaquemines)	Venture Global	2022	10	20.0
	VG LNG (Delta-Plaquemines)	Venture Global	2024	36	22.5

LNG Exporters

Country	Location/Project	Shareholders	Start up	Liquefaction		Storage	
				Trains	capacity (nominal) mtpa	No. of tanks	Total capacity m³
ABU DHABI (UAE)	Das Island (Adgas)	ADNOC, Mitsui, BP, Total	1977	2	3.2	3	240,000
			1994	1	2.5		
ALGERIA	Arzew	Sonatrach GL4Z	1964	3	1.1	3	35,000
	Arzew	Sonatrach GL1Z	1978	6	7.8	3	300,000
	Arzew	Sonatrach GL2Z	1980	6	8.0	3	300,000
	Arzew	Sonatrach	2014	1	4.7		
	Skikda	Sonatrach GL1K II	1980	3	3.0	5	308,000
	Skikda	Sonatrach (rebuild)	2013	1	4.5		
ANGOLA	Soyo	Sonangol, Chevron, BP, ENI, Total	2012	1	5.2	2	370,000
AUSTRALIA	Karratha	NWS Woodside, Shell, BHP	1989	2	5.0	4	260,000
		(BP, Chevron	1992	1	2.5	1	130,000
		(Mistubishi/Mitsui)	2004	1	4.4	1	130,000
		NWS partners	2008	1	4.4	1	130,000
	Darwin	Darwin (Bayu Undan) ConocoPhillips, Santos, Eni, Inpex, TEPCO, Tokyo Gas	2006	1	3.5	1	188,000
	Australia Pacific LNG	ConocoPhillips, Origin Energy, Sinopec	2016	2	7.5	2	320,000
	Gladstone LNG	Santos, Petronas, Total, Kogas	2015	2	7.8	2	280,000
	Gorgon LNG	Chevron, Shell, ExxonMobil	2016	3	15.6	2	360,000
	Pluto LNG	Woodside, Tokyo Gas, Kansei	2012	1	4.8	2	240,000
	QCLNG	Shell, CNOOC	2014	2	8.0	2	280,000
	Wheatstone LNG	Chevron, Woodside, Kuwait (KUFPEC), Jera, Kyushu	2017	2	8.9	2	300,000
	Ichthys LNG	Inpex Corp., Total	2018	2	8.9	2	330,000
	Prelude FLNG	Shell, Inpex, Kogas CPC	2019	1	3.5		
BRUNEI	Lumut	Brunei/Shell/Mitsubishi/Total	1972-74	5	7.2	3	176,000
CAMEROON	Hilli Episeyo FLNG	Kribi Perenco	2018	1	1.2	1	125,000
EGYPT	Damietta	Union Fenosa, EGPC, EGAS	2004	1	5.0	2	300,000
	Idku	EGPC, EGAS, Shell, Total, Petronas	2005	2	7.2	2	280,000
EQ.GUINEA	Bioko Island	Marathon, Sonagas, Mitsui, Marubeni	2007	1	3.4	2	272,000
INDONESIA	Bontang I	Pertamina, VICO, JILCO, Total	1977	2	5.2	5	635,000
	Bontang II		1983	2	5.2		
	Bontang III		1989	1	2.8		
	Bontang IV		1993	1	2.8		
	Bontang V		1997	1	2.8		
	Bontang VI		1999	1	3.0		
	Sulawesi LNG	Medco Energi, Pertamina, Mitsubishi	2015	1	2.0	1	170,000
	Tangguh	BP, MI Berau, CNOOC, Nippon, LNG Japan	2008	2	7.6	2	340,000
MALAYSIA	Bintulu (MLNG Satu)	Petronas, Sarawak, Mitsubishi	1983	3	8.1	4	260,000
	Bintulu (MLNG Dua)	Petronas, Shell, Sarawak, Mitsubishi	1995	3	7.8	1	65,000
	Bintulu (MLNG Tiga)	Petronas, Shell, Sarawak, Mitsubishi, Nippon Oil	2003	2	6.8	1	120,000
