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FSRUs: State of play

The roster of FSRU projects has grown since 2018 but not all were successful whilst established terminals are largely underutilized. Nevertheless, new prospects remain, our Markets Editor Alexander Wilk reports.

LNG imports via Floating Storage and Regasification Units (FSRUs) were on a growth path between 2018 and 2021. They increased from 1.60mmt in January 2018 to a peak of 4.23mmt in July 2021, our data show. That growth stemmed partly from a roster of new projects that were commissioned during the report period between 2018 and March 2022. Among the largest capacity additions since 2018 were the 'Summit' and 'Excellence' FSRUs installed offshore the Maheshkhali region of Bangladesh, the Petrobras-controlled FSRU off Rio de Janeiro and Turkey's Iskenderun facility. However, this does not mean that these new additions are used to full capacity.

FSRUs generally offer countries an alternative to onshore terminals when importing LNG. These floating terminals can be moored to a docking facility or out at sea. Crucially, they are cheaper and faster to install than an onshore solution. This is important as LNG is seeking to carve out a niche in the fast-growing market for gas as a transition fuel away

from coal and heavy fuel oil. Roughly a third of new FSRU projects since 2018 have an annual capacity of around 2.0mmt or less and serve smaller economies. Currently, our data show there are 30 operational FSRU terminals in the world, almost half of which are located in the Atlantic Basin.

However, some FSRU projects have experienced extensive delays and struggled to get off the ground whilst the current high LNG prices are making it more difficult for smaller, price-conscious buyers to accelerate the adoption of gas.

Moreover, the financing environment has arguably become more difficult for future projects. According to the Brookings Institute, economic growth in low- and middle-income countries is beginning to slow as they are adopting tighter monetary policies in response to inflation. The Institute warned in February that COVID-19 has depleted 'healthy current-account balances [and] anchored inflation' so that 'half of all inflation-targeting central banks in

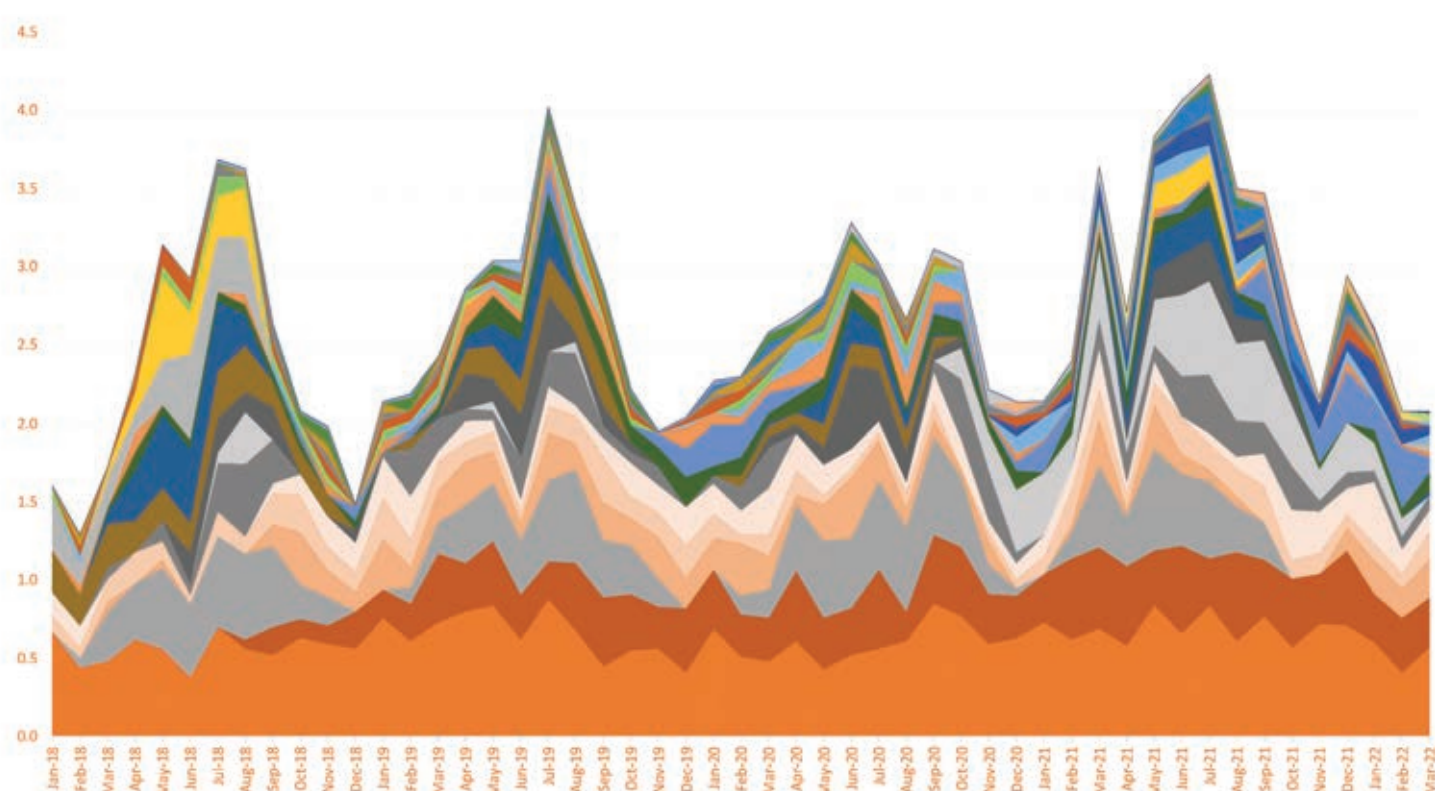
developing economies now face inflation rates above their target range'. Concurrently, Brookings pointed to a sharp drop in capital flows to emerging markets since December last year and even a flow reversal in many cases. This is likely to dampen economic growth and reduce the capacity to attract finance for future FSRU projects.

Utilisation leaders

Of existing projects, the leading examples are the FSRUs installed at Pakistan's Port Qasim LNG and off Maheshkhali Island in Bangladesh our data show. Average annualised capacity utilisation at Port Qasim has been 100 percent since 2018 and stood at 56 percent in Bangladesh. Both Pakistan and Bangladesh have tailored their gas economies to work with FSRUs as a cost-efficient gas import mode because they lack suitable alternatives.

The remaining active FSRU projects with utilisation above 50 percent are all situated in the Atlantic Basin, led by

LNG Imports via FSRUs (MMt)



Source: LNG Journal

A black silhouette of an offshore supply vessel, showing its complex structure with multiple decks, cranes, and storage tanks. The vessel is oriented horizontally, with its bow pointing to the right.

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Print & online **£825/€930/US\$1210**

Online only **£755/€835/US\$1095**

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Printed by The Manson Group Ltd
Reynolds House, 8 Porters' Wood
Valley Road Industrial Estate
St Albans, Herts AL3 6PZ, U.K.

Global FSRU Projects



Large mid-field

reduce dependency on Russian pipeline gas has recently spread to Germany, which is now looking to install substantial FSRU capacity of its own (please see below). Others in the roster – ranging from Argentina’s GNL Escobar to Dubai’s FSRU and most of the installed capacity in Brazil – are mainly employed to bridge seasonal energy supply shortfalls. To that extent, they serve a vital role in their respective energy economies despite lower annual utilisation. Argentina relies on gas imports to meet peak demand during the Southern Hemisphere's winter period

whilst Brazil, which normally can meet up to 70 percent of electricity demand through hydropower, experiences its dry season during that time. Dubai's FSRU, in contrast, is mainly used during the Northern Hemisphere's summer.

Elsewhere, a significant contrast evolved between the Middle East and Southeast Asia regarding the use of FSRU capacity. The continued use of FSRU capacity in Dubai notwithstanding, the Middle East has seen a profound shift in the approach to FSRUs. The wider Middle East region

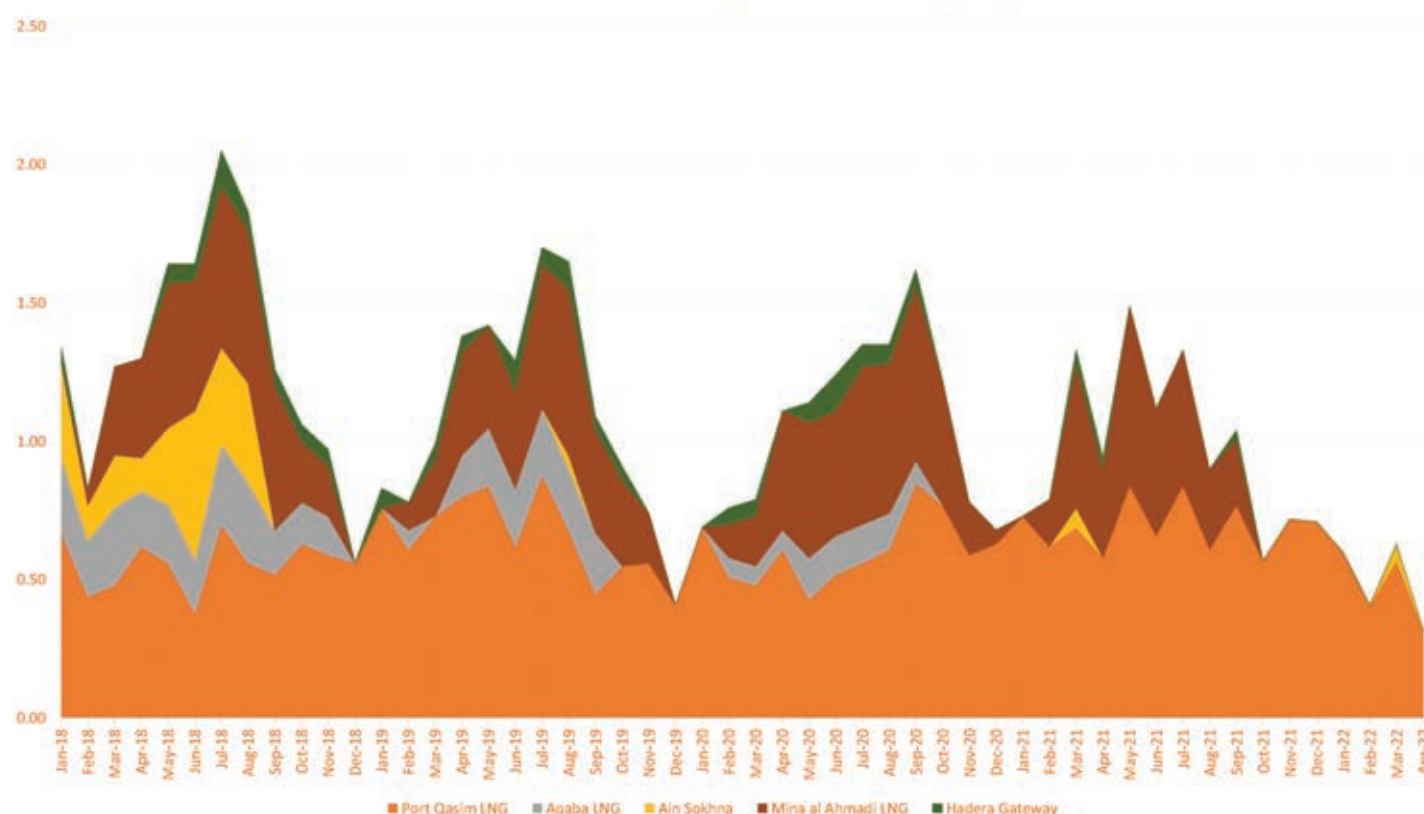
LNG Imports via FSRU



Imports in Report Period (MMt)

- Utilisation

Middle Eastern LNG Imports vis FSRU (MMt)



Source: LNG Journal

had been among the earliest adopters of the FSRU pathway. However, regional FSRU utilisation has been in decline since mid-2018. A prime factor has been the ramping up of gas production from offshore gas fields in Egypt and Israel. Israel released the Excelebrate Energy-chartered Expedient FSRU previously stationed at the Hadera Deepwater LNG Terminal. Increased production from the Tamar and Leviathan offshore gas fields rose to levels that also allowed gas to be exported to Jordan. Israel had previously imported LNG from BP as a stop-gap measure between the beginning of 2013 and September 2021. Gas from Tamar and Leviathan has also enabled Jordan to forgo LNG imports since the beginning of 2020, according to our data. A similar development could be observed in Egypt, which returned to the market as an LNG net exporter in 2021. Unlike Israel, both Jordan and Egypt have retained their FSRU capacities, but these have effectively been idled and are now kept as backup. Concurrently, utilisation of the Mina al Ahmadi FSRU terminal collapsed as the country commissioned its Al Zour onshore terminal. Whilst it was operational, however, the terminal was among the most intensively utilised FSRU facilities globally with average monthly utilisation of 68 percent, our data show. Elsewhere in the Gulf region, Bahrain released its purpose-built FSRU for LNG trading just after its terminal was constructed. Abu Dhabi's FSRU, meanwhile, has been idle almost throughout the report period, according to our data.

Southeast Asia

In contrast, Indonesia showcases the range of outcomes for FSRU projects whilst maintaining commitment to the approach. The country commissioned its fifth FSRU, the MOL-owned Jawa Satu, in April last year. The country thus hosts as many FSRU units as Brazil. Being an archipelago, Indonesia has been keen to position FSRU capacity at different regional hot spots as part of a long-term strategy for flexible energy supply. Although Indonesia has been an important gas producer for the past 40 years – and to date has met the bulk of domestic LNG demand with domestically produced LNG – gas production from its legacy fields has been on a long declining trend. Meanwhile, the country's energy demand grew by 16 percent between 2010 and 2020, according to the EIA. This imparts the potential for foreign LNG cargoes to find their way into the Indonesian market via FSRUs.

However, annualised utilisation for different terminals varies considerably, ranging from almost 50 percent for the Nusantara Regas Satu terminal that supplies the capital Jakarta to just around five percent for the new Jawa Satu facility, our data show. Concurrently, the much older Lampung FSRU only averaged 18 percent utilisation during the report-period, according to our data and calculations. In contrast, Bali's smaller and customized Benoa FSRU project frequently achieves monthly utilisation of up to 67 percent. At the time of installation in 2014, Lampung's

nominal capacity was sufficient to supply around 14 percent of Indonesia's power demand. Market fundamentals have since shifted; first with the oil price crash post-2014, which made fuel oil competitive, and currently with record-high LNG prices.

Setbacks and prospects

Kaliningrad

Apart from low utilisation, there have also been notable setbacks in FSRU adoption. With construction completed in January 2019, the Kaliningrad FSRU terminal has not seen commercial activity beyond its commissioning cargo that year. Notably, Gazprom had already signed a gas transit contract with Lithuanian pipeline operator Amber Grid in 2015 to supply Kaliningrad with Russian gas until 2025.

Gazprom reinstalled the 174,000m³ FSRU and LNG carrier Marshal Vasilevskiy at its Kaliningrad FSRU terminal in early February this year. Later, sanctions imposed on Russia are likely to have interrupted LNG supply to the Marshal Vasilevskiy FSRU. The LNG carriers Energy Integrity, Pskov and Velikiy Novgorod initially loaded cargoes at Cameroon's FLNG facility for delivery to Kaliningrad starting in mid-February but were all subsequently diverted. The cargoes were sold on to buyers in Asia, our data indicated at the time of writing.

Apart from the Kaliningrad FSRU's commissioning cargo, Gazprom planned to supply the Kaliningrad FSRU project with LNG from the 1.5mtpa Portovaya

liquefaction project, located in Leningrad Oblast close to the Finnish border. However, construction at Portovaya has also been delayed. It was still unclear whether the facility has been commissioned to start commercial operations at the time of writing. Whilst the 138,107m³ FSRU Portovyy arrived at the Portovaya project in late August 2021, we had not yet detected any LNG trading activity at the site.

Tema LNG

Ghana once looked like it would become sub-Saharan Africa's first LNG importer in 2021, but this prospect has now been delayed indefinitely, our data indicate. Tema LNG is designed around an innovative combination of the purpose-built Torman Floating Regasification Unit (FRU) twinned with a modified LNG carrier Torman II (ex Flora) to receive, store and re-gasify delivered LNG. Tema LNG was originally expected to receive its commissioning cargo by the end of May 2021. With the Torman II still at Singapore's Sembawang shipyard, Tema LNG's interim replacement Vasant 1 arrived offshore Ghana in late May 2020. The terminal was 'operationally ready', according to a project spokesperson speaking to S&P Global Platts at the beginning of May 2021.

Although it was planned to enhance Ghana's energy security, the project never took in a commercial LNG cargo, according to our data. The Vasant 1 did not carry Tema LNG's commissioning cargo and there had been no delivery by the time the vessel left its moorings on 23 February 2022. Our AIS data showed the Torman II was still at the Sembawang shipyard in Singapore at the time of writing. This suggests the terminal's start-up will be delayed until further notice.

Importantly, the project failed to close on a sales agreement for power or gas with other downstream offtakers, according to Ishmael Ackah, an energy policy expert for Sub-Saharan Africa at the Institute of Economic Affairs. Moreover, apart from pricing uncertainty, there is also a distinct bottleneck in associated distribution infrastructure, Ackah explained in an article submitted to the Energy For Growth Hub. As a result, much of Tema's local industry has continued to rely on residual fuel oil. The distribution bottleneck also extends to potential export options to Côte d'Ivoire and Benin, but Ackah does not see the

process of technical studies and negotiations conclude ‘in the short- to medium-term’.

Jaigarh LNG

H-Energy installed the Höegh Giant FSRU at its Jaigarh LNG project in India’s Ratnagiri district of Maharashtra on 1 March 2022. The March arrival of the Höegh Giant marks H-Energy’s third attempt to install an FSRU at what is currently still going to be India’s first FSRU terminal. The company once attempted to install the Höegh Giant in April last year but subsequently released it to trade on the spot market until January 2022, our data show. H-Energy has chartered the vessel until 2030 from Höegh LNG. Before that, H-Energy had briefly chartered the 145,000m³ Cape Ann but did not go through with the installation.

H-Energy was originally planning to install FSRU capacity at the Jaigarh LNG jetty by 3Q 2018, with commercial operations to begin in 4Q 2018. However, the terminal’s commercial start of operations has been plagued by delays since the completion of its associated infrastructure – from the original start date in 2018 to 1Q 2019, then to 2Q 2020 and 3Q 2021 and on to 1Q 2022. Monsoon rains and the Indian elections had previously contributed to the delayed start-up of the terminal. The more recent delay may well have been due to set-back

in the rolling out of associated pipeline infrastructure. Overall, the LNG project has been in development since 2015.

Cyprus

Cyprus has had LNG ambitions since 2014, first mulling a role as host to an LNG export plant and later refocussing on attracting investment for an import terminal. The resulting project at Vassilikos, which was partly funded by the European Union, aims to slash the island’s cost of electricity, reduce carbon emissions and associated EU penalties, improve air quality and provide better energy security for more than two decades. The facility was originally scheduled to be operational by autumn 2022.

However, the conversion of the 2002-built LNGC Galea into Etyfa Prometheas FSRU at Cosco Shipping Heavy Industry in Shanghai is still underway, our AIS data indicate, whilst construction of associated infrastructure at Vasiliko was still stuck at just about 4 percent in February 2022, according to the Cypriot daily CyprusMail. The newspaper outlined a host of problems, encompassing supply-chain issues, uncertainty on deliverables and minimum safety standards as well as the lack of FSRU-specific experience both by the project owner Etyfa - a subsidiary of state-owned DEFA - and its main Chinese contractor. According to the Cyprus News Agency, the project will now be commissioned in mid-

2023 but the project’s track record suggests it could well be later than that.

Eastern India

Apart from the Jaigarh FSRU project, H-Energy also has plans to station a second FSU based LNG re-gasification project on India’s eastern coast in Kakinada, Andhra Pradesh. Kakinada will comprise an FSU of roughly 170,000-210,000m³ capacity, with an onshore vaporiser of 4mtpa capacity to supply gas to customers in Andhra Pradesh via pipeline. H-Energy also plans to use the terminal as the hub in a hub-and-spoke supply model. The principle is based on the concept of a bicycle wheel, which consists of several spokes jutting outward from a central hub.

As such, the Kakinada FSRU project will serve as a hub for LNG supply to other, smaller LNG projects including H-Energy’s 3mtpa Kukrahati Terminal in West Bengal and other demand centres in the neighbouring countries. The project will also have the Truck Loading Facility to supply LNG to Southeast India. The project is expected to be commissioned by mid-2024.

Notably, this seems to be a change in direction from a previously planned unit south of Kolkata in the Bay of Bengal that was originally scheduled for December 2020. Phase I was to comprise an initial city gate station to supply Kolkata directly whilst Phase II would have seen extensive pipeline works to supply gas further afield and across the border into Bangladesh.

Germany

Germany is among the front-runners chasing FSRUs as the country is seeking avenues to gradually disengage from Russian pipeline gas. The German government plans to spend as much as €3 billion on FSRU import capacity over the next decade. According to German economy minister Robert Habeck, government policy is aiming to make Germany “independent of Russian gas by all but a small portion” by mid-2024. In its ‘Progress Report on Energy Security’ in March, the Finance Ministry said the government had signed options with German LNG trader Uniper and utility RWE to operate three FSRU terminals whilst calling for a fourth unit in a letter to the German Parliament.

In an interview with shipping news source Trade Winds, Dynagas chief executive Tony Lauritzen confirmed that his company was discussing two charters with Uniper for the 2021-built FSRUs Transgas Power and Transgas Force. The

two vessels have capacities of 170,520m³ and 174,000m³, respectively, according to our vessel database.

German Chancellor Olaf Scholz had already announced in February that the German government would support the construction of two LNG terminals in Wilhelmshaven and Brunsbüttel. Notably, this constitutes an about-turn for Wilhelmshaven’s LNG prospects after Uniper scrapped its prior LNG import plan via an FSRU in favour of hydrogen. With the help of political backing, Uniper is hopeful to begin with LNG imports as early as winter 2022, German news service Tagesschau reported in mid-April. Transmission grid operator OGE said in an April press notice it plans to build the necessary connector by the end-2022. Wilhelmshaven is only 28 kilometres away from a major Uniper-owned gas storage site.

The Brunsbüttel terminal, meanwhile, is designed to be an onshore facility operated by a joint venture between Dutch companies Gasunie and Vopak and German hydrocarbon logistics specialist Oiltanking. The operator – German LNG Terminal – and Shell signed a Memorandum of Understanding on 23 March, whereby Shell booked a ‘substantial’ portion of the terminal’s capacity. The terminal’s building permits are not expected by the state government of Schleswig-Holstein to be ready before 2024 and the terminal is not scheduled to be operational before 2026.

Concluding thoughts

The potential benefits of installing FSRU capacity range from shorter implementation time, to cost savings and seasonal demand. To that extent, not much has changed. However, as projects settle in and with an increase in the variety of designs and locations, the spectrum of (relative) success has increased, too. Different parts have to come together for the successful installation of FSRU capacity. Projects in Ghana, India, Germany and Russia highlight that associated infrastructure is crucial. Germany’s example also suggests that political focus is equally important for rapid implementation. Past projects have thus demonstrated that installing FSRU capacity is not exactly ‘plug and play’. Where planning has gone wrong, FSRUs can evolve into costly propositions. Still, the current FSRU roster has proven to be important in pushing LNG as a transition fuel, especially for smaller or seasonal gas buyers. ■



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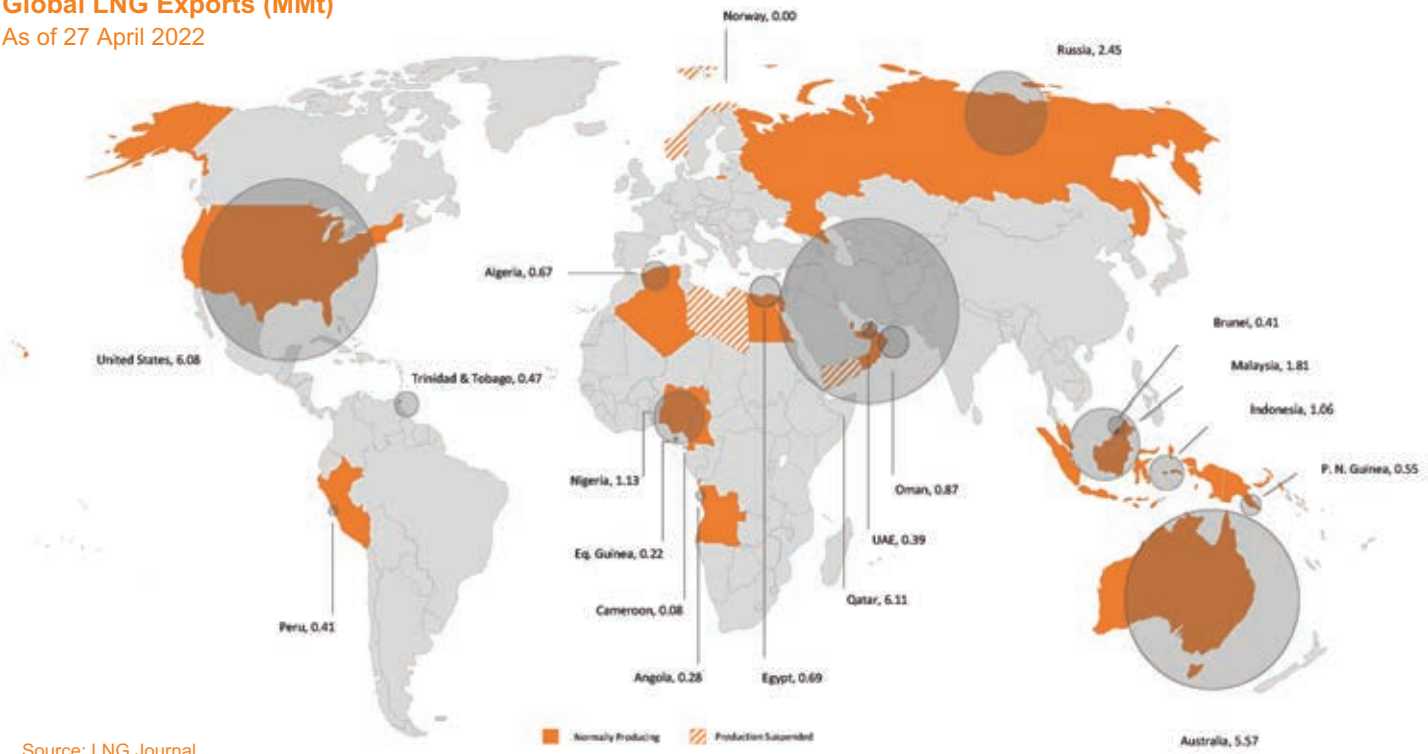
Preliminary data point to continued trade growth in April

Our preliminary April data point to a continued increase in LNG flows but volumes had still to overcome a relatively small negative difference compared to March at the time of writing, our Markets Editor Alexander Wilk reports.

On 27 April, our preliminary data showed global LNG trade for April to date had remained broadly steady at 29.25mmt compared to 29.34mmt for the equivalent period in March. Nevertheless, the shipped amount was slightly above the 29.12mmt exported by 27 April 2021. Exports were led by the Middle East with trade growth of 1.18mmt as Qatar, Oman, the UAE and Egypt increased output levels. Although both Pacific and Atlantic exports showed notable decreases period-on-period, at the time of writing our market visibility indicated both Basins would turn these negative differences into respective net growth by the end of the month.

Meanwhile, global LNG demand for the month up to 27 April was shaped to a large extent by the Far East and Europe as South Korea and Turkey continued to curtail offtakes. This was, however, cushioned by higher demand in Taiwan and Malaysia in Asia and the United Kingdom, Belgium and Spain in Europe.

Global LNG Exports (MMt)
As of 27 April 2022



Source: LNG Journal

LNG imports in the Middle East remained seasonally low and were looking to end April with negative monthly growth at the time of writing.

Exports

On 27 April, global exports were broadly steady at 29.25mmt compared to 29.34mmt for the equivalent period in March. Export growth only came from the Middle East, where overall shipped volumes were up 1.18mmt (17 percent) over the equivalent March period. Concurrently, Pacific Basin shipments were down by 0.68mmt (-6 percent) month-on-month. Atlantic Basin exports also saw negative growth in April to date, down by 0.32mmt (-3 percent). This, in turn, translated to global full-month exports of 29.25mmt by 27 April compared to 29.34mmt by 27 March. Nevertheless, our preliminary data pointed to April's full-month LNG flow coming in above its full-month counterpart in March.

March to 5.57mmt in April. A slump in exports by 0.53mmt (-79 percent) at Wheatstone LNG was the leading factor. Wheatstone LNG exported just 0.14mmt compared to the 0.67mmt in March. Exports from Gladstone LNG, meanwhile, decreased by 0.13mmt (-27 percent) from 0.48mmt to 0.35mmt. This was followed by Queensland Curtis LNG, where at 0.54mmt shipments were down by 0.09mmt (-14 percent) from 0.63mmt in March. NWS LNG and Pluto LNG, meanwhile, had decreased exports more moderately by 0.03mmt (-3 percent) and 0.02mmt (-4 percent) to 0.98mmt and 0.42mmt, respectively, at the time of writing. There were also broadly stable exports in volume terms from Darwin LNG and Ichthys LNG. As such, export increments totalling 0.31mmt (16 percent) at Australia Pacific LNG and Gorgon LNG could only cushion the overall export decrease among Australia's onshore plants at the time of writing.

Shell's Prelude FLNG barge, meanwhile, was again seen in the market with two shipments totalling 0.15mmt. The facility had previously last exported LNG in November 2021. Our data and calculations indicated the facility had operated at around 63 percent of annualised capacity at the time. Following the two April shipments, annualised utilisation stood at 47 percent.

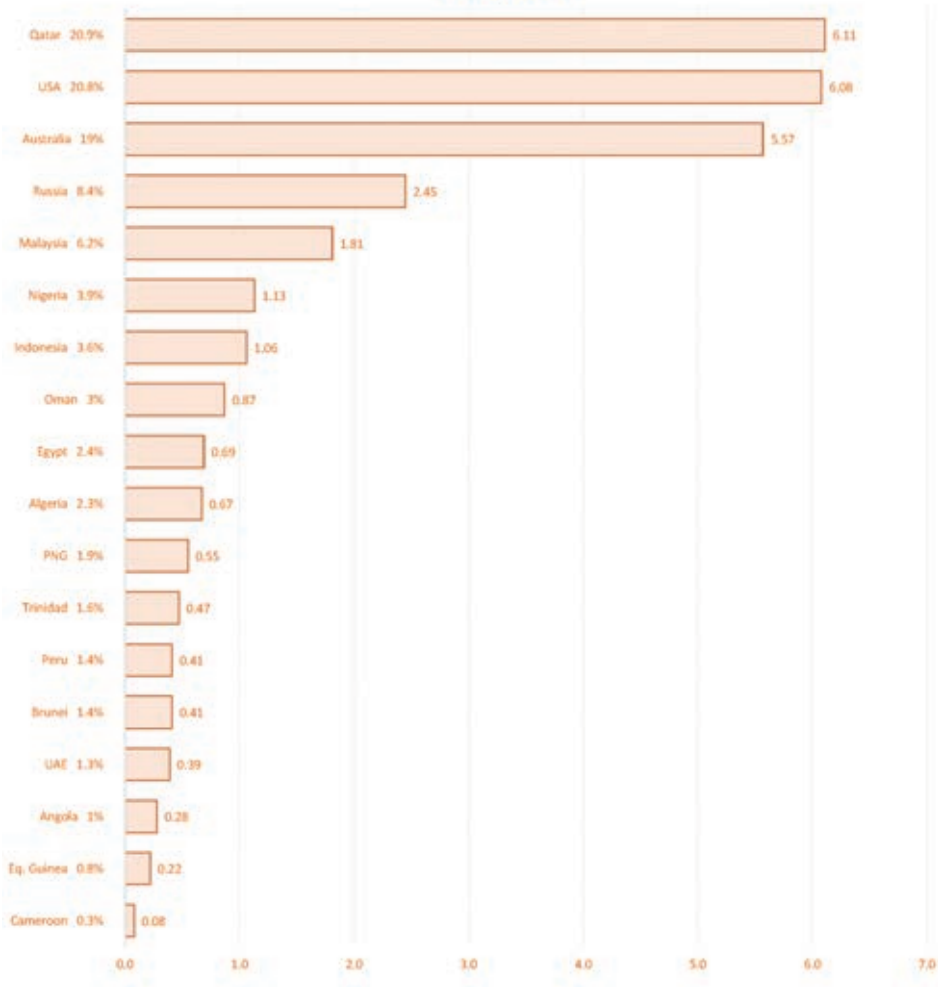
Pacific Basin

Pacific exports had reached 10.62mmt at the time of writing, coming in below equivalent March volume of 11.30mmt by 0.69mmt (-6 percent). Consequently, annualised capacity utilisation stood at 79 percent at the time of writing.

Australia

The Basin's most significant exporter by installed capacity – Australia – decreased exports during the first 27 days of the month by 0.36mmt from 5.93mmt in

Market Share & LNG Exports by Country (MMt)
As of 27 April 2022



Source: LNG Journal



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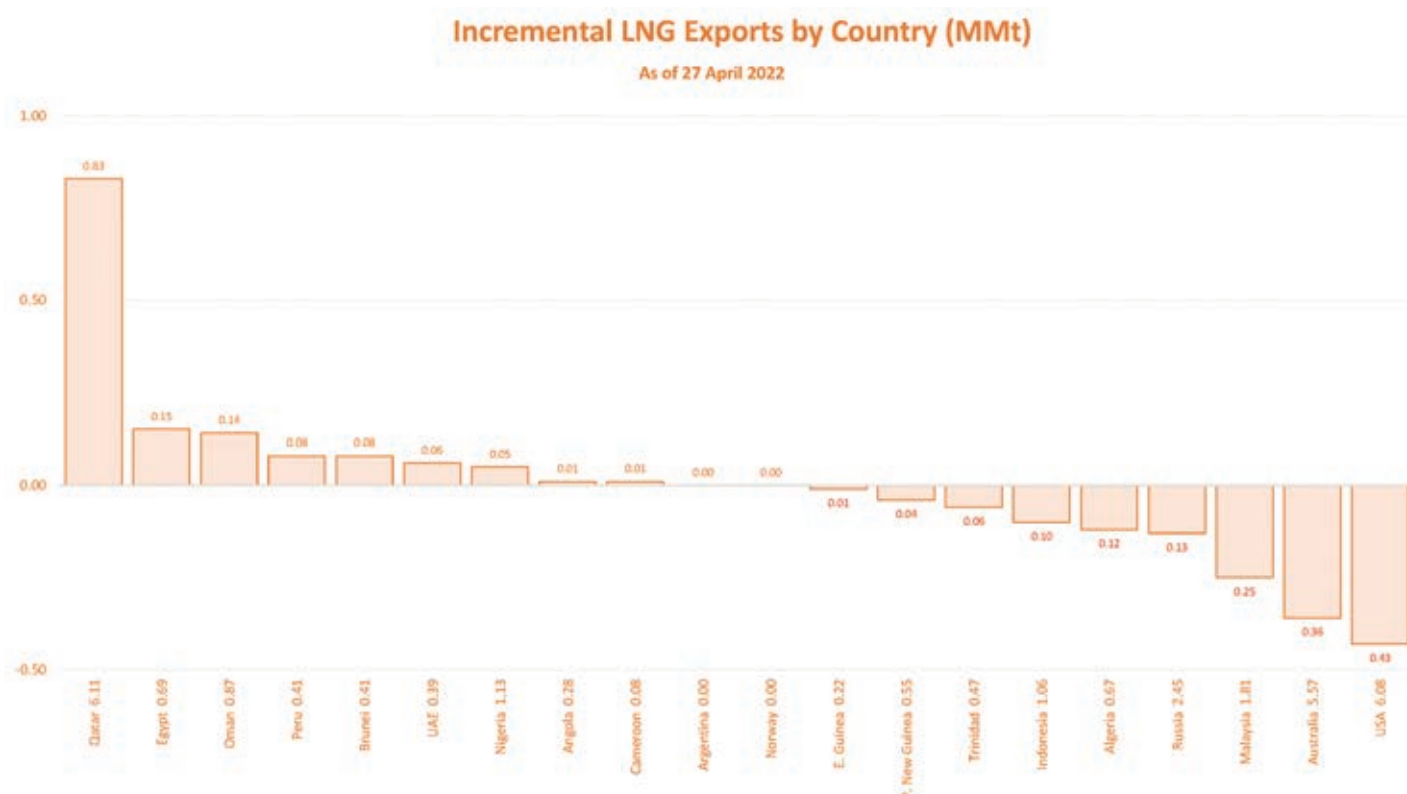
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Southeast Asia

North of Australia, Papua New Guinea's PNG LNG saw shipments decrease by 0.04mmt (-7 percent) to 0.55mmt in April compared to 0.59mmt in March. PNG LNG lost market share in China, South Korea and Taiwan, which was only partially compensated by additional exports to Japan at the time of writing. At 97 percent, however, the plant operated close to nameplate capacity, our calculations show.

