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China buys LNG early for winter, but fresh demand forecast from October

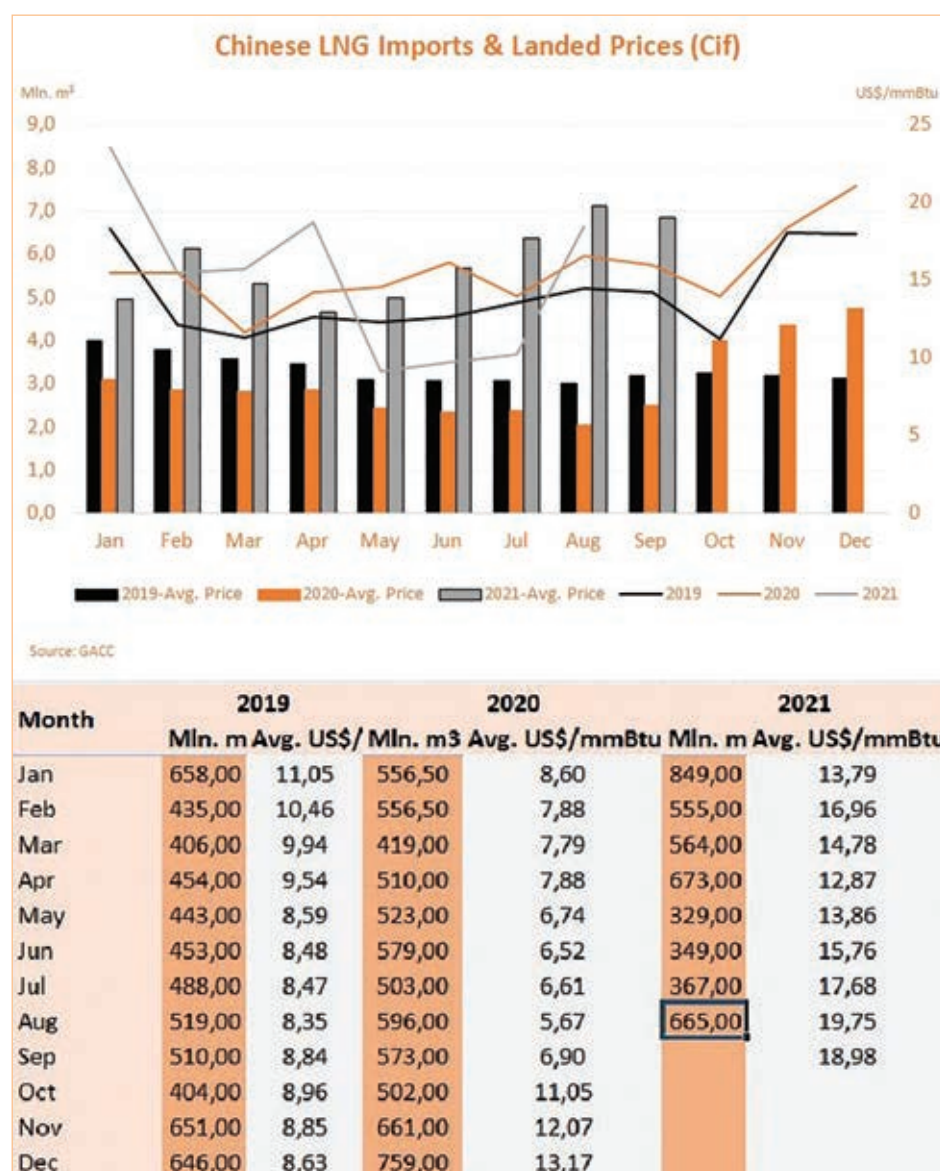
High energy prices and a slowing of China's V-shaped economic recovery have lowered LNG imports in the second half of this year. LNG shipments surged early in 2021 on the back of China's swift rebound from the pandemic, but market observers warn current gas storage levels are not sufficient to meet demand going into winter 2021-22, so utility buyers are bound to return in October. Markets Editor Anja Karl investigates.

Staging an eye-watering 18.3 percent GDP growth in the first quarter, followed by a strong 7.9 percent GDP growth in the second quarter, the Chinese economy has slowed markedly in the third quarter from July to September as fresh coronavirus outbreaks and supply disruptions of raw materials threaten to derail the country's economic recovery. Imports of natural gas, coal and other raw materials fell in line with the slowing demand from manufacturers and heavy industry.

Prices for LNG have stabilised on a very high level, after Asian spot LNG prices skyrocketed to over US\$25 per million British thermal units (MMBtu). The price spike was caused by China's strong economic rebound as well as shortages in natural gas and power supply due to an exceptionally hot summer. Starting from June, soaring spot LNG prices began to deter buyers and imports consequently plunged way below March 2019-levels.

Landed prices for Chinese LNG imports reached a record US\$19.75 per MMBtu in August – nearly a third higher than the US\$12.87 per MMBtu seen in April this year, according to Chinese Customs data (see table and graph). Imports of long-term LNG shipments to China consequently halved from around 673,000 million cubic metres (cbm) in April to just 367,000 million cbm in July.

In August, however, deliveries moved up again. A total of 98 LNG cargoes were shipped to China with a combined volume of 665,000 million cbm – an 11.7 percent increase compared with the 596,000 million cbm received in August 2020. China's main LNG suppliers are Australia, Qatar, the US, Malaysia, Indonesia and Russia. The government also publishes statistics for domestic gas production, showing that output in



August has risen by 11.3 percent to 15.9 bcm. The overall growth rate of natural gas and LNG imports, including pipeline gas, slowed in August compared with July 2020 to 10.44 million tons of imported gas. While imports were up 11.5 percent year-on-year, the figure was 16.4 percent lower than in the previous month – a clear indication of buyers' restraint in the current high-price environment.

State utilities replenished stocks up early

Most Chinese national oil companies have already covered their winter

positions – mostly via strip tenders. Unipetec, the trading arm of Asia's top refiner and gas buyer China Petroleum & Chemical Corp (Sinopec) is known to have procured around 40-50 LNG cargoes for delivery in the second half of 2021 and February, 2022, through a strip tender in April. Now traders are looking to play the arbitrage between cheaper oil-indexed long-term supply and spot LNG.

"The NOCs are quiet, as they are already near balanced and are not desperate; only a bit of demand left from them. No North Asian buyer will gamble on winter this time round," one trader

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commented, suggesting it could backfire to buy too high volumes early in the year if the winter turns out to be milder than expected. Still, some state-owned majors will eventually have to return to the market and buy more LNG to replenish gas storages ahead of the winter.

Spot buyers caught by surprise

Looking at privately-run energy companies, the picture looks very different as these players are more prone to cover demand on the short-term or spot market. Flexible buying patterns normally help private gas companies cover their needs at a cheaper price. This year, however, the unseasonably early surge in gas prices has caught some players by surprise.

“The Chinese private gas companies will have to buy more to inject for winter. I doubt they have fully prepared for winter, due to higher demand throughout this year. They will likely buy in October, the cheapest part of the winter period,” one trader forecast, though he noted much of China’s winter supply security will likely be covered by imported pipeline gas.

JKM futures surge

Trading activity is already starting to reflect concerns about looming winter supply shortages, with forward prices showing a steep upward trajectory for the winter month. The December JKM indicator for future cargo prices for China, Japan and South Korea was last seen increasing to US\$34.525 per MMBtu on CME Group’s trading website on October 1, up more than US\$12 compared with US\$22.100 a fortnight ago. The January 2022 quotation was last seen at US\$34.620 per MMBtu on the first day of October.

The Platts Japan/Korea Marker puts the price for delivery in November at

Chinese LNG Imports (x10,000 tons)				
Month	Year			Grand Total
	2019	2020	2021	
January	658	557	849	2.064
February	435	557	555	1.547
March	406	419	564	1.389
April	454	510	673	1.637
May	443	523	329	1.295
June	453	579	349	1.381
July	488	503	367	1.358
August	519	596	665	1.780
September	510	573		1.083
October	404	502		906
November	651	661		1.312
December	646	759		1.405
Total	6.067	6.738	4.351	17.156
Source: GACC				

US\$27.185 per MMBtu and at US\$27.34 per MMBtu in December – a prohibitively high level for many. Still, private gas companies will eventually have to replenish their stock and fill up gas storages even though market trends show little signs that prices will ease off any time soon. Demand for natural gas is forecast to rise, albeit at a slower pace compared to last winter as electric power generators will opt to dispatch their thermal coal-fired power plants instead of gas or LNG-fuelled units.

Coal-to gas switch spurs LNG imports

Looking at 2020 overall, it’s been a quite exceptional year on many levels: Only Asia has seen LNG imports rise despite the pandemic, largely due to the Chinese government’s coal-to-gas switching policies which pushed up imports by 1.0 billion cubic feet per day last year. Meanwhile, India’s LNG imports increased 0.4 Bcf per day amid low prices

for spot cargoes in spring and summer.

China remains the second largest LNG importer globally, with 68.9 million tons or a 19.3 percent market share – up by almost 2 percent from its 2019 market share, and demand is forecast to rise further, according to figures in the newly released Annual Report 2021 by the International Group of Liquefied Natural Gas Importers (GIIGNL).

In India, meanwhile, LNG imports grew 2.7 million tons or 11 percent underpinned by the operational start of the Mudra regasification terminal and higher utilization rate of the Kochi LNG terminal. Comparatively cheap spot LNG prices in the shoulder seasons prompted many Indian utility buyers to dispatch gas-fired rather than coal-fired plants for power generation.

In contrast, LNG imports to Japan fell by 0.3 Bcf per day over the course of last year to average 9.8 Bcf per day, largely due to the greater utilisation of nuclear reactors for baseload power generation.

Targeting 'Peak Emissions' by 2030

Though widely promoted as a ‘cleaner-burning fuel’, the world’s growing hunger for natural gas is facing similar criticism as the more ‘dirty’ fuels: oil and thermal coal. In the run-up to the UN Climate Change Conference COP19 in Glasgow in November, the Chinese President Xi Jinping reiterated his pledge before the UN General Assembly in September last year that China will reach peak emissions before 2030 and aspires to become carbon-neutral by 2060.



LNG carrier berthing at Tianjin regas terminal, operated by Sinopec

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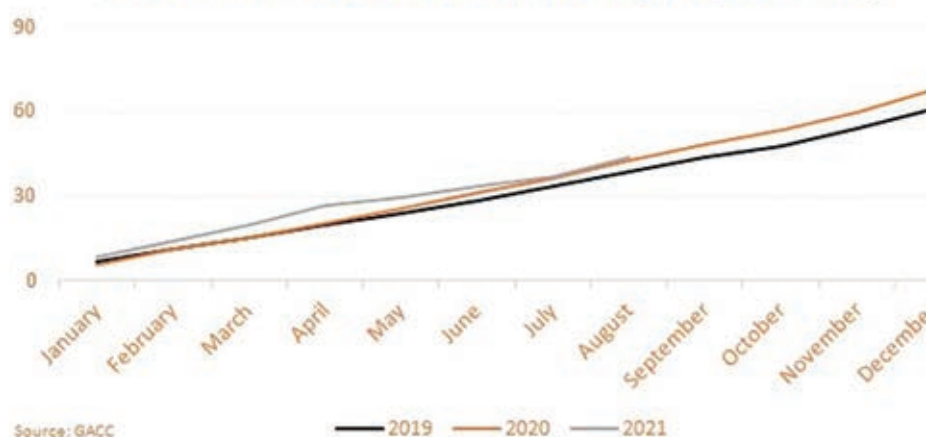
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Chinese Customs: LNG Imports (Million m³)Chinese Customs: Cumulative LNG Imports (Million m³)

“Clearly for China this needs to start at home,” analysts commented, though the signal that China had sent to the UN is that the country intends to take a greater and more vocal role in global environmental protection. China, the world’s largest energy market, currently emits over 10 billion tonnes of CO₂ and contributes about 28 percent of global emissions. Reaching the Net Zero target would require reducing coal demand in China to minimal levels. “Increased investment in wind, solar, electric vehicle and battery storage technology deployment will almost certainly feature,” Wood Mackenzie commented.

Electrification of heavy industries and manufacturing, large-scale renewable deployment, co-firing thermal power plants with green hydrogen and the use of other carbon removal technologies could potentially reduce China’s carbon emissions by almost 60 percent by 2040, from 2019 level, as per Wood Mackenzie’s Accelerated Energy Transition Scenario (AET-2). To reach this target, the Chinese central government would need to deploy over a billion tonnes carbon, capture and

storage capacity across its power and industrial sectors and accelerate coal-to-gas switching in the power sector.

Carbon price “too low” to herald real change

Coal-to-gas switching initiatives in Asia are, so far, still largely policy-driven given that the price on carbon emissions in most Asian countries is “far too low to make a fuel switch economically viable,” Boston Consulting Group finds. Levying a price of US\$40 per ton on carbon emissions in China would render gas-burn 30 percent cheaper than coal.

More generally in Asia, a carbon price of US\$20 to US\$50 per ton would bring gas to achieve cost equivalence with coal. However, analysts warned these price levels are all still “well below what is required to get the world onto a trajectory compatible with the Paris Agreement 2° Celsius pathway – about US\$125 per ton,” analysts pointed out. Assuming such governments would push through a national carbon price above \$100 per ton for new CCGT power stations built today, these units would quite comfortably generate a profit. ■



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Port State Control Detention Trends (%)

Marshall Islands Liberia Panama



0.74% 1.11%** 1.03%**

USCG

2.32% 3.09% 3.14%

Tokyo MoU

1.52% 2.22% 4.78%

Paris MoU

4.23% 8.03%*** 6.30%***

AMSA

** Liberia and Panama are targeted for additional port State control (PSC) examinations by the USCG for having a detention ratio “between the overall average and up to two times the overall average.”

Sources: 2018-2020 Performance Lists Paris MoU, the 2020 Tokyo MoU and USCG PSC Annual Reports, and the 2018-2020 AMSA PSC Annual Reports.

*** Liberia and Panama have exceeded the overall AMSA average detention rate over the three years from 2018-2020.



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LNG's emerging role as a transition fuel in light of a tight market

With COP26 due to start in Glasgow in October, a fierce debate tries to map the optimal path towards a net zero emissions world. However, calls to end all new hydrocarbon investments immediately notwithstanding, LNG has a good case to act as transition fuel. Markets editor Alexander Wilk has more.

Between 31 October and 12 November this year, Glasgow will host what may well prove to be the most important UN Framework Convention on Climate Change (UNFCCC) Conference of the Parties (COP 26) since the Paris Agreement signed in 2015. Already a year late due to COVID-19, the COP Bureau of the UNFCCC is keen to assimilate the announced long-term goals of an increasing number of countries to achieve net-zero greenhouse gas (GHG) emissions over the coming decades.

Earlier this year, the International Energy Agency (IEA) hosted its Net Zero Summit to take stock of the growing list of commitments from countries and companies to reach the goals set by the 2015 Paris Agreement, and to focus on the actions necessary to implement those net zero goals.

This may have implications for LNG as a transition fuel if its use is to be diminished alongside coal and crude oil. The IEA points to the pressing need to reduce and eventually eliminate hydrocarbon consumption to meet climate goals. However, the market remains in flux and demands a more nuanced view. Notably, major players have committed to large-scale investments in the LNG sector (both in terms of export and import capacity) whilst some of the IEA's tenets have been criticised as commercially unavailable at the moment.

IEA hydrocarbon scepticism

The IEA has taken a sceptical view on hydrocarbons' continued viability. In its special report *Net Zero by 2050: A Roadmap for the Global Energy Sector* published in May this year, the Agency concluded that for the world to stand a chance of achieving net zero GHG emissions by 2050, additional investments in new oil and gas fields should cease immediately. The IEA also argued that, according to its 'net zero' scenario, global future hydrocarbon demand can be met by projects already sanctioned as of 2021.

Fundamentally, the IEA's report includes a model setting out more than 400 milestones for a path to net zero

global emissions by 2050. This path is deemed necessary to keep the global temperature rise under 1.5 degrees Celsius. The *Net Zero by 2050* report is meant to guide negotiations at the upcoming Glasgow conference.

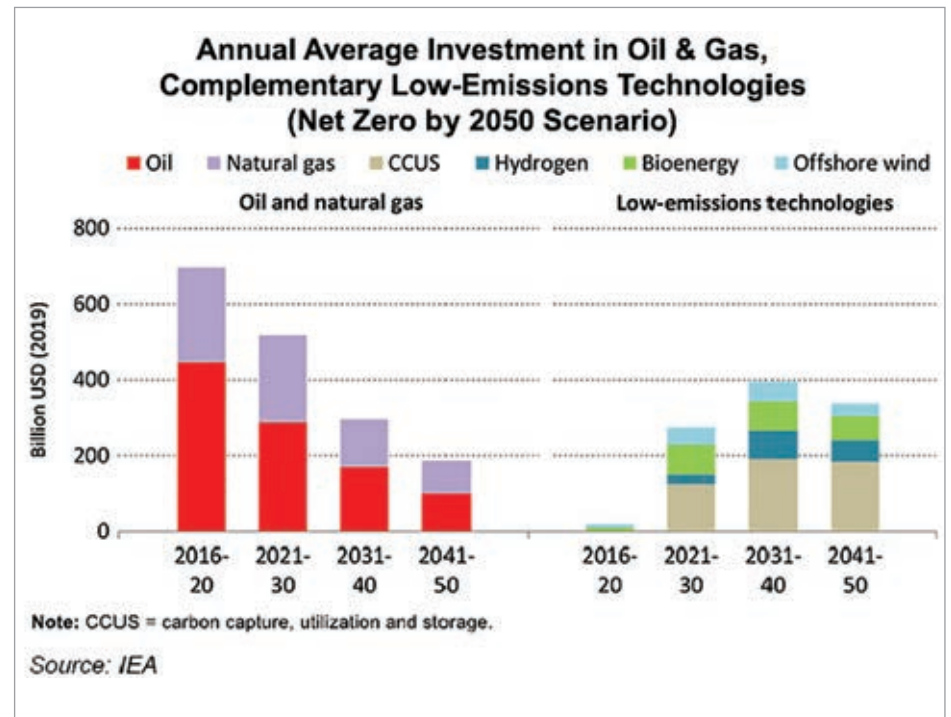
Investment stop

In the report's press release, the Agency explains that these milestones 'include, from today, no investment in new fossil fuel supply projects', which, by their nature, would encompass the LNG sector. Under the IEA model's net zero scenario, all fossil fuels fall from almost 80 percent of total energy supply currently to slightly over 20 percent by 2050. Accordingly, hydrocarbon demand would fall by 55 percent and 75 percent, respectively, by 2050 compared to 2020 levels.

Close to 90 percent of electricity generation would come from renewables, with nuclear power making up the difference of roughly 10 percent, the *Net Zero by 2050* report argues. Together, wind and solar would represent roughly 70 percent of power generation, the IEA said. The Agency's forecast sees upstream oil and gas investment averaging US\$350 billion annually between 2021 and 2030, and to fall to around \$170 billion per year thereafter.

Notably, the IEA's case assumes all upstream investment to be spent on maintaining output at existing fields post-2021 whilst the Agency also added that 'the oil and gas industry could play a key role in helping to develop at scale a number of clean energy technologies, including low-carbon hydrogen, biofuels and offshore wind'. Apart from these developments, actions to curb the emissions intensity of existing oil and gas operations would include the end of natural gas flaring.

In the net zero scenario, fossil fuel prices 'are increasingly set by the operating costs of the marginal project required to meet demand, and this results in significantly lower fossil fuel prices than in recent years', the IEA argued. It went on to say that 'the contraction of oil and gas production will have far-reaching implications for all the countries and companies that produce these fuels.'



As a result, 'no new oil and natural gas fields are needed in the net zero pathway, and supplies become increasingly concentrated in a small number of low-cost producers.'

For example, under the net zero scenario, the IEA predicts OPEC's share of global oil supply to grow from around 37 percent currently to 52 percent by 2050, 'a level higher than at any point in the history of oil markets.'

Importantly, the *Net Zero by 2050* report sees US natural gas prices steady at around US\$2.00/mmBtu through 2050 in the net zero scenario, broadly in line with the price recorded in 2020, as well as an average oil price of US\$35/bbl in 2030, US\$28/bbl in 2040 and US\$24/bbl in 2050.

The IEA's tenor suggests these low prices would be due to a lack in hydrocarbon demand as it predicts renewables will have effectively displaced fossil fuels for power generation.

Threat of high prices

The high prices seen in the market today seem to work in that direction, making LNG less attractive to buyers in terms of energy security. European LNG imports have been lagging their equivalents in 2019 and 2020, our data show, as natural gas prices in Europe have shot up. The Dutch TTF stood at around US\$24.63/mmBtu on 21 September, whilst the Spanish PVB hub showed a price equivalent of around US\$24.57/mmBtu.

European gas prices have thus more than tripled this year. As a result, several smaller utilities in the United Kingdom either have already succumbed to, or are threatened by, bankruptcy due to the price rally.

Even as European gas prices have shot up, they remain below landed LNG prices in Asia – and the Far East in particular – where the Platts Japan/Korea Marker at the time of writing put the price for delivery in November at US\$27.185/mmBtu and at US\$27.34/mmBtu in December. Major regional importers such as China, Japan and South Korea have ramped up their LNG offtakes and, by some accounts, have started panic-buying ahead of winter.

Short-term phenomenon

However, market developments are likely to render this threat time-limited. During a US-Qatar Business Council webinar at the end of August, Marianne Kah, adjunct senior researcher at Columbia University's Center on Global Energy Policy, opined that a "new wave of liquefaction plants starting up in about 2024 and 2025" would exert price downwards pressure.

Meanwhile, energy consultants Wood Mackenzie have forecast that LNG demand will remain resilient even in a 'net zero'-focussed world, thus providing a price floor and secure further LNG

investments long-term. This expectation notwithstanding, demand for oil and coal – both much dirtier fuels than natural gas – is expected to be falling off more sharply.

Broadly in line with the forecast by Wood Mackenzie, Kah warned prices could remain elevated beyond the 2025 horizon if expected supply failed to come online in time. She pointed out that planned facilities in the United States are among those most at risk of delayed or cancelled start-ups due to an increasing focus on renewables in its energy policy. Elsewhere, recent geopolitical events have put greenfield LNG projects at risk, most prominently projects in Mozambique, where a violent insurgency has forced TotalEnergies to declare force majeure in relation to the construction of its Mozambique LNG facility and stalled the sanctioning of the ExxonMobil-backed Rovuma LNG development.

Maxed-out gas substitution : Constraints on IEA outlook

Nevertheless, although the Henry Hub futures curve was at close to US\$5.0/mmBtu for December, almost double the price of US\$2.59/mmBtu seen in December last year, Kah pointed to a ‘below-par’ rate of injections into US inventories that suggests the market has already “maxed-out gas substitution back to coal”.

During the same US-Qatar Business Council webinar Kah was speaking at, H.E. Abdullah Bin Hamad Al-Attiyah – former Energy Minister and Deputy Prime Minister to the State of Qatar as well as Chairman of COP-18 – mused that the projections by the IEA and others ‘will never be achieved’, noting that nations such as China and India still rely heavily on coal power.

Kah concurred, saying for the IEA’s

Net Zero scenario to come to fruition one “would have to triple the investment in clean energy and energy infrastructure by 2030.” She added that “energy intensity would have to fall at two-and-a-half times the rate that we’ve seen historically. And almost 50 percent of the emissions reductions in that IEA report are set to come from technologies that aren’t yet commercially available.”