	Bintulu Train 9	Petronas	2016	1	3.6		
	Kanowit FLNG	Petronas	2016	1	1.2		
NIGERIA	Bonny Island	NNPC, Shell, Total, Eni	1999	2	6.4	2	168,400
		Nigeria LNG (formed by above)	2002	1	3.2	1	84,200
		Nigeria LNG	2006	2	8.2		
		Nigeria LNG	2008	1	4.1	1	84,200
NORWAY	Snøhvit/Melkoya	Equinor, Total, Petoro	2007	1	4.2	2	280,000
OMAN	Oman LNG	Oman Govt., Shell, Total, Korea LNG Mitsubishi, Mitsui, Partex and Itochu	2000	2	7.1	2	240,000
		Oman Govt.,Oman LNG Union Fenosa, Osaka Gas, & Itochu	2006	1	3.7	2	240,000
PAPUA NEW GUINEA	PNG LNG	ExxonMobil, Oil Search, Santos, JX Nippon Oil	2014	2	6.9	2	320,000
PERU	Peru LNG	Hunt Oil, Shell, Marubeni, SK Group	2010	1	4.4	2	260,000
QATAR	Qatargas 1-T1&2	QP, ExxonMobil, Total, Marubeni, Mitsui	1997	2	6.4	4	340,000
	Qatargas 1-T3	QP, ExxonMobil, Total, Marubeni, Mitsui	1999	1	3.1		
	Qatargas II-T1	QP, ExxonMobil	2009	1	7.8		
	Qatargas II-T2	QP, ExxonMobil, Total	2009	1	7.8	8	1,160,000
	Qatargas III-T1	QP, ConocoPhillips, Mitsui	2010	1	7.8		
	Qatargas IV-TI	QP, Shell	2010	1	7.8		
	RasGas I- T1&2	QP, ExxonMobil, Kogas, Itochu, LNG Japan	1999	2	6.6		
	RasGas II- T3	QP, ExxonMobil	2004	1	4.7		
	RasGas II- T4	QP, ExxonMobil	2005	1	4.7	6	840,000
	RasGas II- T5	QP, ExxonMobil	2007	1	4.7		
	Rasgas III – T6	QP, ExxonMobil	2009	1	7.8		
	Rasgas III – T7	QP, ExxonMobil	2010	1	7.8		
RUSSIA	Sakhalin Island	(Sakhalin Energy) Gazprom, Shell, Mitsui, Mitsubishi	2009	2	9.6	2	200,000
	Yamal LNG Siberia	Novatek, Total, CNPC, Silk Fund	2017	3	16.5	4	640,000
TRINIDAD & TOBAGO	Point Fortin Train 1	BP, Shell, CIC, NGC	1999	1	3.0	2	204,000
	Train 2	BP, Shell	2002	1	3.3	1	160,000
	Train 3	BP, Shell	2003	1	3.3	1	160,000
	Train 4	BP, Shell, NGC	2005	1	5.2	1	160,000
USA	Cheniere Sabine Pass	Cheniere Energy	2016	5	22.5	5	800,000
	Cove Point LNG	Dominion Energy	2017	1	5.3	7	695,000
	Cheniere Corpus Christi	Texas Cheniere	2018	2	9.0	3	480,000
	Cameron Hackberry	Sempra, Total, Mitsui, Mitsubishi	2019	2	9.8	3	480,000
	Elba Island Georgia	Kinder Morgan, EIG Energy	2019	10	2.5	5	535,000
	Freeport LNG,Texas	Freeport LNG	2019	2	10.2	3	483,000
YEMEN	Bal-Haf	Yemen LNG, Total, Yemen Gas, Hunt Oil, SK Group, Hyundai	2009	2	6.7	2	320,000

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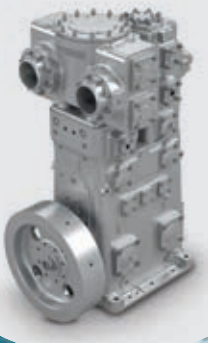

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