In neighbouring Indonesia, the amount of LNG shipped had also decreased by 0.10mmt (-9 percent) to 1.06mmt in April from the 1.16mmt recorded in March. Notably, the Bontang plant had decreased output to 0.35mmt, having exported 0.44mmt in March. The Tangguh LNG facility, meanwhile, had decreased shipped LNG volumes by 0.04mmt (-7 percent) from 0.57mmt to 0.53mmt. However, the Donggi-Senoro plant had increased shipments by 0.03mmt (20 percent) to 0.18mmt from 0.15mmt in March.

Concurrently, Malaysia saw a more significant decrease in monthly shipments, which was led by a 0.13mmt decrease at PFLNG Dua as the facility had not been seen in the market in April at the time of writing. Concurrently, Petronas' Bintulu LNG complex curtailed LNG output by 0.09mmt (5 percent) to 1.67mmt. This reduction in volumes was compounded by Petronas' PFLNG Dua FLNG facility cutting cargo loadings by 0.03mmt (-18 percent) to 0.14mmt in April. Accordingly, Malaysian LNG shipments were down by 0.25mmt (-12 percent) to 1.81mmt at the time of writing from 2.06mmt for the equivalent period in March. In contrast, Brunei had grown



Source: LNG Journal

monthly LNG exports by 0.08mmt (24 percent) to 0.41mmt from 0.33mmt.

Russia & Peru

Elsewhere in the Pacific, Russia's Sakhalin-2 LNG equally shipped less LNG. The plant's exports amounted to 0.81mmt in April at the time of writing, down by 0.09mmt (-10 percent) from 0.90mmt for the equivalent period in March. The plant's April performance to date was due to significantly more market share in Taiwan and Japan, which was only partially compensated by increased shipments to China. Nevertheless, the plant continued to operate at above nameplate capacity, with annualised utilisation pegged at 101 percent at the time of writing. Sanctions and business cancellations in relation to Russia's

invasion of Ukraine had thus not yet affected Sakhalin's LNG export levels. Meanwhile, Peru's Pampa Melchorita had grown exports by 0.08mmt (24 percent) to 0.41mmt from 0.33mmt in March.

Atlantic Basin

In line with the Pacific, the Atlantic Basin's overall shipped LNG had decreased at the time of writing, down by 0.32mmt (-3 percent) period-on-period to 10.57mmt in April from 10.89mmt in March. This translated into annualised export capacity utilisation of 69 percent at the time of writing.

North Africa & Europe

The overall amount of LNG exported within the north-eastern part of the Atlantic Basin – comprising the European Union, Russia and North Africa (and not

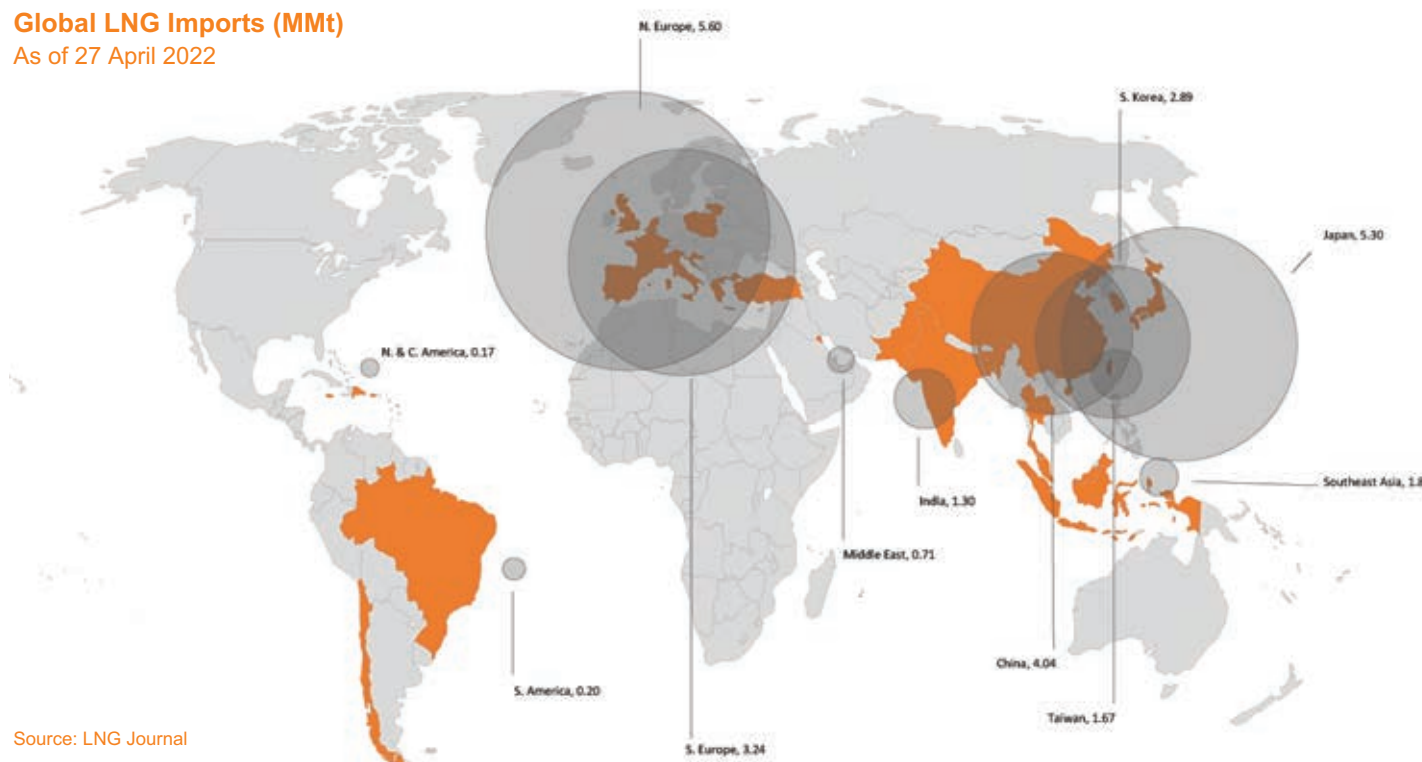
including re-exports) – had decreased by 0.16mmt (-6 percent) to 2.31mmt at the time of writing compared to 2.47mmt for the equivalent period in March. Notably, the ongoing outage at Snøhvit LNG in Norway continued to weigh on the eastern Atlantic's overall exports. Meanwhile, regional exports also suffered from a significant decrease of 0.12mmt (-15 percent) in Algeria at the time of writing on 27 April. Whilst Skikda had kept LNG exports steady at 0.22mmt, output from Arzew was down 0.12mmt (-21 percent) to 0.45mmt. Monthly shipments from Russia's Yamal LNG had decreased slightly by 0.04mmt (-2 percent) as an increase in exports to the Pacific via the Suez Canal could only partially compensate for fewer shipments to Spain and Turkey at the time of writing. Notably, our data at the time of writing did not indicate that these reductions were related to the war in Ukraine.

West Africa

In contrast, West African exports were up moderately by 0.06mmt (4 percent) as of 27 April. Nigeria grew shipments by 0.05mmt (5 percent) to 1.13mmt from 1.08mmt in March. Apart from Nigeria, West African exports also increased in Cameroon, where we recorded growth of 0.01mmt (14 percent) from 0.07mmt to 0.08mmt, and in Angola, where shipments were up by 0.01mmt (4 percent) from 0.27mmt to 0.28mmt. Accordingly, the region's overall positive growth by the time of writing was only tempered by lower exports from Equatorial Guinea, where shipments were down by 0.01mmt (-4 percent) to 0.22mmt from 0.23mmt.

Global LNG Imports (MMt)

As of 27 April 2022



Source: LNG Journal

West African exports benefitted from significant demand growth in the Pacific but had to contend with a significant fall in exports to Europe.

Americas

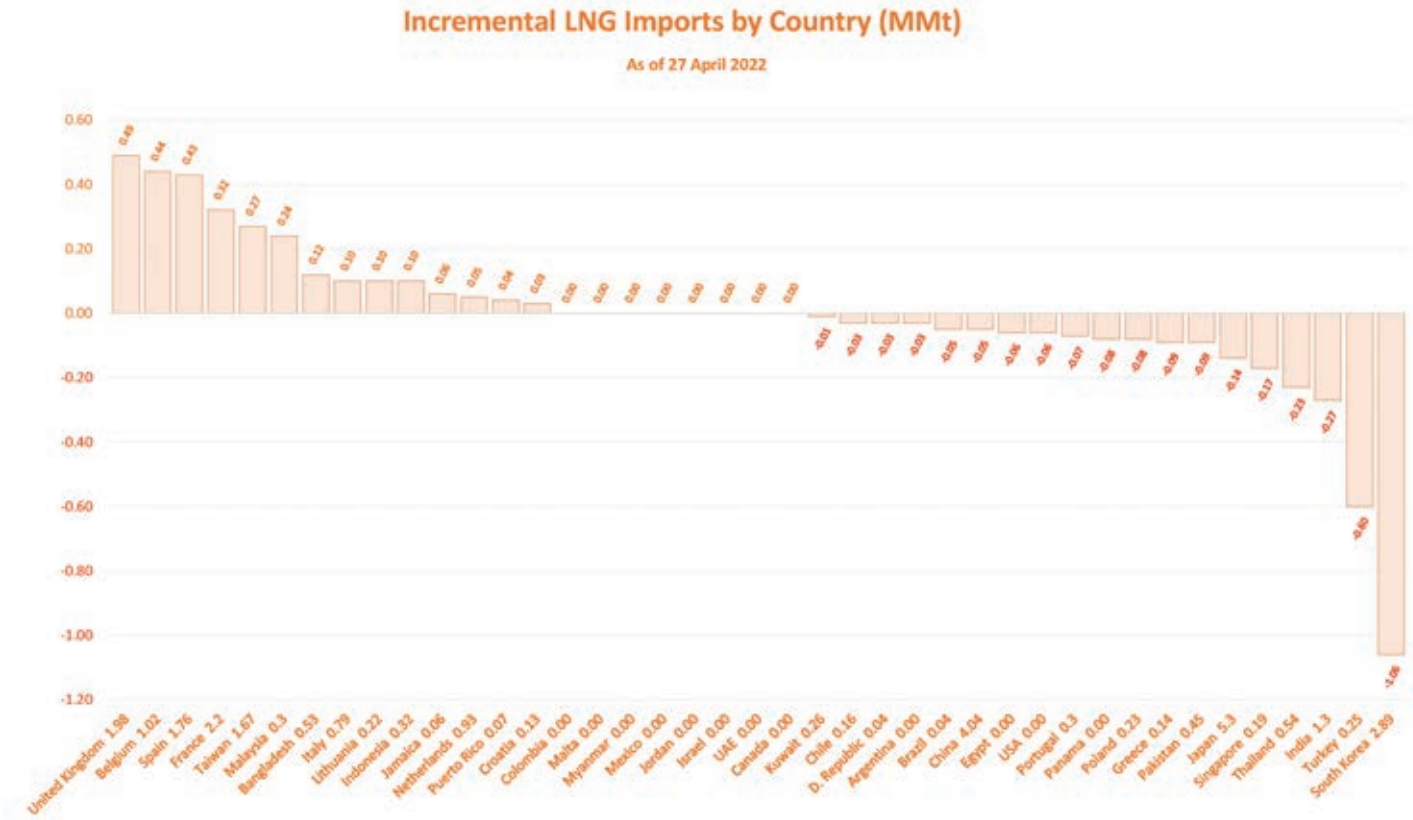
Exports from the United States saw a significant overall decrease of 0.43mmt (-7 percent) to 6.08mmt during the report period up to 27 April from 6.51mmt for the equivalent period in March. Our data indicated the reduction was mainly due to considerably lower exports by 0.20mmt (-18 percent) to 0.92mmt at Freeport LNG and by the same amount (-17 percent) to 0.99mmt at Cameron LNG. As such, further export decreases totalling 0.16mmt (-5 percent) to 2.86mmt at Cove Point LNG, Sabine Pass LNG and Elba Island LNG meant export growth at Corpus Christi LNG and Calcasieu Pass LNG totalling 0.13mmt (11 percent) could not compensate.

In South America, Atlantic LNG in Trinidad & Tobago had seen exports decrease by 0.06mmt (-11 percent) to 0.47mmt at the time of writing compared to 0.53mmt for the equivalent period in March. Atlantic LNG shipments continued their focus on Europe and the Caribbean whilst they had decreased shipments to North America and maintained steady exports to Asia.

Middle East

In contrast to lower period-on-period Pacific and Atlantic Basin exports, shipments from Middle Eastern plants had increased significantly at the time of writing on 27 April. Exports grew robustly by 1.18mmt (17percent) from 6.88mmt in March to 8.06mmt in April. Accordingly, our data showed the Basin’s overall utilisation of operational export capacity (i.e., excluding Yemen) to stand at 92 percent at the time of writing, up 4pp from 88 percent for the equivalent March period.

As was the case in March, month-on-month export growth in the region was not led by exports from Egypt, although the country had continued to grow shipped LNG at the time of writing. Shipments by the country’s Idku LNG plant were up 0.06mmt month-on-month. They thus had increased by 18 percent from 0.34mmt to 0.40mmt. Neighbouring Damietta LNG, meanwhile, had increased exports by 0.09mmt (45 percent) to 0.29mmt from 0.20mmt. Overall, Egypt had thus grown exports robustly terms by 0.15mmt (28 percent) to 0.69mmt at the time of writing in April.



Source: LNG Journal

Concurrently, Qatar had increased exports by 0.83mmt (16 percent) to 6.11mmt compared to 5.34mmt in March. The increase was mainly due to significant growth in shipments to the Far East. These exports were up by 0.39mmt (16 percent) as exports to Japan grew by 0.27mmt. Qatar did not export LNG to Japan in March. Although our data indicated there were still 0.48mmt of Qatari LNG volumes at sea broadly headed to destinations in the Far East, these may change the overall weighting of destinations but not the total shipped amount. Concurrently, European imports of Qatari gas had increased by 0.24mmt (19 percent) to 1.32mmt at the time of writing, led by 0.22mmt more going to the United Kingdom. This was compounded by more Qatari LNG finding its way to Kuwait, which compensated for a 0.06mmt decrease in shipments to Pakistan.

Nevertheless, there was a significant decrease in imports from Qatar by 0.21mmt in China, Taiwan, South Korea and India. There were also four cargoes totalling 0.38mmt still headed for the Atlantic Basin. Together, these higher exports compensated for the above-mentioned decreases at the time of writing.

The country’s fellow Persian Gulf producers in Oman and the UAE had seen an overall export increase by 0.20mmt (19 percent) from 1.06mmt to 1.26mmt at the time of writing on 27 April. This growth was led by Oman, which had increased exports by 0.16mmt (19 percent) to 0.87mmt from 0.73mmt. Meanwhile, the UAE’s Das Island plant

had also increased shipments by 0.06mmt (18 percent) to 0.33mmt from 0.48mmt. Notably, lower exports to China by both plants were compensated by higher exports to India and Thailand.

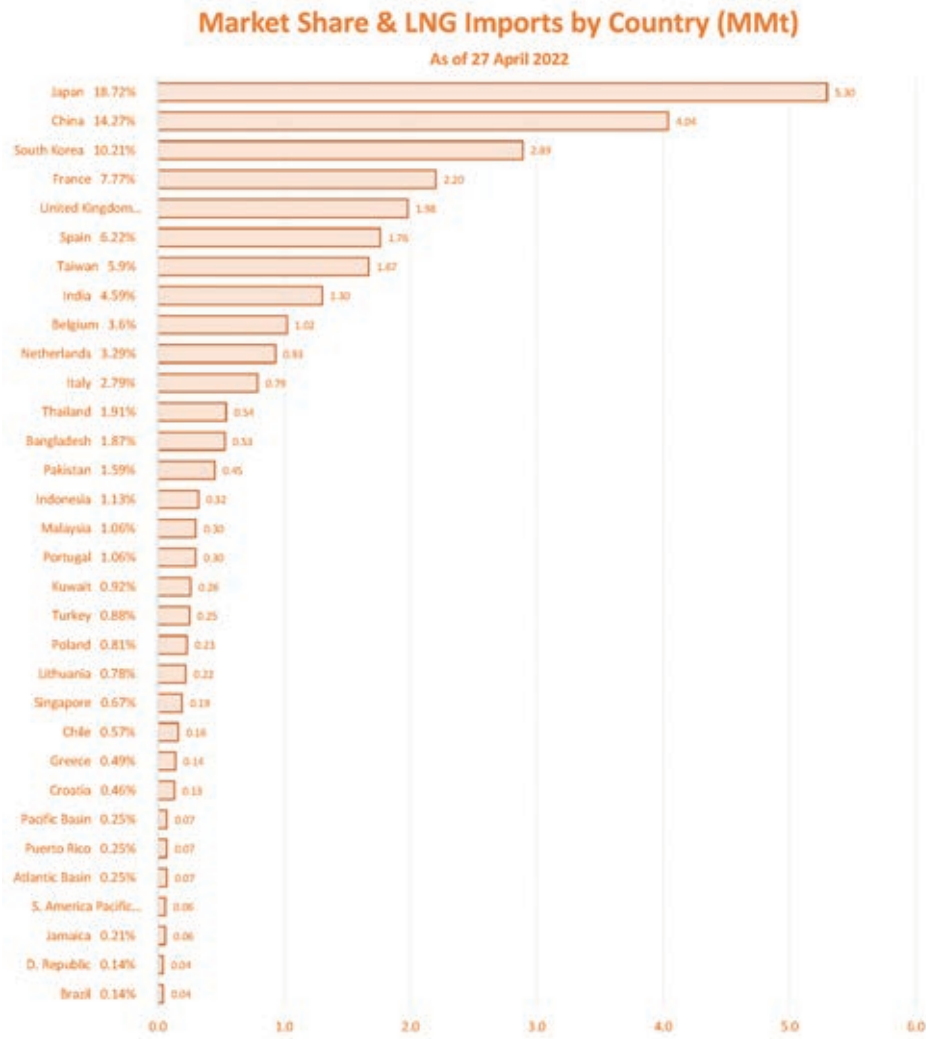
Imports & Domestic Trade

Global LNG imports were down 0.21mmt (-1 percent) for the period up to 27 April at the time of writing. Significantly lower demand in the Pacific Basin was weighing on significant demand growth in the

Atlantic Basin. Concurrently, there was also a notable demand decrease in the Middle East.

Pacific Basin

Period-on-period Pacific Basin imports had decreased considerably by 1.21mmt (-6 percent) at the time of writing in April as South Korea, India and Japan had cut offtakes by 1.47mmt (-13 percent) to 9.49mmt overall. Japan had also reduced imports slightly by 0.14mmt (-3 percent)



Source: LNG Journal

to 5.30mmt. Our data at the time of writing also showed absent demand growth in China, as its offtakes remained broadly steady at 4.04mmt. As such, even robust demand growth totalling 0.61mmt (36 percent) in Taiwan, Malaysia and Indonesia could not compensate.

In line with the Pacific's net demand decrease, the roster of smaller Pacific buyers in volume terms – including Bangladesh, Thailand, Chile, Mexico, Singapore and Myanmar – had collectively seen their April imports slump by 0.31mmt (-18 percent) by the time of writing on 27 April. This was primarily due to Thailand curtailing imports by 0.23mmt (-30 percent) alongside a decrease of 0.17mmt (-47 percent) in Singapore and 0.03mmt (-16 percent) in Chile. These decreases were only mitigated by a substantial increase of 0.12mmt (29 percent) in Bangladesh whilst we continued to see a lack of LNG demand in Mexico and Myanmar. The former had not imported a cargo via the Energia Costa Azul terminal since December whilst the latter had not been seen in the market since July last year, our data showed at the time of writing.

Atlantic Basin

Unlike in the Pacific and the Middle East, LNG imports in the Atlantic Basin were up by 1.04mmt (11 percent) to 10.23mmt as of 27 April from 9.19mmt during the equivalent period in March, with annualised capacity utilisation at 44 percent.

A significant net increase in European offtakes was a primary factor in the Basin's overall demand growth – led by the United Kingdom, Belgium and Spain – which together had grown imports by 1.36mmt (40 percent) to 4.76mmt. In addition, other European importers comprising France, Italy, Lithuania, the Netherlands and Croatia took in 0.60mmt (16 percent) more and saw total imports climb to 4.27mmt as of 27 April. However, these increases were tempered by offtake reductions totalling 0.84mmt (-52 percent) to 0.92mmt in Turkey, Poland, Greece and Portugal. Malta had not yet been seen in the market at the time of writing.

As to demand in the western Atlantic, importers in the Caribbean and South America – including Brazil, Jamaica, Puerto Rico and the Dominican Republic – saw monthly net LNG demand decrease by 0.09mmt (-30 percent) to 0.21mmt at the time of writing in April from 0.30mmt during the equivalent period in March. Notably, Brazil no longer was the region's

key importer in April as the country decreased offtakes by 0.05mmt (-56 percent) to just 0.05mmt from 0.09mmt for the equivalent report period in March. April also saw negative demand growth of 0.14mmt (-78 percent) to just 0.04mmt in the Dominican Republic, Argentina and Panama whilst Colombia resumed its market absence following a rare import of 0.06mmt in January, our data showed. As such relatively robust demand growth totalling 0.10mmt in Jamaica and Puerto Rico could not compensate at the time of writing. Finally, LNG demand had

vanished in the United States, the country having imported 0.06mmt in March, whilst Canada had also not imported LNG in April at the time of writing.

Middle East

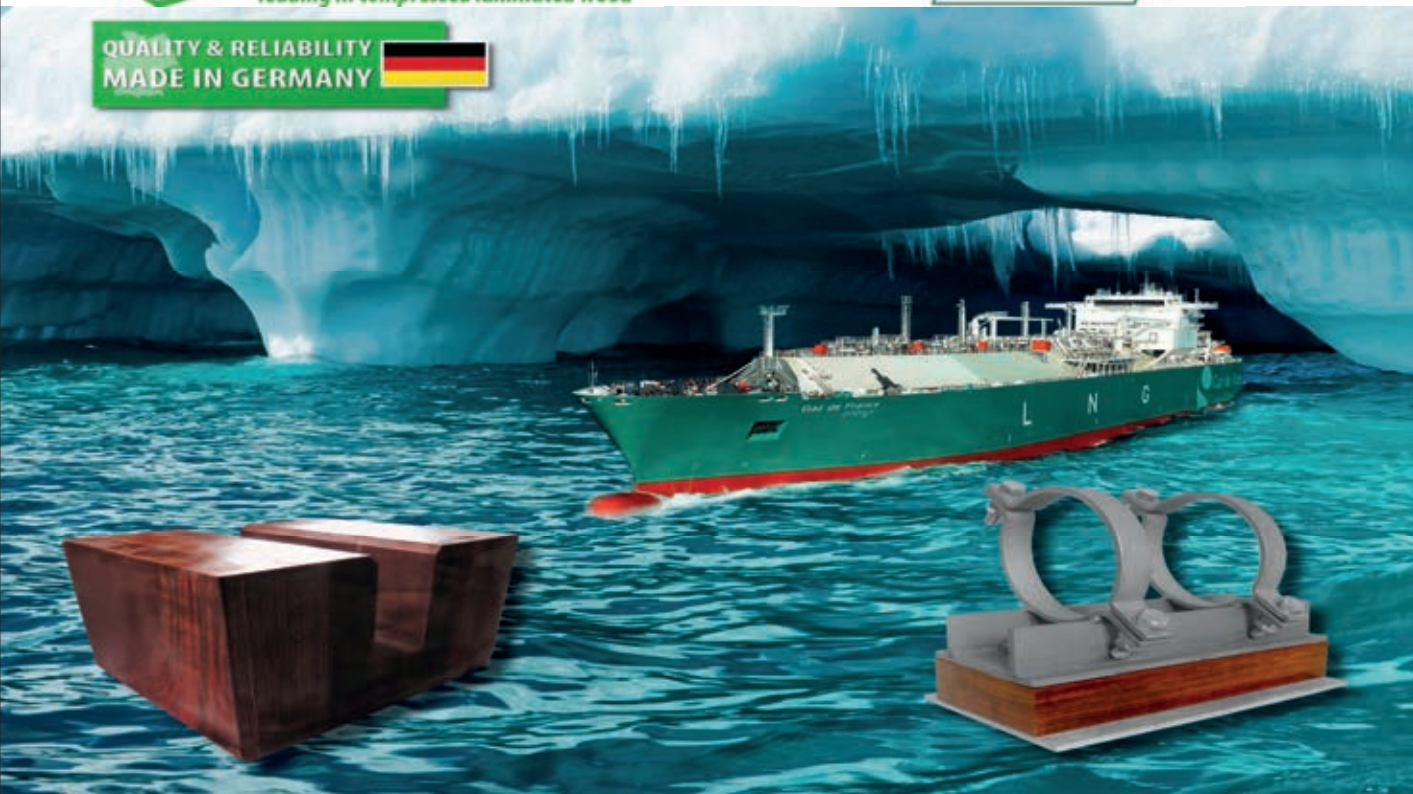
Concurrently, Middle Eastern LNG demand continued at seasonally subdued levels and offtakes were down by 0.16mmt (-18 percent) to 0.71mmt at the time of writing on 27 April from 0.87mmt as of 27 March. Regional offtake figures suffered from absent demand in Egypt after the country took in a rare cargo of

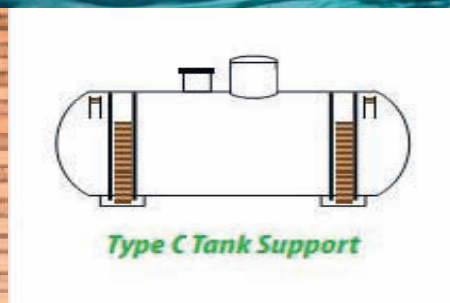
0.06mmt at its Ain Sokhna terminal in March. Meanwhile, demand at Pakistan's Port Qasim facility had fallen by 0.09mmt (-17 percent) at the time of writing whilst at Kuwait's Al Zour terminal offtakes were down more moderately by 0.01mmt (-4 percent). As was the case in March, Dubai's FSRU was not seen in the market, which also applied to Egypt's Ain Sokhna and Jordan's Aqaba FSRU terminals. Accordingly, the Middle East's annualised import capacity utilisation stood at just 15 percent at the time of writing. ■



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Innovative FLNG design wins AiP

Fast tracking floating LNG production and storage units has been the call since Russia's invasion of the Ukraine. Technical Editor Ian Cochran has more.

One of the latest examples is an innovative concept for a floating LNG (FLNG) vessel, which makes use of older LNGCs’ storage tanks.

This design was recently granted an Approval in Principle (AIP) by ABS and was jointly developed by Kawasaki Kisen Kaisha. (“K” Line) and JGC Corp (JGC), supported by Japan’s Ministry of Land, Infrastructure, Transport and Tourism (MLITT).

It involves transferring and reusing LNG storage tanks from MOSS spherical tank fitted LNGCs into the hulls of new FLNG units.

By reusing existing LNG vessels’ Type ‘B’ storage tanks, the potential number of shipyards globally able to build an FLNG is increased, which supports the forecast demand for a wider and quicker adoption of FLNG technology, the developers claimed.

“In many areas of the world, FLNG represents a potential solution to the challenge of meeting increasing demand for natural gas without the need for an export pipeline to shore and the associated infrastructure. ABS is committed to supporting development of FLNG globally while retaining a laser focus on safety,” said Tor Ivar Guttulstrod, ABS Director, FLNG and FSRU.

“This innovative FLNG leverages “K” Line’s expertise in LNG carrier business and contributes to reuse of existing assets to support the world’s environment. “K”

Line will continue to make relentless efforts and generate new values to meet the diversifying needs of our customers,” said Satoshi Kanamori, “K” Line’s Executive Officer.

"This is based on our technical capabilities accumulated in FLNG EPC projects. This results in the enhancement of the customer's FLNG business since it is potentially an optimised CAPEX solution. JGC will continue to develop FLNG technologies for open seas and near shore," added Hiroyuki Ishizaki, Executive Officer of JGC Corp.

JGC explained that an FLNG - floating LNG production, storage and offloading facility - eliminates the costs involved in laying a pipeline for transporting gas from the gas field.

An FLNG can also be redeployed to other offshore reservoirs once a gas field has been exhausted, which makes it suitable for remote small and midsize subsea gas field developments that would not be profitable for a land-based LNG complex.

Stranded offshore fields

There are numerous stranded offshore gas fields all over the world and, given the rising demand for energy among emerging economies in particular, there will be a switch to LNG as a relatively eco-friendly fossil fuel. That is why JGC Global is contributing to several FLNG commercialisation projects, particularly

in Asia and Africa, the company said.

Currently, seven FLNG units exist globally, including those in transit and under construction. However, it is essential to identify technological solutions to the challenges of an FLNG, including counteracting wave motion, the need for a very compact structure, and safety. The challenge is to overcome these while capping construction costs.

The key components of an FLNG are the hull, which contains the LNG storage tanks, as well as the production and liquefaction units on the topside. The LNG storage tanks in the hull require very costly cryogenic materials able to withstand temperatures as low as -162 deg C. Welding together these materials requires special technology, which means that FLNG facilities can only be built by a small number of shipbuilders, which leads to high costs and long delivery times.

Since the first LNGCs were built in the 1960s and 1970s, LNG usage has increased to the point that there are now 600 plus vessels globally. However, in recent years some LNGCs in the fleet have been replaced by newer, more energy-efficient ships with larger carrying capacity, leaving older

Technology Research and Development Programme, the conceptual design of new type of FLNG hull was developed.

Transferring and reusing the spherical MOSS tanks from existing LNGCs means there is -

- (1) No need to build new new storage tanks from expensive cryogenic materials, reducing the cost of hull construction.
- (2) As a result, there is a wider choice of shipbuilding yards able to construct the FLNG hulls. This is expected to reduce construction time and cost, notably providing a safe and quality option for converted FLNGs for application at sea and in harsh operation environments.

The JGC Group claimed to be a pioneer in the FLNG space, providing life-cycle services for project development, including working on engineering, procurement, construction, installation and commissioning (EPCIC) of two FLNGs, as well as supporting commissioning (test operation).

Further, development partner "K" Line has been a player in the LNGC business for many years, accumulating experience in LNGC construction and operation.

"K" Line has also undertaken offshore projects, including FPSO operations.

LNG demand is forecast to grow strongly against the backdrop of increasing demand from developing countries. In

addition to its experience and track record, the JGC Group

intends to build on its development achievements to deliver to its clients highly competitive and reliable FLNG units and is moving aggressively to further build its orderbook, the Japanese company said.

FLNG Fleet		
Project	Owner/Operator	Status
1) ‘Prelude’ FLNG	Shell	Offshore Australia
2) PFLNG ‘Satu’	Petronas	Offshore Malaysia
3) PFLNG ‘Dua’	Petronas	Offshore Malaysia
4) ‘Coral Sul’ FLNG	Eni jv	Offshore Mozambique
5) Exmar FLNG	Exmar	to be positioned in Holland
6) ‘Hili Episeyo’ FLNG	Golar LNG	Offshore Cameroon
7) ‘Gimi’ FLNG	Golar LNG	Under conversion
Note:- JGC’s involvement included the financed commissioning of the ‘Prelude’; Supporting ‘Satu’s’ operations; Executed EPCI with ‘Dua’ and Undertaking EPC on ‘Coral Sul’.		
Source: JGC		

Since the first LNGCs were built in the 1960s and 1970s, LNG usage has increased to the point that there are now 600 plus vessels globally.

carriers idle.

JGC Global and "K" Line saw an opportunity in this older generation of LNGCs and, with the backing of Japan's MLITT, under the Marine Resources Development

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Electrifying process heating systems

De-carbonisation efforts worldwide, led both by major industry players and legislation, have increased efforts to shift fossil fuel use to renewables. Technical Editor Ian Cochran investigates.

One way many industrial organisations can embrace this – and some already have – is by shifting process heater systems from fuel-burning to electric.

In this article, thermal systems' developer Watlow's Dennis Long and Roly Juliano discuss the move towards electrifying process heating systems.

There is a sea-change occurring when it comes to process heating. Pressure to electrify all industrial processes is increasing, from governments, non-profit organisations and business leaders alike.

However, the transition from gas to electric process heating is not as simple as throwing a switch.

According to the US Environmental Protection Agency (EPA), a substantial part of global greenhouse gas emissions (21% as of 2010) comes from industrial sources burning fossil fuels.

Much of this energy is burned on-site for energy and heating needs; in fact, the US Department of Energy's Energy Information Administration (EIA) estimates that the industrial sector uses about 24 quadrillion BTUs of heat per year, or roughly one-third of the US' delivered energy supply.

Process heating applications alone account for 36% of total delivered energy consumption within the manufacturing sector.

Thus, the pressure is mounting to de-carbonise and electrify, where possible.

For example:

- In 2015, the historic Paris Agreement was signed, at which countries agreed to curb the increase in global average temperature well below 2 deg C, and to pursue efforts to limit the temperature increase to 1.5 deg C.
- That same year, the Deep Decarbonization Pathways Project (DDPP) suggested fuel switching as a key part of any strategy to reduce carbon emissions.
- In 2017, the US Department of Energy (DoE) published a report analysing US energy use and greenhouse gas emissions in scenarios where there is widespread electrification and solar power de-carbonisation.
- A year later, the UK's Bank of England put out a statement saying that the financial sector has been "too slow in divesting investments into fossil fuels" and warned that assets

could become useless.

- Fast forward two years - BlackRock leads several firms that begin to divest their interests in companies that are not addressing climate change.
- After years of protests, 17,000 Dutch citizens sue Royal Dutch Shell in 2019. In May 2021, a Dutch court ruled that the company must dramatically reduce its carbon emissions by 45%, compared to 2019 levels.