Beyond these factors applying to natural gas and hydrocarbons in general, LNG appears to be most resilient out of all hydrocarbons. This is because it principally serves markets that do not have sufficient – if any – import capacity via pipeline. In addition, there are growing markets in Europe and Southeast Asia where domestic gas production is declining, increasing the need for gas imports unless a whole swathe of thermal power capacity is to be scrapped. Although nuclear and some renewables may offer pathways to reduce LNG consumption in those markets over time, political and geographical constraints may well limit the scope of such coming to market before 2050.

Downward price pressure

Meanwhile, LNG buyers sourcing supply beyond mid-2024 appear to be spoiled for choice, considering the current Henry Hub and JKM forward curves. Whereas Asian spot prices are around US\$27/mmBtu for delivery before December, the price of futures is on a distinct downwards trend thereafter.

Considerable volumes of new LNG supply are due to come onstream by 2026, led by Qatar’s expansion of its Ras Laffan LNG complex, the Novatek-led Arctic LNG 2 development in Russia and Calcasieu Pass and Golden Pass LNG in the United States.

Qatar Petroleum (QP) – the state-controlled conglomerate operating the

massive Ras Laffan LNG complex – signed a contract in early February for the first phase of the expansion project aiming to boost the country’s annual LNG output by 40 percent to 110 million tonnes per annum (mtpa) by 2026. If all goes to plan, Qatar will see its liquefaction capacity rise to at least 126mtpa by 2030.

In the United States, there are currently six major LNG export terminals in operation. That total is expected to rise to seven next year with Venture Global LNG’s 10mtpa Calcasieu Pass coming online in Louisiana. With the planned market entry of Golden Pass in 2024, there would then be eight export plans by the middle of the decade.

In May last year, the Golden Pass consortium – a 70/30 joint venture of QP and ExxonMobil – applied to the US Federal Energy Regulatory Commission (FERC) for an increase of the project’s total LNG production capacity by 2.5mtpa to 18.1mtpa. FERC’s initial authorisation was for 15.6mtpa.

Arctic LNG 2 is planning to ship first LNG by 2023, with all three trains totalling 19.8mtpa in capacity by 2026. The project is of modular design, with the first modules delivered to the project site on 21 September, according to Novatek. Notably, the Russian gas exporter’s Yamal LNG development was completed slightly ahead of schedule.

At the aforementioned US-Qatar Business Council webinar, H.E. Al-Attiyah mused Golden Pass may focus on supplying Europe and thereby free-up capacity at Ras Laffan for higher exports to the Middle East and Asia where LNG’s growing role as a transition fuel has added to demand. A 2024 startup for Golden Pass would broadly coincide with ongoing expansion plans at Ras Laffan. At potentially 18.1mtpa, the plant alone could cover around 20 percent of

European LNG imports seen in 2019 and 2020, our data indicate.

Securing market share

Consultancy Wood Mackenzie thus expects a buyers’ market post-2025 as major suppliers such as QP and Novatek are set to be structurally long on supply. Wood Mackenzie sees a possible solution in bridging contracts spanning the short- and long-term market. These could provide buyers an escape from currently high spot prices whilst maintaining flexibility in exchange for sellers’ the security of long-term markets. This would allow “the seller to de-risk project investments they have already committed to”, Giles Farrer, Wood Mackenzie’s director of global LNG, said.

Legacy contracts connected to QP’s current LNG portfolio totalling roughly 20mtpa are expected to expire in the coming years. Accordingly, up to 60 percent of QP’s portfolio could be uncontracted by 2030, Wood Mackenzie analysis indicates. “Qatar has what buyers want – it is offering reliable low-cost and low-carbon LNG – and it has plenty of it to market,” the consultancy said.

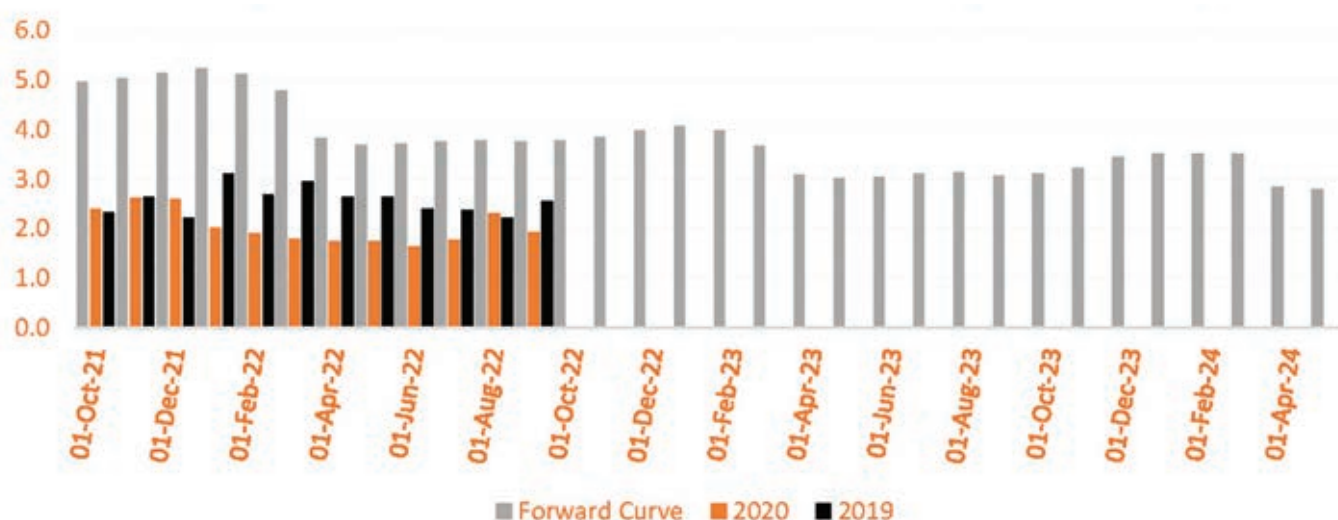
Wood Mackenzie’s Farrer further expressed the view that “for many buyers the fact that Qatar and Russia appear willing to develop new projects without firm contracts in place seems a blessing. The projects currently on their drawing boards can almost plug the expected 50 million tonnes per annum supply gap. This will result in a continued buyers’ market for long-term LNG contracts.”

This buyers’ market, in turn, would work to ensure an important role for LNG as a transition fuel on the path to carbon neutrality in 30 years’ time by increasing its share in national portfolios.

Concluding thoughts

The IEA’s analysis in its *Net Zero by 2050* report carries a strong message that the times of business as usual is over for the hydrocarbon industry – which includes the LNG sector. Although some of its assumptions have been criticised by market observers and analysts, the LNG industry will have to adapt to new market conditions if it wants to secure a role as transition fuel for LNG and thus provide for enough demand to make its latest LNG investments worthwhile. There are clear constraints to the IEA’s outlook the LNG industry can capitalise on, but it must also tackle the risk of tempered demand through high prices. ■

Henry Hub Forward Curve vs Historical Prices (US\$/mmBtu)



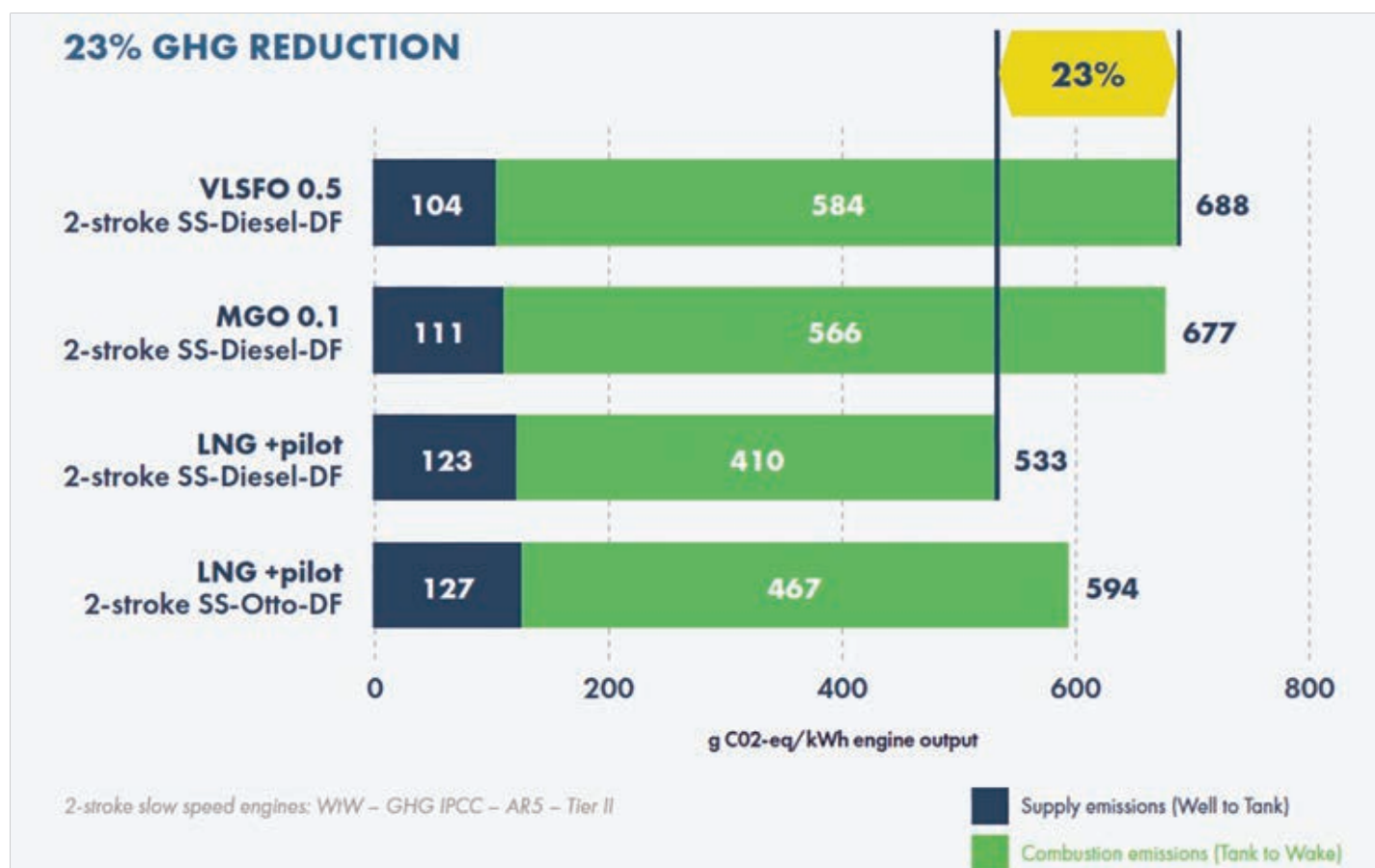
BioLNG set to gradually replace fossil LNG as a marine fuel

LNG and its non-fossil forms – bioLNG and synthetic LNG – are growing in popularity. We sat down with Steve Esau, General Manager of SEA-LNG, the coalition advocating LNG as a marine fuel, to discuss current trends and what it takes to get the shipping industry to see it as more than just a ‘transition fuel’ as we head towards a zero emissions future.

Is SEA-LNG confident that demand for LNG as a fuel will continue to grow given the accelerating development of other future fuels such as ammonia?

Yes. We’re seeing an increasing number of vessels burning LNG as a cost-effective way of reducing CO₂ and virtually eliminating emissions such as SO_x, NO_x and particulate matter. Some 250 LNG-fuelled ships could be added to the orderbook this year, and approximately 175 vessels are already in operation. According to the latest report from Clarkson’s shipbrokers, LNG-fuelled vessel orders are approaching 30 percent of gross tonnage on order and we are confident this momentum will not stagnate beyond 2030 given the potential to use bioLNG or synthetic LNG as a drop-in replacement fuel with LNG.

BioLNG is a prime pathway to carbon neutrality. It can be made sustainably from agricultural, forestry and human waste residues, meaning the production process not only supports the circular economy, but captures methane that would otherwise be released into the atmosphere. Added to this, we and many others are expecting a synthetic version of the fuel to come online in the future. Similar to other hydrogen-based fuels, the production capacity of zero emission



synthetic-LNG will be dependent on the amount of available renewable electricity. Therefore, greater adoption of renewable energy is necessary before zero emission synthetic LNG – and also green hydrogen and ammonia — can be produced at scale.

If you have two zero-emissions, hydrogen-based fuels, i.e. synthetic LNG

and ammonia, that cost approximately the same amount to produce, why would you opt for the one (ammonia) which requires new vessels and massive investments in new transportation, storage and bunkering infrastructure, when you can use one (synthetic LNG) which can be used in existing vessels and supplied through existing infrastructure?

decarbonisation potential of hydrogen

Ship owners’ demand for these fuels is impacted by increasingly stringent climate regulation and pressure from customers, hence we anticipate bioLNG supply will be scaled up and global infrastructure to produce and transport hydrogen will be developed. We expect both to become increasingly economically competitive as a result.

Will bioLNG and synthetic LNG gradually replace today’s fossil LNG as the cost of these newer fuel comes down?

This is the obvious pathway towards decarbonisation. The LNG infrastructure and onboard technology being invested in now does not need changing to accommodate bio and synthetic LNG, and we’re already seeing a steady increase in bioLNG uptake as well as interest in the

“With rising demand, technologies for LNG-ready vessels will become more modular and prices are likely to fall.”



Is the cost of LNG as a marine fuel still competitive with other fuel types, especially Heavy Fuel Oil (HFO), used in conjunction with scrubbers and Very Low Sulphur Fuel Oil (VLSFO)?

LNG prices have spiked recently but if you look at historical data, they have been significantly and consistently lower than marine diesel, low sulphur fuel oil and heavy fuel oil prices. Long term, we expect LNG prices to revert to these low levels, particularly as new LNG supplies come on stream.

There has been some criticism that vessels ordered with LNG-ready machinery will cost a lot to convert to full LNG use. Has SEA-LNG an opinion on this?

The cost of the few LNG-ready vessels, converted to date, have been high largely due to the bespoke nature of these conversions. With rising demand, and shipyards and equipment manufacturers gain more experience and as these technologies and processes become more modular, prices are likely to fall.

SEA-LNG's website lists the Return on Investment (RoI) for several vessel types to be less than five years. Is this still the case?

Absolutely. Analysis, undertaken by simulation and analytics experts Opsiana, shows that LNG delivers the best ROI on a net present value basis over a conservative 10-year horizon, compared to low sulphur fuel oil. For example, a 14,000 teu liner traveling a trade route from Asia to the US West Coast would likely incur payback from between one and two years.

Commercial understanding and

research-led transparency are key to the future fuels debate, and to support this, we have commissioned analysis from Opsiana on the investment opportunity for a VLCC, a cape-size ore carrier, and a PCTC, as well as a containership vessel. All of these studies are freely available on the SEA-LNG website.

Ports are beginning to offer incentives for LNG-powered vessels. Will this trend continue?

Indeed. Ports around the world are recognising the opportunity of LNG and are developing both infrastructure and incentives to support its uptake. Ports including Singapore, Rotterdam, Antwerp, Amsterdam, and Mundra – to name just a few – are all offering discounts on charges such as port dues, pilotage and berth hire charges for vessels using dual-fuel engines with LNG as the primary fuel.

The International Association of Ports & Harbours (IAPH) has developed the Environmental Ship Index (ESI) and ships fuelled by LNG generally achieve a high ESI score. Over 50 ports across the world typically provide 5-10 percent discounts on harbour dues or another financial incentives.

Is SEA-LNG confident that methane

slip will be virtually eliminated by 2030?

Yes, we believe that this timeline is perfectly achievable. Our view was confirmed by the Sphera's 2nd Lifecycle GHG Emissions Study which evaluated the latest engine technologies as well as upstream fuel supply. Methane slip is an issue that needs to be addressed and its effect must be quantified. Already today, some LNG engines have minimal methane slip and for those technologies that have some slip, manufacturers seek to reduce this through design changes, and advanced combustion algorithms.

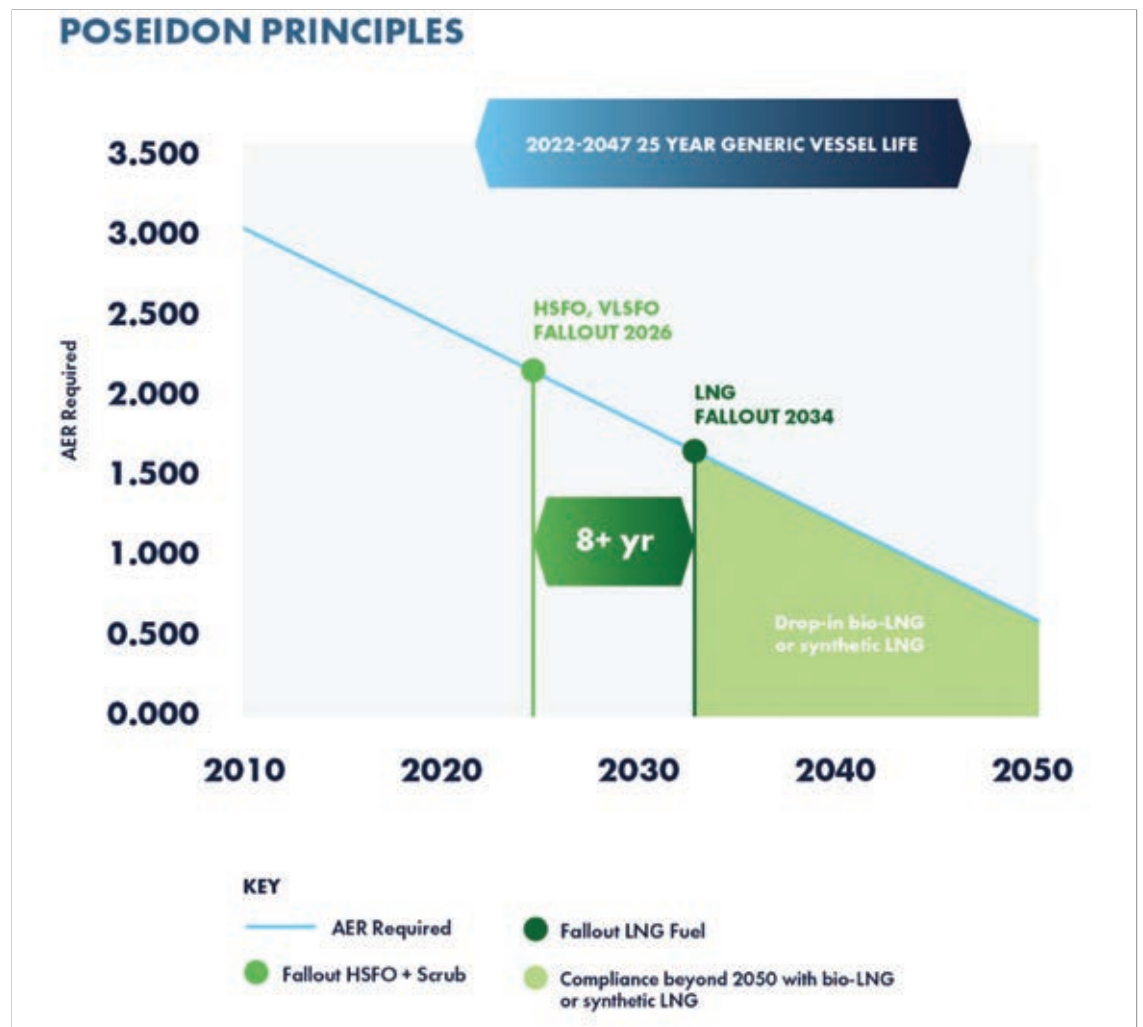
It is important to note that LNG-fuelled vessels being built today have much lower levels of methane slip than what is often cited in academic studies, including the IMO 4th GHG study. Indeed, projections are often based on outdated data and this became an

overused argument for those wishing to justify inaction.

Is there anything you believe the IMO should be doing to speed up the global uptake of LNG?

We strongly encourage the IMO to continue to develop decarbonisation measures which are goal-based and technology neutral, creating a level playing field for all low and zero-carbon marine fuels and propulsion systems. Further, greenhouse gas emissions should be regulated using a full-lifecycle, well-to-wake approach that includes all greenhouse gases i.e. CO₂, methane, NO_x and black carbon.

Waiting is not an option when it comes to reducing emissions and our environmental footprint. We must act now if we're going to create meaningful change. ■



Steve Esau, General Manager of SEA-LNG

Author

Steve is the general manager at SEA-LNG, a position which he has held since the coalition's inception and helped to set up in 2016. Before taking up his position at SEA-LNG Steve was Head of Energy at Xyntéo. He began his career as a Geophysicist in BP, subsequently working in a variety of business development, strategic, and analysis roles in the company's gas, power, and renewables and energy trading businesses.

Can I break new grounds with natural gas?

In business, every company aims to achieve better bottom lines. However, meeting this objective requires having not just the right tools, but the right energy. Today's modern businesses deal with a host of challenges, from changing industry landscapes to mounting pressures from external forces. But amongst these challenges, one stands out in particular, impacting businesses big and small and across all sectors – the energy transition.

As the world transitions toward a cleaner energy future, having the right energy as well as a solutions partner that goes above and beyond to meet your needs, could be your natural advantage – a superpower to supercharge your business performance.

As a global industry leader and cleaner energy solutions provider, PETRONAS LNG knows how to get businesses ahead. Our suite of innovative, customer-centric solutions are designed to power efficient performance across the value chain – giving our customers the energy they need to scale with impact.

Today, PETRONAS LNG is one of the world's largest producers and exporters of natural gas with a proven track record of success – with over 11,500 on-time and as-planned deliveries of LNG cargoes across 25 countries to date. And with over 37 years of experience, including various world's first achievements under our belt, we have the expertise needed to help customers navigate their unique challenges and create more rewarding partnerships for everyone.

We aim to enable businesses to take full advantage of the benefits of natural gas – the cleaner, more versatile and capable fuel. From research and development, to exploration, to building infrastructure and

more, we specialise in laying the groundwork to ensure natural gas becomes a core part of their energy mix.

Additionally, we also offer a range of customisable, end-to-end LNG delivery solutions that strive to provide more value. This includes supplying customers located far away from main pipelines with a reliable supply of LNG via trucks, breaking LNG cargoes into smaller parcels to transfer it more efficiently between seagoing ships and other specialised services such as Gas Up Cool Down (GUCD) which involves cooling down natural gas for improved LNG carrier loading and storage.

In line with our purpose to be a progressive energy and solutions partner enriching lives for a sustainable future, PETRONAS' ambition is to achieve net zero carbon emission by 2050. In addition to natural gas, we also offer renewable and zero carbon energy solutions such as solar, wind and hydrogen. By providing businesses with reliable access to better and more sustainable energy solutions, we enable them to reduce their carbon footprint and create long-term value for societies and the planet.

For businesses looking to progress in these modern times, having the right energy is crucial. Natural gas is the cleaner and more efficient fuel – making it the ideal choice for business operations. But equally important is having an energy solutions partner that is willing to go the extra mile in supporting your business achieve what it seeks – and that is where PETRONAS LNG comes in.

PETRONAS LNG

Above and beyond for you



As an integrated value chain solutions provider, we specialise in helping businesses establish world-class natural gas infrastructure and developing reliable and high-performance plants.



Our suite of customer-centric and innovative solutions ensures a steady supply of cleaner energy that helps businesses achieve progress while protecting the environment.

Get a natural advantage with natural gas



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Passionate about Progress

September trade set for month-on-month growth

Our preliminary September data indicated growing LNG flows underpinned by higher Russian, Egyptian and Australian LNG exports as well as strong Far Eastern demand, our Markets Editor Alexander Wilk reports.

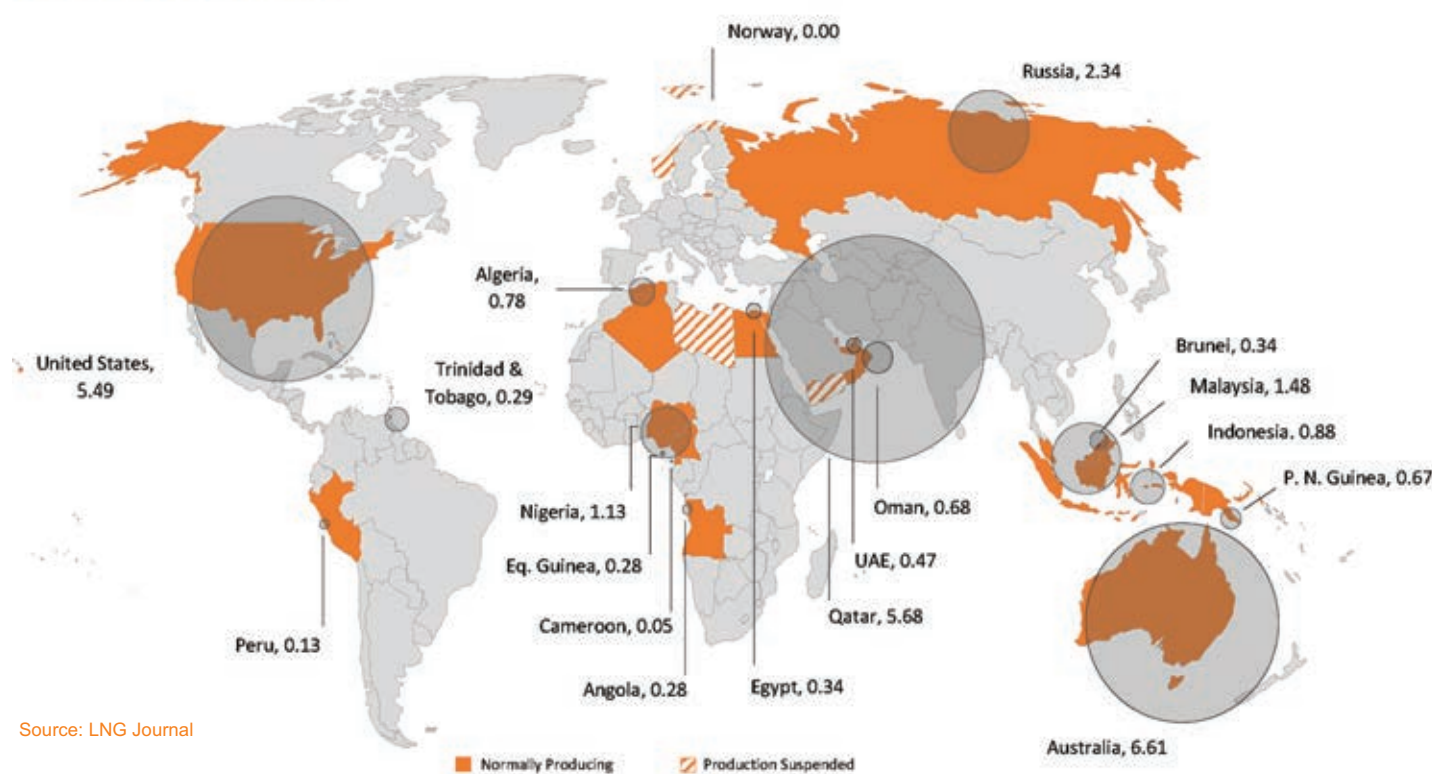
As of 29 September, our data showed global LNG trade had grown by 0.37mmt (1 percent) over the equivalent period in August. Notably, we were still expecting around 2.0mmt to be shipped worldwide before the end of day on 30 September. These expected cargoes hold the potential for September's full-month exports to edge out their full-month August equivalents, assuming they leave on time and represent vessels' full capacity.

Meanwhile, global LNG demand is set to be underpinned by the Pacific Basin although the fastest growth was likely to be in Europe. Concurrently, Middle Eastern offtakes began their seasonal retreat. Demand in the Pacific at the time of writing was mainly driven by China, South Korea and Taiwan although Japan was still scheduled to receive significant volumes before the end of the month.

Exports

At the time of writing on 29 September, our data indicated global month-on-month exports had grown by 0.37mmt (1 percent). Export growth to date was led

Global LNG Exports (MMt)



by the Middle East, where overall shipped volumes were up 0.25mmt (4 percent) over August. Concurrently, Atlantic Basin shipments were up by 0.20mmt (2 percent) month-on-month. The Pacific

Basin, however, only kept September exports broadly steady. They were down marginally by 0.08mmt (-1 percent) as Southeast Asian exports slowed considerably in September, thus negating considerable increases in Australia and Russia. At the time of writing, however, we were still expecting roughly 2.02mmt more to be exported globally before the end of the month, based on our market visibility. This, in turn, would translate to full-month global exports of 29.94mmt on 30 September and represent overall export growth of 1.41mmt (5 percent) month-on-month.

Pacific Basin

Pacific exports stood at 10.87mmt on 29 September, trailing their month-on-month equivalents slightly by 0.08mmt (-1 percent) when compared to the 10.95mmt recorded by 29 August. Consequently, capacity utilisation stood at 81 percent. However, we were still expecting roughly 0.61mmt to be exported throughout the Pacific by end of day on 30 September.

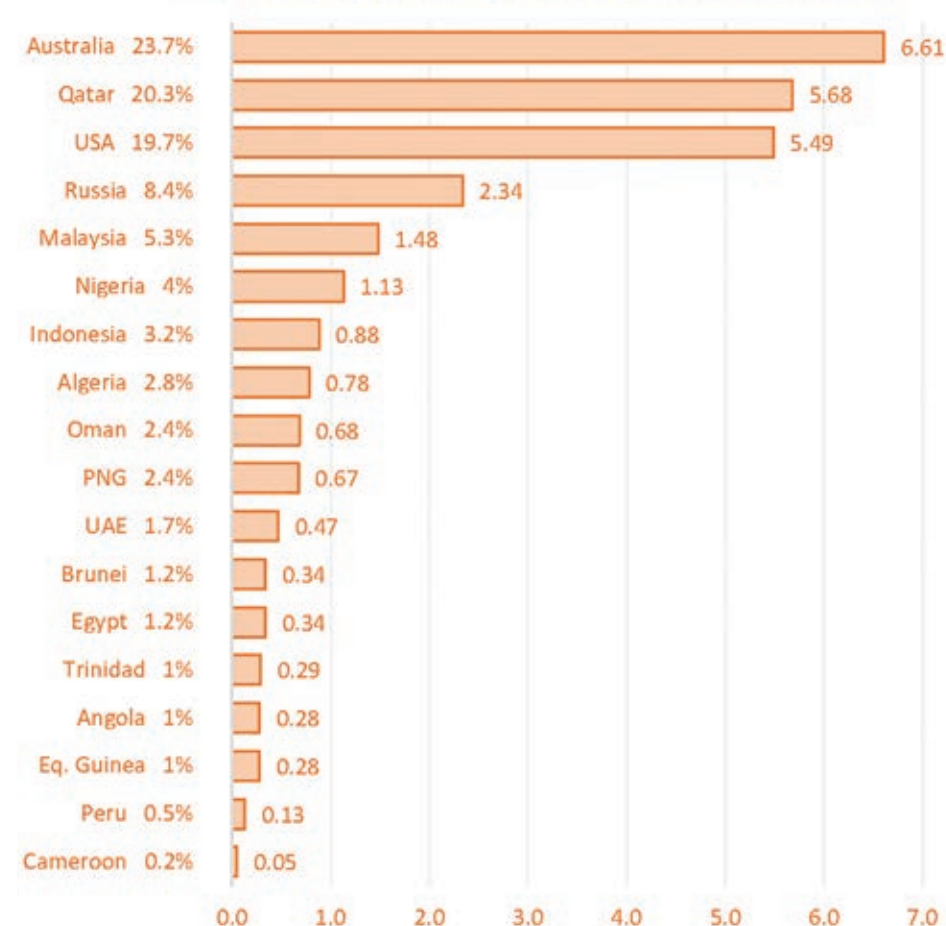
Australia

The Basin's most significant exporter by installed capacity – Australia – grew exports by 0.24mmt from 6.37mmt on 29 August to 6.61mmt on 29 September as key plants had completed maintenance.

Our data indicated export growth of 0.30mmt (73 percent) at Australia Pacific LNG was leading the continent's onshore plants. Australia Pacific LNG exported 0.71mmt compared to the 0.41mmt recorded in August. This was followed by NWS LNG, where at 1.19mmt shipments were up by 0.22mmt (23 percent) from 0.97mmt on 29 August. Pluto LNG and Queensland Curtis LNG also saw exports increase by 0.27mmt (29 percent) overall. Exports from the remaining Australian plants, however – namely Wheatstone LNG, Darwin LNG, Gladstone LNG, Gorgon LNG and Shell's Prelude FLNG barge – came in below their exports during the first 29 days in August. Shipments from Wheatstone LNG in particular trailed their August equivalents by 0.16mmt at the time of writing. Darwin LNG, Gladstone LNG and Gorgon LNG overall showed a month-on-month reduction totalling 0.34mmt (-14 percent).

Shell's Prelude FLNG barge continued to show strong market presence in September but at the time of writing showed exports of 0.21mmt, down 0.05mmt (-19 percent) from 0.26mmt on 29 August. Our data and calculations indicated the facility had operated at around 66 percent of annualised capacity in the month to date.

Market Share & LNG Exports by Country (MMt)



Southeast Asia

North of Australia, Papua New Guinea’s PNG LNG saw month-on-month shipments as of 29 September increase by 0.02mmt (3 percent) to 0.67mmt compared to 0.65mmt on 29 August. PNG LNG had benefitted from additional demand in Taiwan as well as China. PNG LNG thus operated at 118 percent of annualised nameplate capacity.

In neighbouring Indonesia, however, the amount of LNG shipped had decreased, down by 0.40mmt (-31 percent) to 0.88mmt as of 29 September compared to the 1.28mmt recorded by 29 August. In particular, the Donggi-Senoro plant was not seen in the market in September, having exported 0.20mmt in August. Concurrently, Tangguh LNG curtailed shipments by 0.15mmt (-24 percent) to 0.48mmt from 0.63mmt in August. The ageing Bontang facility, meanwhile, reached 45 percent utilisation, which translated into 0.40mmt of exports. Meanwhile, Malaysia once more saw monthly shipments decrease from its Bintulu plant, where cargo loadings were down 0.32mmt (-21 percent) from 1.53mmt as of 29 August compared to 1.21mmt on 29 September. Marginal growth of 0.01mmt in volume terms at PFLNG Satu could not compensate. PFLNG Dua, meanwhile, kept shipments steady at 0.14mmt. In a similar vein, Brunei had seen exports decrease, with month-on-month shipments down 0.19mmt (-36 percent) to 0.34mmt.

Russia & Peru

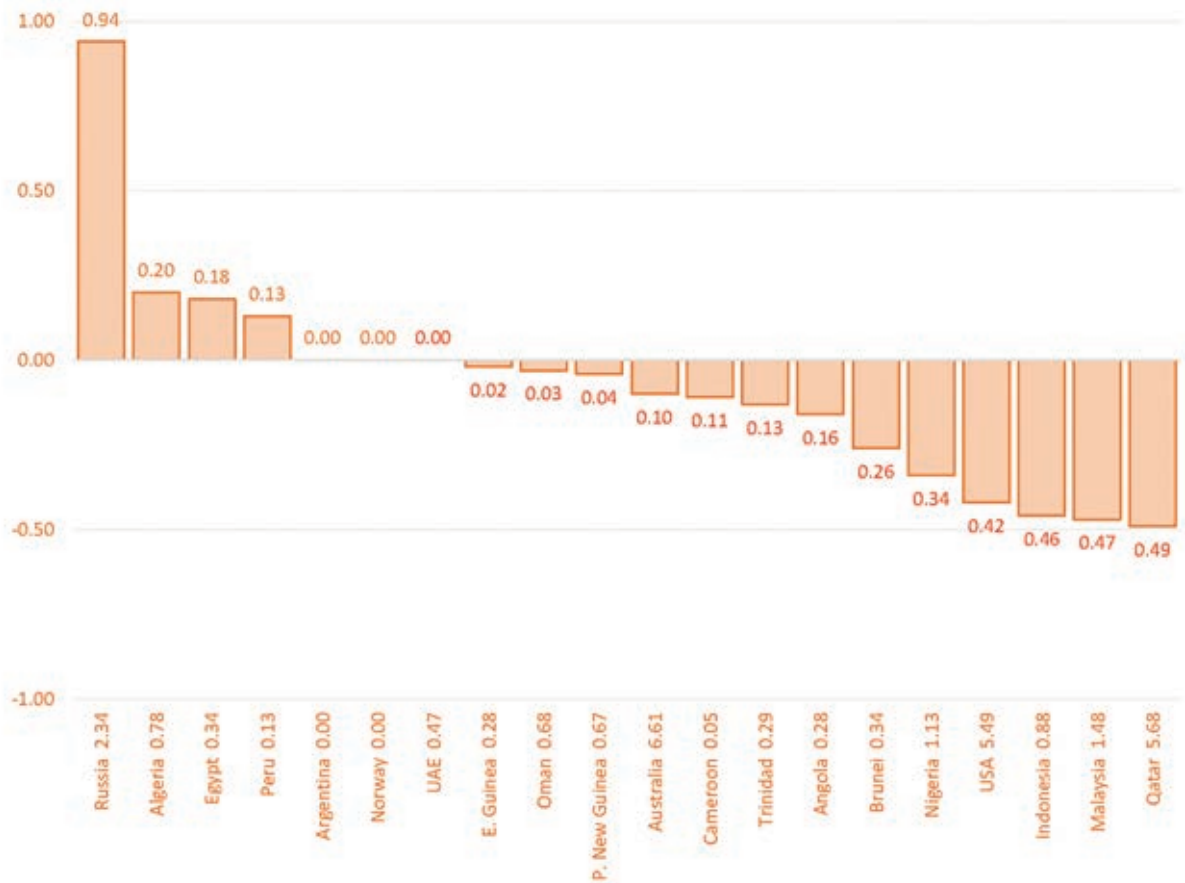
Elsewhere in the Pacific, Russia’s Sakhalin-2 LNG grew shipments robustly in September. The plant’s exports

amounted to 0.76mmt, up drastically by 0.43mmt (95 percent) from 0.33mmt in August. The plant’s September performance had been in large part due more market share in Japan and South Korea, which together imported 0.36mmt more from Sakhalin in September. Meanwhile, Peru’s Pampa Melchorita had returned to the market in September with exports of 0.13mmt at the time of writing.

Atlantic Basin

In contrast to the Pacific, the Atlantic Basin’s overall shipped LNG had

Incremental LNG Exports by Country (MMt)



Source: LNG Journal

increased by 0.20mmt (2 percent) month-on-month to 9.88mmt as of 29 September from 9.68mmt on 29 August. This translated into annualised export capacity utilisation of 71 percent. Notably, we were still expecting roughly 0.82mmt by end of day on 30 September.

North Africa & Europe

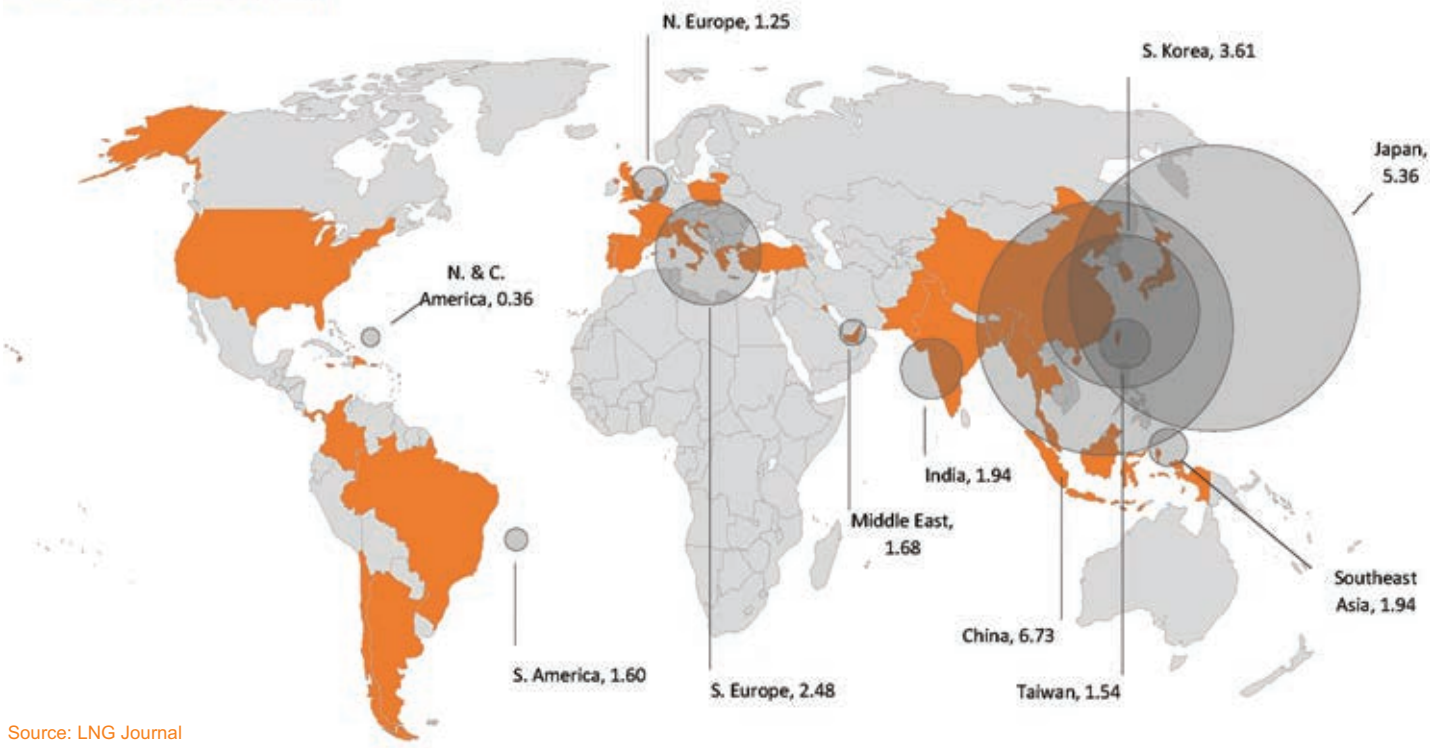
The overall amount of LNG exported within the north-eastern part of the Atlantic – comprising the European Union, Russia and North Africa (and not including re-exports) – had seen a significant net increase of 0.42mmt (11

percent) month-on-month. Although the ongoing outage at Snøhvit LNG in Norway still weighed on the eastern Atlantic’s overall exports, a significant net increase of 0.20mmt (35 percent) in Algeria – a maintenance-induced export lull at Skikda notwithstanding – contributed significantly to the net positive result for the North Africa-Europe region. Monthly shipments from Russia’s Yamal LNG had also increased by 0.66mmt (72 percent) in September as exports to China via the Northern Sea Route continued. Accordingly, Yamal LNG’s shipments to China were up 0.21mmt month-on-month (64 percent) to reach 0.54mmt as of 29 September compared to 0.33mmt on 29 August. This growth more than compensated for the plant’s fewer exports to Spain and Portugal.

West Africa

Meanwhile, West African exports were down by 0.44mmt (-20 percent) at the time of writing as Nigeria and Cameroon in particular reduced exports by 0.33mmt (-22 percent) alongside more modest reductions totalling 0.11mmt (-16 percent) in Angola and Equatorial Guinea. In particular, West African exporters struggled to retain market share in China – down 0.23mmt (-77 percent) – as Yamal LNG was able to step in via the shorter Northern Sea Route. Concurrently, West African

Global LNG Imports (MMt)



Source: LNG Journal

exports to Europe and India wobbled. This was only partially compensated by 0.07mmt in export growth to South Korea as well as higher exports to Pakistan and Kuwait amounting to 0.08mmt.

Americas

We were still expecting up to 0.47mmt to be shipped from the US Gulf Coast by end of day on 30 September. Nevertheless, at the time of writing overall US shipments had seen a slight net reduction of 0.14mmt (-2 percent) to 5.49mmt in September from 5.63mmt in August. Our data indicated the export decrease was mainly due to considerably lower exports from Freeport LNG, where a power outage caused by Tropical Storm Nicholas hampered LNG production. This was only partially compensated by a robust 0.31mmt (18 percent) export increase by Sabine Pass LNG as well as more modest increments of 0.04mmt at Corpus Christi LNG and Cameron LNG.

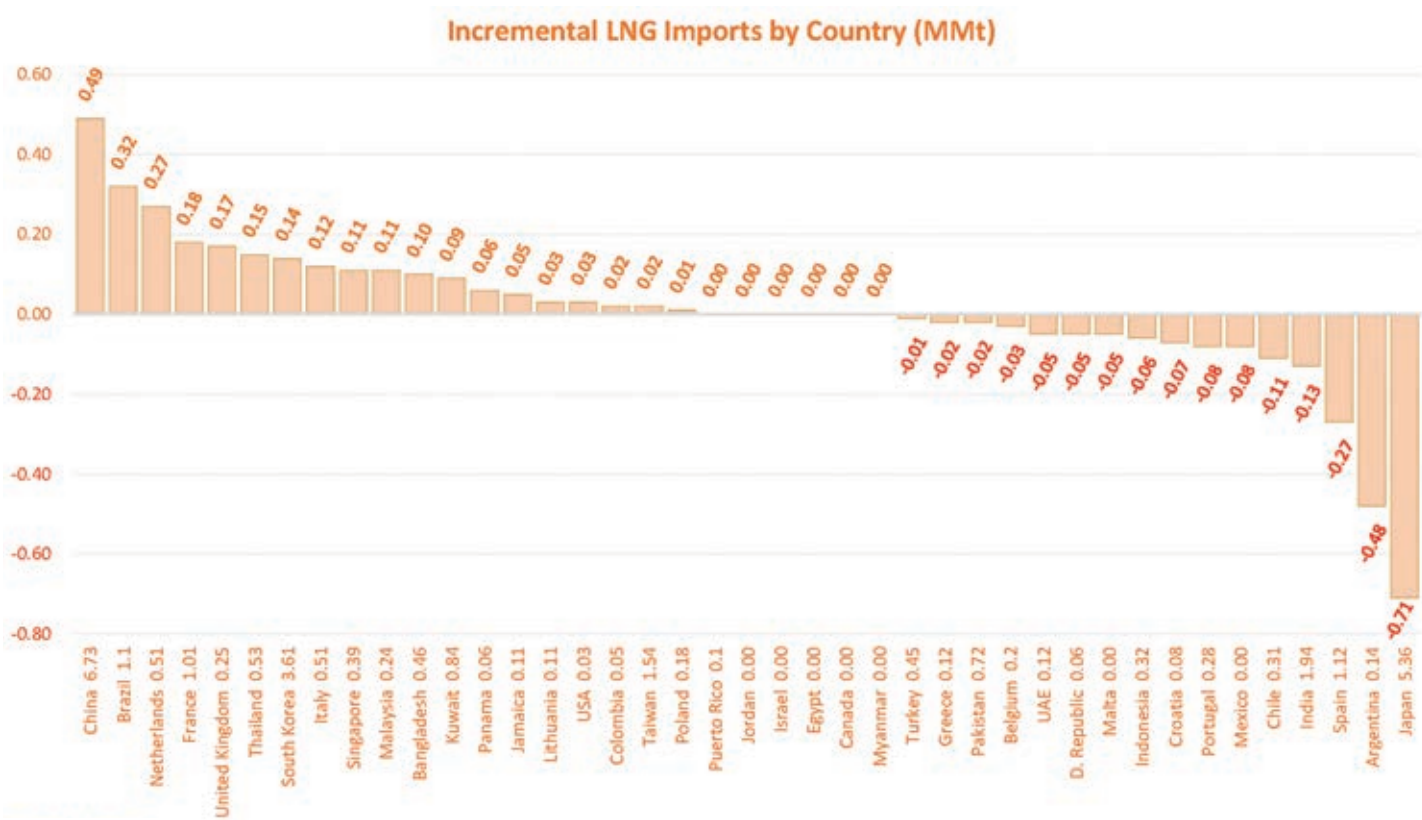
In South America, Atlantic LNG in Trinidad & Tobago had seen exports decrease by 0.08mmt (-22 percent) to 0.29mmt as of 29 September compared to the 0.37mmt recorded by 29 August. Atlantic LNG shipments continued their focus on Europe and the Atlantic side of South America and away from the Caribbean.