As a result of these pressures, industry has been quickening the pace of de-carbonisation of their operations. In a recent survey, Watlow found that over 90% of respondents in the gas and oil industry have developed, or are in the process of developing, a long-term strategy to reach sustainable, low carbon site status.

Heat electrification

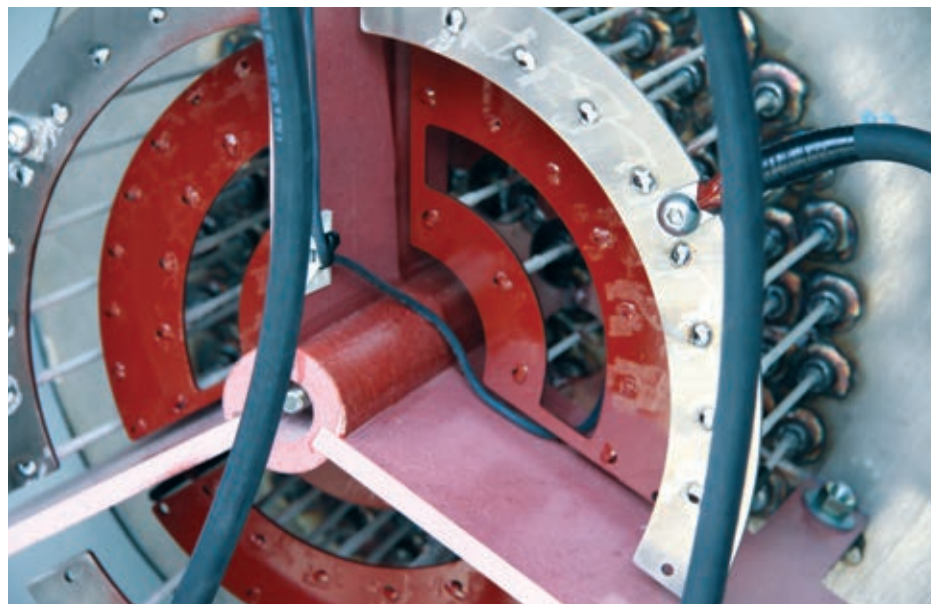
Electrification of processes – and more specifically, process heating – is one of the key strategies for addressing climate change concerns in oil and gas. This requires moving to electric heat exchangers in several applications. These electric heaters do not burn fossil fuels and can be powered via renewable energy sources.

Electric heat exchangers are no strangers to oil and gas operations. However, historically, they have been used only in applications with a name plate under 1 MW - for example, glycol re-boiler heaters, knock-out drum heaters, seawater heaters, fuel gas heaters and pre-heaters, lube oil and seal gas heaters, etc.

Gas-fired process heaters are still used in many ways, since the BTU requirements for some of these processes can only be met by electric heaters with a much higher wattage.

Currently, there is a large and growing potential to use electric heaters for applications requiring more than 1 MW but less than 15 MW. These span several areas, including oil and gas production, but also:

- Renewable fuel production: Hydrocarbon biofuels that are chemically identical to petroleum gasoline or diesel, but produced from biomass sources through various biological, thermal and chemical processes.
- Ammonia production: Ammonia produced using hydrogen from water electrolysis (green ammonia), fossil hydrogen (grey ammonia) or natural



Watlow's medium voltage heater

gas feedstock (blue ammonia).

- Carbon recycling: Methanol created from carbon dioxide captured from industrial exhaust combined with hydrogen (either collected from industrial waste gas or, alternatively, from water through electrolysis).
 - Distillation column and/or fractionation column re-boilers: Electrical generation using energy supplied by the re-boiler system of a distillation or fractionation column.
- Besides reducing the use of fossil fuels, electric heaters and heat exchangers have other well documented advantages:
- Less thermal lag: Temperature is controlled through direct application of electricity.
 - Safer operation: No fossil fuels to burn or combust.
 - More uniform distribution of heat: More control of the current means more control of the heat.
 - Smaller overall footprint: There is no need for storage of heating oil, for example, or transporting it from stage to stage.

Medium voltage heaters

One of the largest developments in the area of electrification for process heating is in reliable medium voltage process heating systems.

The solutions being developed by Watlow can tap directly into medium-voltage lines of up to 7,200 volts, reducing the need for large step-down transformers, circuits and cabling, which can significantly reduce installation, operation and maintenance costs.

The number of connecting cables, the

heat generated by cabling inside the electrical heater enclosure and the control panel, which is a common failure in electric heat exchangers, are greatly reduced.

Medium voltage electric process heating systems also offer the safety advantage of no flames or combustion used in their operation—power is simply applied to the unit's heating elements, which come into direct contact with whatever is being heated, making the heat flux highly efficient.

Can Electric Really Pull Its Weight? Yes. What matters most in achieving process heating parameters is not the method of heating, but the heat flux of the heating surface. When it comes to these kinds of applications, electric heaters can safely achieve operating temperatures comparable to gas-fired heaters and with better uniformity and control.

Watlow has been at the forefront of innovative heat exchanger design, introducing the patented POWERSAFE integrated medium voltage control and heating solution.

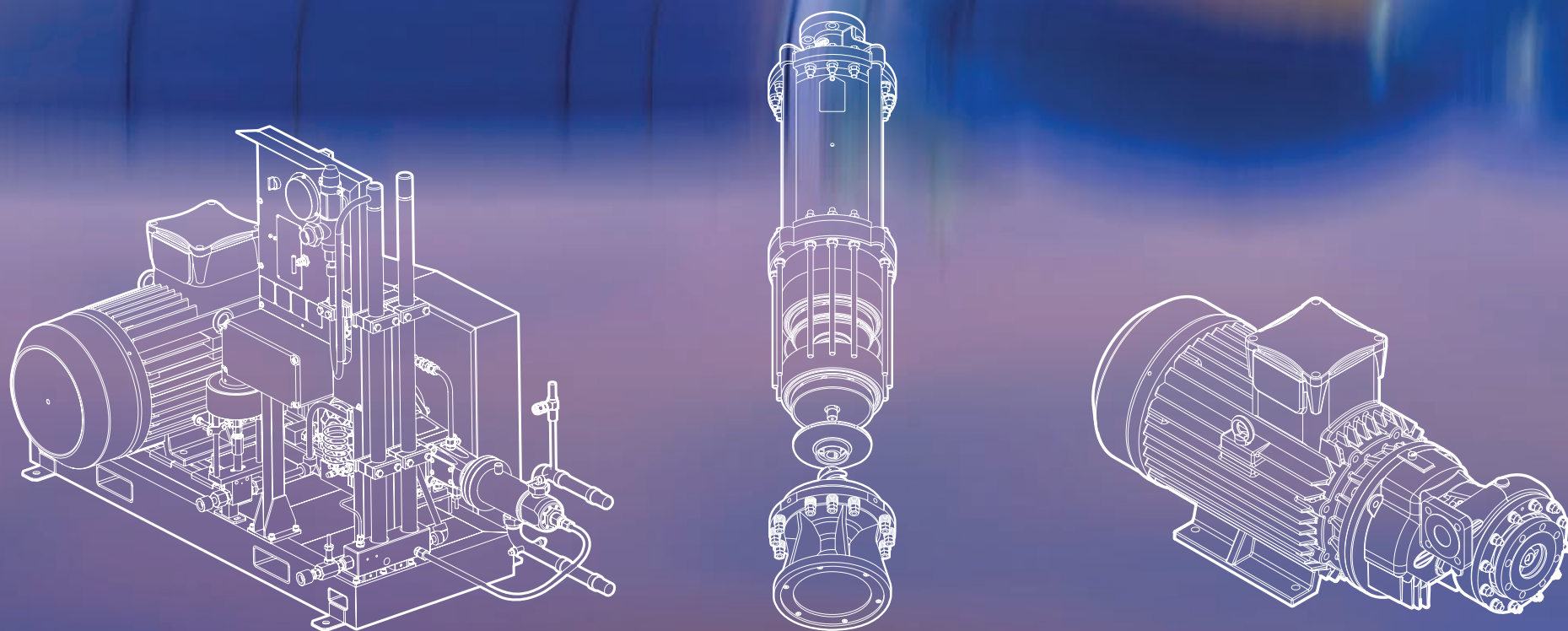
POWERSAFE offers longer heater life, allowing the replacement of fossil fuel solutions with a clean electric solution. It also meets the necessary agency requirements to help make the process safe and reliable.

Wattage size requirements for electric thermal equipment have been on the rise. This makes medium voltage solutions attractive because they reduce overall installation costs for the customer, compared to low voltage electric heaters.

POWERSAFE lowers this cost by eliminating unnecessary cables and additional transformers. ■

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Gas handling and tank equipment is Gas and Heat's staple diet

With the ramping up of both shipboard and shoreside gas handling equipment, designers and manufacturers are looking forward to something of a bonanza in orders. Technical Editor Ian Cochran elaborates.

One such company is Italian-based, family owned gas handling systems designer and manufacturer, Gas and Heat.

The company was founded in 1996 out of the combined expertise of Officine S Marco, established in 1948, as a fabricator and erector of boilers, tanks, piping, pressure vessels and large steel structures; and Marine Engineering Service (MES), a ship design company involved with chemical and gas carriers.

LNG Journal's Technical Editor, Ian Cochran spoke with Gas and Heat's Sales Manager, Nicola Evangelisti, about the LNG space as the company saw it today.

One of the areas that the company is heavily involved in is supplying equipment, such as tanks and gas handling systems for small scale LNG shipping and terminals.

"We strongly believe in LNG in all its forms in the world's transition towards a greener future. The small-scale LNG industry is still in its early stages both on land and in the marine environment. However, it is proven technology that can be implemented today and improved in the years to come.

"We have to continue mixing our creative DNA with our experience and we will continue finding newer and smarter

solutions that drives us towards the zero emissions target.

"It's worth underlining that the infrastructure dedicated to LNG is ready to be used with bio-LNG and, under proper conditions, with ammonia," Evangelisti told *LNG Journal*.

The company was involved in the Sardinian Oristano small scale terminal project and he said that there were many opportunities today worldwide for similar projects.

In addition, in Italy, Gas and Heat expected to receive more and more requests for these type of terminals, due to being a path towards green energy, as well as coping with the recent energy crisis.

LNG fuelled ships also need tanks and gas handling systems and this market has been growing for several years. Many owners are considering building this type of vessel in Europe once again, Evangelisti said.

However, in the short term, the ongoing Ukrainian crisis is slowing down a lot of projects. "In the longer term – we believe the growth of LNG fuelled tonnage will grow rapidly, as there are few viable options to meet the environmental regulation in coming years," he said.

As for the size of tanks, there is no limit in terms of cubic capacity. The largest tank built by Gas and Heat thus far was 4,500 cu m (12.5 m dia, 40 m long and 500 tonnes) designed to hold ethylene.

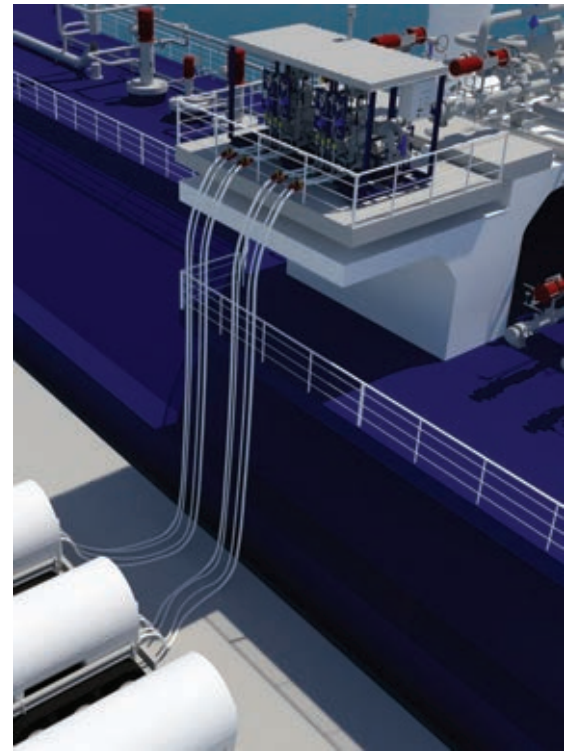
"We recently delivered two bilobe tanks of 2,500 cu m (about 250 tonnes) each and we signed a Letter of Intent to build two 5,000 cu m bilobe tanks of about 500 tonnes each," Evangelisti added.

At the company's Tombolo manufacturing plant, near Pisa, there is a 20 m width limitation on the canal, which connects the manufacturing plant to the port of Livorno, due to a bridge.

"We don't have a real limitation in terms of capacity, even if we have to manage the maximum width of 20 m caused by the bridge before entering Livorno. We have experience with tanks up to 4,500 cu m capacity, but we are able to supply even larger ones," he said.

Turnkey packages

One of Gas and Heat's core businesses is to offer the complete LNG package on a turnkey basis, but under certain circumstances, the company could also



An LNG4speed STT system connected up ashore

provide single pieces of equipment (ie, tanks).

"We are receiving enquiries from both new projects and for retrofits. It seems the retrofit business is increasing today as well.

"Recently, we have added a service department able to offer after sales, maintenance, etc and we are committed to develop this further," he explained.

Gas and Heat recently completed the design, manufacture and assembly of a docking skid (LNG4speed TTS) to be fitted on board an LNG fuelled tanker developed to connect four LNG tank road trucks to the vessel to reduce its full bunkering time by one sixth.

The skid was ordered by Transport Desgagnes (TDI), a Canadian Shipping company, which contracted four 15,100 dwt LNG fuelled chemical tankers from Besiktas shipyard in Turkey.

Each vessel has one docking skid on board that can be offloaded and manoeuvred ashore by the vessel's crane. The skid is connected by hoses to both the vessel and the four trucks for the bunkering operation.

After the completion of each bunkering and draining/purging operation, the skid is secured safely on board ready for the next voyage.

Gas and Heat in co-operation with

LNG4speed skids - details

There are two versions available on the market -

LNG4speed STT - This is a LNG transfer system that allows distribution of LNG from a ship to four ISO containers or tank trucks simultaneously.

The LNG4Speed allows an improvement in logistics and distribution, which will be feasible for remote locations.

It is designed for the starting of LNG capillary distribution by truck without the use of any fixed infrastructure or terminal onshore.

It can be installed/transported:

- On a ship's deck, fitted on board using a container twist lock system. This ensures that the skid is portable and ready for use in

whichever port the ship calls at.

- On a truck trailer - it is also secured by twist locks to ensure that the skid is portable and ready to be used in whichever location it is required.
- Onshore, if the truck loading area is a permanent fixture.

The unit comes with a computerised alarm, monitoring and control system to handle and supervise the entire operation.

The basic philosophy is to ensure an autonomous, modular and affordable control system with the main attention to safety.

Actuated valves are connected to the control system in order:

- To open/close according to automatic procedures, manually activated.
- To be de-energised in case of ESD.

LNG4speed TTS - This is a LNG transfer system that allows distribution of LNG from four tank trucks simultaneously to the ship.

It has similar functions and operations as the LNG4speed STT and to feed the LNG to the fuelled ship, the skid is equipped with four electric driven cryogenic pumps.

The discharge pressure varies during the operation, due to ship's pressure and bunkering loop pressure drop. An automatic control valve is installed in order to keep the pumps at their optimum working curve.

This device enables the operator to simply connect the truck and start bunkering, without any manual valve operations during the transfer. ■



A skid's system's control panel plus connections

TDI, designed the skid to maximise the reduction of weight on the on board storage area. The skid's dimension is of a 20 ft container. Gas and Heat has also

supplied the fuel gas supply system (FGSS) for the four vessels and the on-deck cylindrical C-type fuel tanks.

The company has since won another

two orders for this system to be fitted on two car ferries also under construction in Turkey.

The skid can be expanded to increase the number of truck connections or reduced to a 10 ft box, if fewer than four truck connections are required.

Gas and Heat said that it is offering this product in the market along with another version recently developed (LNG4speed STT) for loading four trucks at the same time directly from the LNGC. This will allow LNG breakbulk distribution even in areas where no fixed terminal infrastructure is available.

For the Oristano terminal, Gas and Heat played a very important role, as the company was not only the EPC contractor for the whole plant, but also the originator of the idea, Evangelisti claimed.

"We started working on this in 2014, then, together with our Italian partner,

we established a new company, Higas, with the sole aim of building and operating a 9,000 cu m capacity terminal at Oristano, Sardinia. In 2017, Norwegian Stolt Nielsen Gas became a shareholder and today, Avenir owns 100% of the shares," he said.

In conclusion, he said that the company was following market developments closely, as the aim was to be able to provide customers with the products they need or want.

"Gas and Heat has over 40 years experience dealing with liquefied gases and that also includes ammonia and hydrogen.

"We built two 600 cu m liquefied hydrogen tanks for the European Space Agency over 25 years ago, so while the industry has a lot of work to do in this space, we have some real experience," he said. ■

Small Scale LNG: New launches to control global emissions

There has been a growing demand of LNG in various countries worldwide, owing to its impeccable application in trucks and ships. Shreeras Shetty sets the scene.

LNG provides a great deal of economic and environmental benefits, compared to conventional fuels, such as diesel and petrol. Thus, LNG is extensively used and considered as an efficient and reliable fuel for transportation. In addition, irregular price hikes of traditional fuels, such as petrol and diesel, create massive hurdles, resulting in the rapid adoption of LNG.

Numerous countries around the world are also adopting various initiatives to reduce carbon footprints. Hence, LNG is an ideal transportation fuel, and is therefore gaining immense traction across the globe.

Europe and other countries, including the US and China, have already taken necessary measures to deploy LNG-powered trucks, particularly for long-distance freight carriage. In the Asia/Pacific region, China is paving the way, due to the demand for small-scale LNG in transportation and power generation. The US is dominating in the North American Region, due to the booming liquefaction terminal sector.

Various Governments are imposing stringent policies and regulations on de-

carbonising and emissions control. For instance, in 2019, the European Commission initiated a Green Deal that includes a comprehensive set of policy initiatives aiming to make Europe carbon-neutral by 2050.

These policies pointed out the importance of LNG to reach the goal. They have also emphasised the wide usage of LNG as a reliable and efficient transportation fuel for ships and trucks.

Small scale LNG is extremely environmental-friendly, and hence its sustainability and extensive application in off-grid power generation in remote or secluded industrial complexes is expected to drive the demand in the coming years. LNG from small-scale plants is extensively used as industrial feedstock, transportation fuel, and for other purposes in commercial, residential and industrial sectors.

A significant surge in the demand for electricity has subsequently resulted in the higher production of LNG. More and more remote and rural areas across the globe are devoid of electricity. Furthermore, a rise in industrialisation and increase in people's household requirements, is further predicted to boost the demand for electricity production.

Small-scale potential

With the ever-growing population, the significance and growth potential of

small-scale LNG is expected to surge in the forthcoming years. Additionally, fluctuations in the prices of crude oil, reduction in the prices of natural gas, and integration of new, innovative technologies, are forecast to create tremendous opportunities for the growth of the global small-scale LNG market.

According to a report published by Allied Market Research (<https://www.alliedmarketresearch.com/small-scale-lng-market-A10738>), the global small scale LNG market is expected to grow expeditiously from 2021 to 2027.

Numerous market players are launching innovative products and services to cater to the needs of their customers. For instance, PAO NOVATEK, a West Siberia-based natural gas producer, announced that it launched a small-scale LNG plant in Magnitogorsk, in the Russian Chelyabinsk Oblast. The plant's key technological equipment was provided by JSC NPO GELIYMASH, one of the leading manufacturers of cryogenic technologies in Russia.

Leonid Mikhelson, NOVATEK's Chairman of the Management Board, said in a statement that he strongly supports the use of LNG as a motor fuel and that the company is developing this market segment both in Russia and abroad.

The trend of launching new LNG storage facilities is gaining huge momentum among leading market players in various countries worldwide. For example, Venice LNG, a subsidiary of Decal SpA Group, which is engaged in warehousing, storage, and transport of goods, has announced the launch of a new facility.

Venice LNG coastal storage will be located across Industrial Channel South of Porto Marghera, Venice, Italy. The plant has already been permitted for construction and operation, and the project is expected to become online by the end of 2024.

It will have a storage capacity of 32,000 cu m and is expected to supply an initial throughput of 150,000 cu m per year and is further anticipated to reach 900,000 cu m per year at full capacity. Venice LNG will also be able to accommodate bio-LNG, which is obtained by the means of liquefaction of biomethane produced from renewable sources. Venice LNG will also be able to handle bio-GNL.

The project is co-financed by the European Union (EU) Commission under the Connecting Europe Facility (CEF) programme with the help of shares in Venice LNG Facility and Gainn4Sea. It was promoted by the Authority of Harbour System of the Adriatic Sea North. ■

UK development fuels bioLNG transport growth

Growth of biomethane and anaerobic digestion infrastructure in the UK is forecast to support a new wave of LNG-fuelled transport in the country as access to green finance improves the cost benefits for transport operators. Fuelling Editor Malcolm Ramsay has more

With many HGV fleet operators now moving from initial trials to wider roll out, the cost and carbon savings of bioLNG are increasingly important for the economics of long-distance transport, according to Jocelyne Bia of the Anaerobic Digestion and Bioresources Association (ADBA).

“The use of biomethane as a transport fuel has grown rapidly over the last few years – increasing from two million litres equivalent in 2015, to eight million litres equivalent in 2018 and 40 million litres in 2021,” Bia tells LNG Journal, predicting that this trend will “continue accelerating”

Financial incentives

In 2021, the UK government introduced the Green Gas Support Scheme (GGSS) an environmental scheme to provide financial incentives for new anaerobic digestion biomethane plants to increase the proportion of green gas in the gas grid.

“Tariffs are calculated to compensate plants for the building of new infrastructure to produce biomethane and ongoing operation costs,” a government spokesperson said, “It is funded by the Green Gas Levy which is applied to all licenced fossil fuel gas suppliers.”

The combination of this levy on traditional fuels and the anticipated growth in biomethane production is

expected to steadily change the dynamics for LNG fuelling in the country.

“The use of bioLNG can significantly cut GHG emissions from operations; if derived from wastes, it can become carbon negative, actively reversing emissions. Crucially, these carbon savings can work toward decarbonisation targets within both voluntary and mandatory schemes, thus improving the company’s ESG rating and access to green finance,” Bia comments adding that “we need more LNG refuelling stations to ensure HGV fleets can conveniently refuel across the UK, mitigating any concerns over vehicle range and ability to refuel.”

The GGSS is currently based on three tiered tariff rates, with the first 60,000 megawatt-hours (MWh) charged at 5.51 per kilowatt-hour (p/kWh), the next 40,000 MWh at 3.53 p/kWh, and any additional capacity at 1.56 p/kWh. The tariff is set to remain in place for the next 15 years and requires an emission threshold of 24g of CO₂ equivalent per MJ of biomethane injected compared to the current RHI threshold of 34.8g of CO₂ equivalent per MJ biomethane.

“The GGSS provides scope for other technologies to be supported by it in the future,” Joe Lloyd, research analyst at Savills Rural Research, explains “This could be gasification or hydrogen, but at present, the government does not have sufficient evidence that these can create



BioLNG fuelling station

a viable commercial opportunity in the same way that AD can.”

Regulatory challenges

Despite strong growth in recent years, the UK still faces challenges in driving uptake of bioLNG, as in many cases legislation is lagging behind ESG efforts of companies.

“The UK is currently under-ambitious with its targets for biomethane production. At present, policy is designed to increase green gas production to around 10-12 terrawatt-hours per year, representing a fifth of the industry’s full potential. Policy and regulations are required throughout the supply chain to ensure all organic wastes are effectively recycled using the optimal technology, AD,” Bia notes.

Developing new legislation has become increasingly challenging for UK policymakers however as the current energy crisis dominates headlines and stalled much progress in developing green transport solutions. The UK Treasury is now reportedly considering rolling back some green levies in response to the cost-of-living crisis while the ongoing war in Ukraine has added further pressure on supplies.

Bia of ADBA notes that the UK only sources around 3 per cent of its gas supply from Russia but nonetheless expects this will create some short-term uncertainty and price increases.

“The government is now looking to enhance its energy security by increasing the production of home-grown biomethane. At full potential, the AD industry could generate over twice the amount of gas currently supplied by

Russia,” Bia adds.

Energy security was also a key factor in the UK government’s recent updated guidance around mass balance for biomethane, which is designed to add detail to the Renewable Transport Fuel Obligation (RTFO)

“The mass balancing concept was evolved for liquid fuels,” Gaynor Hartnell, Chief executive of the Renewable Transport Fuel Association (RTFA) says “We embarked on a process of exploring the detail and examining the range of approaches our members were taking. Our objective was to bring greater transparency and ensure that all stakeholders involved were aware of which approaches would meet the Department for Transport (DfT) criteria.”

Industry participants involved in the project included CNG Fuels, Gasrec, AirLiquide, BP and Decarbonise Fuel Limited. The DfT notes that the Isle of Grain facility on the east coast of England is currently the only point of extraction to take LNG out of the GB pipeline mass balance system.

The largest LNG importation terminal in the UK, the Isle of Grain recently reached a landmark with the installation of 1,000 piles on National Grid’s new tank project at the site. Engineering work was carried out by foundations and soil specialist Bachy Soletanche, on behalf of Entrepouse Contracting, Vinci Construction Grands Projets and Taylor Woodrow (EVT). Work is scheduled to continue until mid-2025 and will result in development of a giant LNG tank with capacity of 190,000 cubic metres. ■



Anaerobic Digestion Plant in Staffordshire, West Midlands



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For the Record

ABS, the American Bureau of Shipping, has granted approval for an innovative concept for floating liquefied natural gas projects to use storage tanks from older LNG carriers.

The FLNG design was jointly developed by two Japanese companies, the shipping line Kawasaki Kisen Kaisha (K-LINE) and LNG and energy engineer JGC Corp.

ABS awarded an approval in principle (AIP) for the joint project which was also supported by Japan's Ministry of Land, Infrastructure, Transport and Tourism.

The design essentially involves transferring and reusing LNG storage tanks from spherical Moss-type LNG carriers into the hulls of new FLNG facilities.

By re-using existing LNG vessels and their Type B storage tanks, the potential number of shipyards globally able to build FLNG units is increased.

The new Japanese design if it moves to production would support the forecast increase in demand for fast-track FLNG solutions.

"In many areas of the world, FLNG represents a potential solution to the challenge of meeting increasing demand for natural gas without the need for an export pipeline to shore and the associated infrastructure," explained Tor Ivar Guttulsrod, the ABS Director for FLNG and FSRU vessels.

"ABS is committed to supporting development of FLNG globally while retaining a laser focus on safety," stated Guttulsrod.

Satoshi Kanamori, an Executive Officer at K-Line, said the design had potential to leverage shipping expertise and existing LNG assets.

"K-LINE will continue to make relentless efforts and generate new values to meet the diversifying needs of our customers," added Kanamori.

JGC executive Hiroyuki Ishizaki agreed with the K-Line assessment as it was based on technical capabilities accumulated in FLNG and engineering, procurement and construction projects.

"This results in the enhancement of the customer's FLNG business since it is

potentially an optimized CAPEX solution. JGC will continue to develop FLNG technologies for open seas and nearshore," added Ishizaki.

ABU DHABI National Oil Co (Adnoc), the owner of the Das Island LNG export plant in the United Arab Emirates, said its logistics arm had signed a contract with a Chinese shipyard for two newbuild LNG carriers.

Adnoc Logistics and Services (Adnoc L&S) said the two vessels with 175,000 cubic metres capacity would join the existing fleet in 2025.

"The purchase, part of the company's broader growth and expansion strategy, further reinforces its position as the UAE's leading shipping and maritime operator," said Adnoc L&S.

"The new LNG vessels will be crucial enablers of Adnoc's 2030 growth strategy, supporting its existing LNG business as well as its ambitions to grow its LNG production capacity," the company explained.

The two carriers will be built at the Jiangnan Shipyard, located northeast of Shanghai on Changxing Island at the mouth of the Yangtze River.

Adnoc L&S has the largest and most diversified fleet of vessels within the Middle East and its trading fleet transports crude oil, refined products, dry bulk, containerised cargo, liquefied petroleum gas and LNG to global markets through its owned and chartered vessels.

"The expansion and modernisation of our LNG fleet will be a key enabler of Adnoc L&S' growth strategy. This acquisition helps future-proof our fleet with more sustainable, modern vessels capable of serving our customers for the next 25 years and deepens our partnership with Jiangnan Shipyard," explained Captain Abdulkareem Al Masabi, Chief Executive of Adnoc L&S.

Adnoc L&S currently has eight LNG carriers among its fleet of over 40 vessels.

The newbuild LNG vessels are significantly larger than the current Adnoc L&S fleet of LNG ship which each have a capacity of 137,000 cubic metres.

Lin Ou, Chairman of Jiangnan Shipyard, said the yard was proud to continue its relationship with Adnoc L&S.

"This order for large LNG carriers is another milestone in the strategic portfolio of Jiangnan shipyard. We are committed to delivering these vessels on time, with good quality and ensuring the highest possible customer satisfaction," stated Lin.

The Das Island LNG plant produces about 6 million tonnes per annum of LNG and came on stream in 1977 as the first liquefaction and production facility in the Arabian Gulf.

The plant is 70 percent owned by Adnoc and the other shareholders are Japan's Mitsui & Co with 15 percent, UK major BP with 10 percent and TotalEnergies with 5 percent.

AIR LIQUIDE, a world leader in industrial gases and owner of LNG technologies, has signed an agreement with French ship and transport firm Sogestran to ship liquid carbon-dioxide around European waterways by barge and ship for carbon capture and sequestration (CCS) projects in the European Union.

"This joint venture will strengthen Air Liquide's position in the carbon management value chain, which includes the capture, centralization, treatment, and transport to permanent CO2 sequestration sites," said Paris-based Air Liquide.

Analysts noted that Air Liquide's LNG background will be helpful. It has an LNG subsidiary and has proprietary technology in logistics, on-shore bunkering stations, service stations and boil-off management.

"CCS technologies represent one of the fundamental levers for the decarbonization of the most carbon-emitting industrial sectors," said Air Liquide.

"In this perspective, maritime transport will be essential to transport CO2 from industrial installations with high CO2 emissions, where the carbon is captured, to sequestration sites, where it will be permanently stored," it added.

Air Liquid's partner, the Sogestran Group, was founded in the Port of Le Havre in 1948 and is organized into several businesses.

Sogestran's river transport division has more than 160 barges and small vessels units operating on the EU's major rovers, the Rhône, the Seine, the Loire, the Danube and the Rhine.

Maritime transport has a 35 vessel fleet operating in Europe, the Indian Ocean, West Africa, French Guiana, Polynesia and the Pacific Ocean.

It also has a multimodal logistics subsidiary with regular container transport services in France, Belgium, Holland, Germany and Switzerland, by barges, trains and trucks.

"Combining Air Liquide's expertise in

CO2 with Sogestran's experience in high value-added transportation of goods, the joint venture will transport CO2 in its liquid form thanks to newly-designed shipping and barging solutions, invested and operated through this collaboration," stated both companies.

Emilie Mouren-Renouard, a member of the Air Liquide's board, said the company was pleased to partner with Sogestran to offer innovative solutions in the new market of large volume CO2 transportation.

"This initiative complements our carbon management technologies to support our industrial customers in their decarbonization strategies and illustrates Air Liquide's commitment to actively contribute to the emergence of a low carbon society," added Mouren-Renouard.

Pascal Girardet, Sogestran's Chief Executive, said Air Liquide and Sogestran have built a strong relationship over the past few years.

"Our teams have worked hand-in-hand to design ships and barges able to safely and efficiently transport liquid CO2," explained Girardet.

"This joint venture will be in a great position to offer the market solutions that will make a significant positive impact on the environment," he added.

ALGERIA and Italy said they had signed an agreement for the North African nation to supply more natural gas to European Union member Italy to replace falling supplies from Russia.

The natural gas supply deal followed talks in Algeria between President Abdelmadjid Tebboune of Algeria and the Italian Prime Minister Mario Draghi as well as the chief executives of the national energy companies of both countries, Sonatrach CEO Toufik Hakkar and his Eni counterpart Claudio Descalzi.

A statement said they signed a deal to increase the quantities of gas imported by Italy through the Trans-Mediterranean Pipeline.

The supply contract with Sonatrach will come into force in the third quarter of 2022.

"This agreement will allow the exploitation of the pipeline's full available transportation capacities to ensure greater supply flexibility, gradually providing increasing volumes of gas from 2022, up to 9 billion cubic metres per year in 2023-2024," they said.

Algeria and Italy added that they intended to strengthen cooperation in the energy field under an accord also signed

by the Algerian Foreign Minister Ramtane Lamamra and the Italian Foreign Minister Luigi Di Maio on behalf of their respective governments.

“The agreement between Eni and Sonatrach, whose foundations have been laid during the previous visit of Descalzi and the Italian Foreign Minister Di Maio to Algiers, was defined and signed in record time following intense negotiations between the top management of the two companies,” they added.

“This is a special day for the relations between Italy and Algeria, in particular for Eni and Sonatrach,” said Eni CEO Descalzi.

“Thanks to the close the long-standing collaboration between the two companies, it was possible in a short time and with an enormous joint effort to sign this important agreement that further consolidates the partnership between the companies and strengthens the cooperation between our countries,” they stated.

Italy, which sources about 40 percent of its natural gas imports from Russia, has been seeking to diversify its suppliers since the invasion of Ukraine.

Algeria is Italy's second-biggest gas supplier via the Trans-Med Pipeline, which has been in operation since 1983.

Italy is also a buyer of LNG volumes, along with nations like France, Spain, the UK and Turkey from the Skikda and Arzew LNG export plants on the Mediterranean Coast of the North African state.

The TransMed has a daily capacity of more than 110 million cubic metres, though according to data it currently transports less than 60 mcm.

Analysts noted that rising Algerian domestic consumption, under-investment and political instability, including the closure of a pipeline to Spain over a dispute with Morocco, have meant Algeria's natural gas exports have declined along with gas revenues.

Preliminary discussions on gas supplies took place on April 3 in the Algerian capital Algiers between Eni CEO Descalzi and Algeria's Prime Minister Aymen Benabderrahmane, Energy Minister Mohamed Arkab and Sonatrach CEO Hakkar.

The meetings were part of the initiatives to strengthen the partnership between Sonatrach and Eni.

Eni said at the time that the main issues addressed were the production of natural gas in Algeria and exports through the Trans-Med Pipeline.

The Trans-Med Pipeline linking Algeria and Tunisia to Sicily and then onwards to the Italian mainland is now Italy's quick-fix replacement for reductions in gas flows from Russia.

Algeria has been exporting less pipeline gas since it shut the Maghreb-Europe Gas Pipeline in October 2021.

That pipeline runs from the Hassi R'mel gas field through Morocco to Cordoba in Spain, one of two pipeline from Algeria to Spain.

The reasons for the Algeria-Morocco-Spain pipeline shutdown are ultimately a political split with the Moroccans over the disputed Western Sahara region and relations with Israel.

However, Algerian gas supplies are still carried from the Hassi R'Mel hub on the Medgaz pipeline via Beni Saf to Almeria in southern Spain.