Middle East

Alongside higher month-on-month Atlantic Basin exports, shipments from Middle Eastern plants had grown by 0.25mmt (4 percent) from 6.92mmt on 29 August to 7.17mmt on 29 September. Accordingly, our data showed the Basin’s overall utilisation of operational export capacity (i.e., excluding Yemen) to stand at 82 percent for the period.

The increase was underpinned by significantly higher exports from Egypt, where shipments by its Damietta SEGAS plant were up 0.21mmt month-on-month. Neighbouring Idku LNG, meanwhile, had increased exports by 0.04mmt (44 percent) to 0.13mmt at the time of writing. Significant export growth to Kuwait, Pakistan and Turkey supported Egypt’s September performance and compensated for a lack of exports to the Far East.

Concurrently, Qatar had seen a slight month-on-month reduction of 0.03mmt (-1 percent) at the time of writing. Shipments to Europe had slumped in September and were down 0.49mmt (-41 percent) on 29 September, more



Source: LNG Journal

shipped volumes to Belgium notwithstanding. This was only partially compensated by higher exports to Taiwan, South Korea and Kuwait. However, our data indicated roughly 0.46mmt were still to be shipped before the end of the month.

The country’s fellow Persian Gulf producers in Oman and the UAE also saw overall monthly exports grow as they increased by 0.07mmt (5 percent). Higher exports to the Far East compensated for a lack of demand in the Middle East as well as lower shipments to India by 0.02mmt (-7 percent) to constitute net growth for the month. Of the two Persian Gulf producers, Oman managed to increase exports by 0.02mmt (2 percent) to 0.98mmt in September. The UAE’s Das Island plant, meanwhile, increased shipments by 0.05mmt (13 percent) to 0.44mmt. This was mainly due to Japan increasing its imports from Das Island in September. Market share in India ceded by the UAE was picked up by Egypt, which nonetheless struggled to maintain exports at August levels. The country’s shipments were down 0.10mmt (-20 percent) net.

Imports & Domestic Trade

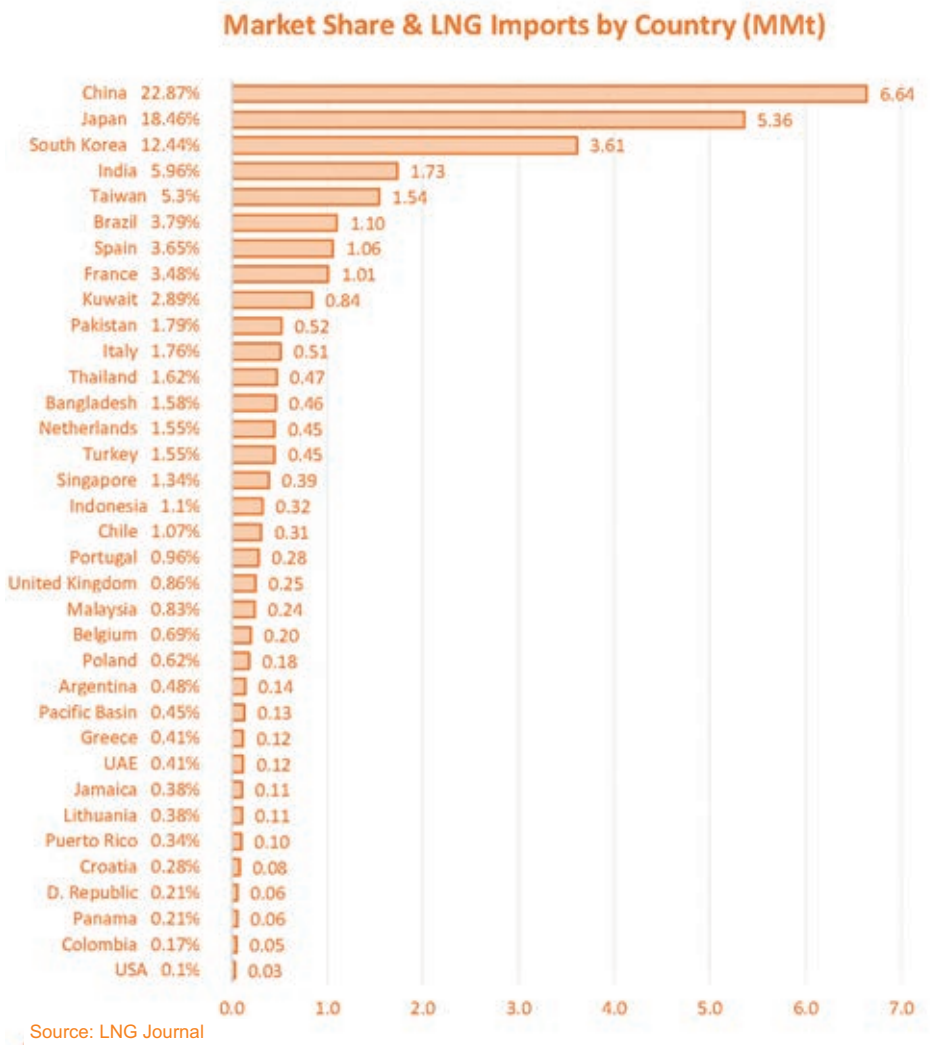
Global LNG imports saw a slight month-on-month increase in September, whereby the Pacific and the Atlantic Basins increased imports by 0.15mmt (1 percent) and 0.42mmt (7 percent), respectively. However, the rate of change was more drastic in the Middle East as total imports there had decreased by 11 percent as of 29 September.

Pacific Basin

Month-on-month Pacific Basin imports had increased by 0.15mmt as of 29 September as China, South Korea and Taiwan increased offtakes by 0.68mmt (6 percent) to 11.51mmt overall. This stood in stark contrast to Japan’s significant import reduction of 0.74mmt (-13 percent). Meanwhile, India had also seen monthly demand decrease by 0.15mmt (-8 percent) to 1.82mmt as of 29 September, probably due to the protracted high-price

environment. Elsewhere, in Southeast Asia, Malaysia’s offtakes grew by 0.11mmt to 0.24mmt (85 percent), whilst at 0.32mmt Indonesia saw monthly demand remain broadly steady.

In contrast to net Pacific demand growth, the roster of typically price-conscious Pacific buyers – including Bangladesh, Thailand, Chile, Mexico, Singapore and Myanmar – collectively saw imports decrease by 0.29mmt (-14 percent) in September. This was primarily due to



Source: LNG Journal

Bangladesh having imported 0.13mmt less alongside lower demand by 0.12mmt in Singapore and 0.07mmt less in Mexico as the market reappearance with a single import of 0.07mmt at Energia Costa Azul in August did not reoccur. Accordingly, even as Myanmar was again seen in the market in September with a 0.03mmt import and Thailand increased offtakes by 0.03mmt, too, these increments were insufficient to compensate.

Notably, at the time of writing, our data still pointed to further Pacific

imports of 1.91mmt, provided these cargoes would not be delayed. Of these cargoes, 0.61mmt were headed for China and 0.39mmt to Japan. Concurrently, South Korea was also scheduled to receive a total of 0.31mmt by end of day on 30 September. The remaining 0.60mmt were headed for India, Taiwan, Bangladesh, Chile and Malaysia.

Atlantic Basin

LNG imports in the Atlantic Basin had already increased considerably by

0.42mmt (7 percent) to 6.37mmt on 29 September, with annualised capacity utilisation at 28 percent. As with the Pacific, there was a considerable number of cargoes totalling 0.58mmt still scheduled for arrival before the end of the month. More than half – 0.31mmt – were headed to Europe whilst 0.21mmt were en route to Brazil and Argentina. The remaining cargo of 0.06mmt was scheduled for Jamaica.

Increasing European offtakes were a primary factor in the overall import

growth – led by France, the Netherlands, the United Kingdom and Italy – which together had grown imports by 0.84mmt (58 percent). Additionally, Turkey and Lithuania showed more modest growth in volume terms of 0.06mmt (15 percent) and 0.03mmt (37 percent), respectively. However, these increments were tempered by lower southern European offtakes totalling 0.37mmt in Spain, Croatia, Malta, Greece and Portugal. Demand in Belgium also decreased by 0.03mmt (-13 percent) to 0.20mmt whilst Poland kept offtakes broadly steady at 0.18mmt.

As to demand in the western Atlantic, importers in the Caribbean and South America – including Brazil, Jamaica, Puerto Rico, the Dominican Republic, the United States and Canada – saw monthly net LNG demand decrease by 0.15mmt (-9 percent) to 1.55mmt on 29 September. Brazil was set to remain the region's key importer in September, having already increased imports by 0.32mmt (41 percent) to 1.10mmt at the time of writing. Brazil's hydroelectric capacity has been hampered by record low rainfall in September-April, which has forced increased reliance on thermoelectric plants and even electricity imports. September also saw isolated imports in Panama and Colombia totalling 0.08mmt. However, this growth was tempered by Argentina slashing imports by 0.49mmt (-83 percent) to 0.10mmt as of 29 September. Finally, there was limited demand in the United States of 0.03mmt in September.

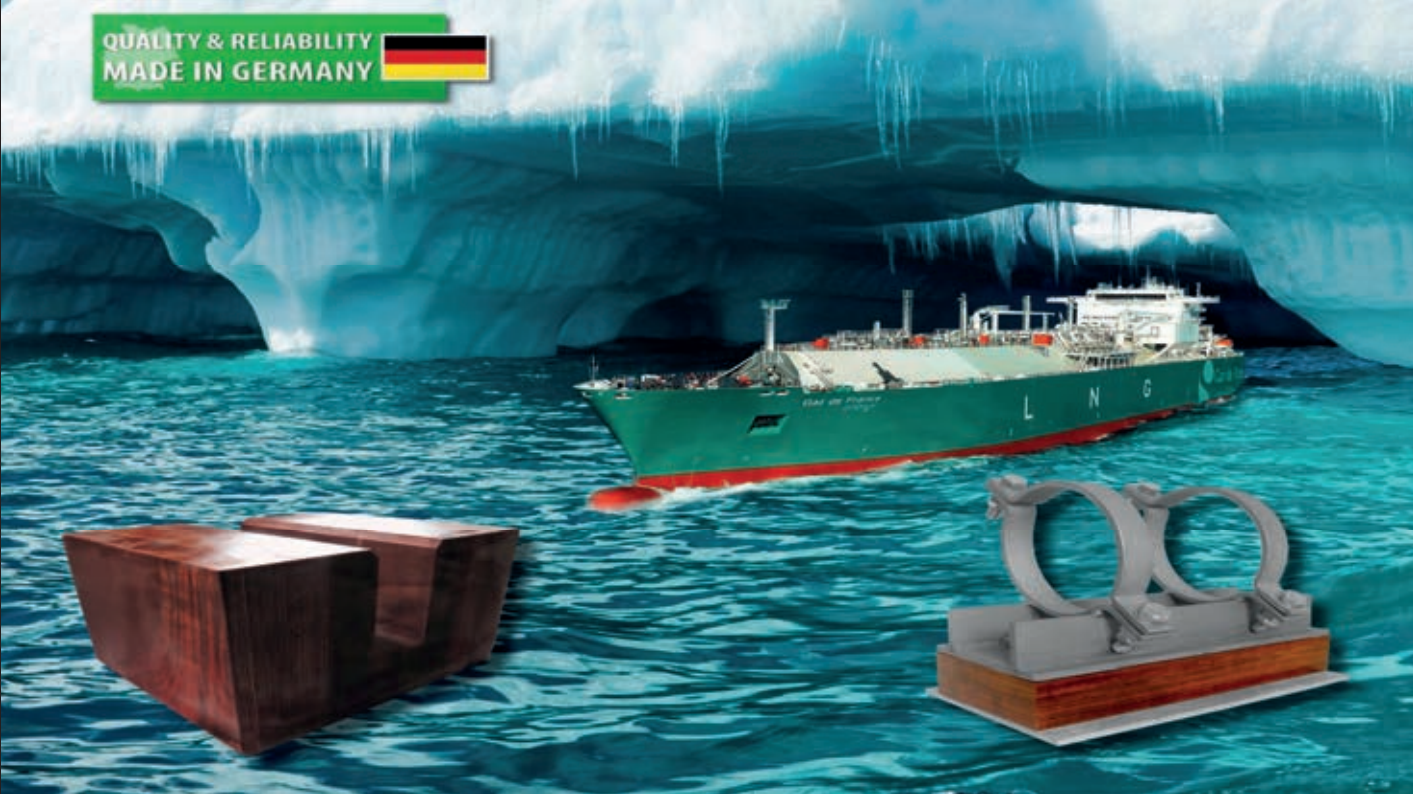
Middle East

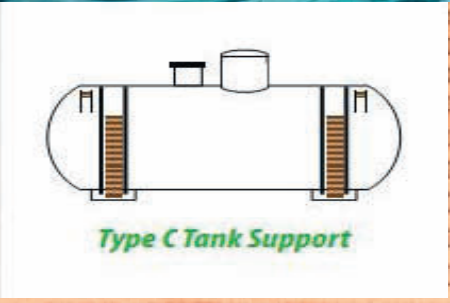
In contrast to the other two Basins, Middle Eastern offtakes had decreased by 0.18mmt (-11 percent) to 1.48mmt by 29 September from 1.66mmt on 29 August. Our market visibility at the time of writing indicated there were still 0.20 mmt en route to Kuwait and Pakistan, however. Regional offtakes suffered from a slump in Pakistani imports by 0.11mmt (-15 percent) to 0.63mmt. The UAE's Dubai FSRU also curtailed imports by 0.05mmt (-29 percent) whilst Kuwait, where the country's new Al Zour terminal added considerable offtake capacity, kept imports broadly steady at 0.73mmt. The country's imports were down only slightly by 0.02mmt (-3 percent) at the time of writing. Unsurprisingly, both Israel and Jordan continued their market absence. Accordingly, the Middle East's annualised import capacity utilisation stood at 31 percent as of 29 September. ■



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For the Record

ADRIATIC LNG, the company that owns and operates the largest LNG regasification terminal in Italy located 17 kilometres off the Veneto coastline, launched its open season in September to allocate regasification capacity for up to 25 years.

Adriatic LNG said the open season consists of an initial, non-binding qualification phase until the end of November 2021 and a second binding phase for the allocation of capacity that is expected to take place in December 2021.

“The regasification company is working to realize one of the most important events in the Mediterranean market for the future of the supply of energy to Italy and Europe,” said a statement.

“The open season is an extraordinary opportunity for LNG market players to subscribe to long-term regasification capacity with the leading operator in Italy,” it added.

The terminal has been on line since autumn 2009 and is a private operator which enables cargo imports amounting to about 10 percent of the national gas consumption of Italy.

It has so far handled about 800 cargoes at its gravity-based structure facilities. The terminal includes two LNG storage tanks, each with a capacity of 125,000 cubic metres.

The terminal includes a regasification plant with four open-rack LNG vaporizers, one heat recovery LNG vaporizer, two cryogenic compressors, four in-tank pumps to pump LNG from the tanks, and five pumps to pump LNG into the vaporizers.

“Developed as a strategic infrastructure for the country for its contribution to the diversification of energy supply, Adriatic LNG at present has contributed to satisfying national Italian needs by delivering more than 73 billion cubic metres of gas to the national gas grid,” said the company.

The cargoes have come from a great variety of carriers from 65,000 cubic metres capacity vessels up to the 217,000 cubic metres capacity carriers from Qatar.

The eight supplying countries so far have been Qatar, Angola, Egypt, Trinidad

and Tobago, Equatorial Guinea, Norway, Nigeria and the US.

Adriatic LNG is co-controlled by ExxonMobil Italiana Gas and Qatar Terminal Ltd, a subsidiary of Qatar Petroleum, while Italian gas network operator SNAM has a 7.3 percent shareholding.

The terminal is connected to Italy’s natural gas national grid by a 40km offshore pipeline extending from the terminal to a metering station near Cavarzere and an 85km pipeline from Cavarzere to an interconnection with the national grid near Minerbio in the north-central Italian region of Emilia-Romagna, about 15km from Bologna.

The terminal currently has available 1.6 Bcm per annum of existing capacity.

The terminal can be optimized to offer additional capacity of 1.0 Bcm per annum in excess of the existing capacity without requiring any modifications.

On top of that, another 6.4 Bcm per annum of existing capacity will become available in December 2034.

Adriatic LNG is also working to complete regulatory approvals for the additional capacity and received, on August 18th 2021, an exemption from the requirement of obtaining a full environmental impact assessment.

Adriatic LNG expects to secure all required approvals prior to the beginning of the binding portion of the open season, referred to as binding “Phase 2”.

More information for interested parties is available from the Adriatic LNG Web site.

The leaflet provides information about regasification capacity and products that will be offered through the open season, key provisions regulating access to service and capacity allocation, as well as details about bidding phases, valuation and allocation methodology.

The Adriatic LNG open season details are available at www.adriaticlng.it

APPEA, the Australian Petroleum Production and Exploration Association, has criticized a report from the Government of the state of Western Australia, the nation’s main natural gas producer and LNG exporter, for issuing a Resources Sector Strategy document without mentioning the critical role of natural gas.

The APPEA, the industry association representing oil and gas exploration and production companies, said the WA strategy “lacked any forward-looking initiatives or tangible objectives” and does

not acknowledge the critical role that a reliable and affordable supply of energy, particularly that of natural gas, will play in the future.

“While we commend the Government’s endeavour to have a strategy, it must be the right strategy,” said APPEA WA Director Claire Wilkinson.

The state hosts four world-scale LNG export plants, Gorgon, Wheatstone, North West Shelf and Pluto as well as multiple gas fields providing domestic gas for homes and industry.

“This document falls short. Rather than providing industry with a clear understanding of the Government’s priorities for the future, it is instead a collection of already-announced initiatives, most of which relate only to the minerals sector,” added Wilkinson.

“We need a strategy that recognizes gas means jobs. We need a strategy that pulls the right levers so gas can continue to mean economic prosperity for our state and a cleaner energy future,” she stated.

The APPEA pointed out that natural gas already generates more than 60 percent of the electricity produced in WA for homes as well as some of the biggest businesses and industries such as mines and minerals processing.

“We expect support for such critical areas of WA’s economy to continue in the decades to come,” said Wilkinson.

“In future decades, gas is well placed to support the growth of renewables, development of low-emission technologies, and enable new energy sources such as hydrogen, but in some areas the policy settings are continuing to drag on WA’s investment competitiveness where capital is needed to bring new gas supplies to market,” she explained.

“It is a missed opportunity that the strategy does not focus on the future,” stated Wilkinson.

“Western Australia cannot rest on its successes of the past and must strive to have in place the right policy frameworks to attract investment and develop new supplies of affordable and reliable natural gas to underpin the rest of the WA economy,” she declared.

She said WA needed a more efficient regulatory processes to end duplication between various government agencies to enable low-emission technologies to be introduced.

The high costs of developing natural gas and other projects also had to be somehow reduced in WA.

“These changes are vital as natural gas is also important in helping lower

Australia’s and indeed the world’s emissions and is supporting the growth of renewable energy,” she said.

“The Australian government estimates our exports have the potential to lower emissions in LNG-importing countries by about 170 million tonnes of CO2 equivalents a year by providing an alternative to higher emissions fuels. That equates to almost a third of Australia’s total annual emissions,” explained Wilkinson.

She cited a recent report from economics and policy consultancy ACIL Allen that said new gas supplies could support energy developments in WA, fuelling economic activity to the tune of up to A\$10 billion (US\$7.5Bln) in gross state product.

“The report detailed that developing a project in WA was at least 20 percent higher than the capital cost of a similar project in the United States, and at least 40 percent higher than the capital cost of a similar project in Mainland China. This is despite WA having the lowest cost gas of all states and territories in Australia,” said Wilkinson.

BASF GROUP, the German oil and gas and chemicals company, said the latest Malaysian floating LNG production hull owned by Petronas had selected BASF’s “OASE purple” process for its Acid Gas Removal Unit.

BASF, headquartered in the Rhine River city of Ludwigshafen, said the Petronas-owned vessel, the “PFLNG Dua”, is the first global user of the process.

The German company noted that Petronas successfully started up “FLNG Dua” in February 2021 and completed its performance test run in May 2021.

Petronas, the world leader in FLNG output, said in January 2021 that the “PFLNG Dua” had entered production in a joint venture with Thailand’s energy company PTTEP over the Rotan gas field offshore Sabah.

The vessel is deployed over the gas located 140 kilometres off Kota Kinabalu in Sabah state on the northern part of the island of Borneo.

The “PFLNG Dua” was constructed at the South Korean shipyard, Samsung Heavy Industries.

The first Petronas LNG hull, “PFLNG Satu”, became the world’s first FLNG vessel to start commercial operations in 2017 over the Kanowit gas field offshore Sarawak, another Malaysian state on Borneo.

The “PFLNG Dua” has production capacity of 1.5 million tonnes of LNG per annum.

BASF said its “OASE purple” process is an amine-based solution that is utilized for the removal of acid gases such as carbon-dioxide (CO₂) and hydrogen-sulfide (H₂S) from natural gas.

The removal of acid gases is necessary to prepare the gas for the liquefaction and subsequent pipeline transportation.

“The highly efficient and environmentally friendly BASF technology provides flexibility and low capital expenditure for its customers,” said BASF.

“Additionally, the low energy demand of the process combined with the non-corrosive nature of the solvent keeps operating and maintenance costs (OPEX) low,” the German company added.

BASF explained that the process also provided a high level of gas purity and gas recovery while keeping solvent losses to a minimum.

“We are proud to now have our first FLNG reference in operation and running at 100 percent capacity, which is the fruit of many years of research,” said Andreas Northemann, Head of BASF’s Gas Treatment business.

“We applied our onshore LNG expertise and conducted motion studies and Computational Fluid Dynamics (CFD) to ensure a high reliability, low maintenance design which meets our customer’s stringent offshore specifications and challenges,” added Northemann.

BW OFFSHORE, the platforms company listed on the Oslo stock exchange, has formed a partnership with global infrastructure investors for the equity financing of the floating storage and offloading (FPSO) unit for the Barossa gas field offshore Australia to prolong the lifespan of the Darwin LNG plant.

BW Offshore already has a fleet of 14 FPSOs with potential for growth to meet the reliable clean energy needs provided by natural gas.

The Barossa FPSO Services contract has an initial production period of 15 years, with options to extend the production period (in the aggregate) for a further 10 years.

The contract value based on the initial production period of 15 years is US\$4.6 billion.

BW Offshore will be responsible for engineering, procurement, construction,

installation, and operation of the FPSO.

The FPSO will be turret moored with a new built hull based on BW Offshore’s Rapid-Framework design.

Initial gas production from the FPSO is expected during the first half of 2025.

The Barossa FPSO will be financed by a 14-year combined construction and long-term debt facility of US\$1.15Bln and US\$240 million from the equity joint venture.

There will also be around US\$1Bln in pre-payments by the Barossa gas field operator, Adelaide-based LNG and energy company Santos, and the Barossa Upstream joint venture partners during the construction period.

“The joint venture agreement has been signed by all parties and completion of the agreement is subject to certain customary regulatory approvals which are expected within the next month,” said BW Offshore.

The FPSO joint venture comprises BW Offshore with 51 percent and with a further 25 percent held by ICMK Offshore Investment, a venture comprising Japan’s Itochu Corp. and a subsidiary of the Japanese Meiji Shipping Group.

The Australian financial group, Macquarie Bank, will own the remaining 24 percent.

Santos, which is currently finalizing its agreed take-over of Papua New Guinea LNG stakeholder Oil Search, took a positive final investment decision in March 2021 on the Barossa field development.

The Barossa project represents the biggest investment in Australia’s oil and gas sector since 2012.

The Santos-operated Darwin liquefaction plant in the Northern Territory has the capacity to produce around 3.7 million tonnes of LNG per annum, mainly for Japanese buyers.

Santos has said Barossa and Darwin LNG life extension will create 600 jobs throughout the construction phase and secure 350 jobs for the next 20 years of production at the Darwin facility.

The FID came a year after Santos completed the acquisition of the assets of US major ConocoPhillips in northern Australia and the Timor Sea, including the existing offshore Bayu-Undan field providing the feed gas now for Darwin.

The Barossa development will comprise the FPSO, subsea production wells, supporting subsea infrastructure and a gas export pipeline tied into the existing Bayu-Undan-to-Darwin LNG pipeline.

CHENIERE ENERGY, the largest US LNG exporter from its Sabine Pass plant in Louisiana and Corpus Christi facility in Texas, has approved a comprehensive, long-term capital allocation plan to achieve an investment-grade balance sheet, return significant capital to shareholders over time and continue to invest in growth.

“With financial results for 2021 expected at the high end of the guidance ranges, and the substantial completion of Sabine Pass Train 6 now expected in the first quarter of 2022, the company has reached a cash flow inflection point,” said the Houston, Texas-based company.

Cheniere said it expected to generate \$10 billion of cumulative distributable cash flow (DCF) through 2024 with annual run-rate DCF of \$2.6Bln to \$3.0Bln, enabling execution on the balance sheet, capital returns and accretive growth priorities.

The company said the plan was designed to achieve a run-rate DCF of \$15 per share to \$17 per share on a long-term basis, inclusive of the Corpus Christi Stage 3 expansion project.

The Corpus Christi plant currently has nameplate output of 13.5 million tonnes per annum from three Trains, each producing 4.5 MTPA.

The Stage 3 plan is an expansion comprising seven mid-scale liquefaction Trains adjacent to the Corpus Christi project, each with an expected nominal production capacity of around 1.4 MTPA of LNG.

The total expected minimum production capacity of the seven mid-scale Trains is 9.5 MTPA.

Cheniere said it expected to make a final investment decision on the Corpus Christi brownfield expansion in 2022 once remaining investment and commercial parameters are met.

The company said it would develop further liquefaction growth opportunities at both Sabine Pass and Corpus Christi with a continued commitment to Cheniere’s disciplined investment parameters, though gave no specific details.

The company additionally pledged to develop environmental solutions along the LNG value chain to further enhance the resiliency and sustainability of Cheniere’s assets.

“Over the past five years, we have successfully executed on our operating, commercial and financial goals, which now serve as the foundation for this comprehensive capital allocation plan for

Cheniere’s stakeholders,” said Cheniere Chief Executive Jack Fusco.

“The plan is built from our guiding principles of maintaining a strong, sustainable balance sheet, funding financially disciplined accretive growth and returning capital to shareholders through share repurchases and dividends,” added the CEO.

“Our accomplishments over the past five years have led us to this point, and the plan helps ensure Cheniere’s long-term success by strengthening our financial position, commencing meaningful shareholder returns and committing to our disciplined approach to deploying growth capital,” stated Fusco.

Plans for the balance sheet include \$1Bln of annual debt repayment, targeting investment-grade consolidated credit metrics by the early-to-mid 2020s

Cheniere will also prioritize repayment of secured callable or maturing project debt to strengthen project credit metrics and lessen subordination of the corporate level credit profiles

The company recently declared an inaugural quarterly dividend of \$0.33, or \$1.32 annualized, per share.

The dividend is payable on November 17, 2021, to shareholders of record as of November 3, 2021.

“This plan not only helps reinforce the long-term sustainability of the business we have built at Cheniere thus far, but significantly enhances our competitive position as we expect to FID Corpus Christi Stage 3 next year and develop further growth for years to come,” said Zach Davis, Cheniere’s Senior Vice President and Chief Financial Officer.

CHINESE liquefied natural gas imports soared last month along with the nation’s domestic natural gas production as industrial and power needs kept pace with economic growth.

Shipments of LNG to China amounted in August to 6.65 million tonnes, or about 98 cargoes, which is a 12.7 percent increase compared with the 5.90MT received in August 2020, according to data from the Chinese General Administration of Customs.

The January-to-August LNG imports jumped by 23.3 percent to 51.81MT versus 42.17MT received in the first eight months of 2020.

China’s main LNG suppliers are Australia, Qatar, the US, Malaysia, Indonesia and Russia.

Shipments of LNG to the network of 22 Chinese regasification facilities hit

another record in 2020 when 67.13MT was received, an increase of 11.5 percent from 2019.

If the current 2021 Chinese import trend continues the annual total would be just under 80MT, surpassing the current global No. 1 importer Japan.

Japanese imports of LNG are forecast for 2021 to be under the 75MT level.

The Chinese government also published statistical data for domestic energy production showing that in August 2021 natural gas output had risen by 11.3 percent to 15.9 billion cubic metres,

From January to August, 136.1 Bcm of natural gas was produced in China, a year-on-year increase of 10.8 percent.

The Chinese data noted that the overall growth rate of natural gas imports, including pipeline gas, slowed in August compared with July 2020 to 10.44MT of imported gas.

While the imported gas showed a year-on-year increase of 11.5 percent, the figure was still 16.4 percentage points down from the previous month.

From January to August, 79.31MT of natural gas was imported, both pipeline and LNG, a rise of 22.2 percent compared with 2020.

China said that in August it produced 17.03 million tons of crude oil, an increase of 2.3 percent on August 2020, though down 0.2 percentage point on July 2021.

From January to August, 133.22MT of crude was produced, a year-on-year increase of 2.4 percent,.

Chinese raw coal production increased in August after declining in the previous month.

In August, 340 million tons of raw coal was produced, with a year-on-year growth rate of 0.8 percent versus a decrease of 3.3 percent in July.

China added that a total of 28.05MT of coal was imported in August, which was 35.8 percent higher than in the same month of 2020.

From January to August, 2.6 billion tons of raw coal were produced, an increase of 4.4 percent on the January-August 2020 period.

A total of 197.69MT of coal were imported in the first eight months of 2021, a rise of 10.3 percent.

CROWLEY Maritime Corp. has ordered a new LNG bunkering barge to operate on the US East Coast and has signed a long-term time charter with Royal Dutch Shell.

On completion the US-built LNG bunker barge will be the largest Jones

Act-compliant vessel of its kind, helping to expand current network capacity and meet demands for cleaner energy for ships calling at US ports.

The LNG fuelling barge will be built at Fincantieri Bay Shipbuilding, located at Sturgeon Bay in the US state of Wisconsin.

“The new bunker barge will extend Crowley’s commitment to deliver cleaner, innovative solutions to help the shipping industry continue on the path to decarbonization,” said Tucker Gilliam, Vice President of Crowley Shipping.

“Orders for ships fuelled by LNG continue to rise and the vessel will provide Shell with an innovative and reliable service to meet demands for more sustainable energy sources,” added Gilliam.

The 416-foot-long barge will feature advanced technologies in cargo-handling capabilities and increased transfer rates, including a bunkering solution from Shell and Crowley Engineering Services for the flexible delivery of LNG to various types of LNG containment systems.

Crowley said the barge design would offer capacity of 12,000 cubic metres of LNG, the equivalent of 3.17 million gallons, and supply equipment to supply the growing LNG-powered fleet.

The US company noted that the vessel becomes the second Jones Act-compliant bunker barge Shell has under long-term charter in the US.

It is expected to be deployed to serve LNG-fuelled ships that call at ports on the US East Coast starting in 2024.

“Shell is dedicated to growing our LNG bunkering network across key trade routes, and this barge supports our commitment to helping provide our customers with the energy solution they are looking for,” said Tahir Faruqi, a general manager for Global LNG at Shell.

“The shipping sector is making progress toward decarbonization, and LNG offers immediate emissions reduction with the potential to become a net zero emission marine fuel given the possible roles of bio-LNG and synthetic LNG,” added Faruqi.

Fincantieri Bay Shipbuilding said the northern Midwest yard was delighted to take up the order.

“This additional LNG barge will serve as another demonstration of our commitment to building and servicing sustainable maritime endeavours, both in the United States and globally,” said Dario Deste, President and Chief Executive of Fincantieri Marine Group.

DELEK Drilling, the Israeli energy company, has signed the final agreement for the US\$1.1-billion sale of its 22 percent stake in Israel’s second-biggest natural gas resource, the Tamar field, to Mubadala Petroleum of the United Arab Emirates.

Under the Israeli Government’s gas framework rules, Delek Drilling is obliged to sell all of its holdings in Tamar by the end of 2021 because of competition issues.

The reserves in the Tamar field, after production of more than 69.3 billion cubic metres, is around 300 Bcm of natural gas and 14 million barrels of condensate.

The Tamar field was discovered in 2009 and is located 90 kilometres west of Haifa, offshore Israel, at an overall depth of 5,000 metres below sea level and in waters that are 1,700 metres deep.

“This transaction marks a milestone in the alignment between Israel and the UAE following the Abraham Accords Peace Agreement signed between the two countries in 2020,” said Yossi Abu, Chief Executive of Delek Drilling.

“The deal represents one of the largest transactions between an Israeli entity and an Arab entity, which shows how Israel’s natural gas resources can be a source of collaboration between nations,” added Abu.

The Tamar field in the East Mediterranean is one of Israel’s two main gas fields along with the Leviathan field and its purchase value is increased through existing sales agreements with regional Arab nations.

Tamar gas is supplied to the Egyptian market through the East Mediterranean Gas (EMG) subsea pipeline connecting the Israeli and Egyptian gas transmission systems.

The Israeli state’s revenues from Tamar’s royalties since it started operations in 2013 have reached US\$1.75 billion.

The natural gas from Tamar is also transmitted into the Israeli market by pipeline for gas supplies and electricity generation while a proportion is also exported to Jordan.

Besides Delek, there are five more partners in the Tamar field licence. They include US major Chevron Corp., which holds 25 percent of the field and operates it after its takeover in 2020 of Houston-based Noble Energy, a long-term partner of the Delek Group in the East Med.

Chevron also now has Noble’s stake in the Leviathan field. When Noble Energy was operator of both fields, there was talk of some of the resources being exported as

LNG using a floating liquefaction plant, but the venture was never pursued beyond the studies stage.

The other remaining shareholders in Tamar after the exit of Delek Drilling are the Israeli companies, Isramco Negev-2 Ltd, Tamar Petroleum Ltd, Dor Gas Exploration and Everest Infrastructures Ltd.

Mubadala Petroleum is based in Abu Dhabi, the wealthiest of the seven emirates in the UAE.

The ultimate owner of Mubadala Petroleum, one of the leading upstream companies in the Middle East with operations worldwide, is the Abu Dhabi sovereign investment fund.

Abu Dhabi is also the longest-standing LNG exporter in the Middle East from its Das Island liquefaction plant in the Gulf.

Mubadala Petroleum is a leading international, upstream oil and gas exploration and production company with a primary geographic focus on the Middle East and North Africa, Russia and Southeast Asia, with assets in 10 countries.

Delek Drilling will still own a 45.3 percent stake in the Leviathan gas field, which has reserves of 22.8 trillion cubic feet (649 bcm) of gas and 41m million barrels of condensate, and a 30 percent stake in the Aphrodite field offshore Cyprus with resources of 3.5 Tcf of gas.

JP Morgan acted as the leading financial advisor to Delek Drilling and Agmon & Co. Rosenberg Hacoen & Co served as legal advisor to Delek.

EDISON of Italy and Enagás, the Spanish natural gas grid operator and LNG terminal network owner, have delivered the first cargo to their small-scale LNG import terminal joint venture at the port of Ravenna on the northeast coast of Italy.

Edison, a leading European utility, and Enagás are cooperating in developing small-scale LNG use in the Mediterranean region of both Italy and Spain.

An Enagás subsidiary called Scale Gas is the Spanish terminal owner’s shareholder in the new Italian small-scale terminal.

The “Ravenna Knutsen” small-scale carrier delivered the shipment from the Enagás large-scale import terminal in Barcelona.

The carrier the docked at the quay in front of the coastal depot of the Ravenna port on September 9 to starting the unloading operation.

The terminal has a storage capacity of 20,000 cubic metres of LNG and potential annual handling of over one million cubic metres of LNG.

It will supply at least 12,000 trucks and up to 48 ferries per annum.

With this, Edison said it launched the first integrated small-scale LNG logistics chain in Italy. The transaction also confirms Edison's commitment to decarbonization.

"With the first discharge of liquefied natural gas in the depot, the test and verification activities of the Ravenna plant began, the first coastal LNG depot in mainland Italy serving the sustainable mobility of heavy and maritime transport, which will come into operation on next October," said Edison.

A third shareholder in the Spanish-Italian venture is Petrolifera Italo Rumena (PIR), an independent Italian terminal operator with 10 facilities in the Mediterranean handling and storing chemicals, petrochemicals, oil, biofuels and other products.

A holding company called Depositi Italiani GNL was created by Edison and PIR for the development and management of the small Ravenna LNG terminal, which is not connected to the national gas grid.

Under the accord between Enagás and Edison, 19 percent of the Ravenna facility shares were transferred to the Enagás subsidiary Scale Gas and this left PIR holding 51 percent and Edison with 30 percent.

The LNG carrier "Ravenna Knutsen" is the dedicated small-scale vessel dedicated to the new small Italian terminal.

The first cargo enabled the controlled filling operations of the tanks.

"With these activities, the test period of the delivery began as part of the commissioning," said Edison.

Norwegian shipowner Knutsen take delivery of the 30,000 cubic metres capacity vessel in February 2021 from South Korea's Hyundai Mipo shipyard.

The newbuild is one of the world's first small and medium-scale LNG carriers to feature C-type bi-lobe cargo tanks. It features three 10,100 cubic metres capacity tanks with low alloy 9 percent Ni steel.

The 180-metres long vessel has WinGD dual-fuel propulsion as well as a boil-off gas re-liquefaction system.

"With the Ravenna plant, Edison has helped launch in Italy the first integrated small-scale LNG logistics chain with a plan for the development of sustainable

mobility both by land and by sea," said Italian power company.

"The development of small scale LNG is supported by a positive institutional strategic context both globally and nationally," stated Edison.

"To achieve the long-term goal to reduce emissions set by COP 21 in Paris, G20 countries confirmed the role of natural gas as a source for the energy transition," it added.

Edison is an Italian and European Union power operator with total net installed power capacity of is 7 gigawatts, including 200 plants from high-efficiency gas-fired combined-cycle facilities, to hydro-electric, thermoelectric, wind and solar.

ENN GROUP, the leading non-state energy company in China with LNG and growing city-gas assets, reported a more than 18 percent jump in first-half profits as revenues soared, boosted by increased business in LNG and in expanding retail, wholesale and industrial gas supply markets.

ENN said first-half core profits increased by 18.4 percent to 3.38 billion Chinese yuan (US\$570 million) from 3.11Bln yuan (US\$481Bln) in the prior-year period.

Profits came mainly from natural gas operations, though ENN has a growing integrated power business.

The company, whose shares are listed on the Hong Kong stock exchange, said earnings per share rose 39.2 percent to 3.34 yuan per share from 2.40 yuan per share in the first half of 2020.

The interim dividend per share came to \$0.59 Hong Kong dollars (US\$0.075).

Profits attributable to owners of the company increased by 39.8 percent to 3.76Bln yuan (US\$583M) from 2.69Bln yuan (US\$417M) in the first half of 2020.

ENN said that first-half revenues jumped 30.7 percent to 41.23Bln yuan (US\$6.38Bln) versus 31.54Bln yuan (US\$4.88Bln) in the first six months of last year.

The company owns the Zhoushan LNG import terminal in the Zhejiang Free Trade Zone in eastern China.

ENN has been doubling LNG storage by adding two more tanks, each with capacity of 160,000 cubic metres.

The company said its retail natural gas sales volumes increased by 22.3 percent to 12.43 billion cubic metres from 10.16 Bcm in the same period of 2020.

"During the period, LNG spot prices surged significantly, driven by strong

demand," said ENN.

"The Group seized opportunities in the trading market, utilising its diversified LNG resources to conduct wholesale business and recorded 3.58 Bcm of wholesale volumes during the period," said ENN.

"Surging LNG price drove the revenue growth of the wholesale business to 9.76Bln yuan (US\$1.51Bln), up by 23.3 percent compared with the same period last year," said ENN.

"The Group flexibly deployed its diversified resources portfolio, maximised the profit of the overall natural gas sales business while maintaining the steady growth of its retail gas sales business," the company explained.

ENN said that during the first half it acquired exclusive operating rights of four more city-gas projects which are the Ruyang Industrial Cluster Zone in Henan province, Lvsigang Town of Qidong City in Jiangsu province, the Lantang Industrial New Town in Zijin County of Guangdong province and the Qianjiang Industrial Park of Chizhou in Anhui province.

"These projects consist of high energy demand industries such as glass processing, metal smelting and ceramic production, which will bring more industrial gas sales volume to the Group," said ENN.

ENN said that it currently had a total of 239 city-gas franchises in 20 different regions and provinces in areas such as in Beijing, Fujian, Guangdong, Guangxi, Hebei, Henan, Inner Mongolia, Sichuan, Shandong, Yunnan, Zhejiang, Shanghai and Tianjin, with a connectable population of 117 million.

ENN said its pipeline natural gas penetration rate rose by 1.4 percentage points to 62.6 percent from 61.2 percent in the prior-year period.

"Most of the group's projects are located in key areas of environmental management such as Beijing-Tianjin-Hebei, Guangdong, Henan, Shandong, Jiangsu, and Zhejiang, where local governments strictly implement environmental protection policies," the company noted.

"At present, the Group has four regular medium to long-term international LNG sale and purchase agreements," said the company.

"The pricing of the international sale and purchase agreements is mainly indexed to the price of crude oil or natural gas," it added.

The Group has established a series of

risk management policies and commodity hedging mechanism by hedging a reasonable proportion of planned annual sale and purchase of LNG. This is a means of stabilising the company's commodity price risks.

EQUINOR, the Norwegian oil and gas company and a leading producer and exporter of West European pipeline natural gas and LNG, has brought on stream the third stage of the Troll gas field, extending the production lifespan beyond 2050.

Norway is western Europe's largest producer of oil and natural gas, covering around 22 percent of the European Union's annual consumption.

Troll is Norway's largest gas field and supplies around 8 percent of EU gas needs from the Norwegian sector of the North Sea.

The Equinor start-up comes as Gazprom of Russia moves towards the commercial start-up by year-end of the Nord Stream II pipeline to double the supply of Russian gas to the EU via the Baltic Sea subsea connection from Russia.

Equinor said that recoverable volumes from Troll's phase three, which will produce the Troll West gas cap, are estimated at 347 billion cubic metres of gas, or around 2.2 billion barrels of oil equivalent.

The Troll phase three project consists of eight wells in two templates, a new pipeline and umbilical connecting the templates to Troll A as well as a new gas processing module on the platform.

The Troll field's initial gas output came on stream in 1995, followed soon after by a parallel oil-production stage.

"By reusing existing infrastructure, notably the Troll A platform and the Kollsnes processing plant, the third-phase development cost just 8 billion Norwegian crowns (\$920 million), well below the equivalent cost per Bcm of both previous stages," explained Equinor.

"Troll phase 3 is one of the most profitable projects in Equinor's entire history," it said.

Annual revenue for the Norwegian government from the latest development is expected to average more than 17Bln crowns (\$1.94Bln).

Equinor holds a 30.58 percent stake in the field, state energy firm Petoro 56 percent, Royal Dutch Shell 8.10 percent, TotalEnergies of France 3.69 percent and US major ConocoPhillips 1.62 percent.

Equinor's Hammerfest LNG plant on Melkoya island in northern Norway is

currently closed after a fire occurred on September 28 last year.

The facility, which supplies European LNG terminals, is expected to be closed until the first quarter of 2022.

EXMAR, the Belgian shipping company and owner of the “Tango FLNG” barge last deployed in Argentina, said it was actively pursuing various employment opportunities and had also had a settlement in the dispute with commodities firm Gunvor over a newbuild regasification vessel.

Exmar gave details of the LNG developments as it posted first-half earnings resulting in a net loss of \$5.3 million, slightly wider than the \$5.2M of losses reported in the first six months of 2020.

First-half revenues increased to \$107.9M compared with \$89M achieved in the same six months last year.

Exmar’s gross earnings (Ebitda) increased by 60 percent to \$61M from \$37M in the prior-year period.

The Antwerp-based company previously received a \$150M settlement fee paid by Argentine energy company YPF for the “Tango FLNG” charter cancellation.

Exmar has been getting its finances back on track after payments from YPS and financing deals for other parts of its fleet.

Exmar’s FLNG vessel, built at the Chinese Wison shipyard in Nantong, China, formally started its operations at Bahia Blanca port in Argentina in mid-2019 and a 10-year charter term began in September 2019.

The Belgian company’s FLNG barge has production capacity of around 500,000 tonnes per annum.

“Exmar’s infrastructure team is actively pursuing various employment opportunities for the ‘Tango FLNG’ barge,” the company explained.

“For several projects technical clearance is confirming feasibility while regulatory approval discussions and commercial negotiations are ongoing in parallel,” said Exmar.

“Meanwhile, Exmar is receiving the YPF settlement fees, in accordance with the agreed payment schedule,” it added.

Regarding the regasification vessel settlement from Gunvor, Exmar has received an interim award on the arbitration commenced in September 2019 in relation to the charter party for the newbuild FSRU No. S188.

“Following this award Exmar has

received a notice of early termination and a termination fee of \$56.8M on the charter party. The unit has become commercially available since the end of June 2021,” added Exmar.

“Marketing of the unit with ongoing and technical validation for several opportunities commenced immediately,” it added.

Exmar also explained that its liquidity position had developed positively during the year with the receipt of termination fees.