ARGENTINA and Bolivia confirmed a new pipeline natural gas agreement with the Argentinians saying they would save foreign exchange reserves with the Bolivian gas and would have to buy 14 fewer LNG cargoes to meet their needs.

Argentine President Alberto Fernandez and his Bolivian counterpart Luis Arce reached a deal in talks in Buenos Aires for Bolivia to export 14 million cubic metres of natural gas per day to Argentina during the Southern Hemisphere winter season.

A joint statement said that the price of the Bolivian supplies was set at US\$12.18 per million British thermal units.

Argentina's Energy Secretary, Dario Martínez, said the Bolivian provisions would mean about 14 fewer cargoes of LNG would have to be purchased at high price and would save Argentina around US\$770 million in LNG import costs.

“This is good news for Argentina, for the Central Bank's dollar reserves and for the government's fiscal plan,” said Martínez in a statement.

Analysts note that Argentina has suffered from an ailing economy and has been unable to meet investment needs to monetize its huge shale oil and gas resources.

A Bolivian Government statement later said the provision of gas in 2021 from Bolivia to Argentina was established at 14 million cubic metres per day, in winter, and for the rest of the year at 10 million cubic metres and this would be repeated.

“The President of Bolivia Luis Arce agreed with his Argentine counterpart, Alberto Fernández, the sale of natural gas

and promised to give priority to its neighbour in case there is a greater production of natural gas on the Bolivian side,” added the statement.

“We are making an effort to maintain the levels of past gas supply to the Republic of Argentina and with additional gas that may be produced in Bolivia,” declared the Bolivian President.

Bolivia added that specific mechanisms between the Bolivian and Argentine state energy companies, Yacimientos Petrolíferos Fiscales Bolivianos and Argentina's IEASA (Integración Energética Sociedad Anónima) would benefit both countries.

“The Argentine and Bolivian presidents agreed on the importance of realising concurrent actions so that the contract of Purchase and Sale of Natural Gas between YPFB and IEASA, reflects a new régime,” added Bolivia.

“It guarantees the supply of 14 million cubic metres, giving priority to making available additional volumes in the winter period as well as waiving the rights and obligations through to 2025, whose effect will be entrusted to the responsible Ministries and departments in order to draft the corresponding documents,” it added.

“The Presidents further agreed to advance in the study of investment opportunities for YPFB in the Vaca Muerta Shale basin in Argentina, working jointly to identify the alternatives for supplying liquid fuels in order to secure the energy security of both states,” stated Bolivia.

AVENIR LNG, the Norwegian-listed small-scale LNG project developer and vessel owner, has agreed to buy out the shareholdings of its Italian partners in the small-scale LNG terminal at Port of Oristano on the Mediterranean island of Sardinia.

Avenir has now taken over the stakes of Gas and Heat and CPL Concordia in the Higas venture, the company that owns and operates the LNG facility.

Financial details of the transaction were not disclosed by the London-headquartered firm, which held 80 percent of the equity while its local partners each held a 10 percent stake.

Avenir is itself a joint venture owned by London-based Stolt-Nielsen and partners Höegh LNG and Golar LNG Ltd.

The company is listed on the over-the-counter market of the Oslo stock exchange in Norway.

The Higas terminal was the first

dedicated small-scale LNG facility in the Mediterranean and via the adjacent deep draft jetty and enabled LNG imports for Sardinia.

Utilising the terminal's LNG truck-loading bays, Higas distributes LNG via road tankers to industrial users and to gas distributors across the island.

The terminal has the capacity to load up to 8,000 LNG trucks per annum via the two truck-loading bays

“This is another important step in executing our investment strategy,” said Peter Mackey, Chief Executive of Avenir LNG.

“In addition to continuing to be a trusted and competitive LNG supplier to our customers in Sardinia, Higas will continue to promote and enhance the long-term environmental sustainability of Sardinia and Italy, and to take an increasingly prominent role in these important energy markets,” he stated.

The company's activities include building a fleet of small-scale LNG carriers.

Avenir LNG at the end of December 2021 announced it would charter one of its small-scale carriers to Shell after it is delivered from a Chinese shipyard in 2022.

Avenir said it had entered into a Time Charter Party with Shell North America for the newbuild “Avenir Achievement”.

The company has a fleet of six small-scale LNG carriers delivered or on order and ranging in capacity from of 7,500 cubic metres to 20,000 cubic metres.

BAKER HUGHES, the LNG equipment-maker and energy services company, reported an increase in first-quarter revenues to \$4.83 billion and a 70 percent jump in operating income to \$279 million while forecasting LNG final investment decisions on up to 150 million tonnes per annum of projects in the next two years.

The company, which has main offices in Houston and London, reported net income of \$72M in the quarter to the end of March 2022 versus a loss of \$452M in the same three months of 2021.

“Our first quarter results reflect operating in a very volatile market environment during the first few months of 2022,” said Lorenzo Simonelli, Baker Hughes Chairman and Chief Executive.

“On the positive side, we recorded strong orders from Turbomachinery and Process Solutions (TPS) as the LNG order cycle continues to unfold,” stated the CEO.

A photograph of an industrial facility, likely a liquefied natural gas (LNG) plant. Large, silver-colored pipes and machinery are visible. A worker in a blue uniform and white hard hat is standing on a metal walkway in the background. The scene is brightly lit, and the overall color palette is dominated by the metallic silver of the equipment and the green of the structural supports.

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The company said TPS orders totalled \$3Bln for the second consecutive quarter, driven again by strong orders in LNG.

“We believe that we are at the beginning of another constructive LNG cycle, which is being expedited by the current geopolitical situation, particularly for US LNG projects,” stated Simonelli.

“As these market dynamics play out, a number of projects should accelerate, and we now believe that 100 to 150 MTPA of LNG FIDs will be authorized over the next two years with additional FIDs becoming more likely in 2024 and 2025,” declared the CEO.

Orders in the quarter were \$3.0Bln, up \$1.6Bln year-over-year and a new quarterly record for TPS.

Simonelli said that equipment orders were up \$1.5Bln year-over-year, driven by a significant award to provide an LNG system for the first phase of US company Venture Global’s Plaquemines LNG project, located south of New Orleans on the Mississippi River in Louisiana.

Service orders in the quarter were up 8 percent year-over-year, primarily driven by growth in contractual and transactional services, partially offset by lower order volumes in upgrades.

Overall orders in the quarter were \$6.8Bln, up 3 percent versus the three months to the end of 2021, driven by Oil Field Equipment and TPS, partially offset by a decrease in Digital Solutions and OFS.

Year-over-year, revenue was up 1 percent compared with \$4.78Bln in the prior-year quarter, driven by increases in OFS and Digital Solutions, partially offset by decreases in OFE and TPS.

Adjusted operating income was \$348M, which excluded \$70M of restructuring, separation and other charges.

As regards the conflict in Ukraine, Baker Hughes said Russia represented roughly 4 percent of total company revenue in the first quarter.

“We recently announced that we have halted all new investment in the country,” said the company.

Oilfield Services revenues in the quarter amounted to \$2.5Bln, down 3 percent from the previous three months.

“International revenue was down 7 percent sequentially led by declines in the North Sea, Russia Caspian, the Middle East, and Latin America,” said Baker Hughes.

Moving to the Oilfield Equipment division, the company said that orders for the quarter were \$739M, double the

\$394M achieved in the same three months of 2021.

It added that the strong orders performance was driven by subsea production systems (SPS), supported by a large subsea tree contract in Asia, along with growth in flexibles, surface pressure control and services.

“As a reminder, we removed Subsea Drilling Systems from consolidated OFE operations when we completed the merger with MHWirth in the fourth quarter of 2021,” Baker Hughes explained.

The company concluded that revenue in the division was \$528M, down 16 percent year-over-year, primarily driven by SPS, SPC and the removal of SDS, partially offset by growth in services and flexibles.

BHP, the Anglo-Australian commodities company, and LNG plant operator Woodside Petroleum have worked out the final point for Woodside’s takeover of BHP’s oil and gas portfolio.

BHP told its shareholders that the completion of the merger was on track for June 2022, subject to satisfaction of conditions precedent including approval by Woodside shareholders.

The commodities giant said it was expected to receive 914.8 million newly issued Woodside shares at completion a dividend on Woodside shares would go to BHP shareholders.

BHP shareholders are expected to be entitled to one Woodside Share for every 5.5340 BHP shares they hold on the record date.

Based on Woodside’s share price of US\$25.55 at 6 April 2022, the implied value of BHP’s subsidiary BHP Petroleum is US\$23.4 billion.

Woodside will retain its primary listing on the Australian Securities Exchange, though the company was seeking a standard listing on the London Stock Exchange and an American Depositary Receipts (ADRs) program on the New York Stock Exchange on completion of the merger.

“A share sale facility will be in place for small BHP shareholders who elect to participate and for shareholders who are ineligible to receive Woodside Shares,” said BHP.

BHP said that all required regulatory and competition approvals have been obtained, other than the National Offshore Petroleum Titles Administrator (NOPATA) approval which is expected prior to completion.

Separate to the receipt of Woodside shares on completion, Woodside will also make a cash payment to BHP of approximately US\$830 million in relation to cash dividends paid by Woodside between the merger’s effective date of 1 July 2021 and completion.

This represents the cash dividend that would have been received by holders of the Woodside shares.

BHP in turn will make a cash payment to Woodside for the net cash flow generated by BHP Petroleum between the merger’s effective date of 1 July 2021 and completion.

From the effective date to 31 December 2021 only, this amounts to approximately US\$900M.

BLUE GRID, an Athens-based company leading the development of the LNG and alternative fuels market in southeast Europe, has joined the Molgas group of companies after receiving a significant investment.

Blue Grid, incorporated in 2017, is developing alternative fuels supply chains delivering environmental, economic, and operational benefits to a wide range of customers.

The company’s current activity focuses on supplying LNG as a fuel to three main customer segments in industry, road transport and for marine bunkering.

Blue Grid said its broader scope includes LNG, renewable methane and bioLNG.

Molgas is a leading downstream supplier of LNG in Europe, providing volumes to over 200 industrial customers, 34 LNG fuelling stations, as well as a growing number of marine customers.

The company is active in eight countries in Europe, including Norway through its fully owned subsidiary Gasnor, a company acquired from Shell in 2021.

Molgas, which has its headquarters in Madrid, is owned by funds managed by InfraVia Capital Partners, a Paris-based private equity firm specializing in infrastructure investments.

As a new part of Molgas, Blue Grid said it would focus on accelerating growth in LNG and bioLNG supply in the broader region of southeast Europe and the East Mediterranean.

“The Molgas investment comes at an opportune time, considering the imminent commissioning of the Revithoussa truck-loading terminal, anticipated for the summer of 2022, which will allow reliable and competitive

supply of LNG to final customers in the SE European region,” said Blue Grid.

The Hellenic Gas Transmission System Operator (DESFA) is the owner of the Revithoussa LNG terminal.

DESFA is also constructing a small-scale LNG reloading jetty on Revithoussa island and it is expected to be operational by the end of 2023.

Blue Grid said it aimed to be one of the first physical suppliers of LNG to marine customers in the Port of Piraeus, and to this end, is planning to have an LNG bunkering vessel available in alignment with the commissioning of the jetty.

“We are proud to have Molgas onboard, and view this investment as a vote of confidence in the work that we have been doing in the region over the past years” said Sofoklis Papanikolaou, founder and Chief Executive of Blue Grid.

Fernando Sarasola, the Chief Executive of Molgas, said that southeast European was the next frontier for small-scale LNG and alternative fuels.

“Blue Grid is perfectly positioned to capture this market. We are very excited to be joining our forces and I am confident that together we will be bringing a lot of value to a wide range of customers,” added Sarasola.

CHINESE LNG imports dropped by almost 18 percent in March to their lowest level in two years as Covid-19 shutdowns in cities such as Shanghai curbed economic and industrial activity as well as fuel demand and led to Japan overtaking China as the largest North Asian importer last month.

Shipments to China’s network of 22 terminal amounted to 4.63 million tonnes, or around 68 cargoes, a drop of 17.9 percent compared with the 5.64MT, or 82 cargoes, received in March 2021, according to data from China’s General Administration of Customs.

Japan’s LNG imports in March 2022 were 6.50MT, or 96 delivered cargoes, compared with 7.12MT in March 2021, according to the preliminary trade figures from Japan’s Ministry of Finance.

Shipments to Chinese terminals in 2021 had amounted to 78.93MT which was 18.3 percent more than in 2020.

This enabled China to be the No. 1 Asian importer as Japanese cargo numbers in 2021 dropped to 74.31MT, down 0.2 percent on 2020, and 4.62MT less than the Chinese total for last year.

The low March LNG import figure was because Chinese energy majors such as PetroChina had deliveries redirected

because of the Covid-19-induced drop in demand.

The Chinese also receive varying volumes of pipeline gas through pipeline links from the former Soviet Asian republics of Turkmenistan, Kazakhstan and Uzbekistan, as well as from Russia since December 2019 as part of Russian company Gazprom's "Power of Siberia" project.

China has increased its pipeline natural gas imports on the "Power of Siberia" pipeline from Russia to 43 million cubic metres per day, or around 15 billion cubic metres per annum.

The volumes are likely to increase as the Russians focus on China as a customer to replace the nations of the European Union who are determined to cut gas imports from the Russians over the invasion of Ukraine.

The Chinese energy industry has undergone changes since China Oil & Gas Pipeline Network Corp. (ChinaPipe) started operating as the government-created owner of the nation's pipelines and terminal assets, formerly held by the country's three state-owned energy majors.

China's oil and gas majors still import most of the nation's LNG and own and operate almost the whole network, though according to the market reforms third-party access is available at most terminals.

Chinese domestic natural gas production is also forecast to reach 221 Bcm in 2022 which will be 6 percent more than in the previous year.

China's natural gas production was 208.6 Bcm in 2021, including 23 Bcm of shale gas.

Domestic natural gas output is expected to account for 55 percent of the country's total gas supply, while imported LNG and pipeline gas will provide 30 percent and 15 percent respectively of gas needs.

China is also upgrading and expanding its LNG import terminal network.

Expansions are underway at existing terminals at Caofeidian, Putian, Qingdao, Shenzhen and Tianjin.

These expansions are expected to add around 12 MTPA of regasification capacity by 2023.

In addition, new onshore regasification terminals are under construction to add around 30 MTPA of import capacity overall at Binhai, Chaozhou, Guangzhou, Jiaxing, Longkou, Tianjin Nangang, Wenzhou, Yangjiang, Yantai and Zhangzhou by 2024.

CLEAN ENERGY Fuels Corp., the California-based producer and marketer of liquefied natural gas made from waste, said it was continuing to increase its customer base and has new production plans.

Clean Energy, which is listed on the Nasdaq global exchange, said it was continuing to encounter growing demand for its Redeem brand of LNG, which it calls RNG.

T. Boone Pickens, a well-known oilman who died in Dallas, Texas, in 2019, had the vision to invest in natural gas fuel as an alternative to diesel and gasoline for transport in 1988 and helped to take the Clean Energy company forward in the early years to where it is now.

"More fleets are finding RNG to be the most easy and cost-effective way to achieve significant carbon reductions," said Chad Lindholm, a Clean Energy senior vice president.

"As we continue to see growing demand for RNG, we're working on the production side so that more customers can turn their sustainability goals into reality," added Lindholm.

He said these included LA County Metro renewing its maintenance agreement with Clean Energy for six filling stations that will power 1,417 transit buses with an expected 137 million gallons of RNG for the length of the contract.

Another customer is California customer is Estes Express Lines, the nation's largest privately-owned freight transportation carrier.

The company is deploying an additional 100 natural gas-powered trucks that will require three million gallons of fuel in California and in Texas.

The Los Angeles County Sanitation Districts has entered into a contract with Clean Energy to construct a new public access fuelling station in Carson in California.

"The contract also includes maintenance services, and a fueling agreement for RNG," said the company.

"When the station is complete it will power regional trucks, transit buses and refuse trucks with an anticipated 10 million gallons of RNG over the contract term," it added.

Clean Energy noted that what it described as, "one of the most environmentally conscious cities in the country, Santa Monica, in California," has extended its RNG fuelling agreement with the company for an expected two

million gallons of RNG to power 200 municipal buses.

The Morongo Basin Transit Authority (MBTA) in the Yucca Valley region of California has also signed an RNG supply agreement for an anticipated 750,000 gallons to power 24 transit buses.

Clean Energy also listed other contracts with companies in other US states such as Arizona, New York state, Florida, Pennsylvania and in Canada.

Clean Energy said it was continuing to make significant investments in the production of additional RNG sources and has prominent oil and gas partner in France's TotalEnergies and BP of the UK.

"The first of these projects was Del Rio Dairy in Friona, Texas, where in late 2021 Clean Energy broke ground on construction for a digester that is anticipated to turn the manure from 7,500 milking cows into more than a million gallons of RNG a year," explained the company.

"At Millenkamp Dairy in Idaho, engineering and procurement are being finalized, and construction of the front-end manure-handling facility is underway," it added.

Construction has also started at dairy farms in Marshall Ridge, Drumgoon and Victory, located in South Dakota and Iowa.

"With more than 30,000 cows, these dairies have the estimated potential to convert the methane produced from waste into more than seven million gallons of RNG annually," stated Clean Energy.

Clean Energy had sold its upstream RNG business to BP of the UK in 2017 and signed a long-term supply agreement to continue to market the fuel.

French major TotalEnergies then became a 25 percent stockholder in Clean Energy in 2018 with a \$83.4 million investment.

COMMONWEALTH, the LNG export venture proposed for Cameron Parish in the US Gulf Coast state of Louisiana, has overhauled its management and named the former Chief Executive of Sempra's Cameron LNG project, Farhad Ahrabi, to serve as Commonwealth's new President and CEO.

Ahrabi joins Commonwealth following a seven-year tenure at Cameron during which he oversaw the development, construction and subsequent operations of a 14.5-million tonnes per annum liquefaction and export facility at Hackberry in Louisiana.

Commonwealth's plan is for an export plant consisting of six liquefaction Trains, each with a nominal production capacity of 1.4 MTPA and totalling 8.4 MTPA.

The project is also proposing to construct six LNG storage tanks, each with capacity of 50,000 cubic metres and one marine berth capable of accommodating vessels of up to 216,000 cubic metres capacity.

The liquefaction plant requires about 182 acres to construct and would occupy about 107 acres during operations.

The Commonwealth project's founder and Chairman, Paul Varello, said he was delighted to recruit Ahrabi to head the team.

"The depth of Farhad's leadership experience, both at Cameron and the preceding 28 years with BG Group, will be of immeasurable value to our team as we move through the final stages of development and into construction and operation," said Varello.

"Projects of this magnitude involve a complex convergence of technical, financial, political and community support elements that require the kind of high-level thinking and pragmatic solutions that Farhad can bring," Varello added.

Ahrabi said he was particularly attracted to the Commonwealth opportunity because of the company's engineering-focused approach.

The new CEO said that Commonwealth's advantage is that it will keep liquefaction costs low and ultra-competitive in the global market at a time when there is a growing demand for US-sourced gas.

"Commonwealth has staked its ground by securing an excellent location, developing a highly modularized approach to provide clean and affordable energy, and offering creative and flexible commercial terms," said Farhad.

"I'm humbled and excited to have the opportunity to lead the organization in delivering its promise in a way that not only serves the interests of this company, its employees, the local communities and all other stakeholders, but is part of the overall advancement of the next generation US LNG facilities," he stated.

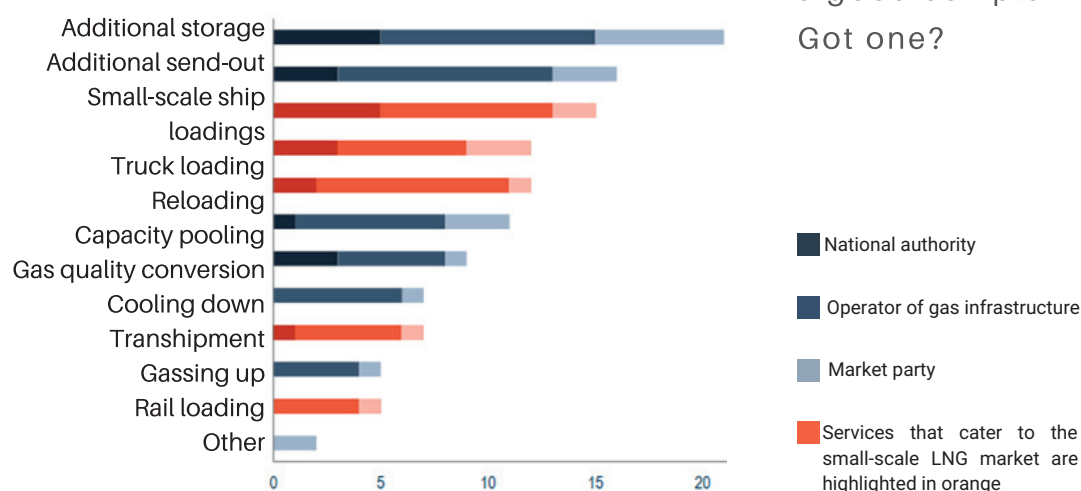
In addition to his prior roles at Cameron LNG and BG Group of the UK, Ahrabi has also served over the past two years as an Independent Director at ARC Resources Ltd, a leading Canadian energy company with a diverse asset portfolio focused on responsible energy development.

GETTING THE IT LANDSCAPE TO MAKE LNG FEEL COMFORTABLE

As LNG trading volumes and value rise, traders increasingly face the need to integrate it better into their core ETRM landscape. Higher visibility of the mark to market and mark to intent, as well as diversion decisions impact on valuation and cost are just parts of the reasons the real world needs to be better integrated into the software.

To make things more fun, LNG combines features of both flow and bulk commodities throughout its lifecycle, so any integration needs to take this into account and reconcile the complexities of both. Capturing the unload-to-regasification processes can be a particularly complex scenario, although there is an increasing move toward bundle pricing. This, however, is compensated by the market need for flexibility in service offerings and enabling services like transshipment, storage, and reloading. Reloads have become increasingly popular in the last years and a study on gas market upgrading and modernization presented in the Madrid Forum 2019 shows the key terminal flexibility factors that make them attractive (Van Nuffel, L. 2019. Study on gas market upgrading and modernisation – Regulatory framework for LNG terminals Preliminary findings, p. 4. Madrid Forum. Trinomics).

Service offerings designated important determinants of terminal attractiveness



Overall, integration into an ETRM landscape poses several key challenges:

- **Capturing the cost complexity of the unload to regasification steps** – there is a different pricing logic between terminals and between the different steps in the process – e.g. unloading may be per unit, but storage per the maximum used capacity in a day.
- **Modelling correctly the mark to intent value and the implied optionality in a market situation** where Europe competes with Asia for LNG shipments. This is not a new or an LNG specific problem, but historically it has been under-addressed.
- **Modelling correctly the state transitions from a liquid into a gas** with the accompanying losses and lead time to get the gas into the pipelines. UoM and currency conversions are among the known challenges, but some gas systems have the additional complexity of an implied MWh to cm conversion resulting in MWh GCV and MWh NCV measures and prices which provides a proper headache while comprehending.

The list is not exhaustive but contains in our view the key deal breakers when modelling LNG and integrating it with the more special-purpose systems around it.

To address those, market players need a reliable implementation and integration partner. ROITI aspires to be such and after we have solved gas in Europe, we are looking for a good complex LNG problem to solve.

Got one?

Ahrabi holds a PhD in Reservoir Engineering from the University of Exeter (England) and a Bachelor of Science degree in Chemical Engineering from the University of Wales.

Commonwealth said its remaining pre-final investment decision activities were underway for a projected start of construction in 2023.

The project is expected to have an accelerated schedule that will allow building to be completed in three years using a predominantly modular approach for a projected start of commercial operations in 2026.

EGYPT signed an agreement to increase natural gas production and LNG exports from its two liquefaction plants east of Alexandria to European customers and specifically Italy.

The accord was signed between Egyptian Natural Gas Holding Company (EGAS) Chairman Magdy Galal and the Chief Operation Officer for resources at Italian energy company ENI, Guido Brusco.

“The parties agreed to valorize Egyptian gas reserves by increasing jointly operated gas activities and identifying opportunities to maximize short-term gas production,” said Milan-based Eni.

“Eni will also optimize the exploration campaigns in existing blocks and in the newly acquired acreage in the Nile Delta, Eastern Mediterranean and Western Desert regions,” explained Eni.

“This agreement, together with the one signed for the restart of Damietta liquefaction plant last year, will provide LNG cargoes for overall volumes of up to 3 billion cubic metres in 2022 for Eni’s LNG portfolio bound to Europe and Italy,” added the statement.

Eni was at the forefront of natural gas discoveries offshore Egypt and enabled the restart of LNG exports.

With its prolific natural gas fields, including Zohr and Nooros in the East Mediterranean and the Nile Delta respectively, Egypt has regained its capacity to meet domestic gas demand and to allocate surplus production for export through its LNG plants.

Following the agreements signed by Eni, Egyptian General Petroleum Corp. and EGAS and Spanish utility Naturgy, the Damietta liquefaction plant, which has 5 million tonnes per annum of capacity and had been idle since the end of 2012, re-started just over a year ago in February 2021.

According to new agreements the resulting shareholdings in the SEGAS holding company, the owner of the Damietta plant, are Eni with 50 percent, EGAS with 40 percent and EGPC with 10 percent.

The second Egyptian plant, the Idku LNG facility, has 7.2 MTPA of capacity from two Trains and is operated by Shell. The other shareholders in the plant are Damietta shareholders EGAS and EGPC.

Eni noted that it had been awarded five new exploration blocks in Egypt with plans to produce natural gas for both the domestic market and LNG exports.

The blocks, which cover about 8,410 square kilometres, were awarded by the Energy Ministry in Cairo under its 2021 international licensing round.

EQUINOR, the Norwegian oil and gas company whose Hammerfest LNG plant is scheduled to resume production in mid-May, has made a new natural gas and oil discovery in the North Sea.

State-owned Equinor is the operator of production licence 293 B close to the Troll and Fram area where the find was made.

“Based on preliminary estimates the size of the discovery is between 4 and 8 million standard cubic metres of recoverable oil equivalent, or 25-50 million barrels of recoverable oil equivalent,” said the company.

Temporarily called Kveikje, this is the sixth discovery in this area since the third quarter of 2019.

“Up to more than 300 million barrels of oil equivalent were proven in the five former discoveries,” said Equinor.

The discovery comes as the Hammerfest LNG plant is scheduled to come back on stream following repairs from a fire in September 2020 and will provide more than 6 billion cubic metres of gas per year from the Barents Sea to European customers.

“We are very pleased to make another discovery in this area that we regard to be commercial,” said Lill H. Brusdal, Equinor’s vice president for the Troll area’s exploration and production.

“As we did with the other discoveries in this area, we will consider tying this discovery to the Troll B or C platform,” added Brusdal.

“By utilising the existing infrastructure, we will be able to recover these volumes at a low cost and with low emissions,” she stated.

“There were several drilling targets in the exploration well. After Kveikje was discovered, drilling continued to the next

target in the upper part of the Cretaceous stratigraphic sequence,” said Equinor.

The well was drilled by “Deepsea Stavanger” and the latest plans are for Equinor to drill another exploration well in this area this year.

The licence owners are Equinor (51 percent), Norwegian firm DNO AS (29 percent), Japan’s Idemitsu (10 percent) and London-listed Longboat Energy (10 percent).

Equinor’s exploration strategy is to explore for volumes in mature areas, where discoveries can be tied into existing infrastructure to maximise the value of investments.

“We will drill between 20 and 30 exploration wells each year moving forward,” said the company.

“Around 80 percent of the exploration wells will be drilled in familiar areas near existing infrastructure, but certain new areas and ideas will be tested,” said the Stavanger-based company.

EXCELERATE Energy, the US LNG specialist and a market leader in floating storage and regasification units (FSRUs), saw its shares increase by 11.8 percent in its trading debut after raising \$384 million in the biggest US initial public offering since January 2022.

Shares in Excelerate closed on the first day on April 13 at \$26.85 per share, giving the company a market value of about \$2.8 billion based on the outstanding shares listed.

Excelerate shares are now quoted on the New York Stock Exchange under the ticker symbol “EE”.

Excelerate sold 16 million shares at the top of a marketed range of \$21 to \$24 per share in its IPO.

The share sale came at a time when FLNG project interest is increasing worldwide as nations try to underpin their energy security with fast-track import projects.

The company has pioneered over a dozen import ventures worldwide and has also led the way in ship-to-ship LNG transfers.

Excelerate, based in The Woodlands in Houston in Texas, is part of a privately held US energy group founded by George Kaiser, owner of the Bank of Oklahoma. Kaiser will continue to control the majority of the shares.

Excelerate developed the Bahia Blanca GasPort, South America’s first LNG import terminal in 2008, and has also operated GNL Escobar, an LNG import

terminal along the Paraná River of Argentina, since 2011.

The business spans the globe, with regional offices in eight countries and operations in the US, Brazil, Argentina, Israel, United Arab Emirates, Pakistan and Bangladesh.

The Excelerate prospectus for the IPO informed potential shareholders that it was the largest provider of regasified LNG in Argentina and Bangladesh and one of the largest providers of regasified LNG in Brazil and Pakistan, while also operating the biggest FSRU in Brazil.

The Excelerate company has additionally started FSRU-led import ventures in the US and the Middle East.

Excelerate had net income of \$41 million and revenue of \$889M in 2021 compared with \$33M of profits and \$431M in revenues in the previous year.

FINLAND has drawn up plans to charter a liquefied natural gas floating storage and regasification unit (FSRU) in cooperation with its fellow European Union and Baltic Sea regional neighbour Estonia.

The Helsinki government said its Ministerial Committee on Economic Policy had recommended that Finland charter a large FSRU to enable both Finland and Estonia to become independent of Russian pipeline natural gas.

“As a result of the war in Ukraine, we must also be prepared for gas imports to stop,” said Finland’s Minister of Economic Affairs Mika Lintilä.

“A floating LNG terminal is an effective way to secure the gas supply for our industry. I would like to thank the Estonian government for the seamless cooperation,” added Lintilä.

Finland currently has two operating small-scale import terminals at the ports of Pori and Tornio.

The Baltic states of Lithuania, Estonia and Latvia have only one import terminal between them at the Lithuanian port of Klaipeda in the form of the 170,000 cubic metres capacity FSRU “Independence”, delivered in 2014 by Norway’s Høegh LNG.

“The Ministry of Economic Affairs and Employment, in cooperation with the Ministry of Finance and the Estonian ministry responsible for energy issues, will continue to prepare the charter of an LNG terminal ship and will shortly submit the proposal to the Ministerial Committee on Economic Policy for its

decision,” explained Finland in its statement.

Finland’s Ministry of Finance said it would task the gas transmission operator Gasgrid Finland Oy with assessing and negotiating, in cooperation with the Estonian transmission network company Elering AS, the terms for the charter of the FSRU.

“The only way to become quickly independent of Russian pipeline gas is to charter a large LNG terminal ship which would be located on the coast of Finland in the immediate vicinity of the natural gas transmission networks,” added the statement.

“In cooperation with the Ministry of Finance, the Ministry of Economic Affairs and Employment requested at the end of March that Gasgrid Finland investigate the procurement of such a vessel,” it explained.

The Estonian ministry offered cooperation to the Finnish government because of the plans to build a port suitable for an LNG terminal in Paldiski in Estonia.

“The aim is to implement the project extremely quickly. Negotiations on the ship are ongoing in cooperation between Gasgrid Finland Oy and Elering AS,” said the Finnish government.

“It is important that the ship would be available for use next winter with as much certainty as possible. It would be placed in Paldiski next winter if the port construction work in Finland has not been done by that time,” it added.

The majority of the ownership and voting rights of the company operating the LNG terminal ship will remain with Gasgrid Finland Oy or the State of Finland.

FLUXYS, the Belgian gas grid and LNG terminal owner, reported annual increased consolidated turnover of €573.2 million (\$638.3M) and more shipping traffic and truck-loadings as expansion plans progressed.

The company, whose activities are regulated by the Belgian government’s energy authorities, said turnover was higher than the €560.6M posted in 2020 and the net income of Fluxys for the year edged higher to €75.5M compared with €73.2M in the previous year.

Fluxys reported that even before the Ukraine crisis there had been shifts in natural gas import flows into Europe in late 2021.

“This meant that there was high demand in both Germany and the

Netherlands for supply flows from Belgium,” said the company.

“Our grid smoothly ensured high throughputs to our neighbours, reaffirming once again its role as an energy hub for northwest Europe,” it added.

The company said there were more LNG cargoes handled at the more Zeebrugge LNG terminal and more LNG trailer-trucks were loaded with the fuel.

Fluxys said that in total 181 ships docked at the terminal, breaking the previous record of 172 in 2020. During 2021, the month of May was the busiest for marine LNG at Zeebrugge with 26 ships docking.

The earnings report added that there had been particularly strong growth over past three years in LNG truck-loading with the number of loading operations doubling to 6,635.

Fluxys said LNG truck loading was among its expansion plans for 2022 and four new loading bays were under construction.

“Given current volumes of traffic, the existing truck-loading stations are gradually approaching their maximum capacity,” said Fluxys.

“Moreover, there is considerable market interest in booking even more loading slots in the future. Therefore, four additional truck loading stations are being built at the terminal,” it added.

Fluxys also launched a bio-LNG service for gas made from waste and around a 100 trucks and two bunker vessels were loaded with the fuel in 2021.

“In consultation with the market and federal energy regulator we have developed a regulated service package for bio-LNG,” said Fluxys.

“The service range is attracting considerable interest, with 60 percent of the bio-LNG capacity for 2022 being sold in a first subscription window,” it added.

In its financial outlook Fluxys noted that under the tariff methodology, the net profit from Belgian regulated activities is determined based on various regulatory parameters.

Fluxys said it was also extremely difficult at this time to anticipate the economic impact of the conflict in Ukraine.

“In light of the current understanding of the situation, the essential nature of the company’s activities and its regulatory framework, at present we do not anticipate the war and the current resulting measures and market developments having a significant

negative impact on the consolidated result of the Fluxys Belgium group in 2022,” it stated.

Fluxys in March 2022 jointly acquired the Quintero LNG import terminal in the South American nation of Chile with the investment firm EIG Global Energy Partners.

Fluxys and EIG purchased 80 percent of the equity in Chilean terminal company, GNL Quintero SA.

The sellers were Spanish LNG gas grid and LNG terminal owner Enagás and the Toronto-based Canadian fund OMERS Infrastructure.

Enagás said the off-loading of GNL Quintero in the Valparaíso region of Chile, was part of its strategic development plan.

The Spanish utility said it received about €600 million (\$659M) for its 45.4 percent shareholding in the Chilean company.

GTT, the French designer of maritime liquefied natural gas storage and fuel tanks, has received another order from the Chinese Jiangnan shipyard as its business in China gathers pace.

GTT said the latest order was for the cargo containment and cargo handling systems design for two large capacity LNG carriers.

As part of this order, GTT said it would provide the design and associated engineering services for the vessel’s tanks, which will each offer a capacity of 175,000 cubic metres.

The tanks will be fitted with the GTT Mark III Flex membrane containment system, a technology developed by GTT.

GTT added that the two vessels were scheduled for delivery in the first and second quarters of 2025.

“We are very pleased to accompany Jiangnan in a new phase of our collaboration, as these vessels are the first large LNG carriers to be built by Jiangnan shipyard,” said Philippe Berterotière, Chairman and Chief Executive of GTT.

“We will do whatever it takes to make this cooperation a great success,” added the CEO.

The Jiangnan shipbuilding business is one of China’s larger shipyard facilities and is located northeast of Shanghai on Changxing Island at the mouth of the Yangtze River.

In mid-March 2022, GTT received an order from the Jiangnan shipyard for tank designs for four very large LNG-powered containerships on order for the

leading Asian shipping company, Pacific International Lines.

Each vessel will be able to carry 14,000 20-foot equivalent units (TUE) containers and are scheduled to be delivered from the Chinese yard progressively from the second-half of 2024 through to the first half of 2025.

The LNG fuel tank of each vessel will offer a capacity of 13,800 cubic metres and will be fitted with the Mark III membrane containment system.

The tanks will also include unique features to facilitate a potential conversion of these vessels to ammonia fuel in the future.

In addition to the engineering services and on-site technical assistance, GTT explained that it would assist PIL through every step of their first LNG-fuelled project.

GTT said this would include commissioning of the LNG tanks, first LNG bunkering operations, as well as further specific LNG operations and maintenance of the vessels.

JERA Co. Inc, Japan’s largest buyer of liquefied natural gas, has decided to resume operations in mid-April at the 47-year-old Sodegaura Thermal Power Station Unit 1, which uses regasified LNG and had been under a long-term planned shutdown process.

The 600 megawatts gas-fired power plant in Chiba Prefecture has been in operation since 1974.

JERA said the unit had “deteriorated over time” and its utilization rate had declined.

The company had also tried to sell its electricity to an electricity retailer through the power generation facility bulletin board run by the Organization for Cross-regional Coordination of Transmission Operators in Japan.

“However, because no applications were received and no contract was signed, the Unit has been in a long-term planned shutdown,” explained JERA.

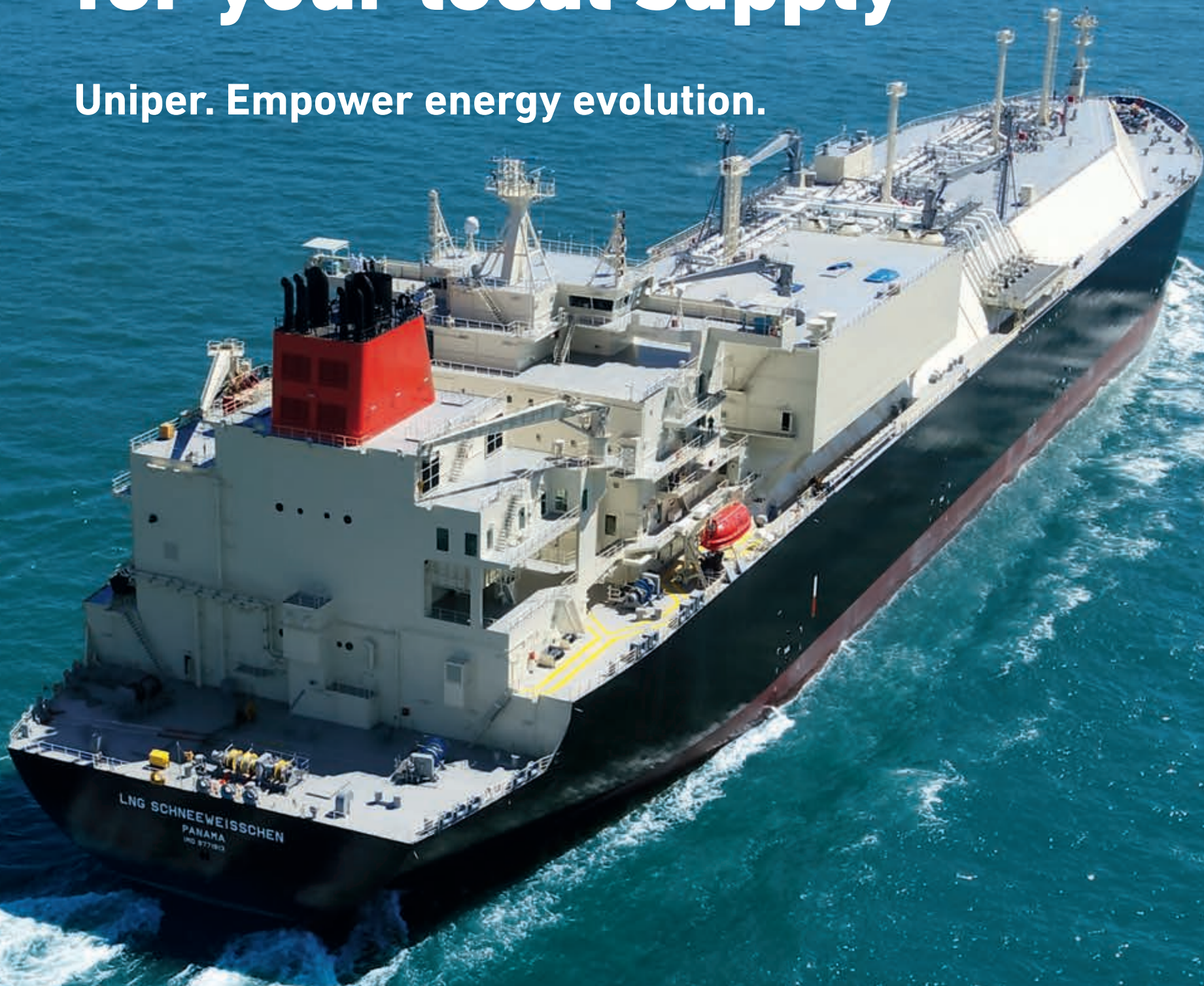
The move to halt the shutdown process at the Sodegaura plant comes amid possible rising needs for power in Japan amid geopolitical uncertainty for energy security.

JERA is the largest corporate LNG buyer in the world with annual volumes of around 35 million tonnes and controls a fleet of 20 LNG carriers.

Additionally, it is Japan’s biggest fossil-fuel generator being owned jointly by Tokyo Electric Power Co. and Chubu Electric, the two largest power companies.

Our global energy for your local supply

Uniper. Empower energy evolution.



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The company currently operates and provides fuel for a total of 26 power plants in Japan and imports LNG into 11 of Japan's network of 37 terminals.

"In response to the tight power supply caused by factors such as the earthquake that occurred off the coast of Fukushima Prefecture on 16 March this year, JERA has, in order to ensure a stable power supply, been working to prepare to quickly resume operations at the Unit given its potential for use," said JERA.

JERA added that it recently received a proposal from an electricity retailer to supply it with electricity, and discussions led to an agreement, so JERA has lifted the Unit's long-term planned shutdown and will operate it from mid-April 2022 to mid-September this year.

"JERA will move forward to restore the Unit from its long-term planned shutdown and will make every effort, in cooperation with related parties, to ensure a stable supply of energy," said the company.

KINDER MORGAN Inc., the US pipeline giant transporting natural gas to LNG plants and to customers around America, reported a boost in demand from liquefaction plants and outlined progress on more Permian Basin natural gas for the Gulf Coast and on a greener gas supply plan.

That's as the Houston-based company saw net income more than halve to \$667 million compared with the \$1.41 billion logged in the first quarter of 2021 because of a major weather event in the prior-year period that favoured revenues.

KMI also reported a plunge in distributable cash flow (DCF) when compared with that period to \$1.45Bln compared with \$2.33Bln in the first quarter of 2021.

"While these both represent a decrease from the first quarter of 2021, those 2021 results were positively impacted by the non-recurring earnings achieved during Winter Storm Uri," said KMI President Kim Dang.

The February 13-17, 2021 North American winter storm was an ice and weather event that impacted electric power supplies and boosted natural gas needs across the United States and the region and particularly in Texas.

"Excluding Uri-related earnings from our 2021 results, earnings per share for the quarter were up 17 percent and DCF per share was up 16 percent as compared to the first quarter of 2021," Dang explained.

Dang said that natural gas transport volumes were up 2 percent at the start of 2022 compared with the first quarter of 2021, with increases on Kinder Morgan Louisiana Pipeline (KMLP), Natural Gas Pipeline of America (NGPL) and Tennessee Gas Pipeline (TGP) due to increased deliveries to LNG customers and from the new Stagecoach assets in the US Northeast.

"These were partially offset by lower contributions from El Paso Natural Gas (EPNG) and Colorado Interstate Pipeline (CIG)," she added.

"Natural gas gathering volumes were up 12 percent from the first quarter of 2021 with higher volumes primarily on KinderHawk," said Dang.

KMI Executive Chairman Richard D. Kinder said he believed the company was off to a great start in 2022.

"We continue to live within our cash flow, have reduced our debt by more than \$11Bln since 2015, and plan for this year to be the fifth consecutive year of increased dividends," stated the Chairman.

"During 2022 we expect to once again fund our expansion capital opportunities internally, meet or exceed our debt metric goal and return excess cash to our shareholders through a dividend increase and opportunistic share repurchases," he explained.

Chief Executive Steve Kean said KMI continued to see growth in its base natural gas business as more customers sought to take advantage of the extensive firm transport and storage services offered.

"Our Stagecoach acquisition is fully integrated with our commercial and physical operations, producing the commercial opportunities we expected, and exceeding the acquisition model," said Kean.

KMI expanded in the US Northeast in June 2021 with the \$1.22Bln purchase of the Stagecoach natural gas pipeline and storage system from a joint venture between Crestwood Equity Partners and Consolidated Edison.

The Stagecoach system consists of 185 miles of pipeline with multiple interconnects to major interstate natural gas pipelines, including Tennessee Gas Pipeline, the KMI subsidiary.

It also included four natural gas storage facilities with a total working gas capacity of 41 billion cubic feet.

KMI reported among the first-quarter highlights that due to the increasing need for additional gas takeaway from the

Permian Basin, the company was in discussions regarding primarily compression expansion opportunities.

This could begin as early as the fourth quarter of 2023 on both the Permian Highway Pipeline and Gulf Coast Express Pipeline.

"Combined, these projects would add more than 1 billion cubic feet per day of additional takeaway capacity to the US Gulf Coast," KMI explained.

KMI also announced its participation in April 2022 in a project led by US LNG exporter Cheniere Energy to improve the overall understanding of greenhouse gas emissions and further the deployment of advanced monitoring technologies and protocols.

Additionally in March, Tennessee Gas Pipeline filed with the Federal Energy Regulatory Commission changes to its proposal to implement a responsibly sourced natural gas (RSG) supply aggregation pooling service at several locations across the Tennessee GP system.

These changes addressed concerns posed by certain shippers and resulted in the withdrawal of their protests.

"The proposed service is designed to enable suppliers and customers on TGP to purchase and sell RSG supply at non-physical trading locations, ultimately serving utilities, power plants and LNG facilities connected to the TGP system," explained KMI.

"Producers who have already obtained RSG certifications from qualified third-party organizations are anticipated to supply the RSG for the proposed pooling service, and the supply is expected to grow," added KMI.

"Pending regulatory approval from the FERC, this service is expected to be available from May 1, 2022," it stated.

KMI also reported that the Ruby Pipeline, a joint venture between KMI and Canadian company Pembina Pipeline Corp. that owns a natural gas pipeline extending from Wyoming to Oregon, filed to reorganize under Chapter 11 bankruptcy laws in response to a debt repayment obligation.

KMI continues to operate the Ruby pipeline, though the timing and outcome of the reorganization are currently uncertain.

"KMI previously wrote off its investment in Ruby, and our financial outlook does not assume any capital contribution to or equity earnings contribution from the asset," it added.

NEW FORTRESS Energy has filed applications with three US regulatory agencies to deploy its "Fast LNG" production system in the US Gulf of Mexico offshore Louisiana with start-up planned by 2023.

NFE said it applied to the US Maritime Administration, the US Coast Guard and US Department of Energy for all necessary permits and regulatory approvals to site, construct and operate a new LNG liquefaction and export plant off the coast of Louisiana.

The initial NFE system would have a capacity for exporting around 145 billion cubic feet of natural gas per annum, the equivalent of about 2.8 million tonnes a year of LNG.

The "Fast LNG" project will be located in Federal waters about 16 miles (26 kilometres) off the southeast coast of Grand Isle, Louisiana, and will access abundant US gas supply by leveraging existing infrastructure.

"Procurement of all long-lead materials is complete and modular assembly of equipment is underway," said NFE.

"Subject to the receipt of all required permits and approvals, NFE targets beginning operations in the first quarter of 2023," it added.

The NFE "Fast LNG" design pairs modular, midsize liquefaction technology with jack-up rigs or similar floating infrastructure to enable a much lower cost and faster deployment schedule than floating liquefaction vessels.

Under the NFE system, a permanently moored floating storage units (FSUs) can serve as an LNG storage facility alongside floating liquefaction infrastructure, which can be deployed anywhere where there is abundant or stranded natural gas.

New York-based NFE has so far concentrated on being a supplier of LNG for power to Latin America and Asia and arranging imports in nations such as Mexico, Nicaragua and Brazil and also has a venture pending in Sri Lanka in West Asia.

However, since the start of 2022 it has started arranging the development of "Fast LNG" projects.

"This announcement demonstrates the flexibility, efficiency and significance of our innovative Fast LNG solution to bring more affordable, reliable and cleaner fuels to customers around the world," said Wes Edens, Chairman and Chief Executive of NFE.

“This is a big step in the growth of our ‘Fast LNG’ portfolio, which will include both tolling liquefaction for high credit worthy partners like ENI (Italian major) as well as market volumes from our merchant assets like these,” explained Edens.

“With rapid deployment, this project can play a significant role in supporting our nation’s commitment to our European allies and their energy security as well as support our efforts to reduce emissions and energy poverty around the world,” stated the CEO.

NFE concluded that with the recent moves by the US and the European Commission to ensure additional LNG volumes for the European Union, LNG production off the coast of Louisiana can support the EU’s goal to end its dependence on Russian fossil fuels.

NFE has already made moves to deploy its “Fast LNG” system offshore the West African nations of Mauritania and the Republic of Congo.

NNE signed an accord at the start of March 2022 with a subsidiary of Italy’s oil and gas Eni in the Congo for the “Fast LNG” solution off coast of the for a period of 20 years.

NFE said it would set up its “Fast LNG” facility to produce up to 1.4 MTPA in the associated gas fields off the Congo.

The deal in the form of a preliminary Heads of Agreement provides a framework for negotiating a long-term tolling agreement between NFE and Eni.

NFE said that this would be for the full capacity of the facility and for the purchase by NFE of around 1.2 million gallons of LNG per day pursuant to a 20-year free-on-board (FOB) sales and purchase agreement.

The Congo associated gas project from oil production was expected to start in the second quarter of 2023.

NEXTDECADE Corp., the developer of the Rio Grande LNG export project on the Brownsville Ship Channel, has signed its second cargo supply accord in a month with a Chinese company.

NextDecade signed a 20-year Sale and Purchase Agreement with the Singapore trading arm of ENN Group of China after previously signing a binding Heads of Agreement with China’s Guangdong Energy Group Natural Gas Co., for the supply of LNG cargoes, also for a 20-year term.

The Houston-based company has ultimate plans and permits to produce up to 27 million tonnes per annum of LNG

from five liquefaction Trains at the Rio Grande facility.

Under the SPA with ENN, the Chinese company will purchase 1.5 MTPA of LNG indexed to Henry Hub on a free-on-board basis.

The LNG supply will be from the first two Trains at Rio Grande with the first Train expected to start commercial operations as early as 2026.

NextDecade said at the end of March 2022 that it proposed to supply Guangdong Energy with up to 1.5 MTPA of LNG, also indexed to the US benchmark natural gas price.

“We are pleased to announce this long-term LNG SPA with ENN, a premier Chinese energy company,” said Matt Schatzman, NextDecade’s Chairman and Chief Executive.

“As one of China’s largest private companies, ENN is a major participant in China’s energy market, and we look forward to a successful, long-term relationship with ENN,” added Schatzman.

Zheng Hongtao, President of ENN Natural Gas Co., said, the agreement with NextDecade secured additional volumes for the company’s growing LNG portfolio.

“The signing of this SPA reflects ENN’s goal of promoting the global energy transition and is of significance given RGLNG’s low greenhouse-gas emissions profile relative to other LNG supply sources,” added Zheng.

NextDecade said that assuming the achievement of further LNG contracting and financing, the company anticipated making a positive final investment decision on a minimum of two Trains at Rio Grande LNG in the second half of 2022.

The FIDs on the remaining three Trains with permits already awarded would follow thereafter.

The \$15.8 billion Rio Grande project has been delayed several times since 2020 and was originally expected to start producing LNG in 2023.

NextDecade had extended pricing in the construction contract with US LNG engineer Bechtel Inc. and extended the validity until July 31, 2022.

The Rio Grande project has signed a lease agreement with the Brownsville Navigation District of Cameron County in Texas for around 984 acres of land for the plant construction.

However, the start-date of the lease had to be extended into May 2022 and a further, longer extension may be required.

NextDecade additionally signed an agreement in April 2021 with Mitsubishi Heavy Industries of Japan to install post-combustion, carbon-capture technology at the Brownsville plant.

Next Decade and MHI have signed an engineering services agreement for the design, license and performance guarantee of the KM CDR Process.

OSAKA GAS, the Japanese utility and one of the nation’s top six LNG importers, said its engineering subsidiary was awarded a contract for the large expansion project at the Tai-Chung LNG import terminal in Taiwan.

The utility said the Daigas Gas and Power Solutions (DGPS), a fully-owned unit of Osaka gas, was awarded the front-end engineering and design and technical consulting contract for the Phase-4 Expansion of Tai-Chung LNG, owned and operated by the Taiwanese energy company CPC Corp.

Taiwan is still Asia’s fifth-largest LNG importer after North Asia’s top three of Japan, China and South Korea and with India in fourth place.

It has two existing terminal, Tai-Chung completed in built in 2009 and the earlier Yung-An facility in operation since 1990.

The Taiwanese are also constructing a third LNG terminal to meet increasing demand after imports rose 6 percent last year to 17.75 million tonnes.

“The Taiwanese government has been pursuing an energy policy which targets nuclear power phase-out and reduction of greenhouse gas emission,” said Osaka Gas’s DGPS.

“Under this energy policy, the government is planning to increase the share of natural gas in power generation to 50 percent by 2025 and CPC is expanding its LNG regasification and storage capacity in tandem with the plan,” it added.

The Phase-4 expansion includes building four LNG storage tanks each with 180,000 cubic metres of storage capacity, regasification facilities and a jetty for LNG tankers.

“After the completion of this project scheduled in 2029, LNG handling capacity of Tai-Chung LNG Receiving Terminal will increase to 13 million tonnes per annum,” said the utility

Among Taiwan’s current suppliers are QatarEnergy and Cheniere Energy in the US.

The first phase of the new Taoyuan terminal construction should be

completed by 2023 and a second expansion has already been proposed.

Osaka Gas and its engineering unit are part of the Daigas Group. The utility has three regasification terminals, two at Senboku, constructed in 1972 and 1977 respectively and with combined storage of around 800,000 cubic metres.

The utility also operates the Himeji regasification terminal, in operation since 1984 and with the same capacities as both Senboku facilities.

Another Japanese engineering company, JGC Holdings Corp, is taking part in the project as part of consortium that includes leading Taiwanese construction firm RSEA Engineering Corp. The group is providing eight LNG vaporizers and associated facilities.

This is a lump-sum contract for around 60 billion yen (\$65.7 million), with the JGC portion being nearly 34Bln yen. Delivery is scheduled for 2024.

SANTOS, the Australian LNG producer with plant and project stakes in Queensland and in the Northern Territory as well as in Papua New Guinea, reported a jump in LNG sales revenues to US\$1.116 billion from US\$427 million in the same three months of 2021.

Santos said that first-quarter sales revenues were a record and were 25 percent higher, reflecting the benefits of the merger with PNG-based Oil Search as well as higher natural gas, LNG and oil prices.

Overall sales revenues came to US\$1.916Bln versus US\$964M in the prior-year quarter.

Average realised LNG prices more than doubled to US\$13.77 per million British thermal units from US\$6.12 in the first quarter of 2021.

Santos said that 13 of the LNG shipments it sold in the first quarter from liquefaction plants were at the elevated Japan-Korea Marker price for spot cargoes.

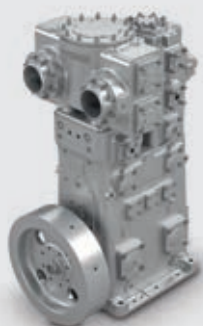
The company said 25 cargoes were shipped from the Gladstone coalseam-gas-to-LNG plant in Queensland and 74 CSG wells were drilled and 45 were connected across the GLNG acreage in the first quarter.

A further 28 cargoes were also shipped in the quarter from the ExxonMobil-operated PNG export plant.

The Santos interest in PNG LNG increased to 42.5 percent in December 2021 following completion of the Oil Search merger.

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The Papua LNG project to expand output at the liquefaction facility at Caution Bay northwest of Port Moresby continued to progress on the technical, commercial, regulatory and social fronts.

The P'nyang Gas Agreement was successfully executed between the PRL3 joint venture partners and the Government of PNG at the end of February 2022.

"This agreement provides a framework for the future development of the P'nyang project," said Santos.

Fewer LNG cargoes were shipped from the Darwin plant with seven lifted compared with 11 in the previous quarter at the end of 2021.

That was because Bayu-Undan gas field production was lower than the prior quarter due to the expected natural field decline.

"The field is expected to continue to decline through 2022 and production is anticipated to cease in late 2022," noted Santos.

The Adelaide-based company reported that the Barossa natural gas project in the Timor Sea offshore northwest Australia to replace Bayu-Undan volumes was 33 percent completed and on schedule and on budget.

The Barossa feed gas will help prolong the life-span of the Darwin LNG plant which was sold to Santos by ConocoPhillips.

In the Cooper Basin of south-central Australia, domestic production was slightly lower than the previous quarter due to natural field decline and weather impacts from increased rainfall causing delays to the development programme.

"Oil production was 6 percent higher than the previous quarter due to new wells in the Limestone Creek area and an improvement in downtime," added Santos.

"Twelve gas wells were drilled and five connected across the Cooper Basin in the first quarter. The well count was lower than plan due to the significant rainfall events," it explained.

In other projects Santos said that the Moomba carbon-capture and storage (CCS) project was 14 percent complete and progressing towards first injections of carbon-dioxide in 2024.

Santos Chief Executive Kevin Gallagher said the company delivered record production, sales revenue and free cash flow in the first quarter, demonstrating the strong performance of the base business and strategic benefits of the diverse portfolio.

"Strong production combined with higher commodity prices delivered record quarterly free cash flow of US\$865M, an increase of 186 percent from the corresponding period last year," explained the CEO.

"By designing our portfolio to provide strong cash flows throughout the commodity price cycle, our disciplined, low-cost operating model has positioned us to take full advantage of the increase in commodity prices," he stated.

SEMPRA Infrastructure, the liquefaction and LNG export affiliate of California utility Sempra, has signed an agreement with French and Japanese partners to develop the expansion project of the Cameron LNG export plant in Hackberry in Louisiana.

The heads of agreement have been signed with Japanese trading house Mitsui & Co., French oil and gas major TotalEnergies, and Japan LNG Investment, a joint venture comprising Mitsubishi Corp. and Nippon Yusen Kabushiki Kaisha (NYK Line), the shipping company.

"We are excited to continue advancing Cameron LNG Phase 2 with our partners," said Justin Bird, Chief Executive of Sempra Infrastructure.

"The announcement represents the shared focus of the Cameron LNG partners to increase the supply of cleaner US natural gas to global markets, while also facilitating the energy security of our allies," added Bird.

The HOA provides the commercial framework for the expansion of the Cameron LNG facility by adding a fourth liquefaction Train and increasing the production capacity of the existing three Trains through debottlenecking.

The expansion project is slightly reduced in capacity. Instead of the authorized two Trains at 4.98 MTPA each, Sempra has opted for one Train with over 6 MTPA of output.

The Cameron facility has three operating trains with a nameplate capacity 13.5 MTPA.

Under the deal, Sempra Infrastructure will be allocated 50.2 percent of the projected fourth Train production capacity and 25 percent of projected debottlenecking capacity under tolling agreements, with the remaining capacity being allocated equally to the existing Cameron LNG Phase 1 customers.

"Sempra Infrastructure plans to sell the LNG corresponding to its capacity under long-term sale and purchase

agreements prior to taking a final investment decision," it stated.

Additionally, Sempra Infrastructure announced that Cameron LNG had awarded two front-end engineering and design (FEED) contracts to Bechtel Energy Inc. and a joint venture between an affiliate of JGC Corp. of Japan and US construction firm Zachry Industrial Inc.

"At the conclusion of this competitive FEED process, one contractor is expected to be selected to be the engineering, procurement and construction (EPC) contractor for the project," explained Sempra.

The proposed Cameron LNG Phase 2 project will include a single LNG Train with a maximum production capacity of 6.75 MTPA of LNG.

"The project is expected to include certain design enhancements resulting in a more cost-effective and efficient facility, while also reducing overall greenhouse-gas emissions," added Sempra.

SHELL said LNG cargo exports had resumed from the Prelude floating LNG production facility offshore northwest Australia after safety checks had been passed by the regulator.

"Our focus at Prelude remains on the long-term and delivering safe, sustained and reliable performance into the future," said the UK major.

Shell noted the announcement from Australian National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) confirming a safety inquiry had been closed.

"Shell's demonstrated to NOPSEMA's satisfaction that the facility can safely recover essential power and associated essential services following a loss of power, and that the safety systems and essential support systems operate to maintain safety of personnel," explained the company.

The Australian energy safety authorities had ordered the closure of the "Prelude" FLNG plant in December 2021 after the latest in a series of incidents in an electrical utility on board.

The Shell-operated FLNG vessel is moored 400 kilometres north of the town of Broome on Western Australia's Kimberley coast and has 3.6 million tonnes per annum of capacity.

The Australian regulators had ordered a deeper safety probe by Shell.

This meant Shell had to halt the offloading of LNG cargoes from "Prelude" while the unreliable power shutdown issues were investigated.

NOPSEMA had directed Shell to review what happened on the Prelude between December 2 and 6 and then develop a detailed plan to implement "all necessary corrective actions" on safety.

Shell also had to provide NOPSEMA with monthly reports on its progress from early March 2022.

Shell had to additionally convince the safety regulator that it could safely recover essential power and other services after a power outage alarm sounded.

According to Shell, smoke triggered the automatic fire detection and management systems in the early December incident and an evacuation of most of the 200 or so crew on board was started.

All workers on the facility were accounted for and no injuries reported.

The Shell facility was previously shut down for 11 months after electrical issues.

Operations only resumed in February 2021 following an "electrical trip" in early 2020 and three incidents which NOPSEMA had described at the time as "dangerous occurrences".

For the Shell project, the Concerto gas field and the nearby Prelude field, with combined resources of around 3 trillion cubic feet, are providing the feed gas to produce the LNG.

The Prelude joint venture is owned 67.5 percent by Shell and 17.5 percent by Inpex Corp. of Japan, operator of the Australian Ichthys project.

A further 10 percent of Prelude is held by LNG buyer Korea Gas Corp. and 5 percent by CPC Corp. of Taiwan.

TITAN LNG, the bunkering fuel supplier in the Amsterdam-Rotterdam-Antwerp (ARA) area of northwest Europe, has partnered with Malaysian energy company Petronas for a successful re-fuelling operation for an LNG-powered Very Large Crude Carrier chartered by Koch Industries of the US.

Titan and the Petronas maritime fuel subsidiary delivered the fuel under a long-term supply contract to the VLCC "Yuan Rui Yang", owned by China Ocean Shipping Co. (Cosco).

The ship-to-ship transfer took place at the Malaysian port of Pasir Gudang using the bunkering vessel "Avenir Advantage", which is on a long-term charter to Petronas.

The "Yuan Rui Yang" is the world's first LNG-fuelled VLCC and was delivered to Cosco in February 2022.

The vessel is 333 metres in length, 60 metres wide and 30.5 metres deep and is

equipped was WinGD low-pressure, dual-fuel main engines and two 3,500 cubic metres LNG storage tanks.

“This is the first delivery under the contract agreement between Titan LNG and Koch Industries and marks another milestone for the Petronas-Titan collaboration,” said Dutch company Titan.

Petronas and Titan have previously combined to re-fuel the LNG-powered Pure Car and Truck Carrier (PCTC) the “Siem Aristotle” and several other smaller LNG-fuelled vessels that were en route from Asia to Europe.

“Global access is now a reality as the LNG bunkering pioneers collaborate to deploy expertise worldwide,” said Titan.

“As the expansion of LNG infrastructure continues to build momentum in meeting cleaner energy demand, multiple players are coming together to ensure availability and supply, as well as technical assistance and compatibility,” Titan explained.

As an independent supplier, Titan LNG said it was assisting customers and partner suppliers in realising the common goal of making LNG fuel available.

“We are proud of the strong and ongoing relationship with our supply partner, Petronas Marine, and the faith shown by our long-term customer, Koch Industries,” said Michael Schaap, Titan LNG’s Commercial Director for Marine activities.

“As the LNG pathway gains recognition and momentum, taking a collaborative approach enables us to continue to deliver LNG safely across Europe, Asia and around the world,” added Schaap.

Schaap stated that shipping companies such as Cosco and Koch are becoming much more aware of how to meet the 2030 and 2050 decarbonisation targets and recognise that the use of LNG as a marine fuel has a multitude of benefits.

“This is why Titan is committed to providing access to LNG, and all commercially viable alternative fuels, enabling more shipping companies to start the journey towards a zero-carbon future today,” he added.

TOTALENERGIES and North American US LNG plant owner and developer Semptra are expanding their strategic alliance with the signing of an accord covering the Vista Pacífico LNG export project in Mexico.

The Vista Pacífico LNG project is planned to be a mid-scale facility on

Mexico’s West Coast with cargoes pointing at the high-demand markets such as Asia and South America.

California-based Semptra, the main owner and operator of the Cameron LNG plant in Louisiana, has already signed a non-binding agreement with Mexico’s state-owned utility company, the Comisión Federal de Electricidad, for the potential joint development of this project.

Semptra said the accord signed with TotalEnergies was in the form of a memorandum of understanding (MoU) for the French oil and gas company to offtake one-third of future LNG production at Vista Pacífico LNG and to become a shareholder in the project with a minimum stake of 16.6 percent.

Semptra’s development of Vista Pacífico LNG is in addition to its Energía Costa Azul LNG export project, which is transforming an existing import terminal into an export plant.

TotalEnergies and Semptra are already partners in the Cameron LNG plant in Hackberry, Louisiana and in the Cosa Azul project.

TotalEnergies is already one of the world’s leading LNG export developers and traders with interests in liquefaction plants in Angola, Australia, Egypt, the United Arab Emirates, Nigeria, Norway, Oman, Russia and Qatar. It is also developing the Mozambique LNG project.

Mexico’s other LNG export plans also include the US Mexico-Pacific Ltd (MPL) LNG project.

The MPL company is based in Houston and has joined with LNG engineering firm Bechtel Inc. on developing a liquefaction and export facility on the Pacific Coast using US natural gas as the feed gas and processing technology from ConocoPhillips.

The MPL plant is proposed for near Puerto Libertad in the northwest state of Sonora and would have just over 14 million tonnes per annum of output.

Semptra’s LNG interests have been transferred into the Semptra Infrastructure entity under a corporate restructuring and one of its shareholders is the US investment fund Kohlberg Kravis Roberts, now known as just KKR.

A second MoU with Semptra and TotalEnergies provides for the co-development of several renewable energy projects in North America.

This could see Semptra’s acquisition of 30 percent of the TotalEnergies equity interest in a wind project off the coast of California that is preparing for an upcoming auction.

“We are pleased to further strengthen our partnership with Semptra in North America in LNG and to extend it to renewables,” said Patrick Pouyanné, Chairman and Chief Executive of TotalEnergies.

“Over the past years, TotalEnergies has become the leading exporter of US LNG and has built up a pipeline of 4 gigawatts of solar projects and 3 GW of offshore wind projects currently under development in the US,” added Pouyanné.

US hurricane forecasters said they expected a more active US Gulf Coast hurricane season in 2022. Analysts said this would likely lead to the temporary shutting of oil and gas production and LNG export facilities ahead of and during events.

The Colorado State University Department of Atmospheric Science is predicting more hurricanes in 2022 than in previous years.

The US Gulf Coast hurricane season lasts from June 1 until the end of November.

Previous hurricane seasons have led to damage and shutdowns at LNG export facilities in Louisiana and Texas and at liquefaction plants under construction.

“The Colorado State University meteorologists are forecasting an above-average hurricane season in the Atlantic Basin this season, citing the unlikelihood of a significant El Niño weather pattern,” said a statement.

“Tropical Atlantic sea surface temperatures are near their long-term averages, while Caribbean and sub-tropical Atlantic sea surface temperatures are warmer than their long-term averages,” said the report.

“The warmer Caribbean and eastern part of the sub-tropical Atlantic also favor an active 2022 Atlantic hurricane season,” it added.

The report said that the tropical Pacific currently has weak La Niña conditions, that is, water temperatures are somewhat cooler than normal in the eastern and central tropical Pacific.

“While La Niña may weaken and transition to neutral conditions by this summer, the CSU researchers do not currently anticipate El Niño for the peak of the Atlantic hurricane season. El Niño tends to increase upper-level westerly winds across the Caribbean into the tropical Atlantic, tearing apart hurricanes as they try to form,” explained the report.

CSU forecasters Philip Klotzbach and Michael Bell said they anticipated “an

above-average probability for major hurricanes making landfall” along the continental United States coastline and in the Caribbean.

“As is the case with all hurricane seasons, coastal residents are reminded that it only takes one hurricane making landfall to make it an active season for them. They should prepare the same for every season, regardless of how much activity is predicted,” they warned.

The CSU team is forecasting nine hurricanes and 19 named storms in the Atlantic for 2022, compared to averages of 7.4 and 14.4, respectively, for 1991-2020.

The researchers expect four major hurricanes for 2022 versus an average of 3.2.

The team forecasts that the 2022 hurricane activity will be about 130 percent of the average season from 1991-2020.

By comparison, 2021’s hurricane activity was about 120 percent of the average season.

The 2021 hurricane season had eight continental US named storm and two continental US landfalling hurricanes, including Category 4 “Hurricane Ida” which battered the central Gulf Coast and then brought devastating flooding to the mid-Atlantic and northeast US.

This is the 39th year that the CSU hurricane research team has issued an Atlantic Basin seasonal hurricane forecast.

WOODFIBRE LNG, the mid-scale project near the town of Squamish in British Columbia, has issued a notice to proceed to US energy engineering contractor McDermott International.

“This notice to proceed is an instruction from Woodfibre LNG to McDermott to begin the work required in order to move the project towards major construction commencement in 2023,” stated the company.

The Woodfibre liquefaction plant will be built on the site of a former pulp mill, located about seven kilometres from Squamish and 70km north of Vancouver.

Woodfibre is the second project in BC to start the construction phase following the LNG Canada project under way at Kitimat in BC.

The proposed Woodfibre project is owned by Pacific Energy Corp., a subsidiary of founder Sukanto Tanoto’s Royal Golden Eagle Group.