Additionally at the end of June 2021 one of its two Very Large Gas Carrier newbuilds, the “Flanders Innovation”, was put into operation and the “Flanders Pioneer” was expected to be delivered at the end of the third quarter of 2021.

“The lease financing for both vessels has been arranged and for both a minimum five-year charter with Equinor ASA (Norway) has been signed,” said Exmar.

The Exmar Board of Directors, represented by Executive Chairman Nicolas Saverys and Executive Director Carl-Antoine Saverys and the Executive Committee, represented by Chief Executive Francis Mottrie (representing FMO BV) and Christine Verhaert, Chief Financial Officer (representing Finmore BV), certified the earnings statement.

GAZPROM, the Russian natural gas company supplying pipeline gas to Europe and China in competition to LNG, posted much higher first-half profits as volume sales of gas increased by 18 percent with the start of the partial global economic recovery.

The company said profits amounted to 995.5 billion Russian roubles (\$13.5Bln) for the first six months to the end of June 2021, a more than 21-fold rise on the 45.4Bln roubles (\$618.1 million) posted in the same period of 2020.

Gazprom’s net sales of natural gas increased to 272.3 billion cubic metres from 230.7 Bcm in the same period of 2020.

First-half volume sales to Europe came to 120.6 Bcm compared with 98.2 Bcm in the first half of 2020.

Income from net sales of gas to Europe and other countries doubled from 702.4 billion roubles (\$9.5Bln) to \$1.4 trillion roubles (\$19.8Bln) for the six months to the end of June.

“The change was mainly due to the increase in average prices (including excise tax and customs duties) denominated in the Russian rouble by 63

percent and the increase in volumes of gas sold by 23 percent, or 22.4 Bcm,” explained Gazprom.

“At the same time average prices denominated in US dollar increased by 53 percent,” it added.

Gazprom said that for the second quarter of 2021 its profits more than tripled to 529.9Bln roubles (\$7.2bln) versus 153.5Bln (2.1Bln) in the second quarter of 2020.

The earnings statement also showed that the average first-half price of gas sold to Europe per million cubic metres, including excise tax and customs duties, amounted to 15,469 roubles (\$210.3M).

Gazprom says its 1 MCM units equates to approximately 360,000 therms.

While competing with LNG in the European Union and China, Gazprom is only a limited player in the LNG market with around 10 million tonnes per annum of sales from the Sakhalin joint venture in the Russian Far East. The cargoes are mostly supplied under contract to Japanese utilities.

Gazprom, which also sells refined products, oil and natural gas condensate, is preparing to double its export volumes to Europe via the Nord Stream II pipeline project.

Gazprom’s new sales flow to China since the start of 2020 is still at a low level in volume terms of 5 Bcm and is not mentioned in the earnings.

Gas volumes sales to the Russian Federation increased almost 14 percent to 133.4 Bcm from 117.6 Bcm in the first half of last year.

The balance of gas sales to former countries of the Soviet Union came to 18.3Bcm, up from the previous first-half total of 14.9 Bcm.

Gazprom said its adjusted gross earnings increased by 802.9Bln roubles, or 134 percent, to 1.4 trillion roubles (\$19.1Bln).

“This change was mainly due to an increase in sales,” said Gazprom.

The company said its net debt decreased by 12 percent during the first half and amounted to 3.4 trillion roubles (\$46.2Bln) at the end of June 2021.

“This change was mainly due to an increase in cash and cash equivalents,” said Gazprom.

GRUPO HAM of Spain, the European Union liquefied natural gas filling station network owner, has completed a project to bring the South American nation of Chile its first LNG fuel station after previously opening a facility in Peru.

HAM and local partner company Empresas Lipigas designed, constructed and commissioned the Chilean LNG facility.

This station is located at the fuelling base of trucking company Transportes San Gabriel, in Linares, 300 kilometres south of the Chilean capital Santiago.

The latest station in the Maule region of Chile is sited close to the Pan-American Highway, part of the main artery of road transportation in the country.

“This project has been possible thanks to Lipigas, Transportes San Gabriel and the multinational AB InBev, a company that will incorporate 35 LNG-fuelled trucks into its fleet,” said HAM.

The first full LNG trucking fleet in Chile will refuel at the new service station, contributing to a reduction of more than 800 tons per year of carbon-dioxide emissions and an 80 percent reduction in polluting Particulate Matter (PM), which affects human health.

“Liquefied natural gas is a real option for reducing CO2 in long-distance heavy transport, thus contributing to sustainable development, with the design of efficient energy solutions that help to face the challenge of reducing emissions to the environment,” said Esteban Rodríguez, senior Lipigas executive and business manager.

Lipigas is a company with a presence in Chile, Colombia and Peru and is developing its own clean energy portfolio of customers.

Grupo Ham’s own subsidiary, HAM Chile S.p.A, has been working for several years in South America, with its own personnel and facilities located in the Santiago metropolitan region.

HAM previously partnered with Peruvian firm Limagas to build the first LNG and compressed natural gas station in Peru, an LNG exporting nation.

The station is on one of the main avenues of the city of Cuzco, located in the Peruvian Andes.

The HAM group said in July 2021 it had opened its 100th LNG filling station and now operates around 25 percent of existing facilities in Europe for LNG-powered trucks and other vehicles.

HAM’s latest European LNG filling station was opened in Saint Quentin Fallavier in southeast France, reaffirming its leading role in the vehicular natural gas sector in the European Union.

The company’s network of LNG and CNG facilities is expanding in a growing number of countries with more than 30 in Spain and the others spread around the

EU in France, Belgium, Italy and the Netherlands.

HAM has also started developing networks in the newer entrants to the EU such as the Czech Republic, Finland, Poland and Slovakia, as well as non-EU countries like the UK and Switzerland.

HAM as a trucking company as well and was a pioneer in Spain in 2000 when it acquired its first US-built, natural gas-powered trucks.

Later, in 2009 HAM designed and built the first public vehicular natural gas filling station in Spain, located in Abrera in Barcelona.

GTT, the French liquefied natural gas storage technology firm, has expanded business in China by receiving a first storage system order for an LNG carrier from the Jiangnan Shipyard in Shanghai.

The order is for the cargo-handling storage system for an LNG carrier being built for Chinese energy company, the Jovo Group.

“This is GTT’s first order for a membrane LNG carrier from Jiangnan, making the shipyard the second Chinese yard to construct a vessel with GTT technology,” said the Paris-based company.

GTT’s orders for storage systems for LNG carriers are normally from Hudong-Zhonghua Shipbuilding, also based in Shanghai.

The order is also for a mid-sized LNG carrier to be added to the global fleet.

GTT said it would design the tanks of the vessel with a cargo capacity 79,800 cubic metres.

The mid-sized carrier would be fitted with the GTT’s Mark III Flex membrane containment system and would be the first LNG carrier built in China with the Mark III technology family.

The vessel is scheduled to be delivered to the Jovo Group in the fourth quarter of 2023.

“We are pleased to count Jiangnan among our LNGC new-building partners and to participate in the development of Jovo’s marine fleet,” said Philippe Berterotière, Chairman and Chief executive of GTT.

“This mid-scale LNG carrier will be the first vessel built by a Chinese shipyard using our Mark III membrane technology. This agreement with Jiangnan is a significant milestone for the industry and for membrane LNGCs in China,” added Berterotière.

Hu Keyi, Chief of Corporate Technology of the Jiangnan Shipyard said

the yard was proud to enter into the medium-size LNG carrier market with this project.

“Thanks to our rich experience on hull-form design of Very Large Gas Carriers, and the great support from GTT especially in pre-contract stage, Jiangnan has successfully combined optimized hull form with GTT’s Mark III Flex cargo containment system,” stated Hu.

“We are confident we will provide a state of the art and highly flexible LNG carrier to operate between coastal terminals and pan-Pacific energy sources,” he added.

“Furthermore, it is really a significant step for Jiangnan shipyard toward the construction of a large LNG carrier,” Hu declared.

A statement from the Jovo Group said the order for the customized “China Max” LNG carrier was a key part of its sourcing strategy and paves the way for future developments.

“We are fully confident that GTT will assist Jiangnan shipyard for its first mid-scale LNG carrier, using the cargo-handling system designed by GTT and featuring GTT’s Mark III Flex technology, as well as supporting us for the LNG operations,” added Jovo.

GTT has previously had orders from Jiangnan Shipyard for LNG-powered vessels rather than LNG carriers.

In June 2021 GTT confirmed an order for the design of fuel tanks for 12 new liquefied natural gas-powered container vessels ordered from China by the global CMA CGM shipping group based in the French port of Marseille.

The LNG fuel tanks will be the GTT Mark III system and will be able to load 14,000 cubic metres of LNG.

The 12 vessels will be delivered between the last quarter of 2023 and the third quarter of 2024.

The construction contracts for the CMA CGM newbuilds were given to traditional partner Hudong-Zhonghua as well as Jiangnan Shipyard.

Each of the Chinese yards will build six vessels able to carry between 13,000 and 15,000 twenty-foot equivalent units of containers.

LTHE of India, a wholly owned subsidiary of global construction group Larsen & Toubro and operating as L&T Hydrocarbon Engineering (LTHE), has won a contract from the largest Indian LNG importer Petronet to further expand the nation’s biggest regasification facility at Dahej.

Mumbai-based LTHE said the engineering, procurement, construction and commissioning contract was for two LNG storage tanks, each with a capacity of 170,000 cubic metres for Phase IIIB of the expansion of Dahej, located north of Mumbai in the state of Gujarat.

“The project has been awarded through international competitive bidding on a lump-sum, turn-key basis,” said the company in a statement to the Bombay Stock Exchange (BSE).

“The award demonstrates Petronet’s trust in LTHE’s capability to deliver the project within a challenging schedule, while ensuring excellent safety and quality performance,” it added.

LTHE did not disclose the value of the contract, saying only that it was “significant”.

The engineering firm said it was committed to being an active EPC player in achieving the Government of India’s target of increasing the share of natural gas in the primary energy mix from the current 6 percent to 15 percent by 2030.

LTHE is also constructing the LNG tanks for the Dhamra LNG import terminal on the East Coast state of Odisha being developed by two companies, Gas Authority of India (GAIL) and the Adani Group.

The Dhamra terminal is aimed at serving city-gas and power projects as well as industrial customers.

Petronet, which also owns the Kochi terminal in the southwest state of Kerala, is additionally planning a third terminal and its first on the East Coast at the Port of Gopalpur, also in Odisha.

There is currently only one terminal operating on the East Coast at Kamarajar Port, also known as Ennore, in the state of Tamil Nadu and located just north of Chennai. The terminal is owned by Indian Oil Corp.

Petronet’s Dahej facility, sited north of Mumbai, has capacity of 17.5 MTPA and already as six storage tanks.

The LTHE contract would take that total to eight tanks and storage capacity from the current 930,000 cubic metres to 1.272 million cubic metres and nameplate capacity to around 21.85MT.

Petronet was formed by the Government of India in 1998 specifically to import LNG.

Shareholders in Petronet, which began operations in 2004, include the other big Indian energy players, GAIL, Indian Oil, Oil and Natural Gas Corp. and Bharat Petroleum Corp.

MEXICAN state-run fuel distribution company CFEnnergía is seeking expressions of interest from companies to build and operate a floating liquefied natural gas export facility at the Pacific port of Salina Cruz and an affiliated gas pipeline.

The LNG export and pipeline projects are part of the Mexican government’s economic development plan for the Isthmus of Tehuantepec, the shortest distance between the nation’s two coastlines on the Gulf of Mexico and the Pacific Ocean.

CFEnnergía is part of the state-owned utility CFE and trades more than 3.4 billion cubic feet per day of natural gas, almost half of the country’s demand.

The subsidiary was created after Mexico’s 2013 energy reforms were introduced to improve the supply of gas to CFE power plants.

The pipeline would have capacity of 500 million cubic feet per day and would link Chinameca in the Gulf of Mexico state of Veracruz to Salina Cruz in the state of Oaxaca on the Pacific side, supplying gas to the LNG export facility for exports of around 3 million tonnes per annum.

The Salina Cruz LNG facility would be Mexico’s second on the Pacific Coast as US company Sempra Energy is transforming its existing Costa Azul import terminal into an export plant further north in the state of Baja California.

“CFE would sell gas procured via its extensive pipeline network to the FLNG operator under a 25-year take-or-pay contract,” explained the tender documents.

“The operator would have exclusive rights to market liquefaction capacity and LNG volumes produced from the project,” it added.

The gas infrastructure expansion is part of the government-backed Corredor Interoceánico del Istmo de Tehuantepec (CIIT), or Tehuantepec Isthmus Interoceanic Corridor.

The CIIT operating company would also have a majority stake in a joint venture to provide maritime services to the LNG export facility.

CFEnnergía stated that the operator would assume full ownership of the pipeline and FLNG projects and take on all associated risk in exchange for “security and certainty” in the supply of gas from the state company.

“CFE proposes to sell excess pipeline capacity as well as contributing to the economic development of the Tehuantepec

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Isthmus to strengthen Mexico’s energy security and sovereignty,” said the company.

The pipeline would also be designed to handle future interconnections with industrial areas along its route with capacities of between 50 and 70 million cubic feet per day.

MINERAL RESOURCES Ltd (MRL) of Australia said it had made a “significant” natural gas discovery in the onshore Perth Basin from where other gas producers are planning LNG production and exports.

The company said the discovery was made at the Lockyer Deep 1 project in the Perth Basin, near the town of Mingenew in Western Australia.

MRL is mining services company with its own mining operations for several commodities, including iron ore and lithium.

The company, listed on the Australian Securities Exchange, also has an energy unit engaged in exploration and production.

In July 2021, MRL said its wholly owned subsidiary, Energy Resources Limited (ERL), had secured a drilling rig to support conventional gas exploration in WA’s Mid-West region.

ERL is operator of the EP368 joint venture and holds 80 percent while partner Norwest Energy owns 20 percent.

ERL also holds the largest petroleum acreage in the onshore Northern Carnarvon Basin, with the combination of the Perth and Northern Carnarvon Basins providing a total acreage position of 13,629 square kilometres in Western Australia.

Another Australian company Beach Energy, partnered with a subsidiary of Japan’s Mitsui & Co., are developing the Waitsia natural gas field in the Perth Basin and have a tolling agreement to liquefy and export the gas at the Woodside Petroleum-operated North West Shelf liquefaction plant at Karratha.

The Beach Energy project will produce around 7.5 million tonnes per annum of LNG.

Describing the Lockyer Deep discovery, MRL said drilling commenced in late July at the well location.

“Successful exploration to a depth of over 4,000 metres identified a significant gas discovery in the Kingia Sandstone, the primary objective of the well, representing a positive step forward in MRL’s efforts to locate and utilise natural gas to replace diesel fuel in powering its own and other

Western Australian mining operations,” explained MRL in a statement.

MRL Managing Director Chris Ellison said the update from Lockyer Deep 1 was “an exciting start” to the gas exploration programme.

“As our business continues to grow, we remain committed to pursuing opportunities for natural gas to power our operations, alongside renewable energy sources such as solar and wind,” Ellison said.

“This is an exciting step forward in our gas exploration efforts. Now the final depth of over 4,000 metres has been achieved, a wireline logging program will be completed,” he explained.

“Positive supporting data from the logging program will result in the well being cased for production testing. A seismic survey planned for later this year will assist in selecting future drilling locations on the Lockyer Deep prospect,” Ellison added.

MRL said that subsidiary ERL was WA’s largest holder of gas exploration permits in the Perth Basin and is working closely with government, industry and community stakeholders to ensure new energy opportunities are explored responsibly and safely.

NEW FORTRESS Energy, the New York-based firm with LNG-for-power projects in South America and the Caribbean, has signed a definitive agreement with the government of Sri Lanka for the Asian island nation’s first LNG import terminal.

New Fortress said it would invest in West Coast Power Ltd (WCP), the owner of the 310-megawatts Yugadanavi Power Plant based in the Sri Lankan capital Colombo while also developing and LNG facility off the coast.

As part of the transaction, New Fortress will have gas supply rights to the Kerawalapitya Power Complex, where 310 MW of power is operational today and an additional 700 MW is scheduled to be built, of which 350 MW will be operational by 2023.

“New Fortress will acquire a 40 percent ownership stake in WCP and plans to build an offshore LNG receiving, storage and regasification terminal,” the US company explained.

The LNG import terminal is expected to begin operations in 2023. While New Fortress has been acquiring a small fleet of LNG vessels, its most recent concept started up in Mexico and is centred on imports of ISO containers being

off-loaded to a regasification site.

“New Fortress will initially provide the equivalent of an estimated 1.2 million gallons of LNG per day to Sri Lanka with the expectation of significant growth as new power plants become operational,” stated the company.

It pointed out that the 310 MW Yugadanavi Power Plant currently has a long-term power purchase agreement to provide electricity to the national grid that extends through 2035.

This power plant consists of General Electric turbines and is configured to run on natural gas in combined cycle.

“This is a significant milestone for Sri Lanka’s transition to cleaner fuels and more reliable, affordable power,” said Wes Edens, Chairman and Chief Executive of New Fortress.

“We are pleased to partner with Sri Lanka by investing in modern energy infrastructure that will support sustainable economic development and environmental gains,” added Edens.

New Fortress noted that the Kerawalapitya Power Complex was the foundation of the baseload power that serves the country’s population of 22 million people.

While centering its business in Central and South America with projects in Mexico, Nicaragua, Puerto Rico, Jamaica and Brazil, New Fortress has been looking at other projects in Asia.

The state-owned Philippine National Oil signed an accord with New Fortress in October 2020 to jointly develop Filipino LNG infrastructure

Separately, New Fortress also announced the signing of a term loan facility secured on eight company vessels and will borrow an initial \$430 million from the \$725M arranged under the loan.

The company said the “shipping facility” would help fund the development and construction of the company’s energy projects.

“This facility provides additional capital for us to build additional LNG terminals and infrastructure around the world,” said CEO Edens.

NOVATEK said that modules constructed in China for the first liquefaction Train for the Arctic LNG II project arrived at the Novatek-Murmansk assembly site in Northern Russian from the Wison shipyard.

The first module left the fabrication yard at Zhoushan in the eastern Chinese province of Zhejiang at the end of August for the sea voyage to Russia.

Novatek said the shipment has now been formally handed over to the Arctic LNG II Project engineering, procurement and construction contractors Technip Energies, Italy’s Saipem and Russian company NIPIGAS.

Shanghai-based Wison said the modules for the first Train weighed a combined 50,000 tons and took two years to build at the Zhoushan facility.

Wison noted that each of the three production Trains ordered would have annual nameplate production capacity of 6.6 million tonnes for a combined 19.8 MTPA.

The Chinese company said the equipment within the three Trains includes about 150,000 tons of pipe rack modules and in total 21 modules .

“The two first pipe-rack modules weighing approximately 9,000 tons each were shipped from the Zhoushan to the Novatek-Murmansk LNG Construction Centre and will be further skidded onto the Gravity Base Structure, or GBS, platform of LNG Train 1,” explained Novatek.

“The next two modules have been loaded onto a transport ship and are in transit to Murmansk. Overall, 14 modules will be delivered from the shipyards for the first LNG Train,” added the Russian natural gas company and current operator of the existing Yamal LNG export plant.

“The Arctic LNG II project is progressing on schedule, and the successful delivery of the first modules represents an important milestone towards launching the project on time,” Novatek declared.

Construction of the Arctic LNG II Trains began at the Zhoushan yard in September 2019 and the Chinese company said it overcame multiple challenges and difficulties posed by the Covid-19 pandemic and extreme weather.

Wison said that the equipment had stringent requirements as regards material selection and construction quality for polar exposure.

The project is utilizing the GBS construction concept to reduce overall capital cost and reduce the environmental footprint in the Arctic zone of Russia.

The Utrenneye gas field underpinning the LNG project has reserves totalling 1,434 billion cubic metres of natural gas and 90 million tons of liquids.

The engineering plan is to drop the GBS platforms into the Gulf of Ob and other infrastructure will include LNG storage facilities of a combined

687,000 cubic metres capacity.

Novatek holds 60 percent of the Arctic LNG II project and four other 10 percent stakes are shared between various shareholder, including TotalEnergies of France.

The others are the Chinese energy majors, China National Petroleum Corp. and China National Offshore Oil Corp., as well as a Japanese shareholding split between trading house Mitsui & Co and the state body, Japan Oil, Gas and Metals National Corp.

NOVATEK has signed a strategic agreement with the Japan Bank for International Cooperation (JBIC) on financing projects such as carbon-capture around its liquefaction and plants in northern Siberia.

The agreement was signed in the Russian Far East city of Vladivostok at a regional event called the Eastern Economic Forum.

“We are actively studying options to further reduce our current low carbon footprint from Novatek’s LNG production by using renewable energy sources, and carbon capture and storage at our LNG projects,” said Leonid Mikhelson, Novatek’s Chairman.

“This agreement provides opportunities for us to work with Japanese companies and financial institutions on developing our low-carbon solutions, attracting investments and expanding the range of suppliers of state-of-the-art equipment and technologies,” explained Mikhelson.

“Moreover, it facilitates opportunities for us to market our clean fuel products to a wider range of consumers from Japan to reduce the total carbon emissions,” he added.

The Vladivostok Forum also saw the signing of a similar carbon-capture and clean fuels agreement between the governments of Russia and Japan.

That accord was signed by the Minister of Energy of the Russian Federation Nikolai Shulginov and the Minister of Economy, Trade and Industry of Japan, Hiroshi Kajiyama.

PERTAMINA, the Indonesian oil and gas company, said its gas and LNG subsidiaries would be cooperating with French major TotalEnergies on using the Arun LNG Hub, a former liquefaction plant on North Sumatra island.

Indonesia was the first country to turn a liquefaction and export plant into a regasification terminal when the Arun

plant was converted and came on line in 2014.

It now operates as the Arun Gas Hub and it additionally started truck-loading services in 2020.

The Pertamina-TotalEnergies cooperation at the Arun LNG Hub is through agreements with Pertamina's gas units, PT Perusahaan Gas Negara and PT Perta Arun Gas (PAG), the operator of the Arun terminal.

Pertamina said TotalEnergies would use Arun LNG Hub storage tanks for part of its Asian trading of cargoes from its international portfolio in an expanding global LNG marketing strategy.

The Pertamina-TotalEnergies deal was signed between the President of Arun Gas, Arif Widodo, the President of Pertamina Gas, Wiko Migantoro, the Senior Vice President of Petramina Downstream, Gas and Power, Arif Azof, and senior executives from TotalEnergies.

Arun is the only bonded Logistics Centre operator for LNG as a commodity in Indonesia.

The Arun terminal currently has four LNG storage tanks, each of 127,000 cubic metres and totalling 508,000 cubic metres.

“TotalEnergies will use two LNG tanks and we are already set to welcome the first shipment on the LNG carrier “Cubal” arriving from Angola (southwest Africa) in early September,” stated Arun Gas Hub President Widodo.

Nicolas Poulteney, Managing Director of TotalEnergies Gas and Power in Asia, explained his company’s participation in the venture with the Arun Gas Hub.

“Focusing on this deal, we plan to bring vessels from our LNG portfolio in Angola for storage at the Arun LNG Hub before delivering cargoes to customers,” explained Poulteney.

“We are also excited to collaborate with Pertamina to maximize our international portfolio strategy,” he added.

Widodo explained that the Arun facility’s collaboration with TotalEnergies was in line with expanding into a world-class LNG Hub and regasification company.

“Arun Gas Hub aims to fulfil its role by participating in driving the national economy forward by meeting Indonesia's energy needs and growth,” added Widodo.