Woodfibre LNG is a full Canadian subsidiary of Pacific Energy whose main

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OLT Offshore LNG Toscana is the company which manages the floating storage and regasification unit "FSRU Toscana". The Terminal is technologically innovative and well-advanced. It guarantees the maximum standards in terms of environmental sustainability and safety. "FSRU Toscana" is permanently moored off the Italian coast – between Livorno and Pisa – in the heart of the Mediterranean Sea. The Terminal has a maximum authorized regasification capacity of 3.75 billion Standard cubic meters per year and an LNG storage capacity of 137,100 cubic meters. New SSLNG service soon available.

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offices are in Singapore and with others in Jakarta, Beijing and Hong Kong.

The Woodfibre project comprises a single liquefaction Train with 2.1 million tonnes per annum of LNG production and storage capacity of 250,000 cubic metres.

Woodfibre had previously awarded the engineering, procurement, fabrication and construction (EPFC) contract to Houston, Texas-based McDermott.

McDermott through this EPFC contract has been able to advance detailed engineering and construction schedules.

Woodfibre LNG expects to reach substantial completion in 2027 when the first cargo will be shipped.

It is approved and regulated by the Canadian and BC governments and by the Squamish First Nation of native North Americans.

Woodfibre LNG also noted that it was the first industrial project in Canada to recognize an Indigenous people as a full project regulator.

Woodfibre had already started hiring workers in January 2022 for a wide range of posts as the project's development gathers pace.

The project has committed itself to giving hiring priority to qualified Squamish Nation members first, then Squamish residents followed by the rest of BC and Canada.

McDermott will manage onshore construction, leveraging Canadian-based contractors and commitments included in Woodfibre LNG's Impact Benefit Agreements with the Squamish First Nation of the area.

It is estimated that 650 people will be

working on the Woodfibre LNG site at peak construction.

Woodfibre is aiming for the cleanest technology available and will use hydro-electricity for the main liquefaction process and will include technology that enables liquefaction machinery to restart without flaring.

Other equipment brought in will be a recycling system for boil-off gas, along with additional transformers, switchgear and transmission lines.

“When shipped to Asia where it will replace coal-fired electricity, the LNG produced at the Woodfibre facility will reduce 3.5 million tonnes of CO2 emissions per year,” the company has said.

WOODSIDE Petroleum, the Australian oil and gas company and LNG operator, has received final approvals for the pipeline to shore and for the field development plan Scarborough Gas project to underpin the Pluto LNG expansion in Western Australia.

The Commonwealth-Western Australian Joint Authority has offered Woodside the pipeline licence to construct and operate the infrastructure and fully approved the Scarborough Field Development Plan (FDP).

This will enable Woodside to commence petroleum recovery operations from Petroleum Production Licences WA-61-L and WA-62-L offshore.

The Scarborough field is located about 375 kilometres (233 miles) off the coast of Western Australia and is estimated to contain 11.1 trillion cubic feet of dry gas.

The gas will be transported to Pluto

LNG through a new approximately 430km trunkline.

The Scarborough Gas joint venture and the associated Pluto LNG Train 2 project were the subject of US\$12.0 billion final investment decisions in November 2021 with Woodside's share amounting to US\$6.9Bln.

The Scarborough joint venture comprises Woodside with a majority stake and BHP Petroleum holding 26.5 percent.

The Scarborough gas project and Pluto LNG Train 2 are schedule to come on stream for 2026 to supply customers in North Asia.

“Developing Scarborough delivers value for Woodside shareholders and significant long-term benefits locally and nationally, including thousands of jobs, taxation revenue and energy security here and abroad,” said Woodside CEO Meg O'Neill.

“The Scarborough reservoir contains only 0.1 percent carbon dioxide, and Scarborough gas processed through the efficient and expanded Pluto LNG facility supports the decarbonisation goals of our customers in Asia,” said the CEO.

The key offshore contractors on the project include Saipem of Italy, Europe's Subsea Integration Alliance, comprising Europe's OneSubsea and US firm Subsea 7, as well as US engineers McDermott International.

US engineers Bechtel have been selected as the engineering, procurement and construction contractor for Pluto Train 2 and for the integration process for the existing Pluto LNG facilities.

The Pluto Train 1 Joint Venture (including the Pluto foundation assets)

comprises Woodside (90 percent), Japan's Kansai Electric Power (5 percent) and Tokyo Gas (5 percent).

The Pluto Train 2 joint venture comprises just Woodside (51 percent) and Global Infrastructure Partners (GIP), one of the world's leading specialist energy infrastructure investors (49 percent).

Woodside completed the non-operating participating interest sale to GIP in January 2022.

The estimated capital expenditure for the development of Pluto Train 2 is US\$5.6Bln.

The joint venture arrangements require GIP to fund its 49 percent share of capital expenditure and an additional amount of construction capital expenditure of about US\$822M.

Woodside's capital expenditure will be reduced accordingly. The Perth-based company had previously entered into a sale and purchase agreement with GIP in November 2021.

Diary of events

World Gas Conference 2022

23 - 27 May 2022

EXCO (Daegu Exhibition & Convention Centre) 10, Exco-ro, Buk-gu, Daegu, South Korea
<https://www.wgc2022.org>

Gastech Exhibition and Conference 2022

5-8 September

Fiera Milano, Italy
<https://www.canadagaslng.com>

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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 editor@lngjournal.com

Country	Location (Project)	Owners	Start up	Storage	
				Tanks	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, Zhejiang	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 Oil	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	Capacity
Japan (continued)	Sakaide	Shikoku Electric, Cosmo Oil	2011	1	180,000
	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
Korea	Soma Fukushima	Japan Petroleum Exploration	2017	1	225,000
	Boryeong	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
Kuwait	Al Zour LNG	KIPIC	2021	8	1,800,000
Malaysia	Pengerang Johor	Petronas Gas	2017	2	400,000
Mexico	Altamira	Vopak, Enagas	2006	2	300,000
	Energia Costa Azul	Sempre 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
Philippines	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 Ereğlisi	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	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	Hrvatska Elektroprivreda Plc, Plinacro Ltd	2021
Colombia	Cartagena FSRU	Promigas, Sociedad Portuaria El Cayao	2016
Egypt	Ain Sokhna, Suez	EGAS, BW Gas	2015
Ghana	Tema LNG	Helios/GNPC	2021
Indonesia	Lampung	Hoegh LNG, PGN LNG	2014
	Nusantara (Jakarta Bay)	Golar LNG, Pertamina	2012
	Benoa LNG	PT Pertagas Niaga	2016
	Amurang	Karadeniz	2020
	Jawa Satu FSRU	Pertamina	2021
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 Mediterranea	ElectroGas	2016
Myanmar	Thanlyin	CNTIC Vpower	2020
Pakistan	Port Qasim	Excelerate, Engro Corp	2015
	Port Qasim	BW-Mitsui, GGP Consortium	2017
Russia	Kaliningrad FSRU	Gazprom	2020
Turkey	Aliaga FSRU, Turquoise FLNG	Etki LNG	2016
	Dortyol FSRU Terminal	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
INDONESIA	Sengkang LNG	Energy World Corp.	2021+	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	Sempre	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 1994	2 1	3.2 2.5	3	240,000
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
		(Mitsubishi/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	2000	2	7.1	2	240,000
		Mitsubishi, Mitsui, Partex and Itochu					
PAPUA NEW GUINEA	PNG LNG	Oman Govt., Oman LNG Union Fenosa, Osaka Gas, & Itochu	2006	1	3.7	2	240,000
		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-T1	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	3	15.0	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
	Calcasieu Pass LNG	Venture Global	2022	18	11	2	400,000
YEMEN	Bal-Haf	Yemen LNG, Total, Yemen Gas, Hunt Oil, SK Group, Hyundai	2009	2	6.7	2	320,000



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World LNG Carrier Fleet

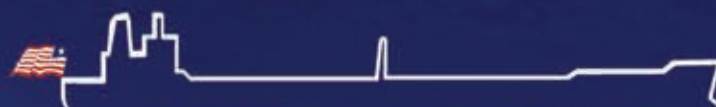
LNG Carrier	Capacity m ³	Registered Owner	Builder	Delivery	Flag	Power Plant	Cargo System	No. of Tanks	Original Project	Hull Number
Aamira	268,000	Nakilat SHI 1753 Inc.	Samsung	Apr-10	M. Islnds.	Diesel	TZ Mk. III	10	Qatargas IV	1753
Abadi	135,000	Tost Two (NBD) Sendirian Berhad	Mitsubishi	May-02	Brunei	Steam	Moss	5	Lumut	2163
Adam LNG	162,000	Oman Shipping Co.	HHI	Jul-14	Malta	Diesel	TZ Mk. III Flex	4	Oman LNG	2584
Adamastos	170,800	Shin Doun Kisen Co. Ltd.	HHI	Aug-21	Malta	X-DF	TZ Mk. III Flex	4	Portfolio	3109
Adriano Knutsen	180,000	Knutsen OAS Shipping	HHI	Jul-19	Spain	ME-GI	TZ Mk. III Flex	4	Corpus Christi	2963
Al Aamriya	210,168	J5 Nakilat No.1 Ltd.	Daewoo	May-08	M. Islnds.	Diesel	GT NO 96	5	RasGas III	2249
Al Areesh	148,786	Al Areesh LLC	Daewoo	Jan-07	Bahamas	Steam	GT NO 96	4	RasGas II	2239
Al Bahiya	210,100	Nakilat DSME 2286 Inc.	Daewoo	Dec-09	M. Islnds.	Diesel	GT NO 96	5	Qatargas IV	1726
Al Bidda	137,339	Mitsui O.S.K. Lines	Kawasaki	Nov-99	Japan	Steam	Moss	5	Qatargas I	1470
Al Daayen	148,853	Seaspirit Leasing	Daewoo	Mar-07	Bahamas	Steam	GT NO 96	4	RasGas II	2240
Al Dafna	268,000	Nakilat SHI 1726 Inc.	Samsung	Oct-09	M. Islnds.	Diesel	TZ Mk. III	10	RasGas	1726
Al Deebel	145,000	Peninsula LNG Transport No. 3	Samsung	Nov-05	Bahamas	Steam	TZ Mk. III	4	RasGas II	1442
Al Gattara	216,200	Overseas LNG H1 Corp.	HHI	Nov-07	M. Islnds.	Diesel	TZ Mk. III	4	Qatargas II	1791
Al Ghariya	210,150	Neptora Schiffsbetriebsgesellschaft mbH & Company ts Julia KG	Daewoo	Dec-07	Bahamas	Diesel	GT NO 96	4	Qatargas II	2248
Al Gharrafa	216,200	Overseas LNG H2 Corp.	HHI	Jan-08	M. Islnds.	Diesel	TZ Mk. III	5	Qatargas II	1792
Al Ghashamiya	217,591	Nakilat SHI 1696 Inc.	Samsung	Apr-09	M. Islnds.	Diesel	TZ Mk. III	10	Qatargas III	1696
Al Ghuwairiya	263,300	Nakilat Al Ghuwairiya Inc.	Daewoo	Dec-08	M. Islnds.	Diesel	GT NO 96	5	Qatargas II	2255
Al Hamla	216,200	Overseas LNG S2 Corp.	Samsung	Feb-08	M. Islnds.	Diesel	TZ Mk. III	4	Qatargas II	1606
Al Hamra	137,000	Al Hamra Ltd.	STX	Nov-96	Liberia	Steam	Moss	4	Das Island	1332
Al Huwaila	217,000	Al Huwaila Inc.	Samsung	May-08	Bahamas	Diesel	TZ Mk. III	10	RasGas III	1643
Al Jasra	137,227	Mitsui O.S.K. Lines	Mitsubishi	Jun-00	Japan	Steam	Moss	5	Qatargas I	2117
Al Jassasiya	145,700	Venice Maritime Inc.	Daewoo	May-07	Bermuda	Steam	GT NO 96	4	RasGas II	2243
Al Karaana	210,100	Nakilat DSME 2284 Inc.	Daewoo	Oct-09	M. Islnds.	Diesel	GT NO 96	4	Qatargas III	2284
Al Kharaitiyat	216,300	Nakilat HHI 1909 Inc.	HHI	Jun-09	M. Islnds.	Diesel	TZ Mk. III	4	Qatargas III	1909
Al Kharsaah	217,000	Al Kharsaah Inc.	Samsung	Jun-08	Bahamas	Diesel	TZ Mk. III	10	RasGas III	1644
Al Khatiya	210,150	Nakilat DSME 2283 Inc.	Daewoo	Jul-09	M. Islnds.	Diesel	GT NO 96	4	Qatargas IV	2283
Al Khaznah	135,496	Al Khaznah Inc.	Mitsui E&S	Jul-94	Liberia	Steam	Moss	5	Das Island	1390
Al Khor	137,354	Mitsui O.S.K. Lines	Mitsubishi	Nov-96	Japan	Steam	Moss	5	Qatargas I	2089
Al Khuwair	217,000	Al Khuwair Inc.	Samsung	Jun-08	Bahamas	Diesel	TZ Mk. III	10	RasGas III	1646
Al Mafyar	266,000	Nakilat SHI 1697 Inc.	Samsung	Apr-09	M. Islnds.	Diesel	TZ Mk. III	5	Qatargas III	1697
Al Marrouna	149,539	Seaspirit Leasing	Daewoo	Sep-06	Bahamas	Steam	GT NO 96	4	RasGas II	2238
Al Mayeda	266,000	Nakilat SHI 1694 Inc.	Samsung	Jan-09	M. Islnds.	Diesel	TZ Mk. III	5	Qatargas III	1694
Al Nuaman	210,100	Nakilat DSME 2285 Inc.	Daewoo	Dec-09	M. Islnds.	Diesel	GT NO 96	4	Qatargas III	2286
Al Oraiq	210,200	J5 Nakilat No.3 Ltd.	Daewoo	Jun-08	M. Islnds.	Diesel	GT NO 96	18	RasGas III	2250
Al Rayyan	137,420	Mitsui O.S.K. Lines	Kawasaki	Mar-97	Japan	Steam	Moss	5	Qatargas I	1445
Al Rekayyat	216,293	Nakilat HHI 1910 Inc.	HHI	Jun-09	M. Islnds.	Diesel	TZ Mk. III	4	Qatargas III	1910
Al Ruwais	210,150	Neptana Schiffsbetriebsgesellschaft mbH & Company ts Alexandra KG	Daewoo	Aug-07	Bahamas	Diesel	GT NO 96	4	Qatargas II	2245
Al Sadd	210,200	Nakilat DSME 2265 Inc.	Daewoo	Mar-09	M. Islnds.	Diesel	GT NO 96	12	Qatargas III	2265
Al Safliya	210,150	Nausola Schiffsbetriebsgesellschaft mbH & Company ts Britta KG	Daewoo	Sep-07	Bahamas	Diesel	GT NO 96	5	Qatargas II	2246
Al Sahla	216,200	J5 Nakilat No.5 Ltd.	HHI	Jun-08	M. Islnds.	Diesel	TZ Mk. III	4	RasGas III	1863
Al Samriya	263,300	Nakilat Al Samriya Inc.	Daewoo	Feb-09	M. Islnds.	Diesel	GT NO 96	5	Qatargas II	2257
Al Shamal	217,000	Al Shamal Inc.	Samsung	Apr-08	Bahamas	Diesel	TZ Mk. III	10	RasGas III	1645
Al Sheehaniya	210,100	Nakilat DSME 2264 Inc.	Daewoo	Feb-09	M. Islnds.	Diesel	GT NO 96	12	Qatargas III	2264
Al Thakhira	145,000	Peninsula LNG Transport No. 2	Samsung	Aug-05	Bahamas	Steam	TZ Mk. III	4	RasGas II	1441
Al Thumama	216,200	J5 Nakilat No.2 Ltd.	HHI	Feb-08	M. Islnds.	Diesel	TZ Mk. III	4	RasGas III	1862
Al Utouriya	215,000	J5 Nakilat No.8 Ltd.	HHI	Sep-08	M. Islnds.	Diesel	TZ Mk. III	4	RasGas III	1875
Al Wajbah	137,308	Mitsui O.S.K. Lines	Mitsubishi	Jun-97	Japan	Steam	Moss	5	Qatargas I	2090
Al Wakrah	137,371	Mitsui O.S.K. Lines	Kawasaki	Nov-98	Japan	Steam	Moss	5	Qatargas I	1446
Al Zubarah	137,573	Mitsui O.S.K. Lines	Mitsui E&S	Nov-96	Japan	Steam	Moss	5	Qatargas I	1411
Alto Acrux	147,798	Bahamas LNG Shipping	Mitsubishi	Mar-08	Bahamas	Steam	Moss	4	Darwin LNG	2219
Amadi	154,800	Brunei Gas Carriers	HHI	Jul-15	Brunei	Steam	TZ Mk. III	4	Lumut	2607
Amali	148,000	BGC SPV NBD	Daewoo	Aug-11	Brunei	Steam	GT NO 96	4	Lumut	2277
Amani	154,800	Brunei Gas Carriers	HHI	Oct-14	Brunei	Steam	TZ Mk. III	4	Lumut	H2606
Amberjack LNG	174,000	LNGShips	HHI	Apr-20	Malta	X-DF	TZ MK. III Flex	–	Portfolio	3021
Amur River	149,700	Seacrown Maritime	HHI	Nov-07	M. Islnds.	Steam	TZ Mk. III	4	Sakhalin II	1734
Arctic Aurora	155,000	Fareastern Shipping	HHI	Jul-14	M. Islnds.	Diesel/Gas-Electric	TZ Mk. III	4	Snøhvit LNG	2580
Arctic Discoverer	142,612	Northern LNG Transport II Company S.A.	Mitsui E&S	Feb-06	Bahamas	–	Moss	4	Hammerfest	1564
Arctic Lady	147,200	Leif Hoegh (UK) Ltd.	Mitsubishi	Apr-06	Norway	Steam	Moss	4	Hammerfest	2185
Arctic Princess	147,200	R.B. Quadrangle Leasing	Mitsubishi	Jan-06	Norway	Steam	Moss	4	Hammerfest	2184
Arctic Spirit	89,800	Artic Spirit LLC	Ishikawajima	Dec-93	Liberia	Steam	IHI SPB	4	Atlantic LNG	3016
Arctic Voyager	142,759	Lloyds TSB Equipment Leasing (No.1)	Kawasaki	Jul-06	Bahamas	Steam	Moss	4	Hammerfest	1532

Aristarchos	174,000	Dias Gas Carrier Corp.	HHI	Jun-21	Malta	X-DF	TZ Mk. III Flex	4	Portfolio	3107
Aristidis I	174,000	Atrotos Gas Carrier Corp.	HHI	Jan-21	Malta	X-DF	TZ Mk. III Flex	4	Portfolio	3106
Aristos I	174,000	Xiang Ch25 HK International	HHI	Nov-20	Malta	X-DF	TZ Mk. III Flex	4	Portfolio	3105
Arkat	148,000	BGC SPV NBD	Daewoo	Feb-11	Brunei	–	GT NO 96	4	Lumut	2273
Arwa Spirit	165,500	Membrane Shipping	Samsung	Aug-08	M. Islnds.	Diesel/Gas-Electric	TZ Mk. III	4	Balhaf	1625
Aseem	155,003	India LNG Transport Company No.3 S.A.	Samsung	Nov-09	Malta	Diesel	TZ Mk. III	4	RasGas	1686
Asia Endeavour	154,948	Chevron Global Technology Services Co.	Samsung	Jun-15	Bahamas	Diesel/Gas-Electric	TZ MK. III	4	Gorgon	1942
Asia Energy	154,948	Chevron Global Technology Services Co.	Samsung	Oct-14	Bahamas	Diesel/Gas-Electric	TZ MK. III	4	Gorgon	1921
Asia Excellence	154,948	Chevron Global Technology Services Co.	Samsung	Jan-15	Bahamas	Diesel/Gas-Electric	TZ MK. III	4	Gorgon	1941
Asia Integrity	154,948	Chevron Global Technology Services Co.	Samsung	Feb-17	Bahamas	Diesel/Gas-Electric	TZ Mk. III	4	Wheatstone	2069
Asia Venture	154,948	Chevron Global Technology Services Co.	Samsung	Jul-17	Bahamas	Diesel/Gas-Electric	TZ Mk. III	4	Wheatstone	2070
Asia Vision	154,948	Chevron Global Technology Services Co.	Samsung	Jul-14	Bahamas	Diesel/Gas-Electric	TZ MK. III	4	Gorgon	1920
Asklipios	170,816	Sea 199 Leasing Co Ltd.	HHI	Sep-21	Malta	X-DF	TZ Mk. III Flex	4	Portfolio	3110
Attalos	170,800	Sea 200 Leasing Co. Ltd.	HHI	Aug-21	Malta	X-DF	TZ Mk. III Flex	4	–	3108
Barcelona Knutsen	173,400	Norspan LNG V AS	Daewoo	Jan-10	Spain	Diesel/Gas-Electric	GT NO 96	4	Portfolio	2267
Beidou Star	172,000	Mitsui O.S.K. Lines	Hudong Zhonghua	Sep-15	H.K., China	Diesel	GT NO 96	4	PNG LNG	H1672A
Berge Arzew	138,088	Sonatrach Berge Arzew Corp.	Daewoo	Jul-04	Norway	Steam	GT NO 96	4	Arzew	2217
Bilbao Knutsen	138,000	Norspan LNG AS	Izar	Jan-04	Spain	Steam	GT NO 96	4	Portfolio	321
Bishu Maru	164,700	"K" Line - Kawasaki Kisen Kaisha	Kawasaki	Dec-17	Panama	TFDE	Moss	4	Wheatstone	1713
Bonito LNG	174,000	LNGShips	HHI	May-20	Malta	X-DF	TZ MK. III Flex	4	–	3022
Boris Davydov	172,410	Arctic LNG 4 Ltd.	Daewoo	Dec-18	Cyprus	TFDE - Azipod	GT NO 96 GW	4	Yamal	2428
Boris Vilkitsky	172,410	Arctic LNG 1 Ltd.	Daewoo	Jun-17	Cyprus	TFDE - Azipod	GT NO 96 GW	4	Yamal	2421
British Achiever	173,644	BP	Daewoo	Nov-18	Isle of Man	ME-GI	GT NO 96 GW	4	Freeport	2442
British Contributor	173,644	BP	Daewoo	Dec-18	Isle of Man	ME-GI	GT NO 96 GW	4	Freeport	2443
British Listener	173,644	BP	Daewoo	Jan-19	Isle of Man	ME-GI	GT NO 96 GW	4	Freeport	2444
British Mentor	173,644	BP	Daewoo	Mar-19	Isle of Man	ME-GI	GT NO 96 GW	4	Freeport	2445
British Partner	173,400	BP	Daewoo	Jun-18	Isle of Man	ME-GI	GT NO 96 GW	4	Freeport	2441
British Sapphire	155,000	RBSSAF (19) Ltd.	HHI	Jun-08	Isle of Man	Diesel/Gas-Electric	TZ Mk. III	4	Portfolio	1779
British Sponsor	173,644	BP	Daewoo	May-19	Isle of Man	ME-GI	GT NO 96 GW	4	Freeport	2446
Broog	137,529	Mitsui O.S.K. Lines	Mitsui E&S	Apr-98	Japan	Steam	Moss	5	Qatargas I	1412
Bu Samra	266,000	Nakilat Bu Samra Inc.	Samsung	Dec-08	M. Islnds.	–	TZ Mk. III	5	Qatargas II	1677
Bushu Maru	180,000	Mitsui O.S.K. Lines	Mitsubishi	Jul-19	Bahamas	Reheat Steam Turbine	TZ MK. III Flex	4	Sabine Pass	2327
BW Boston	138,059	Partrederiet BW Gas GDF Suez EMT DA	Daewoo	Jan-03	Norway	Steam	GT NO 96	4	Atlantic LNG	2207
BW Brussels	162,400	Ines LNG	Daewoo	Aug-09	Bermuda	Diesel/Gas-Electric	GT NO 96	4	Balhaf	2259
BW Everett	138,028	BW Gas SLNG	Daewoo	Jun-03	Norway	Steam	GT NO 96	4	Atlantic LNG	2212
BW Helios	174,000	Selene Navigation Pte Ltd.	Daewoo	May-21	Bermuda	ME-GI	GT NO 96 GW	4	–	2497
BW Lesmes	174,000	BW Gas AS	Daewoo	Mar-21	Bermuda	ME-GI	GT NO 96 GW	4	–	2496
BW Lilac	173,400	BW Maritime	Daewoo	Mar-18	Isle of Man	ME-GI	GT NO 96 GW	4	–	2436
BW Magna	173,000	BW Group	Daewoo	Mar-19	Singapore	ME-GI	GT NO 96	4	–	2488
BW Magnolia	173,400	Helen Navigation Pte Ltd.	Daewoo	Feb-20	Singapore	ME-GI	GT NO 96 GW	–	–	2490
BW Paris	162,400	SNC Elias	Daewoo	Jul-09	Bermuda	Diesel/Gas-Electric	GT NO 96	4	Balhaf	2258
BW Pavilion Aranda	173,400	BW Group	Daewoo	Sep-19	Singapore	ME-GI	GT NO 96 GW	4	Portfolio	2489
BW Pavilion Aranthera	173,400	BW Diamond LNG Pte Ltd.	Daewoo	Jul-20	Singapore	ME-GI	GT NO 96 GW	4	Portfolio	2491
BW Pavilion Leeara	158,629	BW LPG FPSOI	HHI	Jun-15	Singapore	Diesel/Gas-Electric	TZ Mk. III Flex	4	Portfolio	2572
BW Pavilion Vanda	155,000	BW LPG FPSOI	HHI	Feb-15	Singapore	DFDS	TZ Mk. III Flex	4	Portfolio	2571
BW Tatiana	135,269	Shell Tankers Singapore	Mitsubishi	Dec-02	Singapore	Steam	Moss	5	Atlantic LNG	2173
BW Tulip	173,400	BW Maritime	Daewoo	Dec-17	Singapore	ME-GI	GT NO 96 GW	4	–	2435
Cadiz Knutsen	138,826	Norspan LNG II AS	Navantia	Apr-04	Spain	Steam	GT NO 96	4	Portfolio	103
Cape Ann	145,130	SRV Joint Gas Two Ltd.	Samsung	Apr-10	Norway	Diesel/Gas-Electric	TZ Mk. III	4	Jaigarh LNG	1689
Castillo de Caldelas	176,300	Empresa Naviera Elcano	Imabari Shipbuilding	Jun-18	Malta	ME-GI	TZ Mk. III Flex	–	Portfolio	8188
Castillo De Merida	176,300	Empresa Naviera Elcano	Imabari Shipbuilding	Mar-18	Spain	ME-GI	TZ MK. III Flex	4	Portfolio	8177
Castillo de Santisteban	170,000	Naviera Trans Gas AIE	STX	Jun-10	Malta	Diesel Electric	GT NO 96	4	Portfolio	3008
Castillo de Villalba	138,000	Empresa Naviera Elcano	Navantia Cadiz	Sep-03	Spain	Steam	GT NO 96	4	Portfolio	87
Catalunya Spirit	138,000	Teekay Shipping Spain S.L.	Izar	Jun-03	Spain	Steam	GT NO 96	4	Atlantic LNG	319
Celsius Canberra	180,000	Xiang CH27 HK International	Samsung	Jan-21	Marshall Isl.	X-DF	TZ Mk. III Flex	4	US Portfolio	2298
Celsius Carolina	180,000	Oriental Fleet LNG 03 Ltd.	Samsung	Aug-21	Marshall Isl.	X-DF	TZ Mk. III Flex	4	US Portfolio	2314
Celsius Charlotte	180,000	Xiang CH28 HK International	Samsung	Jun-21	Marshall Isl.	X-DF	TZ Mk. III Flex	4	US Portfolio	2313
Celsius Copenhagen	180,000	Greenheart Gas Shipco I LLC	Samsung	Nov-20	Bermuda	X-DF	TZ Mk. III Flex	4	Portfolio	2297
CESI Beihai	174,000	COSCO Shipping Energy Transportation Co.	Hudong Zhonghua	Jun-17	H.K., China	DFDS	GT NO 96	4	APLNG	1717A
CESI Gladstone	174,000	China Shipping Co.	Hudong Zhonghua	Oct-16	H.K., China	–	GT NO 96	4	APLNG	1715A
CESI LianYungAng	174,000	COSCO Shipping Energy Transportation Co.	Hudong Zhonghua	Jun-18	H.K., China	Diesel-Electric	GT NO 96	4	APLNG	1720A
CESI Qingdao	174,000	China Shipping Co.	Hudong Zhonghua	Feb-17	H.K., China	DFDS	GT NO 96	4	APLNG	1716A



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CESI Tianjin	174,000	COSCO Shipping Energy Transportation Co.	Hudong Zhonghua	Jul-17	China	TFDE	GT NO 96	4	APLNG	1718A
CESI Wenzhou	174,000	COSCO Shipping Energy Transportation Co.	Hudong Zhonghua	Feb-18	China	Diesel-Electric	GT NO 96	4	APLNG	1719A
Cheikh Bouamama	75,558	Skikda LNG Transport Corp.	Universal SB	Jul-08	Liberia	Steam	TZ Mk. III	4	Arzew/Skikda	88
Cheikh el Mokrani	75,759	Mediterranean LNG Transport Corp.	Japan Marine United	Jun-07	Liberia	Steam	TZ Mk. III	4	Skikda	55
Christophe De Margerie	170,000	DY Shipping Limited	Daewoo	Nov-16	Russia	Diesel/Gas-Electric	GT NO 96 GW	–	Yamal	2418
Clean Energy	149,700	Pegasus Shipholding	HHI	Mar-07	M. Islnds.	Steam	TZ Mk. III	4	Portfolio	1748
Clean Horizon	162,000	Dynagas	HHI	Apr-15	Malta	Diesel/Gas-Electric	TZ Mk. III Flex	4	Portfolio	2566
Clean Ocean	162,000	Dynagas	HHI	May-14	M. Islnds.	Diesel/Gas-Electric	TZ Mk. III Flex	4	Sabine Pass	2558
Clean Planet	162,000	Dynacom Tankers Management	HHI	Aug-14	M. Islnds.	Diesel Electric	TZ Mk. III Flex	4	Yamal	H2565
Clean Vision	162,000	Olinda	HHI	Aug-15	Malta	Diesel/Gas-Electric	TZ Mk. III Flex	4	Portfolio	2567
CNTIC VPower Energy	127,500	Shell Tankers Australia	Mitsubishi	Jan-92	Bermuda	Steam	Moss	4	North West Shelf	2041
Cobia LNG	174,000	Cardiff LNG ETA Owning LLC	HHI	Feb-21	Malta	X-DF	TZ Mk. III Flex	4	–	3038
Cool Discoverer	174,000	Serendipity Maritime Ltd.	HHI	Sep-20	Greece	X-DF	TZ MK. III Flex	4	Portfolio	S970
Cool Explorer	160,000	Thenamaris Ships Management Inc.	Samsung	Jan-15	Malta	DFDS	TZ Mk. III Flex	4	Spot	2049
Cool Racer	174,000	Eloquent Shipping Ltd.	HHI	Feb-21	Malta	X-DF	TZ Mk. III Flex	4	Portfolio	3126
Cool Runner	160,000	Thenamaris Ships Management Inc.	Samsung	Mar-14	Malta	Diesel Electric	TZ Mk. III Flex	4	Wheatstone	H2046
Cool Voyager	160,000	Energy Shipping & Trading	Samsung	Oct-13	Malta	TFDE	TZ Mk. III Flex	4	Wheatstone	–
Corcovado LNG	160,162	Drytank	Daewoo	Apr-14	Malta	Diesel Electric	GT NO 96 L03	4	Spot	H2297
Creole Spirit	173,400	Teekay LNG Partners	Daewoo	Feb-16	Bahamas	ME-GI	GT NO 96 GW	–	Sabine Pass	2407
Cubal	160,276	Mint LNG IV	Samsung	Jan-12	Bahamas	–	TZ Mk. III	4	Soyo	1813
Cygnus Passage	145,400	Cygnus LNG Shipping	Mitsubishi	Jan-09	Panama	Steam	Moss	4	Sakhalin II	2235
Dapeng Moon	147,200	Yue Gang LNG Ship Management Co.	Hudong Zhonghua	Jul-08	H.K., China	Steam	GT NO 96	4	Pluto	1309
Dapeng Star	147,210	Yue Peng LNG Shipping Co.	Hudong Zhonghua	Nov-09	H.K., China	Steam	GT NO 96	4	Pluto	1379
Dapeng Sun	147,200	Yue Peng LNG Shipping Co.	Hudong Zhonghua	Apr-08	H.K., China	Steam	GT NO 96	4	North West Shelf	1308
Diamond Gas Crystal	174,000	Diamond LNG Shipping 5 Pte Ltd.	Hyundai Samho	Jun-21	Singapore	X-DF	TZ Mk. III Flex	4	–	8030
Diamond Gas Metropolis	174,000	Diamond LNG Shipping 4 Ltd.	HHI	Nov-20	Bahamas	X-DF	TZ Mk. III Flex	4	Portfolio	8029
Diamond Gas Orchid	165,000	NYK Line	Mitsubishi	Jun-18	Japan	STaGE	Sayaringo	4	Cameron	2325
Diamond Gas Rose	165,000	NYK Line	Mitsubishi	Aug-18	Bahamas	STaGE	Sayaringo	4	Cameron	2325
Diamond Gas Sakura	165,000	Tokyo Gas	Japan Marine United	May-19	Panama	STaGE	Sayaringo	4	Cameron	2332
Diamond Gas Victoria	174,000	Diamond LNG Shipping 6 Pte Ltd.	Hyundai Samho	Jun-21	Bahamas	X-DF	TZ MK. III Flex	4	–	8031
Disha	136,025	India LNG Transport Company No.1 Ltd.	Daewoo	Dec-03	Malta	Gas Turbine	GT NO 96	4	RasGas	2210
Doha	137,262	Mitsui O.S.K. Lines	Mitsubishi	Jun-99	Japan	Steam	Moss	5	Qatargas I	2091
Dorado LNG	174,000	Hai Kuo Shipping 2052G Ltd.	Samsung	Dec-20	Malta	X-DF	TZ Mk. III Flex	4	Portfolio	2276
Duhail	210,150	Nauranto Schiffsbetriebsgesellschaft mbH & Company ts Gabriela KG	Daewoo	Dec-07	Bahamas	Diesel	GT NO 96	4	Qatargas II	2247
Dukhan	137,661	Qatar LNG Transport	Mitsui E&S	Sep-04	Liberia	Steam	Moss	5	Qatargas II	1561
East Energy	122,255	Bonny Gas Transport	STX	Aug-82	Bermuda	Steam	Membrane	4	NLNG	26B
Eduard Toll	172,410	Teekay Corp.	Daewoo	Sep-17	Bahamas	TFDE - Azipod	GT NO 96 GW	4	Yamal	2423
Ejnan	145,000	Peninsula LNG Transport No. 3	Samsung	Jan-07	Bahamas	Steam	TZ Mk. III	4	RasGas II	1594
Ekaputra 1	136,400	Cometco Shipping Inc.	Mitsubishi	Jan-89	Liberia	Steam	Moss	5	Bontang	2011
Elisa Aquila	174,000	Caroline 82 SASU	Hyundai Samho	04/03/2022	France	X-DF	TZ Mk. III Flex	4	Portfolio	S917
Elisa Larus	174,000	Caroline 77 SASU	Hyundai Samho	May-20	France	X-DF	TZ Mk. III Flex	4	Portfolio	S970
Energy Advance	147,624	Tokyo LNG Tanker Co. & Toho LNG Shipping Co.	Kawasaki	Mar-05	Japan	Steam	Moss	4	Portfolio	1521
Energy Atlantic	156,000	Alpha Tankers	STX	Sep-15	Greece	TFDE	GT NO 96 L03	4	Sabine Pass	1670
Energy Confidence	153,000	Tokyo LNG Tanker Co. & NYK	Kawasaki	Apr-09	Japan	Steam	Moss	4	Darwin LNG	1611
Energy Endeavour	173,400	Rossini Navigation SA	Daewoo	Jan-21	M. Islnds.	ME-GI	GT NO 96 GW	–	–	2484
Energy Frontier	147,599	Tokyo LNG Tanker Co.	Kawasaki	Sep-03	Japan	Steam	Moss	4	Sakhalin II	1520
Energy Glory	165,000	NYK Line	Japan Marine United	Mar-19	Japan	TFDE	TZ Mk. III Flex+	4	Cove Point	5071
Energy Horizon	177,000	Tokyo LNG Tanker Co. & NYK	Kawasaki	Aug-11	Japan	Steam	Moss	4	Pluto	1664
Energy Innovator	165,000	Tokyo Gas	Japan Marine United	Jun-19	Panama	TFDE	TZ Mk. III Flex+	4	Cove Point	5072
Energy Integrity	173,400	Mozart Navigation SA	Daewoo	May-21	M. Islnds.	ME-GI	GT NO 96 GW	4	–	2485
Energy Intelligence	173,400	Strauss Navigation SA	Daewoo	Jun-21	M. Islnds.	ME-GI	GT NO 96 GW	4	–	2500
Energy Liberty	165,000	Mitsui O.S.K. Lines	Japan Marine United	Oct-18	Japan	TFDE	TZ Mk. III Flex+	4	Cove Point	5070
Energy Navigator	145,000	Tokyo LNG Tanker Co.	Kawasaki	May-08	Japan	Steam	Moss	4	Sakhalin II	1600
Energy Pacific	173,400	Ravel Navigation SA	Daewoo	Aug-20	M. Islnds.	ME-GI	GT NO 96 GW	4	Portfolio	2483
Energy Progress	147,558	Jovial Shipping Navigation	Kawasaki	Nov-06	Bahamas	Steam	Moss	4	Darwin LNG	1540
Energy Universe	166,571	Tokyo LNG Tanker Co.	Japan Marine United	Aug-19	Panama	TFDE	TZ Mk. III Flex	4	Cove Point	5073
Enshu Maru	164,700	Mitsui O.S.K. Lines	Kawasaki	Aug-18	Panama	Reheat Steam Turbine	Moss	4	Wheatstone	1720
Esshu Maru	153,000	Mitsui O.S.K. Lines	Mitsubishi	Dec-14	Bahamas	–	Sayaendo	4	Portfolio	–
Etyfa Prometheas	135,269	Shell Bermuda (Overseas) Ltd.	Mitsubishi	Oct-02	Singapore	Steam	Moss	5	Peru LNG	2172
Excalibur	138,034	Exmar Excalibur Shipping Co.	Daewoo	May-02	Belgium	Steam	GT NO 96	4	Portfolio	2206
Fedor Litke	172,410	Arctic LNG 2 Ltd.	Daewoo	May-17	Cyprus	TFDE - Azipod	GT NO 96 GW	4	Yamal	2422
Flex Amber	174,000	Bund 10 Holding Ltd.	HHI	Oct-20	M. Islnds.	X-DF	TZ Mk. III Flex	4	Portfolio	8011
Flex Artemis	174,000	Flex LNG Rreliance Ltd.	Daewoo	Aug-20	M. Islnds.	ME-GI	NO-96-GW+FRS	4	Portfolio	2479
Flex Aurora	174,000	Flex LNG Aurora Ltd.	HHI	Jun-20	M. Islnds.	X-DF	TZ Mk. III Flex	4	Portfolio	8010
Flex Constellation	173,400	Frontline	Daewoo	Jun-19	M. Islnds.	ME-GI	NO-96-GW+PRS	4	Portfolio	H2470