He noted that in the seven years since Arun was converted to regasification and storage the revived facility had shown sufficient professional competence and integrity to attract more domestic and international customers.

Pertamina’s expanding regasification programme already includes construction of a small-scale regasification terminal at the port of Teluk Lamong.

Indonesia, whose main LNG export plant is at Bontang in the province of East Kalimantan, was a pioneer in introducing floating storage and regasification units (FSRUs) to enable the distribution of domestic gas where long-range pipelines were lacking.

Indonesia exported 15 million tonnes per annum of LNG in 2020 and has three production plants with the largest being Bontang.

Their existing nameplate export capacity of over 20 MTPA has been dropping as domestic demand increases.

Indonesia, because of its lack of pipeline infrastructure, linked to the nation's geography of multiple islands, was the first exporting country to become a user of regasified LNG in the domestic market.

It already has five regasification facilities nationwide with the first of them, the FSRU “Nusantara Regas Satu”, having come on line in 2012.

PETRONET, the largest Indian importer with two terminals on the West Coast at Dahej and Kochi, is now planning a third import facility on the East Coast where only one currently operates.

Chairman Tarun Kapoor said in the Petronet annual report just published that the company was studying a project to deploy a floating storage and regasification unit (FSRU) at the port of Gopalpur in the East Coast state of Odisha, and possibly an onshore terminal as well at a later date.

“The LNG terminal will help meet the increasing gas demand of the eastern and central part of the country,” said Kapoor.

“Petronet has completed the pre-project studies and is in process of preparing the Detailed Feasibility Report (DFR) for a 4 million tonnes per annum floating storage and regasification (FSRU) terminal followed by a pre-feasibility report for a 5 million tonnes land-based terminal in the future,” explained the Petronet Chairman.

Petronet had previously planned to set up a terminal at Gangavaram in the East Coast state of Andhra Pradesh, though did not proceed because of a lack of perceived demand in 2017.

Petronet now believes that there is growing demand for LNG around Gopalpur port.

India’s seventh import facility, the sixth on the West Coast, is now on line at Jaigarh Port, south of Mumbai in Maharashtra state in the form of an FSRU chartered from Höegh LNG by the Indian Hiranandani Group’s H-Energy subsidiary for a period of 10 years.

Petronet’s Dahej facility, located north of Mumbai, has capacity of 17.5 MTPA and the most recent average utilisation rate was 80.2 percent.

The company’s Kochi terminal in the southwest state of Kerala has 5 MTPA of capacity, though has only secured 23.2 percent of usage.

Monthly shipments to India’s network of seven regasification terminals most recently amounted to 1.87 million tonnes, or around 27 cargoes.

However, India is having to pay much more for its LNG cargoes than it did a year ago.

The imports are now costing around \$900 million per month versus \$500M in 2020 and the LNG bill was \$3.1 billion in the four months of the current fiscal year versus \$1.9Bln in the previous fiscal year.

LNG deliveries to India come mainly from Qatar, which provides over one-third of volumes, as well as West Africa, the US, Asian nations, Australia and the spot market.

Imports for the whole previous fiscal year from April 2020 to March 2021 had amounted to 24.31MT, a decline of 3 percent compared with the 25.07MT imported in the 2019-2020 fiscal year.

PHILIPPINES LNG prospects are progressing to avoid a surge in electricity prices and possible power cuts once the Malampaya natural gas field reserves are depleted by 2024.

The current Malampaya gas-to-power facility fuels three gas-fired power plants with a total generating capacity of 2,700 megawatts (MW), providing up to 30 percent of the power generation needs of Luzon island, including the capital Manila.

The Philippines House of Representatives has just held hearings about the government’s concerns about future gas supplies to keep electricity generation at adequate levels.

Energy Undersecretary Donato Marcos told the Philippines House Committee on Appropriations that the LNG terminal projects of First Gen Corp. and Atlantic Gulf & Pacific Co. (AG&P) with main offices in Manila and Singapore have already secured notices to proceed from the Department of Energy and all

encouragement is being extended to the developers.

“At least one LNG terminal and possibly two will be opened or be commissioned by the second half of 2022, or at least as early as the end of June next year,” Marcos told the hearing.

Marcos was referring to the floating LNG project led by First Gen Corp., one of the country’s leading utilities and based in Manila, and another project led by Atlantic Gulf and Pacific Company (AG&P), the LNG and natural gas logistics and distribution company, which plans to develop an import and regasification facility on Batangas Bay.

Firs Gen has chosen BW LNG of Singapore to provide a floating storage regasification unit (FSRU) for its LNG import terminal project at Batangas in Luzon.

The Filipino company chose BW Gas over Høegh LNG after a tender for the five-year charter agreement.

The project will allow First Gen to accelerate its ability to introduce LNG to the Philippines and eventually have an onshore terminal.

First Gen has said that its terminal plans would serve the natural gas requirements of existing and future gas-fired power plants of third parties and First Gen affiliates in the region.

Other companies are planning LNG import ventures around Batangas to replace the dwindling domestic gas resources with imports.

AG&P’s project is called Philippines LNG and will store and dispatch LNG to power plants and industrial and commercial customers.

PLNG will have initial capacity to deliver up to 3.0 million tonnes per annum of LNG by 2022, with additional capacity for distribution in the liquid fuel market.

SIEMENS ENERGY said its HL-class gas-fired power technology is poised to enable particularly low-emission, economical and flexible power generation from mid-2024 for Taiwan’s increasing LNG imports.

Taiwan in July 2021 signed a new LNG supply with Qatar Petroleum for 1.25 million tonnes per annum of cargoes as the Taiwanese use more of the fuel and expand their infrastructure.

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

The Taiwanese are constructing a third LNG import terminal to meet increasing

demand after imports rose 6 percent last year to 17.75 million tonnes.

Under the Taiwan expansion plans, the national energy company CPC Corp. is developing its third LNG import terminal in the Taoyuan district of Datan Borough.

The first phase is under construction and could be completed by 2023. A second expansion phase is also proposed with the target of full commissioning by 2025.

The first expansion of Taiwan’s existing Tai-Chung LNG terminal was completed at the end of 2019.

Further work is planned, including the addition of another berth and associated tanks, to be carried out in two phases.

The 1.8 MTPA expansion project at Taiwan’s second terminal, the Yung-An facility, including three new storage tanks and related regasification facilities, is expected to be completed by the end of 2026.

Siemens Energy, together with its consortium partner CTCI Corp, the leading Taiwanese engineering, procurement, and construction (EPC) company, will build the Sun Ba Power Phase II combined-cycle power plant.

“The plant will be an important building block in Taiwan’s energy transition, which aims to shift from coal and nuclear power to environmentally friendly gas-fired power plants and renewable energies,” explained Munich-based Siemens Energy.

“The Sun Ba II facility will be built in Tainan in southwest Taiwan, and have an installed electrical capacity of 1,100 megawatts (MW),” added the company.

“It will be fired with regasified liquefied natural gas and Siemens Energy will also provide long-term service for the plant’s core components,” it stated.

The customer is the independent power producer Sun Ba Power Corp.

“We are very excited to contribute to the energy transition of Taiwan with our leading HL-class gas turbine technology,” said Karim Amin, Executive Vice President Generation at Siemens Energy.

“This technology offers substantial value for Sun Ba Power Corp.’s project, as it combines high power density with world-class efficiencies,” added Amin.

“As a result, a large amount of electricity can be produced at the lowest possible cost while driving significant CO2 reductions at the same time,” he explained.

As one of the world’s foremost manufacturers of semiconductors and a technology leader, Taiwan depends on secure and affordable power supply.

“Since Taiwan must import its entire

natural gas requirements as LNG at comparatively high costs, the efficiency of gas-fired power plants has a particularly strong impact on their economic viability,” declared Siemens Energy.

Sun Ba II is designed as a multi-shaft combined-cycle power plant in which two gas turbines and one steam turbine each drive its own electrical generator.

Siemens Energy’s scope of supply includes the plant’s power island, consisting of two SGT6-9000HL gas turbines, one SST-5000 steam turbine, three SGen6-2000P generators, two heat-recovery steam generators and the SPPA-T3000 control system.

“The service contract includes long-term service over 25 years for both gas turbines, the generators, the steam turbine and the heat recovery steam generators,” said Siemens Energy.

RENERGEN, the South African natural gas and helium producer, has seen its shares recover some lost ground to reach A\$2.00 (US\$1.49) per share even amid a depressed national economy after significant liquefied natural gas and helium supply agreements were signed.

Renergen shares on the Australian Securities Exchange (ASX) were last priced at A\$1.92 per share on September 6 after rising by 35 percent from A\$1.42 per share after the announcements were made.

The 2021 high was reached at the start of April when the shares traded at A\$2.74 per share.

The company is also listed on the Johannesburg Stock Exchange and the shares were last at 21 South African rand (US\$1.46) per share.

Renergen’s LNG supply agreement was signed at the start of August 2021 with industrial company Consol Glass and deliveries will start in January 2022.

This will be shortly after the commissioning of Renergen’s first phase of its Virginia Gas Project in South Africa’s Free State province.

The contract is for five years and will carry a price which will be linked to the floating liquefied petroleum gas (LPG) price in South Africa, as published by the Department of Mineral Resources and Energy.

“The supply volumes will be ramped up over a period of three months, reaching an approximate volume of 14 tons per day within three months from commencement as the necessary equipment is installed and tested,” explained Renergen.

This contract marks the first one for the company which isn’t linked to the

supply of gas to trucks for the substitution of diesel.

“It shows the increasing emphasis that companies are placing on reducing their carbon footprint, and our LNG can do this in an innovative way which gives the end-user greater predictability in their future energy prices. We look forward to nurturing this relationship and can’t wait to engage on Phase 2 in due course,” added Renergen Chief Executive Stefano Marani.

Renergen earlier disclosed multiple conditional helium sales agreements from its planned phase two development at the Virginia Gas Project.

Following the company’s maiden sales agreement in April for the supply of helium, Renergen has secured a further three take-or-pay agreements for helium for periods of 10 and 15 years.

The customers are Linde Inc. for 15 years, Messer LLC for 15 years and Helium24 LLC for 10 years.

Renergen has now completed sales agreements for approximately 65 percent of the five tons per day Phase 2 helium production at the Virginia Gas plant.

The company said all the helium contracts are based on a fixed US\$/MCF price, escalating on every anniversary at the US Consumer Price Index, which will commence from the date of first production anticipated to commence in the fourth quarter of 2023.

The cumulative volume of helium to be supplied under the contracts is 196 containers per annum.

“The agreements are conditional upon completion of a number of project development milestones at the Virginia Gas Project and either party may terminate due to a delay in the commencement of production date,” said Renergen.

REPSOL has started the construction of the liquefied natural gas bunkering terminal in the northwest Spanish port of Bilbao to supply the Brittany Ferries company and its LNG-powered vessels linking to port in Northern France, the UK and Ireland.

The first two vessels to be provided for are the “Salamanca” and the “Santoña”, which will start their operations in 2022 and 2023 respectively. The Bilbao terminal will also supply other ships with LNG fuel in the future.

“The construction of this terminal is part of the long-term collaboration agreement formalized in 2019 between Repsol and Brittany Ferries for the supply of LNG to their operations in

Spain,” Repsol explained.

This facility is scheduled to be commissioned in the first half of 2022.

The Bilbao terminal will have a cryogenic tank with a storage capacity of 1,000 cubic metres.

“The flexible design of the terminal will allow it to service different vessels in the future, representing an important decarbonization opportunity for port operations,” stated Repsol.

The Spanish company said the start of construction is on schedule thanks to the efficient collaboration between Repsol's engineering teams, the different administrations involved and the Port Authority of Bilbao.

Repsol said it was committed to industrial development for fuel and the bunkering venture involves an investment of more than €10 million (\$11.7M).

Repsol is also planting the construction of a second LNG bunkering at another northwest port, Santander. It will have the same capacity as Bilbao and is being developed in cooperation with the Port Authority of Santander.

Work has already begun on the conditioning of the quay where the bunker station will be located.

Both terminals are co-financed by the European Commission through the CEF-Connecting Europe Facilities Programme.

Spain currently has six operational LNG import and storage terminals around the coastline and they will provide supplies of fuel.

Repsol cited data from the Iberian Association of Natural Gas for Mobility (Gasnam), showing that the current fleet of LNG-powered ships worldwide is 221, which represents 70 percent growth compared with the 131 ships that were sailing in 2018.

SEMPRA ENERGY has completed its final move in making Mexican subsidiary Infraestructura Energética Nova (IEnova) a private company by buying up all its publicly-held shares and clearing the way for the creation of the new Sempra North American LNG and gas platform.

IEnova said in a statement that the public cash tender offer launched by Sempra to acquire all of the outstanding ordinary shares had been completed.

“IEnova has filed an application with the Mexican Banking and Securities Commission for the cancellation of the registration of all the shares representing its capital stock from the Mexican Securities Registry, which will result in the

de-listing of such shares from the Mexican Stock Exchange, the Bolsa Mexicana de Valores (BMV),” explained IEnova.

IEnova parent Sempra is continuing with process of creating its new energy platform called, Sempra Infrastructure Partners.

The IEnova subsidiary is part of this move by Sempra to bring non-utility infrastructure into one company.

This involved first taking IEnova private as a sole Sempra Infrastructure asset.

The San Diego-based company aims to combine the strengths of Sempra LNG and its Cameron export plant at Hackberry in Louisiana and IEnova's related assets.

The IEnova subsidiary has become one of the Mexico's largest energy companies, owning the Costa Azul LNG export project and being a leading developer and operator of Mexican renewable power projects and natural gas pipelines.

Sempra also agreed in April 2021 to sell a non-controlling 20 percent interest in Sempra Infrastructure Partners to US investment fund Kohlberg Kravis Roberts, now known as just KKR, for \$3.37 billion in cash.

That transaction valued Sempra Infrastructure Partners at round \$25.2Bln, including expected asset-related debt of \$8.37Bln.

The buying up of IEnova shares was an integral part of creating Sempra Infrastructure Partners, meaning it now owns the Mexican natural gas infrastructure portfolio, consisting of distribution companies and certain cross-border and in-country pipelines.

These include pipelines carrying US natural gas exported to Mexico and which will supply feed gas for the Costa Azul LNG export plant when completed.

Sempra's aim remains ownership of an LNG portfolio consisting of up to 45 million tonnes per annum of export capacity in development, under construction or in operation on the North American Pacific and Gulf Coasts.

This LNG output figure is dependent on Sempra's Port Arthur project in Texas going ahead and with other expansions.

SHELL, whose oil and gas business includes annual sales of 60 million tonnes per annum of LNG, has reached an agreement for the sale of its interests in the US Permian Basin to ConocoPhillips for \$9.5 billion in cash.

The transaction will transfer all of Shell's interest in the Permian to

ConocoPhillips, subject to regulatory approvals.

The Permian Basin, which spans West Texas and southeast New Mexico, is one of the main sources of associated feed gas from oil for LNG export plants and projects under development on the US Gulf Coast.

“After reviewing multiple strategies and portfolio options for our Permian assets, this transaction with ConocoPhillips emerged as a very compelling value proposition,” said Wael Sawan, Shell's Upstream Director.

“This decision once again reflects our focus on value over volumes as well as disciplined stewardship of capital,” added Sawan.

Shell's Permian business includes ownership of around 225,000 net acres with current production of around 175,000 barrels per day equivalent.

“The majority of Midland-based Permian employees and many Houston-based employees will be offered employment by ConocoPhillips with effect upon closing in accordance with the terms and conditions of the transaction,” stated Shell.

Shell's main Permian activities are in exploring and producing light, tight oil (LTO) and is one of several shale basins in the Americas where the company is present.

Shell's shale gas and oil projects in North America also include the Delaware Basin portion of the Permian and Canadian assets in the Duvernay and Montney plays in Alberta along with the Montney gas play in British Columbia.

Outside of North America, Shell also has interests in Argentina's main shale oil and gas region, the Neuquén Basin.

The Anglo-Dutch company said the cash proceeds from this Permian transaction would be used to fund \$7Bln in additional shareholder distributions after closing, with the remainder used for further strengthening of the balance sheet.

Shell said the Permian business recorded a before-tax operating loss of \$491 million in 2020 and the transaction was expected to result in an after-tax gain of \$2.4Bln to \$2.6Bln, subject to adjustments.

Shell is one of America's leading energy companies with interests in 50 states employing more than 15,000 people.

Shell's US portfolio of operated companies and interests consists of oil, natural gas, petrochemicals, gasoline, lubricants, and other refined products

along with renewables such as wind and solar.

Shell said Morgan Stanley & Co. LLC and Tudor, Pickering, Holt & Co. are serving as its financial advisors and Norton Rose Fulbright is serving as Shell's legal advisor for the transaction.

TECHNIPFMC has sold 17.6 million shares in Technip Energies, one of the world's leading liquefied natural gas engineering companies, to Dutch firm HAL Investments.

The sale price of the shares was set at €11.15 (\$13.20) per share, yielding total gross proceeds of €196.2 million.

HAL, which has a varied portfolio of international investments and is listed on the Euronext Exchange in Amsterdam, has agreed to a lock-up of 180 days for its shares in Technip Energies.

Upon completion of the sale, representing about 9.9 percent of the issued and outstanding share capital of Technip Energies, TechnipFMC is still left with a direct stake of around 12.3 percent of the shares in Technip Energies.

TechnipFMC completed a spin-off of Technip Energies in February 2021.

Technip Energies is now pursuing its own path as one of the leading LNG engineering companies with current LNG export projects in nations such as Russia, Mexico and Mozambique.

The spin-off reversed the 2017 merger of Technip of France and FMC Technologies of the US, a transaction valued at the time at \$20Bln as it created TechnipFMC as a fully-integrated subsea and onshore provider and Technip Energies as a stand-alone company with the old Technip heritage.

Its portfolio also includes the construction of the world's largest liquefaction Trains in Qatar with 7.8 MTPA of capacity.

In its most recent projects the Technip Energies division of the former TechnipFMC entity constructed Yamal LNG in Russia's northern Siberia region with Japanese partners Chiyoda Corp. and JGC Corp.

It has also been contracted for Arctic LNG II by the same operator of Yamal, Russia's Novatek, and is being partnered by Italy's Saipem and Russian firm NIPIGas, a subsidiary of the Gazprom Neft Group, to construct a plant with almost 20 MTPA of output from three Trains.

Technip Energies, which is currently completing the Coral South FLNG project offshore Mozambique, was also awarded

the Costa Azul export plant contract in Mexico by Sempra Energy.

TOKYO GAS and JERA Co. Inc., the leading Japanese utilities and LNG importers, have sold their combined 50 percent stake in a Mexican-based company operating five gas-fired power plants, including one close to the Gulf Of Mexico LNG import terminal at Altamira.

The Mexican company MT Falcon Holdings owns five natural gas combined-cycle power plants (CCPPs) in northeast Mexico and Tokyo Gas and JERA have sold their respective 30 percent and 20 percent stakes.

Each power plant has had long-term power purchasing agreement with Mexico's state-owned Federal Electricity Commission.

Both Tokyo Gas and JERA have entered into sale and purchase agreements with Actis GP LLP, a London-based private equity firm with investments in global energy infrastructure.

The sales are expected to be completed by the end of March 2022 and are subject to certain approvals from Mexican government authorities.

“Tokyo Gas will enhance business expansion also in the global business such as renewable energy, gas and power supply, LNG infrastructure development, and contribute to the society through corporate growth with the experience and knowledge acquired from MT Falcon,” explained the Tokyo utility, which is aiming for more Asian investments.

The five MT Falcon plants have total generating capacity of 2,233 megawatts of power.

The value of the transactions with Actis were not disclosed, though the Japanese utilities seemed pleased with their sell-offs.

The power plant near the Mexican LNG import terminal at Altamira is a facility with 495 MW of capacity.

Three of the other plants are at Rio Bravo and the fourth is at Saltillo.

JERA also indicated that it preferred its investment portfolio to show more growth in Asia than in the Americas.

“JERA will continue to renew its portfolio going forward, selling assets and reinvesting the proceeds as it optimizes its asset allocation for compatibility with a changing business environment,” said JERA.

The company is the largest Japanese LNG buyer with 35 million tonnes per annum of volumes and controls a fleet of

20 LNG carriers.

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

The joint venture 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.

The Tokyo Gas LNG portfolio currently amounts to around 14 MTPA and the utility controls a fleet of 10 ships to deliver to its four import terminals, three around Tokyo Bay and one at Hitachi in Ibaraki Prefecture.

TRELLEBORG of Sweden, a maker of liquefied natural gas transfer and mooring equipment, has received certification from the Petroleum and Explosives Safety Organization of India as the Asian nation moves to develop more LNG terminals on the East and West Coasts with highest-grade safety standards.

Trelleborg said its marine Quick Release Hook mooring systems received the certificate from the body that sets the rules for equipment containing electrical systems at new or upgraded LNG facilities in the country.

The certification signifies Trelleborg is now the largest accredited docking and mooring equipment manufacturer in the region.

“We set out on a 12-month initiative with our certification agent and support from key supply chain partners, to record technical documentation regarding all electrical systems and enclosures needed to be assessed for hazardous area operation suitability,” said Richard Hepworth, President of Trelleborg's marine and infrastructure operations.

“As a result, we are delighted that Trelleborg Quick Release Hook mooring systems are now certified for use in the Indian market, and are therefore fully compliant with Indian laws and regulations that govern the operation of LNG facilities,” added Hepworth.

“As the largest accredited docking and mooring equipment manufacturer, customers in the region requiring Quick Release Hooks can be confident that our equipment is certified and meets all safety standards,” he stated.

Hepworth noted that the accreditation means that engineering companies and LNG terminal owners in India can avoid unforeseen budget overruns and schedule delays due to compliance issues.

Safety is paramount across the oil and

gas industry with a particular focus in the LNG sector.

Transportation of combustible materials must be managed carefully to avoid the release of gases or vapors into the environment, which can potentially result in explosions, serious injury to personnel and damage to equipment and assets in the surrounding area.

“Trelleborg applies this philosophy at every interface across the LNG transfer chain,” said the company.

“Building on decades of experience in the LNG industry, Trelleborg is an experienced and reliable partner to optimize the business model of any LNG transfer operation and support safe, efficient and cost-effective performance,” it added.

“With standards and guidelines for equipment utilized in port operations developed by industry bodies in many countries and regions, it is vital that operators ensure their terminals meet the highest safety standards anywhere in the world,” Trelleborg declared.

TRINIDAD and Tobago, the Caribbean nation shipping cargoes from the Atlantic LNG facility at Point Fortin in Trinidad, will have access to more natural gas after UK major BP brought on stream the Matapal project.

Matapal is the BP Trinidad and Tobago subsidiary's second subsea development.

BP said the field is located about 80 kilometres off the southeast coast of Trinidad and around 8km east of Juniper platform in a water depths of 163 metres.

It comprises a three-wells tie back into the existing Juniper platform, which helped to minimize development costs.

“Matapal will deliver gas into the Trinidad gas market from resources discovered by the Savannah exploration well, which was drilled in 2017,” explained BP.

“The initial production from this development is expected to be in the range of 250-350 million standard cubic feet per day, once all wells are fully ramped up,” added BP.

The success of BP, the main shareholder in the Trinidad LNG plant along with Royal Dutch Shell, followed Shell's start-up in July 2021 of “Project Barracuda”, otherwise known as Block 5C in the East Coast Marine Area (ECMA) of Trinidad and Tobago.