Flex Courageous	173,400	Frontline	Daewoo	Aug-19	M. Islnds.	ME-GI	NO-96-GW+PRS	4	–	2471
Flex Endeavour	172,400	Flex LNG	Daewoo	Jan-18	U.K.	ME-GI	NO-96-GW+PRS	4	–	2447
Flex Enterprise	172,400	Flex LNG	Daewoo	Jan-18	U.K.	ME-GI	NO-96-GW+PRS	4	Portfolio	2448
Flex Freedom	173,400	Flex Freedom Ltd.	Daewoo	Jan-21	M. Islnds.	ME-GI	NO-96-GW+FRS	4	Portfolio	2492
Flex Rainbow	174,000	Flex LNG	Samsung	Jun-18	Isle of Man	ME-GI	TZ Mk. III Flex	4	–	2108
Flex Ranger	174,101	Flex LNG	Samsung	Jun-18	Isle of Man	ME-GI	TZ Mk. III Flex	4	–	2107
Flex Resolute	173,400	Flex LNG Resolute Ltd.	HHI	Sep-20	M. Islnds.	ME-GI	NO-96-GW+FRS	4	Portfolio	2480
Flex Vigilant	174,000	Flex Vigilant Ltd.	HHI	May-21	Liberia	X-DF	TZ Mk. III Flex	4	Portfolio	8013
Flex Volunteer	174,000	Flex Volunteer Ltd.	HHI	Jan-21	M. Islnds.	X-DF	TZ Mk. III Flex	4	–	8012
Fraiha	210,100	J5 Nakilat No.6 Ltd.	Daewoo	Aug-08	M. Islnds.	Diesel	GT NO 96	18	RasGas III	2252
Fuji LNG	149,172	Aletheia Owning Co.	Kawasaki	Mar-04	Malta	Steam	Moss	4	Sabine Pass	1527
Fuwairit	138,200	Camartina Shipping Co.	Samsung	Jan-04	Bahamas	Steam	TZ Mk. III	4	RasGas II	1406
Gail Bhuwan	180,000	Primavera Montana SA	Daewoo	Feb-21	M. Islnds.	X-DF	GT NO 96 GW	4	Portfolio	2499
Galia Spirit	140,624	Teekay Gas II	Daewoo	Jul-04	Liberia	Steam	GT NO 96	4	Portfolio	2209
GasLog Chelsea	153,000	Gas-Fifteen Ltd.	Hanjin (Busan)	Jun-10	Bermuda	TFDE	TZ Mk. III	4	–	193
GasLog Galveston	174,000	Gas-Thirty Three Ltd.	Samsung	Jan-21	Bermuda	X-DF	TZ Mk. III Flex+	4	US Portfolio	2301
GasLog Geneva	174,000	GasLog	Samsung	Oct-16	Bermuda	TFDE	TZ Mk. III Flex	4	Portfolio	2102
GasLog Genoa	174,000	GasLog	Samsung	Mar-18	Bermuda	X-DF	TZ Mk. III Flex	4	Portfolio	2130
GasLog Georgetown	174,000	Gas-Thirty Two Ltd.	Samsung	Nov-20	Bermuda	–	TZ Mk. III Flex+	4	Portfolio	2300
GasLog Gibraltar	174,000	Gas-Fourteen Ltd.	Samsung	Nov-16	Bermuda	TFDE	TZ Mk. III Flex	4	Portfolio	2103
GasLog Gladstone	174,000	GasLog	Samsung	Mar-19	Bermuda	X-DF	TZ Mk. III Flex+	4	Portfolio	2131
GasLog Glasgow	174,000	GasLog	Samsung	Jul-16	Bermuda	TFDE	TZ Mk. III Flex	4	Portfolio	2073
GasLog Greece	174,000	GasLog	Samsung	Mar-16	Bermuda	TFDE	TZ Mk. III Flex	4	Portfolio	2072
GasLog Hong Kong	174,000	GasLog	HHI	Mar-18	Bermuda	X-DF	TZ Mk. III Flex	4	Portfolio	2801
GasLog Houston	174,000	GasLog	HHI	Dec-18	Bermuda	X-DF	TZ Mk. III Flex	4	GoM	2800
GasLog Salem	155,000	GasLog	Samsung	May-15	Bermuda	TFDE	TZ Mk. III	4	Portfolio	2044
GasLog Santiago	155,000	Gas-Four Ltd.	Samsung	Mar-13	Bermuda	TFDE	TZ Mk. III	4	Portfolio	1947
GasLog Saratoga	155,000	GasLog	Samsung	Dec-14	Bermuda	TFDE	TZ Mk. III	4	Spot	2043
GasLog Savannah	155,000	Gas-One Ltd.	Samsung	May-10	Liberia	TFDE	TZ Mk. III	4	Portfolio	1641
GasLog Seattle	155,000	Gas-Seven Ltd.	Samsung	Oct-13	Bermuda	TFDE	TZ Mk. III	4	Portfolio	2041
GasLog Shanghai	155,000	Gas-Three Ltd.	Samsung	Feb-13	Bermuda	TFDE	TZ Mk. III	4	Portfolio	1946
GasLog Singapore	155,000	Gas-Two Ltd.	Samsung	Aug-10	Liberia	TFDE	TZ Mk. III	4	Portfolio	1642
GasLog Skagen	155,000	Gas-Six Ltd.	Samsung	Aug-13	Bermuda	TFDE	TZ Mk. III	4	Portfolio	2017
GasLog Sydney	155,000	Gas-Five Ltd.	Samsung	Jun-13	Bermuda	–	TZ Mk. III	4	Portfolio	2016
GasLog Wales	180,000	GasLog	Samsung	May-20	Bermuda	X-DF	TZ Mk. III Flex+	4	Portfolio	2274
GasLog Warsaw	180,000	GasLog	Samsung	Jul-19	Bermuda	X-DF	TZ Mk. III Flex+	4	Portfolio	2212
GasLog Wellington	176,400	GAS-Thirty Four Ltd.	Samsung	Jun-21	Bermuda	X-DF	TZ Mk. III Flex+	4	US Portfolio	2311
GasLog Westminster	180,000	Gas-Thirty Ltd.	Samsung	Jul-20	MAIta	X-DF	TZ Mk. III Flex	4	Portfolio	2262
GasLog Winchester	176,400	Gas-Thirty Five Ltd.	Samsung	Aug-21	Bermuda	X-DF	TZ Mk. III Flex+	4	US Portfolio	2312
GasLog Windsor	180,000	GasLog	Samsung	Apr-20	Bermuda	X-DF	TZ Mk. III Flex	4	Portfolio	2213
Gemmata	135,269	Shell Bermuda (Overseas) Ltd.	Mitsubishi	Feb-04	Singapore	Steam	Moss	5	Peru LNG	2183
Georgiy Brusilov	172,410	Arctic LNG 3 Ltd.	Daewoo	Nov-18	Cyprus	TFDE - Azipod	GT NO 96 GW	4	Yamal	2427
Georgiy Ushakov	172,652	Teekay Corp.	Daewoo	Sep-19	Bahamas	ME-GI	GT NO 96 GW	4	Yamal	2433
Ghasha	137,000	Ghasha Inc.	Mitsui E&S	Jun-95	Liberia	Steam	Moss	5	Das Island	1392
Gigira Laitebo	177,419	Cleopatra LNG Shipping Co.	HHI	Feb-10	Bahamas	–	TZ Mk. III	4	RasGas	1876
Global Energy	74,100	GDF Armateur 2	STX	Jan-04	France	Diesel/Gas-Electric	CS1	4	Portfolio	32M
Global Energy	173,400	Hai Kuo Shipping 2118G Ltd.	Daewoo	May-20	Greece	ME-GI	GT NO 96 GW	4	Portfolio	2478
Global Sea Spirit	169,932	Global Sea Spirit Inc	Daewoo	Oct-21	Greece	ME-GI	–	4	US Portfolio	2502
Global Star	173,400	Hai Kuo Shipping 2119G Ltd.	Daewoo	Jan-21	M. Islnds.	ME-GI	GT NO 96 GW	4	Portfolio	2487
Golar Arctic	140,648	Golar LNG 2216 Corp.	Daewoo	Oct-03	Singapore	Steam	GT NO 96	4	Jamaica LNG	2216
Golar Bear	160,000	Golar LNG	Samsung	Sep-14	M. Islnds.	Diesel/Gas-Electric	TZ Mk. III Flex	4	Spot	2027
Golar Celsius	160,000	Golar Hull M2026 Corp.	Samsung	Oct-13	M. Islnds.	Diesel/Gas-Electric	TZ Mk. III Flex	4	Spot	2026
Golar Crystal	159,800	Golar LNG	Samsung	Sep-14	M. Islnds.	–	TZ Mk. III Flex	4	Spot	2022
Golar Frost	160,000	Golar LNG	Samsung	Oct-14	M. Islnds.	Diesel/Gas-Electric	TZ Mk. III Flex	4	Portfolio	2055
Golar Glacier	162,000	Golar LNG	Hyundai Samho	Nov-14	M. Islnds.	TFDE	TZ Mk. III Flex	4	Spot	–
Golar Grand	145,700	Golar Grand Corp.	Daewoo	Jan-06	M. Islnds.	Steam	GT NO 96	4	Gorgon	2226
Golar Ice	160,000	Golar LNG	Samsung	Jan-15	Bermuda	Diesel Electric	TZ Mk. III Flex	4	Spot	2048
Golar Kelvin	162,000	Golar LNG	Hyundai Samho	Jan-15	M. Islnds.	DFDS	TZ Mk. III Flex	4	Spot	S659
Golar Maria	145,700	Golar LNG 2234 LLC	Daewoo	Jun-06	M. Islnds.	Steam	GT NO 96	4	Spot	2234
Golar Penguin	160,000	Golar LNG	Samsung	Sep-14	M. Islnds.	–	TZ Mk. III Flex	4	Spot	2023
Golar Seal	160,000	Golar Hull M2021 Corp.	Samsung	Sep-13	M. Islnds.	Diesel/Gas-Electric	TZ Mk. III Flex	4	Spot	2021
Golar Snow	160,000	Golar LNG	Samsung	Jan-15	Bermuda	Diesel/Gas-Electric	TZ Mk. III Flex	4	Spot	2047
Grace Acacia	149,700	Algawin Shipping Inc.	HHI	Feb-07	Bahamas	Steam	TZ Mk. III	4	Spot	1728
Grace Barleria	149,700	NYK LNG Shipmanagement	HHI	Apr-07	Bahamas	–	TZ Mk. III	4	Portfolio	1729
Grace Cosmos	150,000	Algahunt Shipping Inc.	HHI	Feb-08	Bahamas	Steam	TZ Mk. III	4	Portfolio	1730
Grace Dahlia	177,000	NYK Line	Kawasaki	Sep-13	Japan	Steam	Moss	4	Spot	1665
Grace Emilia	174,000	Akizuki Maritima SA	Hyundai Samho	Oct-21	Bahamas	X-DF	–	4	Portfolio	8032
Grand Aniva	145,000	NYK-SCF LNG Shipping No. 1	Mitsubishi	Jan-08	Cyprus	Steam	Moss	4	Sakhalin II	2230

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Grand Elena	145,580	NYK-SCF LNG Shipping No. 1	Mitsubishi	Oct-07	Cyprus	Steam	Moss	4	Sakhalin II	2229
Grand Mereya	147,000	Ice Gas LNG Shipping Co.	Mitsui E&S	Mar-08	Cyprus	Steam	Moss	4	Sakhalin II	1681
Gui Ying	170,701	Fortune Power Shipping Ltd.	Hudong Zhonghua	Oct-21	Singapore	X-DF	GT NO 96 L03+	4	Portfolio	H1828A
Hanjin Muscat	138,366	Pluto Lease Corp.	Hanjin (Busan)	Jul-99	Panama	Steam	GT NO 96	4	Oman LNG	54
Hanjin Pyeongtaek	130,636	Hanjin Shipping Co.	Hanjin (Busan)	Sep-95	Panama	Steam	GT NO 96	4	Bontang	16
Hanjin Ras Laffan	138,214	KSH International	Hanjin (Busan)	Jul-00	Panama	Steam	GT NO 96	4	RasGas I	62
Hanjin Sur	138,333	KSG International	Hanjin (Busan)	Feb-00	Panama	Steam	GT NO 96	4	Oman LNG	61
Hellas Athina	170,520	Kronos Shipping LLC	Hyundai Samho	Sep-21	Malta	X-DF	TZ Mk. III Flex	4	Portfolio	8040
Hellas Diana	174,000	Zeus Shipping LLC	Hyundai Samho	Mar-21	Malta	X-DF	TZ Mk. III Flex	4	Portfolio	8039
Hispania Spirit	145,500	Teekay Gas Naviera SL	Daewoo	Aug-02	Spain	Steam	GT NO 96	4	Peru LNG	2205
HongKong Energy	138,000	Chevron LNG Shipping Co.	Daewoo	Feb-04	Australia	Steam	GT NO 96	4	North West Shelf	2214
Hyundai Aquapia	137,415	H&S Shipping	HHI	May-00	Panama	Steam	Moss	4	Oman LNG	1156
Hyundai Cosmopia	137,415	H&B Shipping	HHI	Feb-00	Panama	Steam	Moss	4	RasGas I	1074
Hyundai Ecopia	149,745	KLT 1 International	HHI	Nov-08	Panama	–	TZ Mk. III	4	Balhaf	1903
Hyundai Greenpia	125,000	Hyundai Merchant Marine	HHI	May-96	Panama	Steam	Moss	4	MLNG	853
Hyundai Oceanpia	135,000	H&T Shipping	HHI	Jun-00	Panama	Steam	Moss	4	Oman LNG	1157
Hyundai Peacepia	174,000	Hyundai LNG Shipping	Daewoo	Jun-17	Panama	ME-GI	GT NO 96 GW	4	Sabine Pass	2452
Hyundai Princepia	174,000	Hyundai LNG Shipping	Daewoo	May-17	Panama	ME-GI	GT NO 96 GW	4	Sabine Pass	2451
Hyundai Technopia	137,415	H&K Shipping	HHI	Jul-99	Panama	Steam	Moss	4	RasGas I	1073
Hyundai Utopia	125,182	Hyundai Merchant Marine	HHI	Jun-94	Panama	Steam	Moss	4	Donggi Senoro	760
Iberica Knutsen	138,000	Norspan LNG III AS	Daewoo	Aug-06	Norway	Ultra Steam Turbine	GT NO 96	4	Portfolio	2236
Ibra LNG	147,000	SNC Corentin	Samsung	Jul-06	Panama	Steam	TZ Mk. III	4	Oman LNG	1573
Ibri LNG	147,569	Dune LNG Carrier	Mitsubishi	Jul-06	Panama	Steam	Moss	4	Oman LNG	2215
Isabella	169,932	Kasimia Marine Co.	Daewoo	Jul-21	Greece	ME-GI	GT NO 96 GW	4	–	2495
Ish	137,000	Ish Inc.	Mitsubishi	Nov-95	Liberia	Steam	Moss	5	Das Island	2067
John A. Angelicoussis	174,000	Varta Shipping Ltd	Daewoo	Mar-22	Greece	ME-GI	–	4	–	2508
K. Acacia	138,017	Horizon Maritime Shipholding	Daewoo	Dec-99	Panama	Steam	GT NO 96	4	Oman LNG	2203
K. Freesia	138,015	Meridian Maritime Shipholding	Daewoo	Aug-00	Panama	Steam	GT NO 96	4	RasGas I	2204
K. Jasmine	145,878	Kolt JV No. 1	Daewoo	May-08	Panama	Steam	GT NO 96	4	Sakhalin II	2260
K. Mugungwha	151,812	Kolt JV No. 2	Daewoo	Nov-08	Panama	Steam	GT NO 96	4	Oman LNG	2261
KARMOL LNGT Powership Asia	127,500	BHP Consortium	Kawasaki	Jan-91	Bermuda	Steam	Moss	4	North West Shelf	1410
Kinisis	173,400	Chandris Group	Daewoo	Oct-18	Greece	ME-GI	GT NO 96 GW	4	Portfolio	2464
Kita LNG	147,895	Cardiff LNG	Daewoo	May-14	Malta	Diesel Electric	GT NO 96 L03	4	Spot	H2298
Kmarin Diamond	155,000	RBSSAF (19) Ltd.	Hyundai Samho	Jul-08	Isle of Man	Diesel/Gas-Electric	TZ Mk. III	4	Portfolio	S297
Kmarin Emerald	155,000	RBSSAF (19) Ltd.	HHI	May-07	Isle of Man	–	TZ Mk. III	4	Portfolio	1777
Kumul	170,000	Mitsui O.S.K. Lines	Hudong Zhonghua	Dec-15	H.K., China	Diesel	GT NO 96	4	PNG LNG	1673A
La Mancha Knutsen	176,300	Norspan LNG IX	HHI	Sep-16	Spain	ME-GI	TZ Mk. III Flex	4	Portfolio	2733
La Seine	174,000	Xiang CH16 HK International	HHI	Feb-20	Malta	X-DF	TZ MK. III Flex	4	Portfolio	3020
Lalla Fatma N'Soumer	145,000	Algerian Nippon Gas Transport Corp.	Kawasaki	Oct-04	Bahamas	Steam	Moss	4	Arzew	1534
Lena River	155,000	Solana Holdings	HHI	Sep-13	M. Islnds.	–	TZ Mk. III	4	Portfolio	H2557
Lijmiliya	263,300	Nakilat Lijmiliya Inc.	Daewoo	Dec-08	M. Islnds.	Diesel	GT NO 96	5	Qatargas II	2256
LNG Abalamabie	162,000	Bonny Gas Transport	Samsung	Jul-16	Bermuda	DFDS	TZ Mk. III Flex	4	NLNG	2079
LNG Abuja II	162,000	Bonny Gas Transport	Samsung	Mar-16	Bermuda	–	TZ Mk. III Flex	4	NLNG	2078
LNG Adamawa	141,000	Bonny Gas Transport	HHI	Apr-05	Bermuda	Steam	Moss	4	NLNG	1470
LNG Adventure	174,000	Diderot Financement 28 SNC	Samsung	Mar-21	M. Islnds.	X-DF	TZ Mk. III Flex	4	Portfolio	2302
LNG Akwa Ibom	141,000	Bonny Gas Transport	HHI	Oct-04	Bermuda	Steam	Moss	4	NLNG	1469
LNG Alliance	154,472	NYK Armateur	STX	Mar-07	France	Diesel/Gas-Electric	CS1	4	Portfolio	32P
LNG Aquarius	126,300	P.T. Hanochem Shipping	General Dynamics	Jan-77	Indonesia	Steam	Moss	5	Bontang	41
LNG Barka	155,982	Lloyd's TSB General Leasing (No. 3)	Kawasaki	Dec-08	Bahamas	Steam	Moss	4	Oman LNG	1591
LNG Bayelsa	137,500	Bonny Gas Transport	HHI	Mar-03	Bermuda	–	Moss	4	NLNG	1429
LNG Benue	145,952	BW Gas LNG Carriers	Daewoo	Apr-06	Bermuda	Steam	GT NO 96	4	NLNG	2224
LNG Bonny II	174,000	Nigeria LNG	HHI	Dec-15	Bermuda	Diesel/Gas-Electric	TZ Mk. III Flex	4	NLNG	2636
LNG Borno	149,600	Okra Shipping No. 1	Samsung	Aug-07	Bermuda	Steam	TZ Mk. III	4	NLNG	1563
LNG Cross River	141,000	Bonny Gas Transport	HHI	Aug-05	Bermuda	Steam	Moss	4	NLNG	1471
LNG Dream	145,000	Osaka Gas Consortium	Kawasaki	Sep-06	Bahamas	Steam	Moss	4	North West Shelf	1545
LNG Dubhe	174,000	Mitsui O.S.K. Lines	Hudong Zhonghua	Nov-19	Panama	ME-GI	GT NO 96 L03+	4	Yamal	1810A
LNG Ebisu	147,546	LNG Ebisu Shipping Corp.	Kawasaki	Jul-08	Bahamas	–	Moss	4	Pluto	1588
LNG Endeavour	170,520	Fortune Great Shipping Ltd.	Samsung	Oct-21	France	X-DF	TZ Mk. III Flex	4	Portfolio	2355
LNG Endurance	170,520	DuPlessis Bail SNC	Samsung	Dec-21	France	X-DF	TZ Mk. III Flex	4	Portfolio	2307
LNG Enterprise	170,520	Hanovre Financement 20 SASU	Samsung	Oct-21	France	X-DF	TZ Mk. III Flex	4	Portfolio	2360
LNG Enugu	145,926	BW Gas LNG Carriers	Daewoo	Oct-05	Bermuda	Steam	GT NO 96	4	NLNG	2222
LNG Finima II	162,000	Bonny Gas Transport	Samsung	Dec-15	Bermuda	–	TZ Mk. III Flex	4	NLNG	2076
LNG Fukurokuju	164,700	Mitsui O.S.K. Lines	Kawasaki	Jul-16	Panama	Steam	Moss	4	APLNG	1712
LNG Imo	148,452	Bergesen LNG XI Ltd.	Daewoo	Jun-08	Bermuda	–	GT NO 96	4	NLNG	2232
LNG Jamal	135,333	Osaka Gas Consortium	Mitsubishi	Oct-00	Japan	Steam	Moss	5	Oman LNG	2157
LNG Juno	180,000	Mitsui O.S.K. Lines	Mitsubishi	Oct-18	Japan	STaGE	Moss	–	Freeport	2323
LNG Jupiter	153,000	Osaka Gas Consortium	Kawasaki	Jul-09	Panama	Steam	Moss	4	PNG LNG	1592

LNG Jurojin	160,000	LNG Jurojin Shipping Corp.	Mitsubishi	Nov-15	Bahamas	Steam	Moss	4	Portfolio	2299
LNG Kano	148,565	Bergesen LNG IX Ltd.	Daewoo	Jan-07	Bermuda	Steam	GT NO 96	4	NLNG	2230
LNG Kolt	153,595	KLT 5 International	Hanjin (Busan)	Dec-08	Panama	Steam	TZ Mk. III	4	Portfolio	192
LNG Lagos II	174,000	Nigeria LNG	HHI	Jan-16	Bermuda	DFDS	TZ Mk. III Flex	4	NLNG	2637
LNG Lerici	65,000	LNG Shipping S.p.A.	Sestri Ponente	Apr-98	Italy	Steam	GT NO 96	4	Portfolio	5911
LNG Lokoja	148,471	Bergesen LNG VIII Ltd.	Daewoo	Nov-06	Bermuda	Steam	GT NO 96	4	NLNG	2229
LNG Maleo	127,544	Mitsui O.S.K. Lines	Mitsui E&S	Jan-89	Japan	Steam	Moss	4	North West Shelf	1351
LNG Mars	155,693	Osaka Gas Consortium	Mitsubishi	Oct-16	Japan	Steam	Moss	4	PNG LNG	2296
LNG Megrez	174,000	Mitsui O.S.K. Lines	Hudong Zhonghua	Nov-20	Panama	ME-GI	GT NO 96 L03+	4	Yamal	1813A
LNG Merak	174,000	Mitsui O.S.K. Lines	Hudong Zhonghua	Jan-20	Panama	ME-GI	GT NO 96 L03+	4	Yamal	1811A
LNG Ogun	149,000	Okra Shipping No. 1	Samsung	Jul-07	Bermuda	Steam	TZ Mk. III	4	NLNG	1564
LNG Ondo	148,478	Bergesen LNG X Ltd.	Daewoo	Sep-07	Bermuda	Steam	GT NO 96	4	NLNG	2231
LNG Oyo	145,842	BW Gas LNG Carriers	Daewoo	Jan-06	Bermuda	Steam	GT NO 96	4	NLNG	2223
LNG Phecda	174,000	Mitsui O.S.K. Lines	Hudong Zhonghua	Sep-20	Panama	ME-GI	GT NO 96 L03+	4	Yamal	1812A
LNG Pioneer	138,121	M & S Shipping 3 S.A.	Daewoo	Jul-05	Bahamas	Steam	GT NO 96	4	Das Island	2219
LNG Port Harcourt II	162,000	Bonny Gas Transport	Samsung	Dec-15	Bermuda	–	TZ Mk. III Flex	4	NLNG	2077
LNG Prima Carrier	137,000	Pacific Eurus Shipping	Mitsubishi	Mar-06	Bahamas	Steam	Moss	4	Das Island	2187
LNG River Niger	141,000	Bonny Gas Transport	HHI	Jul-06	Bermuda	Steam	Moss	4	NLNG	1472
LNG River Orashi	145,914	BW Gas LNG Carriers	Daewoo	Nov-04	Bermuda	Steam	GT NO 96	4	NLNG	2221
LNG Rivers	137,200	Bonny Gas Transport	HHI	Jun-02	Bermuda	–	Moss	4	NLNG	1295
LNG Rosenrot	176,523	Fair Wind Navigation SA	Daewoo	Jan-21	M. Islnds.	X-DF	GT NO 96 GW	4	Portfolio	2498
LNG Sakura	177,000	Mitsui O.S.K. Lines	Kawasaki	Feb-18	Bahamas	TFDE	Moss	–	Freeport	1731
LNG Saturn	155,300	Mitsui O.S.K. Lines	Mitsubishi	Feb-16	Bahamas	Ultra Steam Turbine	Moss	4	Gorgon	2311
LNG Schneeweisschen	180,000	Mitsui O.S.K. Lines	Daewoo	Sep-18	Bermuda	TFDE	GT NO 96 GW	–	Freeport	2462
LNG Sokoto	137,425	Bonny Gas Transport	HHI	Sep-02	Bermuda	–	Moss	4	NLNG	1296
LNG Unity	154,472	GDF Armateur 2	STX	Nov-06	France	Diesel/Gas-Electric	CS1	4	Portfolio	32N
LNG Venus	153,000	Mitsui O.S.K. Lines	Mitsubishi	Nov-14	Japan	–	Sayaendo	4	North West Shelf	2295
LNG Vesta	127,386	Tokyo LNG Tanker Co.	Mitsubishi	Jun-94	Japan	Steam	Moss	4	–	2061
LNGShips Athena	170,618	Cardiff LNG Iota Owning LLC	HHI	Mar-21	Malta	X-DF	TZ Mk. III Flex	4	–	112
LNGShips Empress	174,000	Cardiff LNG Kappa Owning LLC	Samsung	Mar-21	Malta	X-DF	TZ Mk. III Flex	4	QCLNG	2380
LNGShips Manhattan	174,000	Cardiff LNG Theta Owning LLC	HHI	May-21	Malta	X-DF-HPSCR	NO-96-GW+PRS	4	QCLNG	3039
Lobito	160,276	Mint LNG III	Samsung	Nov-11	Bahamas	–	TZ Mk. III	4	Soyo	1812
Lusail	145,000	Peninsula LNG Transport No. 1	Samsung	May-05	Bermuda	–	TZ Mk. III	4	RasGas II	1440
Macoma	145,400	Teekay LNG Partners	Daewoo	Sep-17	Bahamas	ME-GI	GT NO 96 GW	4	Portfolio	2417
Madrid Spirit	138,000	Teekay Shipping Spain S.L.	Navantia	Dec-04	Spain	Steam	GT NO 96	4	Atlantic LNG	105
Magdala	173,400	Teekay Corp.	Daewoo	Feb-18	Bahamas	ME-GI	GT NO 96 GW	4	Portfolio	2453
Magellan Spirit	165,500	Magellan Spirit ApS	Samsung	Apr-09	Denmark	Diesel/Gas-Electric	TZ Mk. III	4	Portfolio	1626
Malanje	160,276	Mint LNG II	Samsung	Oct-11	Bahamas	–	TZ Mk. III	4	Soyo	1811
Maran Gas Achilles	174,000	Maran Gas Maritime	Hyundai Samho	Jan-16	Greece	DFDS	TZ Mk. III Flex	4	Portfolio	S689
Maran Gas Agamemnon	174,000	Maran Gas Maritime	Hyundai Samho	May-16	Greece	DFDS	TZ Mk. III Flex	4	Portfolio	S690
Maran Gas Alexandria	161,870	Maran Gas Maritime	Hyundai Samho	Oct-15	Greece	–	TZ Mk. III Flex	4	QCLNG	S627
Maran Gas Amphipolis	174,000	Maran Gas Maritime	Daewoo	Aug-16	Greece	–	GT NO 96 L03	4	Portfolio	2412
Maran Gas Andros	173,400	Maran Gas Maritime	Daewoo	Nov-19	Greece	ME-GI	GT NO 96 GW	4	Freeport	2467
Maran Gas Apollonia	161,870	Maran Gas Maritime	Hyundai Samho	Jan-14	Greece	Diesel Electric	TZ Mk. III Flex	4	Punta Europa	S624
Maran Gas Asclepius	145,000	Sea Satin Corp.	Daewoo	Jul-05	Greece	Steam	GT NO 96	4	RasGas II	H2227
Maran Gas Chios	170,000	Maran Gas Maritime	Daewoo	Mar-19	Greece	ME-GI	GT NO 96 GW	4	–	2456
Maran Gas Coronis	145,700	Jopica Shipping Company	Daewoo	Jul-07	Greece	Steam	GT NO 96	4	RasGas II	2244
Maran Gas Delphi	159,800	Maran Gas Maritime	Daewoo	Feb-14	Greece	Diesel Electric	GT NO 96 L03	4	Portfolio	2296
Maran Gas Efessos	159,800	Maran Gas Maritime	Daewoo	Jun-14	Greece	–	GT NO 96 L03	4	Portfolio	H-2291
Maran Gas Hector	174,000	Maran Gas Maritime	Hyundai Samho	Nov-16	Greece	Diesel/Gas-Electric	TZ Mk. III Flex	–	Portfolio	S691
Maran Gas Hydra	173,400	Maran Gas Maritime	Daewoo	Feb-19	Greece	ME-GI	GT NO 96 GW	4	Sabine Pass	2459
Maran Gas Ithaca	174,000	Arona Maritime Inc.	Daewoo	Oct-21	Greece	X-DF	TZ Mk. III Flex	4	Portfolio	2507
Maran Gas Leto	174,000	Maran Gas Maritime	Hyundai Samho	Mar-16	Greece	DFDS	TZ Mk. III	4	Portfolio	S688
Maran Gas Lindos	161,870	Maran Gas Maritime	Daewoo	Jul-15	Greece	DFDS	GT NO 96 L03	4	Punta Europa	2292
Maran Gas Mystras	155,900	Maran Gas Maritime	Daewoo	Aug-15	Greece	DFDS	GT NO 96 L03	4	QCLNG	2405
Maran Gas Olympias	174,000	Maran Gas Maritime	Daewoo	Feb-17	Greece	ME-GI	GT NO 96 L03	–	Portfolio	2415
Maran Gas Pericles	173,400	Maran Gas Maritime	Hyundai Samho	Aug-16	Greece	DFDS	TZ Mk. III Flex	4	Portfolio	S734
Maran Gas Posidonia	161,870	Maran Gas Maritime	Hyundai Samho	May-14	Greece	–	TZ Mk. III Flex	4	Punta Europa	S625
Maran Gas Psara	173,595	Highseas Shiptrade Co.	Daewoo	May-20	Greece	ME-GI	GT NO 96 GW	4	Portfolio	2469
Maran Gas Roxana	174,000	Maran Gas Maritime	Daewoo	Jan-17	Greece	ME-GI	GT NO 96 L03	4	Portfolio	2413
Maran Gas Sparta	159,800	Maran Gas Maritime	Hyundai Samho	Apr-15	Greece	–	TZ Mk. III Flex	4	QCLNG	S626
Maran Gas Spetses	173,400	Maran Gas Maritime	Daewoo	Jul-18	Greece	ME-GI	GT NO 96 GW	4	GoM	2458
Maran Gas Troy	155,000	Maran Gas Maritime	Daewoo	Sep-15	Greece	DFDS	GT NO 96 L03	4	–	2406
Maran Gas Ulysses	173,400	Maran Gas Maritime	Hyundai Samho	Jan-17	Greece	Diesel/Gas-Electric	TZ Mk. III Flex	–	Portfolio	S735
Maran Gas Vergina	174,000	Santa Lucia Enterprises Inc.	Daewoo	Dec-16	Greece	ME-GI	GT NO 96	–	Portfolio	2414
Maria Energy	174,000	Tsakos Energy Navigation	HHI	Sep-16	Greece	Diesel/Gas-Electric	TZ Mk. III Flex	4	–	2612
Marib Spirit	165,500	Membrane Shipping	Samsung	Apr-08	M. Islnds.	Diesel/Gas-Electric	TZ Mk. III	4	Balhaf	1608
Marshal Vasilevskiy	170,000	Gazprom	HHI	Jan-19	Russia	Diesel/Gas-Electric	TZ Mk. III Flex	4	Kaliningrad LNG	2854



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Marvel Crane	177,000	NYK Line	Mitsubishi	Mar-19	Japan	STaGE	Moss	–	Cameron	2321
Marvel Eagle	155,000	Mitsui O.S.K. Lines	Kawasaki	Oct-18	Panama	Reheat Steam Turbine	Moss	–	Cameron	1728
Marvel Falcon	174,000	Mitsui O.S.K. Lines	Samsung	Apr-18	Singapore	TFDE	TZ Mk. III Flex	4	Cameron	2148
Marvel Hawk	177,000	Mitsui O.S.K. Lines	Samsung	Dec-18	Japan	TFDE	TZ Mk. III Flex	4	Cameron	2149
Marvel Heron	177,000	Mitsui O.S.K. Lines	Mitsubishi	Sep-19	Japan	STaGE	Moss	–	Cameron	2322
Marvel Kite	177,000	Mitsui O.S.K. Lines	Samsung	Jan-19	Japan	TFDE	TZ Mk. III	4	Cameron	2150
Marvel Pelican	156,265	Mitsui O.S.K. Lines	Kawasaki	Dec-19	Panama	Reheat Steam Turbine	Moss	4	Cameron	1729
Marvel Swan	174,000	MIF I NO 20 K/S	Samsung	Apr-21	Denmark	X-DF	TZ Mk. III Flex	4	–	2310
Megara	173,400	Teekay LNG Partners	Daewoo	Jul-18	Bahamas	ME-GI	GT NO 96 GW	4	Portfolio	2455
Mekaines	266,000	Nakilat SHI 1695 Inc.	Samsung	Apr-09	M. Islnds.	–	TZ Mk. III	5	Qatargas III	1695
Merchant	138,000	Sea Breeze Leasing	Samsung	Jul-03	Isle of Man	Steam	TZ Mk. III	4	Portfolio	1381
Meridian Spirit	165,500	Meridian Spirit Aps	Samsung	Jan-10	Denmark	Diesel/Gas-Electric	TZ Mk. III	4	Portfolio	1633
Mesaimmer	216,312	Nakilat HHI 1908 Inc.	HHI	Mar-09	M. Islnds.	Diesel	TZ Mk. III	4	Qatargas III	1908
Methane Alison Victoria	145,000	Lloyds TSB Leasing No.8 Ltd.	Samsung	Apr-07	Bahamas	Steam	TZ Mk. III	4	Punta Europa	1587
Methane Becki Anne	170,000	Methane Services (Shell)	Samsung	Sep-10	Bermuda	–	TZ Mk. III	4	Singapore	1858
Methane Heather Sally	145,000	Lloyds TSB Leasing No.8 Ltd.	Samsung	Jan-07	Bahamas	Steam	TZ Mk. III	4	Punta Europa	1586
Methane Jane Elizabeth	145,000	British Gas Asia Pacific	Samsung	Jun-06	Bermuda	Steam	TZ Mk. III	4	Idku	1554
Methane Julia Louise	170,000	Methane Services (Shell)	Samsung	Apr-10	Bermuda	–	TZ Mk. III	9	Singapore	1745
Methane Kari Elin	138,267	BG Group	Samsung	May-04	Bermuda	Steam	TZ Mk. III	4	Singapore	1428
Methane Lydon Volney	145,000	BG Group	Samsung	Aug-06	Bermuda	Steam	TZ Mk. III	4	Idku	1555
Methane Mickie Harper	170,000	Methane Services (Shell)	Samsung	Dec-10	Bermuda	Diesel/Gas-Electric	TZ Mk. III	4	Singapore	1859
Methane Nile Eagle	145,000	Egypt LNG Shipping	Samsung	Dec-07	Bermuda	Steam	TZ Mk. III	4	Idku	1588
Methane Patricia Camila	170,000	Methane Services (Shell)	Samsung	Oct-10	Bermuda	–	TZ Mk. III	4	Singapore	1746
Methane Princess	138,000	Golar LNG	Daewoo	Aug-03	U.K.	Steam	GT NO 96	4	Portfolio	2215
Methane Rita Andrea	145,000	British Gas Asia Pacific	Samsung	Apr-06	Bermuda	Steam	TZ Mk. III	4	Idku	1553
Methane Shirley Elisabeth	145,000	Lloyds TSB Leasing No.8 Ltd.	Samsung	Feb-07	Bermuda	Steam	TZ Mk. III	4	Punta Europa	1585
Methane Spirit	165,500	Malt Singapore Pvt. Ltd.	Samsung	Feb-08	M. Islnds.	Diesel/Gas-Electric	TZ Mk. III	4	Atlantic LNG	1607
Milaha Qatar	145,500	Qatar Shipping Co.	Samsung	Apr-06	Malta	Steam	TZ Mk. III	4	RasGas II	1562
Milaha Ras Laffan	138,270	Milaha Ras Laffan GmbH & Co. KG	Samsung	Apr-04	Malta	Steam	TZ Mk. III	4	RasGas II	1425
Min Lu	147,100	Minlu LNG Shipping Co.	Hudong Zhonghua	Aug-09	H.K., China	–	GT NO 96	4	Tangguh	1378
Min Rong	145,000	Min Rong LNG Shipping Co.	Hudong Zhonghua	Feb-09	H.K., China	–	GT NO 96	4	Tangguh	1320
Minerva Chios	170,520	Peninsula Shipping SA	Samsung	Aug-21	Greece	X-DF	TZ Mk. III Flex+	4	–	2305
Minerva Kalymnos	174,000	Koje Shipping SA	Samsung	Feb-21	Malta	X-DF	GT NO 96 GW	4	–	2304
Minerva Limnos	173,400	Roland Shipping SA	Daewoo	Jun-21	Greece	ME-GI	GT NO 96 GW	4	Portfolio	2482
Minerva Psara	173,400	Wimbledon Shipping SA	Daewoo	Jan-21	Malta	–	GT NO 96 GW	4	–	2481
MOL Hestia	173,400	LNG Harmonia Shipping Corp	Daewoo	Jul-21	M. Islnds.	X-DF	GT NO 96 GW	4	–	2505
Mozah	266,000	Nakilat Haloul Inc.	Samsung	Aug-09	M. Islnds.	Diesel	TZ Mk. III	5	Qatargas II	1675
Mraweh	137,000	Mraweh Ltd.	STX	Apr-96	Liberia	Steam	Moss	4	Das Island	1331
Mu Lan	174,400	Fortune Great Shipping Ltd.	Hudong Zhonghua	Aug-21	Liberia	X-DF	GT NO 96 L03+	4	Portfolio	1827A
Mubaraz	137,000	Mubaraz Ltd.	STX	Dec-95	Liberia	Steam	Moss	4	Das Island	1330
Murex	173,400	Teekay LNG Partners	Daewoo	Jul-17	Bahamas	ME-GI	GT NO 96 GW	4	Portfolio	2416
Murwab	210,100	J5 Nakilat No. 4 Ltd.	Daewoo	Jun-08	M. Islnds.	Diesel	GT NO 96	18	RasGas III	251
Myrina	173,400	Teekay Corp.	Daewoo	May-18	Bahamas	ME-GI	GT NO 96 GW	4	Portfolio	2454
Neo Energy	150,000	Sea Optima	HHI	Jan-07	Liberia	Steam	TZ Mk. III	4	Portfolio	1754
Neptune	145,130	SRV Joint Gas Ltd.	Samsung	Nov-09	Norway	–	TZ Mk. III	4	Portfolio	1688
Nikolay Urvantsev	172,658	China Shipping Development Co.	Daewoo	Jul-19	H.K., China	ME-GI	GT NO 96 GW	4	Yamal	2432
Nikolay Yevgenov	172,410	Teekay Corp.	Daewoo	Apr-19	Bahamas	ME-GI	GT NO 96 GW	4	Yamal	2430
Nikolay Zubov	172,410	Arctic LNG 5 Ltd.	Daewoo	Nov-18	Cyprus	TFDE - Azipod	GT NO 96 GW	4	Yamal	2429
Nizwa LNG	147,684	Oryx LNG Carrier	Kawasaki	Dec-05	Panama	Steam	Moss	4	Oman LNG	1562
Nohshu Maru	180,000	Mitsui O.S.K. Lines	Mitsubishi	Feb-19	Bahamas	Reheat Steam Turbine	Moss	4	–	2326
Northwest Sanderling	127,525	Shell Tankers Australia	Mitsubishi	Jan-89	Australia	Steam	Moss	4	North West Shelf	1996
Northwest Sandpiper	125,042	Shell Tankers Australia	Mitsui E&S	Jan-93	Australia	Steam	Moss	4	North West Shelf	1370
Northwest Snipe	127,500	International Gas Transportation Co., Ltd.	Mitsui E&S	Jan-90	Australia	Steam	Moss	4	North West Shelf	1352
Northwest Stormpetrel	127,500	Shell Tankers Australia	Mitsubishi	Dec-94	Australia	Steam	Moss	4	North West Shelf	2074
Oak Spirit	173,400	Teekay LNG Partners	Daewoo	Mar-16	Bahamas	ME-GI	GT NO 96 GW	–	Sabine Pass	2408
Ob River	149,700	Lance Shipping	HHI	May-07	M. Islnds.	Steam	TZ Mk. III	4	Sakhalin II	1719
Oceanic Breeze	155,300	"K" Line - Kawasaki Kisen Kaisha	Mitsubishi	Apr-18	Japan	Reheat Steam Turbine	Moss	4	Ichthys	2310
Onaiza	210,150	Nakilat DSME 2266 Inc.	Daewoo	Apr-09	M. Islnds.	Diesel	GT NO 96	12	Qatargas III	2266
Orion Sea	170,852	Meridian 23 Ltd.	Samsung	Jan-22	Liberia	X-DF	TZ Mk. III	4	Portfolio	2336
Ougarta	170,000	Hyproc Shipping Co.	HHI	Mar-17	Algeria	DFDS	TZ Mk. III Flex	4	Arzew	2814
Pacific Arcadia	145,400	Bahamas LNG Shipping	Mitsubishi	Oct-14	Bahamas	–	Moss	4	PNG LNG	MHISB 2289
Pacific Breeze	180,000	"K" Line - Kawasaki Kisen Kaisha	Kawasaki	Mar-18	Japan	TFDE	Moss	4	Ichthys	1718
Pacific Enlighten	145,400	Pacific Hope Shipping	Mitsubishi	Mar-09	Panama	Steam	Moss	4	North West Shelf	2236
Pacific Mimosa	155,300	NYK Line	Mitsubishi	Mar-18	Japan	Reheat Steam Turbine	Moss	–	Wheatstone	2316
Pacific Notus	137,006	Pacific LNG Shipping	Mitsubishi	Sep-03	Bahamas	Steam	Moss	5	Darwin LNG	2176
Palu LNG	159,800	Cardiff LNG	Daewoo	Nov-14	Malta	TFDE	GT NO 96 L03	4	Spot	2400
Pan Africa	174,000	Teekay LNG Partners	Hudong Zhonghua	Jan-19	H.K., China	TFDE	GT NO 96	4	QCLNG	1666A

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Pan Americas	174,000	Teekay LNG Partners	Hudong Zhonghua	Jan-18	H.K., China	TFDE	GT NO 96	4	QCLNG	H1664A
Pan Asia	174,000	Teekay LNG Partners	Hudong Zhonghua	Sep-17	H.K., China	TFDE	GT NO 96	4	QCLNG	1663A
Pan Europe	174,000	Teekay LNG Partners	Hudong Zhonghua	Jul-18	H.K., China	TFDE	GT NO 96	4	QCLNG	H1665A
Papua	170,000	Mitsui O.S.K. Lines	Hudong Zhonghua	Nov-14	H.K., China	–	GT NO 96	4	PNG LNG	H1670A
Patris	174,000	Chandris Group	Daewoo	Jan-18	Liberia	ME-GI	GT NO 96 GW	4	Freeport	2460
Pearl LNG	174,000	Cardiff LNG Delta Owning LLC	Samsung	Aug-20	Malta	X-DF	NO-96-GW+PRS	4	Portfolio	2275
Point Fortin	154,200	Los Halillos Shipping Co.	Koyo Dockyard	Jan-10	Panama	Steam	TZ Mk. III	4	Portfolio	2263
Polar Spirit	89,800	Polar Spirit LLC	Ishikawajima	Jun-93	Liberia	Steam	IHI SPB	4	Atlantic LNG	3015
Portovenere	65,000	LNG Shipping S.p.A.	Sestri Ponente	Apr-97	Italy	Steam	GT NO 96	4	Portfolio	5910
Portovyy	138,107	Monteriggioni Inc.	Daewoo	Aug-03	Belgium	Steam	GT NO 96	4	Portfolio	2213
Prachi	162,000	India LNG Transport Company No. 4 Ltd.	HHI	Nov-16	Singapore	Diesel/Gas-Electric	TZ Mk. III Flex	–	Gorgon	2633
Prism Agility	180,000	SK Shipping	HHI	May-19	Panama	X-DF	TZ Mk. III Flex	4	Portfolio	2937
Prism Brilliance	180,000	SK Shipping	HHI	May-19	Panama	X-DF	TZ Mk. III Flex	4	Portfolio	2938
Prism Courage	176,462	Millenaire Financement 12 SASU	HHI	Oct-21	Panama	X-DF	TZ Mk. III Flex	4	Portfolio	2939
Pskov	170,200	Sovcomflot	STX	Sep-14	Liberia	–	GT NO 96	4	Portfolio	1911
Puteri Delima	130,400	Puteri Delima S.Bhd.	STX	Jan-95	Malaysia	Steam	GT NO 96	4	MLNG II	30F
Puteri Delima Satu	137,100	MISC	Mitsui E&S	Oct-02	Malaysia	Steam	GT NO 96	4	MLNG III	1506
Puteri Firus Satu	137,100	Puteri Firus S.Bhd.	Mitsubishi	Aug-04	Malaysia	Steam	GT NO 96	4	MLNG III	2177
Puteri Intan	137,100	Puteri Intan S.Bhd.	STX	Aug-94	Malaysia	Steam	GT NO 96	4	MLNG II	30E
Puteri Intan Satu	137,100	MISC	Mitsubishi	Aug-02	Malaysia	Steam	GT NO 96	4	MLNG III	2165
Puteri Mutiara Satu	137,100	MISC	Mitsui E&S	Apr-05	Malaysia	Steam	GT NO 96	4	MLNG III	1562
Puteri Nilam	130,400	Puteri Nilam S.Bhd.	STX	Jul-95	Malaysia	Steam	GT NO 96	4	MLNG II	30G
Puteri Nilam Satu	137,100	Puteri Nilam S.Bhd.	Mitsubishi	Jul-03	Malaysia	Steam	GT NO 96	4	MLNG III	2169
Puteri Zamrud	130,400	Puteri Zamrud S.Bhd.	STX	Jun-96	Malaysia	Steam	GT NO 96	4	MLNG II	30H
Puteri Zamrud Satu	137,100	MISC	Mitsui E&S	Feb-04	Malaysia	–	GT NO 96	4	MLNG III	1507
Qogir	174,000	LNGShips	Samsung	Jun-20	Malta	X-DF	TZ MK. III Flex	–	Portfolio	2271
Raahi	138,076	India LNG Transport Company No.2 Ltd.	Daewoo	Oct-04	Malta	Steam	GT NO 96	4	RasGas	2211
Rasheeda	266,000	Nakilat SHI 1754 Inc.	Samsung	Aug-10	M. Islnds.	Diesel	TZ Mk. III	10	Qatargas IV	1754
Rias Baixas Knutsen	180,000	Knutsen OAS Shipping	HHI	Sep-19	Norway	ME-GI	TZ Mk. III Flex	4	Corpus Christi	2964
Ribera del Duero Knutsen	173,400	Norspan LNG VIII AS	Daewoo	Dec-10	Norway	–	GT NO 96	4	Portfolio	2275
Rioja Knutsen	170,000	Norspan LNG X	HHI	Dec-16	Norway	ME-GI	TZ Mk. III Flex	4	Portfolio	2734
Rudolf Samoylovich	172,410	Teekay Corp.	Daewoo	Aug-18	Bahamas	ME-GI	GT NO 96 GW	4	Yamal	2425
Salalah LNG	147,000	Tiwi LNG Carrier S.A.	Samsung	Dec-05	Panama	Steam	TZ Mk. III	4	Oman LNG	1536
SCF Barents	174,000	Heliconia Maritime SA	HHI	Sep-20	Liberia	DFDS	TZ Mk. III Flex	4	Portfolio	8007
SCF La Perouse	174,000	Albus Shipping Ltd.	HHI	Feb-20	Liberia	X-DF	NO-96-GW+PRS	4	Portfolio	8006
SCF Melampus	170,200	Sovcomflot	STX	Jan-15	Liberia	Diesel Electric	GT NO 96 GW	4	Portfolio	1912
SCF Mitre	170,200	Sovcomflot	STX	Apr-15	Liberia	Diesel Electric	GT NO 96 GW	4	Portfolio	1913
SCF Timmerman	174,000	Headliner Maritime SA	HHI	Jan-21	Liberia	X-DF	NO-96-GW+PRS	4	Portfolio	8008
Sean Spirit	174,162	Teekay LNG Partners	Hyundai Samho	Dec-18	Bermuda	ME-GI	TZ Mk. III Flex	–	Freeport	S856
Seishu Maru	138,000	Mitsui O.S.K. Lines	Mitsubishi	Sep-14	Bahamas	–	Moss	4	PNG LNG	2297
Senshu Maru	127,167	Mitsui O.S.K. Lines	Mitsui E&S	Feb-84	Japan	Steam	Moss	5	Bontang	1230
Seri Alam	145,572	MISC	Samsung	Jul-05	Malaysia	–	TZ Mk. III	4	Bintulu	1502
Seri Amanah	145,709	MISC	Samsung	Mar-06	Malaysia	Steam	TZ Mk. III	4	Bintulu	1503
Seri Anggun	145,731	MISC	Samsung	Oct-06	Malaysia	Steam	TZ Mk. III	4	North West Shelf	1589
Seri Angkasa	145,130	MISC	Samsung	Dec-06	Malaysia	Steam	TZ Mk. III	4	Bintulu	1590
Seri Ayu	145,894	MISC	Samsung	Oct-07	Malaysia	Steam	TZ Mk. III	4	Bintulu	1591
Seri Bakti	152,944	MISC	Mitsubishi	Apr-07	Malaysia	Steam	GT NO 96	4	Gladstone	2220
Seri Balhaf	152,000	MISC	Mitsubishi	Jan-09	Malaysia	Steam	GT NO 96	4	Bontang	2223
Seri Balqis	152,000	MISC	Mitsubishi	Mar-09	Malaysia	Steam	GT NO 96	4	NLNG	2224
Seri Begawan	152,900	MISC	Mitsubishi	Nov-07	Malaysia	Steam	GT NO 96	4	Bintulu	2221
Seri Bijaksana	152,300	MISC	Mitsubishi	Apr-08	Malaysia	Steam	GT NO 96	4	Bintulu	2222
Seri Camar	150,000	MISC	HHI	Feb-18	Malaysia	Ultra Steam Turbine	Moss	4	Pacific Northwest	2732
Seri Camellia	159,800	MISC	HHI	Sep-16	Malaysia	Ultra Steam Turbine	TZ MK. III Flex	4	Pacific Northwest	2729
Seri Cemara	150,200	MISC	HHI	Apr-18	Malaysia	Ultra Steam Turbine	Moss	4	Portfolio	2735
Seri Cempaka	162,000	MISC	HHI	Aug-17	Malaysia	Ultra Steam Turbine	TZ MK. III Flex	4	Pacific Northwest	2731
Seri Cenderawasih	162,000	MISC	HHI	Feb-17	Malaysia	Ultra Steam Turbine	Moss	4	Pacific Northwest	2730
Sestao Knutsen	136,947	Norspan LNG IV AS	Navantia Cadiz	Oct-07	Spain	Steam	GT NO 96	4	Portfolio	331
Sevilla Knutsen	173,400	Norspan LNG VI AS	Daewoo	May-10	Spain	Diesel/Gas-Electric	GT NO 96	4	Portfolio	2269
Shagra	268,000	Nakilat SHI 1751 Inc.	Samsung	Nov-09	M. Islnds.	Diesel	TZ Mk. III	10	Qatargas IV	1751
Shahamah	135,496	Shahamah Inc.	Kawasaki	Oct-94	Liberia	Steam	Moss	5	Das Island	1438
Shen Hai	147,200	Shanghai LNG Shipping Co.	Hudong Zhonghua	Dec-12	H.K., China	Steam	GT NO 96	4	Bintulu	H1621A
Shinshu Maru	180,000	Mitsui O.S.K. Lines	Kawasaki	Feb-19	Japan	DERST (aka STaGE)	Moss	4	Freeport	1734
Simaisma	145,889	Greenwell Corporation	Daewoo	Jul-06	Bermuda	Steam	GT NO 96	8	RasGas II	2235
Singapore Energy	138,000	Sea Breeze Leasing	Samsung	Feb-03	Isle of Man	Steam	TZ Mk. III	4	Portfolio	1416
SK Audace	174,000	Milestone LNG Transport	Samsung	Aug-17	Panama	X-DF	TZ Mk. III Flex	4	Portfolio	2080
SK Resolute	180,000	Milestone LNG Transport	Samsung	Nov-17	Panama	X-DF	TZ Mk. III Flex	4	Ichthys	2081
SK Serenity	174,000	SK Shipping	Samsung	Feb-18	South Korea	TFDE	KC-1	4	Sabine Pass	2153
SK Spica	174,117	SK Shipping	Samsung	Mar-18	South Korea	TFDE	KC-1	–	Sabine Pass	2154

SK Splendor	138,370	Optima Leasing	Samsung	May-00	Panama	Steam	TZ Mk. III	4	Oman LNG	1258
SK Stellar	138,375	Stellar Shipholding	Samsung	Dec-00	Panama	Steam	TZ Mk. III	4	RasGas I	1259
SK Summit	138,003	Omnia Enterprises	Daewoo	Aug-99	Panama	Steam	GT NO 96	4	RasGas I	2202
SK Sunrise	138,306	Methane Navigation S.A.	Samsung	Aug-03	Panama	Steam	TZ Mk. III	4	RasGas II	1405
SK Supreme	138,225	Celeste Maritime	Samsung	Feb-00	Panama	Steam	TZ Mk. III	4	RasGas I	1207
SM Eagle	174,000	Korea Line Corp.	Daewoo	May-17	Panama	ME-GI	GT NO 96 GW	4	Sabine Pass	2449
SM Seahawk	174,000	Korea Line Corp.	Daewoo	Jun-17	Panama	ME-GI	GT NO 96 GW	4	Sabine Pass	2450
Sohar LNG	137,248	Energy Spring LNG Carriers	Mitsubishi	Oct-01	Malta	Steam	Moss	5	Oman LNG	2162
Sohshu Maru	177,000	Mitsui O.S.K. Lines	Kawasaki	Jul-19	Japan	DERST (aka STaGE)	Moss	4	Freeport	1735
Solaris	155,000	GasLog	Samsung	Jul-14	Bermuda	Diesel/Gas-Electric	TZ Mk. III	4	Portfolio	2042
Sonangol Benguela	160,500	Sonangol Benguela Ltd.	Daewoo	Dec-11	Bahamas	–	GT NO 96	4	Soyo	2282
Sonangol Etosha	160,500	Sonangol Etosha Ltd.	Daewoo	Sep-11	Bahamas	–	GT NO 96	4	Soyo	2281
Sonangol Sambizanga	160,500	Sonangol Sambizanga Ltd.	Daewoo	Aug-11	Bahamas	–	GT NO 96	4	Soyo	2280
Southern Cross	172,000	Mitsui O.S.K. Lines	Hudong Zhonghua	Jul-15	H.K., China	ME-GI	GT NO 96	4	PNG LNG	H1671A
Soyo	160,276	Mint LNG I	Samsung	Aug-11	Bahamas	–	TZ Mk. III	4	Soyo	1810
Spirit of Hela	177,000	Nefertiti LNG Shipping Co.	Hyundai Samho	Nov-10	Bahamas	Diesel Electric	TZ Mk. III	4	PNG LNG	S324
Stena Blue Sky	145,700	Blue Sky LNG	Daewoo	Aug-06	Panama	Steam	GT NO 96	4	Spot	2233
Stena Clear Sky	171,800	Clear Sky LNG Shipping	Daewoo	May-11	U.K.	Diesel/Gas-Electric	GT NO 96	4	Portfolio	2278
Stena Crystal Sky	171,800	Stena Drilling Cyprus	Daewoo	May-11	U.K.	Diesel/Gas-Electric	GT NO 96	4	Portfolio	2268
Symphonic Breeze	145,394	Reborn Maritime	Kawasaki	Dec-07	Bahamas	Steam	Moss	4	Portfolio	H1587
Taitar No 1	145,000	NiMic No 1 S.A.	Mitsubishi	Oct-09	Panama	–	Moss	4	RasGas	2241
Taitar No 2	145,000	NiMic No 2 S.A.	Kawasaki	Dec-09	Panama	–	Moss	4	RasGas	1625
Taitar No 3	145,000	NiMic No 3 S.A.	Mitsubishi	Dec-09	Panama	–	Moss	4	RasGas	2242
Taitar No 4	147,000	NiMic No 4 S.A.	Kawasaki	Aug-10	Panama	–	Moss	4	RasGas	1626
Tangguh Batur	145,700	LNG North-South Shipping Co.	Daewoo	Dec-08	Singapore	Steam	GT NO 96	4	Tangguh	2242
Tangguh Foja	155,000	Ocean 1919 Shipping No. 1	Samsung	Nov-08	Panama	–	TZ Mk. III	4	Tangguh	1619
Tangguh Hiri	155,000	Tangguh Hiri Finance Ltd.	HHI	Dec-08	Isle of Man	–	TZ Mk. III	4	Tangguh	1780
Tangguh Jaya	155,000	Ocean 1919 Shipping No. 2	Samsung	Dec-08	Panama	–	TZ Mk. III	4	Tangguh	1620
Tangguh Palung	155,000	Ocean 1919 Shipping No. 3	Samsung	Mar-09	Panama	–	TZ Mk. III	4	Tangguh	1634
Tangguh Sago	155,000	Teekay Shipping (Canada) Limited	Hyundai Samho	Dec-08	Bahamas	Diesel/Gas-Electric	TZ Mk. III	4	Tangguh	S298
Tangguh Towuti	145,700	LNG East-West Shipping Co.	Daewoo	Oct-08	Singapore	Steam	GT NO 96	4	Tangguh	2241
Tembek	216,200	Overseas LNG S1 Corp.	Samsung	Nov-07	M. Islnds.	Diesel	TZ Mk. III	4	Qatargas II	1605
Tenergy	170,520	Briety Shipping Inc	HHI	Jan-22	Greece	X-DF	TZ Mk. III	4	Portfolio	3157
Tessala	170,000	Hyproc Shipping Co.	HHI	Feb-17	Algeria	Diesel/Gas-Electric	TZ Mk. III Flex	–	Arzew	2813
Torben Spirit	173,400	Teekay LNG Partners	Daewoo	Nov-16	Bahamas	ME-GI	GT NO 96 GW	–	Portfolio	2411
Trader	138,000	K Line LNG Shipping (UK) Ltd.	Samsung	Nov-02	Isle of Man	Steam	TZ Mk. III	4	Portfolio	1380
Traiano Knutsen	180,000	Hai Kuo Shipping 1901 G Ltd.	HHI	Jul-20	Belgium	ME-GI	TZ Mk. III Flex	4	Portfolio	3086
Trinity Arrow	154,982	Luster Maritime S.A. & Cypress Maritime Panama & Los Halillos Shipping Co.	Koyo Dockyard	Feb-08	Panama	Steam	TZ Mk. III	4	Portfolio	2258
Trinity Glory	154,000	Cypress Maritime Consortium	Koyo Dockyard	Nov-08	Panama	Steam	TZ Mk. III	4	Bontang	2260
Tristar Ruby	155,000	RBSSAF (19) Ltd.	HHI	Apr-08	Isle of Man	Diesel/Gas-Electric	TZ Mk. III	4	Portfolio	1778
Umm Al Amad	210,200	J5 Nakilat No. 7 Ltd.	Daewoo	Sep-08	M. Islnds.	Diesel	GT NO 96	18	RasGas III	2253
Umm Al Ashtan	137,000	Umm Al Ashtan Ltd.	STX	May-97	Liberia	Steam	Moss	4	Das Island	1333
Umm Bab	145,000	Sea Trade International Inc.	Daewoo	Nov-05	Greece	Steam	GT NO 96	4	RasGas II	2228
Umm Slal	266,000	Nakilat Umm Slal Inc.	Samsung	Nov-08	M. Islnds.	–	TZ Mk. III	5	Qatargas II	1676
Valencia Knutsen	173,400	Norspan LNG VII AS	Daewoo	Sep-10	Spain	–	GT NO 96	4	Portfolio	2274
Velikiy Novgorod	170,200	Sovcomflot	STX	Dec-13	Liberia	–	GT NO 96	4	Portfolio	1910
Vivit Americas LNG	174,000	Cardiff LNG Zeta Owning LLC	HHI	Oct-20	Malta	X-DF	TZ Mk. III Flex	4	Portfolio	3037
Vivit City LNG	174,103	Kaiser SA	Hyundai Samho	Dec-21	Liberia	X-DF	TZ Mk. III Flex	4	Portfolio	8025
Vladimir Rusanov	174,000	Mitsui O.S.K. Lines	Daewoo	Jan-18	Bahamas	ME-GI	GT NO 96 GW	4	Yamal	2424
Vladimir Vize	172,000	China Shipping Development Co.	Daewoo	Sep-18	H.K., China	ME-GI	GT NO 96 GW	4	Yamal	2426
Vladimir Voronin	172,652	Teekay Corp.	Daewoo	Jul-19	Bahamas	ME-GI	GT NO 96 GW	4	Yamal	2431
WilForce	155,900	Wilforce LLC	Daewoo	Sep-13	Norway	–	GT NO 96	4	–	H2289
WilPride	155,900	Wilpride LLC	Daewoo	Nov-13	Norway	–	GT NO 96	4	–	H2290
Woodside Chaney	174,000	Maran Gas Maritime	Daewoo	Jul-19	Greece	ME-GI	GT NO 96 GW	4	Portfolio	2457
Woodside Charles Allen	173,400	Hai Kuo Shipping 2027G Ltd.	Daewoo	Oct-20	Greece	ME-GI	GT NO 96 GW	4	Portfolio	2486
Woodside Donaldson	165,500	Malt Singapore Pvt. Ltd.	Samsung	Oct-09	Singapore	Diesel/Gas-Electric	TZ Mk. III	4	Pluto	1632
Woodside Goode	159,800	Armour Company Ltd.	Daewoo	Nov-13	Greece	Diesel Electric	GT NO 96 GW	4	RasGas	H2295
Woodside Rees Withers	173,400	Maran Gas Maritime	Daewoo	Oct-19	Greece	ME-GI	GT NO 96 GW	4	–	2466
Woodside Rogers	159,800	Margie Seaway Corp.	Daewoo	Jul-13	Greece	Diesel/Gas-Electric	GT NO 96 GW	4	Pluto	H2288
Yakov Gakkel	172,658	DSME Hull No.2434 LLC	Daewoo	Nov-19	Bahamas	ME-GI	GT NO 96 GW	4	Yamal	2434
Yamal Spirit	174,000	Teekay LNG Partners	Hyundai Samho	Jan-19	Bermuda	ME-GI	TZ Mk. III Flex	–	Freeport	S857
Yari LNG	159,800	Cardiff LNG	Daewoo	Nov-14	Malta	TFDE	GT NO 96 L03	4	Spot	2401
Yenisei River	155,000	Navajo Marine	HHI	Jul-13	M. Islnds.	–	TZ Mk. III	4	Yamal	2556
Yiannis	169,932	Onerato Marine SA	Daewoo	Sep-21	Greece	ME-GI	GT NO 96 GW	4	Portfolio	2501
YK Sovereign	127,125	SK Shipping	HHI	Dec-94	Panama	Steam	Moss	4	MLNG	761
Zarga	268,000	Nakilat SHI 1752 Inc.	Samsung	Jan-10	M. Islnds.	–	TZ Mk. III	5	Qatargas IV	1752
Zekreet	137,482	Mitsui O.S.K. Lines	Mitsui E&S	Dec-98	Japan	Steam	Moss	5	Qatargas I	1432

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 Vermögensverwaltung	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 Favia	Jul-10	10,000	Somargas II Pvt. Ltd.	Wuzhou Shipbuilding	Singapore	Diesel	Cylinders	2	Baltic portfolio
Coral Fraseri	Jan-10	10,000	Innovation Shipping Co.	Wuzhou Shipbuilding	Singapore	Diesel	Cylinders	2	Portfolio
Coral Fungia	Jan-11	10,000	Somargas II Pvt. Ltd.	Wuzhou Shipbuilding	Singapore	Diesel	Cylinders	2	Baltic portfolio
Coral Furcata	Nov-11	10,000	Conception Shipping Company	Wuzhou Shipbuilding	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
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
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
Ravenna Knutsen	Feb-21	30,000	Norspan LNG 14 AS	Hyundai Mipo	Spain	X-DF	Cylinders	3	Italy coastal trade
Seoul Gas	Jul-98	4,365	Chemgas Schiffahrts GmbH & Co. mt Oste KG	Severnav Shipbuilding	Liberia	Diesel	Cylinders	2	S. Korea-China
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
Unikum Spirit	Jun-11	12,000	DHJS Hull No.2007-001 LLC	AVIC Dingheng	Singapore	Diesel	Cylinders	2	Kuantan
Vision Spirit	Sep-11	12,000	I.M. Skaugen Marine Services	AVIC Dingheng	Singapore	Diesel	Cylinders	2	Portfolio

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



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