Project Barracuda is a backfill venture amounting to around 25,000 barrels of oil equivalent per day, or 140 million standard cubic feet per day of gas, of

sustained near-term output with peak production expected to be around 220 million scf per day.

The new feed-gas resources are a boost for the liquefaction plant in Trinidad that saw exports drop in 2020 by 19.3 percent to 10.08 million tonnes.

The BP and Shell delivery of new natural gas for the nation will also help to stabilize the domestic market.

Before the shale-gas boom in North America, Trinidad was the main LNG supplier to import terminals in the US, now the world's third-largest LNG exporter.

However, several years of under-investment in exploration and production by Trinidad & Tobago's energy partners meant the country was becoming short of energy resources.

Shell is a major shareholder along with BP in the Atlantic LNG plant and both have large equity shares in the four liquefaction Trains at the Point Fortin facility.

The Anglo-Dutch company is additionally planning a four-well development project in Block 22 and NCMA 4, known as the Colibri Project.

This is a joint venture with Heritage Petroleum Co., the emerging Trinidad and Tobago oil and gas company, with first gas from Colibri expected in 2022.

BP said its latest natural gas production stream would play an important role in the energy transition and in the economy of Trinidad and Tobago for decades to come.

“This is why our team at BBPTT has worked diligently to safely start up our Matapal project which we successfully achieved both under budget and ahead of schedule,” said Claire Fitzpatrick, President of BPTT

“We are committed to a strong energy future in Trinidad and Tobago and this project plays a critical role in delivering that,” stated Fitzpatrick.

Fabrication work on the Matapal venture began in 2019 and modification was required to the existing Juniper platform as well as the construction and installation of new subsea equipment.

“Hydrocarbons from Matapal will be transported to the Juniper platform via two 9km flexible flowlines,” said BP.

With 15 offshore production platforms, BPTT is the country's largest hydrocarbon producer, accounting for about 55 percent of the nation's natural gas production.

In 2019, BP started up the Angelin development to help underpin the future of LNG exports. ■

WinGD takes holistic approach to de-carbonisation

Swiss-based engine designer WinGD has developed an ecosystem of solutions around the main engine to enhance energy efficiency and to enable the transition to new fuels - Technical Editor Ian Cochran reports.

These are deemed to be the two key parameters to reducing greenhouse gas (GHG) emissions in line with the IMO's ambitions.

WinGD's solutions deploy digital vessel optimisation and battery-hybrid energy systems to improve the energy efficiency and future fuel flexibility of its 2-stroke engines.

For example, using LNG as fuel in a low-pressure X-DF engine can reduce GHG emissions by around 20%, compared to a conventional 2-stroke engine burning heavy fuel oil.

Combined with the new solutions, CO2 equivalent emissions can be reduced even further - taking vessels beyond IMO's intermediate target of reducing carbon intensity by 40% by 2030, the engine designer claimed.

"Our ecosystem approach to energy efficiency acknowledges that vessels today are complex power systems with the main engine at the heart of the integrated solution," said Klaus Heim, WinGD CEO. "These systems, including our engines, are fully ready for the future fuels that will take ships much further than IMO's target of cutting greenhouse gas emissions by at least 50% by 2050."

The solutions include fuel flexibility and smart engine monitoring, coupled with advanced electronic control and hybrid energy management systems.

WinGD's engine expertise means that it can integrate all elements of these

complex systems optimally, including advising shipowners on the sizing and operation of hybrid energy sources, such as batteries, the company said.

In a recent project, WinGD is integrating sustainability and efficiency enhancements through a hybrid energy system on board four pure car and truck carriers (PCTC) ordered by Japanese owner NYK Line.

These vessels will run on LNG, using WinGD's 7X62DF-2.1 2-stroke engines coupled with shaft generators, DC links and battery systems.

WinGD has optimised spinning reserves, peak shaving, and energy flow to run the main engine at its sweet spot as much as possible, while reducing the use of less efficient auxiliary engines.

This propulsion initiative will be managed by WinGD's new hybrid control system.

"Such integrated energy management plays a key role in our vision to power the energy transition in shipping.

"Through WinGD's progressive investments in future fuels, engine control, optimisation and hybridisation, combined with the continued evolution of our core engine technology, these advances give shipowners certainty that they can meet long-range environmental targets with systems they can order today," Heim explained.

Underlying the new offering is WinGD's Integrated Digital Expert

(WiDE), a monitoring and optimisation solution that comes as standard on all medium and large bore WinGD engines.

The monitoring and support capabilities work with a modern control system - WinGD Integrated Control Electronics (WiCE) - that meets the connectivity and security demands of future ship energy systems.

Meeting challenges

Combined with WinGD intensive operator training and a global service network, customers are fully equipped to meet the challenges that lie ahead, the company said.

While developing the wider ecosystem of solutions, WinGD has continued to focus on the performance and sustainability of vessels powered by its engines.

For example, the emissions advantages of the dual-fuelled X-DF 2-stroke engine series have been enhanced through the introduction of intelligent Cooling and Exhaust Recirculation (iCER), which cuts methane slip by around 50%, as well as improving fuel consumption in both gas and diesel modes.

The X-DF engine is already able to operate on carbon-neutral fuels including biogas or synthetic LNG without engine modifications, preparing shipowners for the next stage in their transition to lower carbon operations.

As the most widely deployed low-



WinGD's CEO Klaus Heim

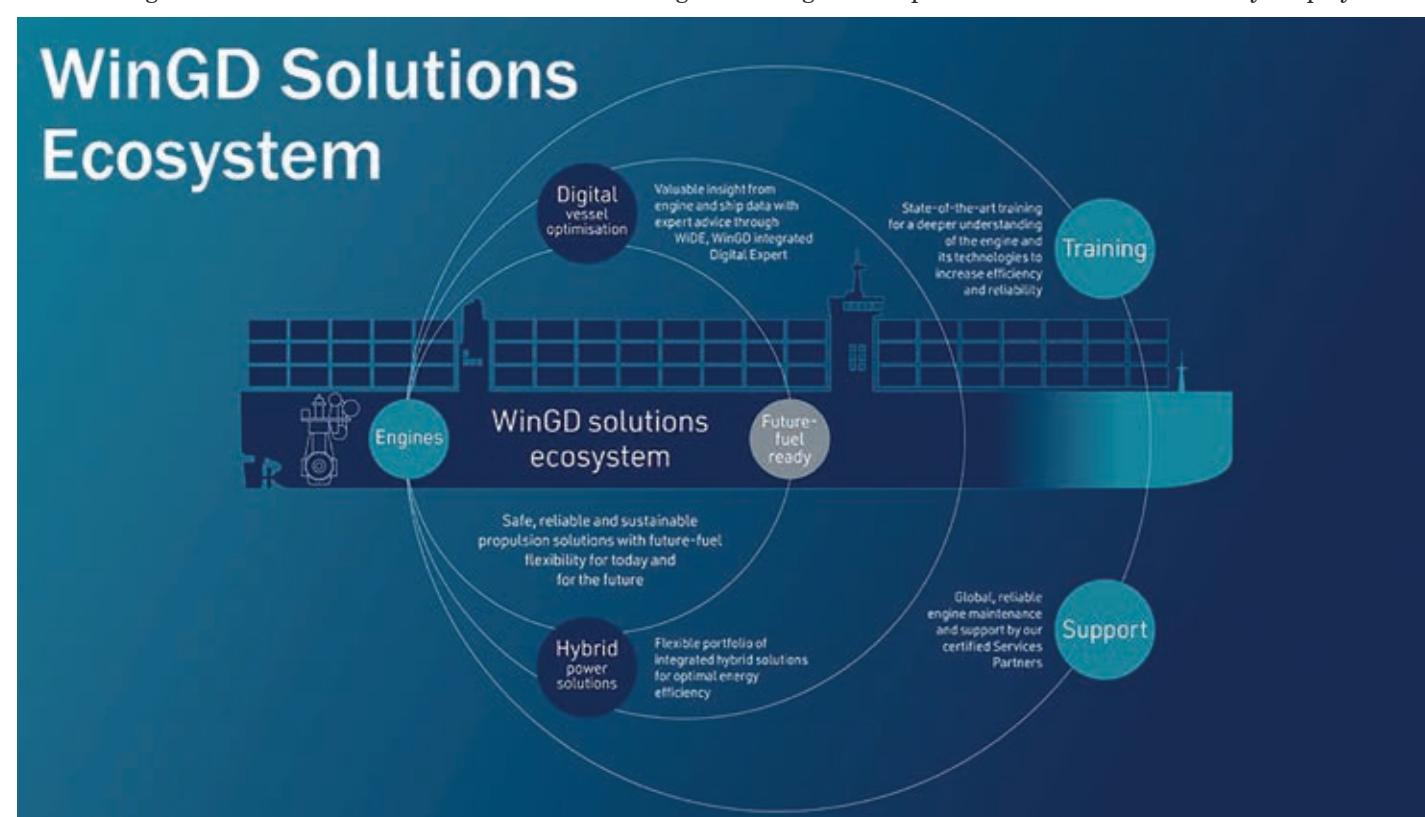
pressure dual-fuel technology in the marine 2-stroke market, it is the ideal platform around which to build a future-ready energy system fit for the next generation of low-emission vessels, WinGD claimed.

However, the benefits of future fuel flexibility and potential hybridisation are not only limited to gas-fuelled engines. WinGD's X engines are powered by liquid fuels, of which there are several emerging carbon-neutral or zero-carbon candidates, including bio-diesel and alcohol fuels.

The company said that it had invested extensively in preparing to use these fuels, including leading European research into injection concepts.

The core engine offering is continuously being developed to improve efficiency and flexibility, most recently with the addition of the first integrated, on-engine NOx abatement solution in the marine 2-stroke engine market.

Talking to *LNG Journal* specifically about LNGC propulsion units, WinGD said that as of August of this year, about 55 LNGCs were in operation equipped with the company's engine designs, while another 95 LNGCs were on order. ■



LNGC WinGD engine types

Vessel size (cu m)	Engine
Abt 15,000	X48DF
15,000 - 30,000	X52DF/RT-flex50DF
60,000	X72DF
170,000 - 250,000*	X62DF/X72DF

*Twin screw configuration

Source: WinGD

Interest in LNG-powered ships fuel gas supply systems increasing

Interest in LNG-powered ships is continuing to increase and the current orderbook stands at more than 150 ships, latterly driven by a rise in larger containerships and car carrier ordering. Technical Editor Ian Cochran has more

R. Stahl's Business Development Manager, Ingo Emde, explained that just as LNG-powered ships are seeing increased interest, the focus has also turned to alternative drive types, known as fuel gas supply systems (FGSS).

FGSS provide a complete fuel gas handling system for LNG-fuelled ships, storing, pressurising, and vaporising LNG ready to be supplied as a fuel gas. The system includes an LNG storage tank, an LNG process system, a bunker system, plus a control & safety system.

These core components are backed up by a sophisticated network of evaporators, compressors, pumps, and heat exchangers with a subsequent need for data on temperature, pressure, and flow values (and their position) to be fed into the ship's control and alarm control monitoring systems (ACMS).

Yet, FGSS installations also come with several challenges, due to the high volatility and flammability of the conveyed gas, Emde said.

Retrofitting ships powered by heavy fuel oil to enable them to use FGSS will mean additional hazardous areas on board requiring the integration of explosion protected Input/Output (I/O) and display systems within the ship's control system and on board alarm monitoring.

Other challenges with deploying a FGSS include the need to seamlessly

transmit the sensor data from hazardous zones to the ship's control centre; the need for resilience and reduced maintenance; and the importance of a flexible system that can be scaled up and down accordingly.

Today, many customers are requesting an FGSS connection that works with remote I/O systems for quality assurance and safety reasons and that also meets their data transfer, resilience, and flexibility requirements.

It's with these issues in mind that R. Stahl, a manufacturer of explosion protection and electrical products, which has been implementing remote I/O installations on ships and offshore platforms for over 30 years, has developed a solution for intrinsically safe sensor/actuator networking in hazardous systems, such as FGSS.

This solution is the IS1+ Remote I/O (Input/Output) system.

Hazardous areas

The system is designed for Hazardous Zone 1 - an area in which an explosive gas is likely to occur in normal operations - and is particularly suited to FGSS, due to the additional hazardous areas on board, Emde said.

The control I/O devices surrounding the FGSS use multi-mode fibre optics for data transmission, enabling signals from hazardous areas to be connected to the



The IS1+ Remote I/O system for modern process automation offers support for PROFINET, EtherNet/IP, Modbus TCP and PROFIBUS DP

distributed control system via PROFIBUS DP, Modbus RTU or Ethernet Modbus TCP, EtherNet/IP and PROFINET.

Due to the low-power technology designed specifically for the IS1+ I/O level, the modules are also suitable for an extended temperature range between -40 deg C and +75 deg C and reach a service life of 15 years. Moreover, there is increased flexibility for the end user with the option to expand the installation at any time using the plug-and-play principle.

This solution has already been tried and tested on several hundred LNGCs and other oil & gas applications with regular orders for remote I/O solutions for LNGCs and FSRU's that are operating

worldwide under the most adverse environmental conditions.

In South Korea, for example, the shipyards are seeing increasing demand for LNG-powered ships and many shipbuilders have opted for R. Stahl's remote I/O system for sensor data transmission from the FGSS to command levels and ACMS systems.

Over the past year, two of the largest shipyards and heavy engineering companies in South Korea have approached the company to adjust the specifications of existing ship control systems and the FGSS connection for use with R. Stahl products.

Yet the question remains - will the LNG ready vessels being ordered prove too expensive to retrofit in the long term?

While the type of ship and the speed of the wider gas infrastructure will determine when the retrofitting and installation of LNG drives will see a return on investment (ROI), current model calculations show that gas drives on ships will offer an ROI after an average of five years, based on strict environmental requirements, the price of maritime diesel and decreasing costs of LNG supply.

In addition, effective FGSS retrofitting and operation in hazardous areas will be a crucial element to any retrofits.

They will also continue to be increasingly important over the next few years as more LNG-fuelled ships become operational with the need to integrate explosion protected I/O and display systems, Emde concluded. ■



A key element of LNG-powered ships is the Fuel Gas Supply System (FGSS) that supplies fuel to the engines

LNG fuelling firms advance ammonia-ready systems

Long hailed as a carbon-free fuel of the future, ammonia is increasingly entering the agenda for LNG vessel operators, as manufacturers explore technology to bring the fuel onboard future vessels. Fuelling editor Malcolm Ramsay has more.

French engineering group Gaztransport & Technigaz (GTT) is the latest firm to develop a solution for this technology, introducing a new “NH3 Ready” notation for its Mark III membrane tanks. Awarded Approval in Principle (AiP) by certification agency Bureau Veritas earlier this year the new tank promises to provide new storage potential for the fuel.

“We believe that some LNG fuel ships will be converted to ammonia, once the ammonia fuel supply chain is developed. That’s why we have developed the ammonia ready notation for our membrane LNG fuel tank,” Jonathan Blicher, Product Line Manager at GTT, tells *LNG Journal*.

While GTT remains “convinced that the LNG is the solution of choice” in the near term, as the most widely available fuel to reduce ship emissions, it expects ammonia will be “a credible alternative fuel in the medium term” and notes that the new AiP recognizes Mark III technology as suitable for the containment of ammonia “without major design changes” compared with LNG fuel tanks.

Challenges ahead

Composed of nitrogen and hydrogen, ammonia (NH3) is a colourless gas that has a lower energy density than LNG but roughly 10 times the energy density of a lithium-ion battery. The chemical composition of the gas further means that it can be combusted to produce water and nitrogen, although this reaction is in practice difficult to achieve, and engines running on the fuel face numerous other challenges.

“Ammonia mustn’t leak into the environment,” Sofia Fürstenberg Stott, partner in Fürstenberg Maritime Advisory, tells *LNG Journal*. “Even the smallest air concentrations are poisonous to us, and ammonia is also a strong

environmental pollutant. Ammonia has a different corrosive behaviour than LNG (or fuel oils) and thus new pipe fittings, valves etc., must be applied.”

For this reason, LNG containment storage and handling systems are not currently ammonia ready and while some components, such as GTT’s LNG tank systems, are now emerging, there remain a complex range of issues to overcome before LNG systems can be reconfigured for the fuel.

“Material selection must be carefully made as ammonia is not compatible with several material families: for instance, any nickel steel with more than 5% nickel is not compatible due to risk of the stress corrosion cracking. Compatibility has yet to be proven for some other materials such as high manganese steel. This corrosive nature of ammonia increases the risk of ammonia leakage and the necessity to strengthen the system to detect and safely manage potential leaks,” Blicher comments.

Despite this, the rapid uptake of LNG bunkering in recent years is seen as a vital component in the development of ammonia, as this infrastructure is built around very similar safety principles. This may mean that LNG-trained staff, onboard vessels and onshore at terminals or waterways, may be amongst the first to test and use ammonia technology.

“LNG bunkering infrastructure is well located for the introduction of ammonia but despite there being many convergences, a transition of the technology is required,” Connor Fürstenberg Stott of Fürstenberg Maritime Advisory adds.

Dual-fuel complications

As dual-fuel engines that run on both LNG and fuel oil have emerged as a norm for many vessels, the possibility of combining ammonia and LNG may seem a logical outcome, hedging against future unpredictability in fuel, but this presents its own issues.

Emmanuel Rousseau, Product Line Manager GTT notes that the “possibility of a multi-fuel system including LNG and ammonia is under study” but predicts that it will be



Wartsila engine test facility

“extremely challenging, both technically and economically”. Differing liquefaction points, density, mechanical and chemical properties all provide obstacles to combining the two fuels.

“We think that owners will choose either ammonia or LNG to fuel their ships but not both of them at the same time,” Rousseau adds. “This flexibility would be expensive as it would be necessary to install two separate power production systems, one for LNG and one for ammonia. Engine makers are rather prioritizing the development of dual fuel (liquid fuel oil and ammonia) engines and extensively working to provide the market with a product at the soonest.

One key difference between the fuels is that liquid ammonia is far denser than LNG, meaning it exerts higher static and dynamic mechanical forces upon a tank and its pumps.

“Mechanical loads are increased due to the higher ammonia density compared to LNG,” Blicher explains. “Sloshing loads are increased due to this higher density. To sustain and manage them, the strength of the tank needs to be reinforced and the tank shape must also be redesigned to reduce the sloshing loads with increased chamfers for instance. Scantling on the bottom of the tank must further be reinforced in a reasonable way to sustain increased static pressure (due to higher density, higher weight is applied on the tank bottom).”

The outlook for blending ammonia with LNG is similarly doubtful, as Rousseau predicts that directly mixing liquid ammonia with LNG “seems very complicated due very different liquefaction temperature. Our perception is that ammonia is a very specific product and it is complicated to find systems able

to deal with it and with other fuels. We believe the best way to further reduce the carbon footprint will be mixing LNG with first bio-LNG then e-LNG.”

Commercial development

Despite these challenges, manufacturers see a bright future for ammonia alongside LNG and last year Finnish engine manufacturer Wärtsilä launched the world’s first long-term, full-scale, prototype of an ammonia-powered marine four-stroke combustion engine.

“We are really excited to further develop and understand the combustion properties of ammonia as a carbon-free fuel in one of our multi-fuel engines”, Egil Hystad, General Manager, Market Innovation at Wärtsilä Marine Business, said. “Ammonia storage and supply systems will be designed and developed for maximum personal safety, and in parallel with the Fuel Gas Handling System under development as part of the EU project ShipFC.”

Based in the Sustainable Energy Catapult Centre’s testing facilities at Stord, Norway, this project will study the use of ammonia as a future carbon-free fuel in cooperation with Knutsen OAS Shipping and Repsol. While no timeframe for completion of trials was announced, the introduction of commercial ammonia engines seems an increasingly likely outcome.

Connor Fürstenberg Stott predicts that the use of ammonia as a marine fuel will be “quite segment dependent relative to handling and capacity constraints of hydrogen and other alternative fuels” but notes that deep-sea ocean shipping is likely to be the first segment to benefit due to its scale and necessity for “onboard high energy density fuel”. ■



GTT containment tank

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	Tanks	Storage Capacity
Belgium	Zeebrugge	Fluxys	1987	4	380,000
Canada	Canaport Saint John	Irving Oil, Repsol	2009	3	480,000
Chile	Quintero	ENAP, Metrogas, Enagas	2009	3	334,000
	Mejillones	Engie, Ameris Capital AGF	2010	1	175,000
China	Beihai LNG, Guangxi	Sinopec	2015	4	640,000
	Dalian	PetroChina	2011	3	480,000
	Dapeng ND Guangdong	CNOOC	2018	4	640,000
	Dongguan, Guangdong	Jovo Group	2013	2	160 000
	Fujian LNG (Xiuyu)	CNOOC, Fujian I&D Corp.	2008	2	640,000
	Guangdong	CNOOC,BP	2006	3	480,000
	Haikou, Hainan LNG	CNOOC	2014	3	480,000
	Ningbo, 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 Ereglisi	Botas	1994	3	255,000
	Izmir	EgeGaz	2006	2	280,000
USA	Everett	Suez LNG NA	1971	2	155,000
	Lake Charles	Shell, ETE	1982	4	425,000
	Freeport	Freeport LNG Development	2008	2	320,000
	Golden Pass, TX	Qatar Petroleum, ExxonMobil	2010	5	775,000
	Pascagoula, MS	Gulf LNG, Kinder	2012	2	320,000
UK	Isle of Grain	National Grid	2005	8	1,000,000
	South Hook	ExxonMobil, Qatar Petroleum, Total	2009	5	775,000
	Dragon LNG, Milford Haven	Shell, Petronas	2009	2	310,000

LNG Import Terminal Projects

Country	Location/Project	Owners/Project Developers	Start up	Storage	
				Tanks	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 Mediterrana	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 (Bayu Undan) ConocoPhillips, Santos, Eni, Inpex, TEPCO, Tokyo Gas	2006	1	3.5	1	188,000
	Australia Pacific LNG Gladstone LNG Gorgon LNG Pluto LNG QCLNG Wheatstone LNG Ichthys LNG Prelude FLNG	ConocoPhillips, Origin Energy, Sinopec	2016	2	7.5	2	320,000
		Santos, Petronas, Total, Kogas	2015	2	7.8	2	280,000
		Chevron, Shell, ExxonMobil	2016	3	15.6	2	360,000
		Woodside, Tokyo Gas, Kansei	2012	1	4.8	2	240,000
		Shell, CNOOC	2014	2	8.0	2	280,000
		Chevron, Woodside, Kuwait (KUFPEC), Jera, Kyushu	2017	2	8.9	2	300,000
		Inpex Corp., Total	2018	2	8.9	2	330,000
		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					
		Oman Govt., Oman LNG Union Fenosa, Osaka Gas, & Itochu	2006	1	3.7	2	240,000
PAPUA NEW GUINEA	PNG LNG	ExxonMobil, Oil Search, Santos, JX Nippon Oil	2014	2	6.9	2	320,000
PERU	Peru LNG	Hunt Oil, Shell, Marubeni, SK Group	2010	1	4.4	2	260,000
QATAR	Qatargas 1-T1&2	QP, ExxonMobil, Total, Marubeni, Mitsui	1997	2	6.4	4	340,000
	Qatargas 1-T3	QP, ExxonMobil, Total, Marubeni, Mitsui	1999	1	3.1		
	Qatargas II-T1	QP, ExxonMobil	2009	1	7.8		
	Qatargas II-T2	QP, ExxonMobil, Total	2009	1	7.8	8	1,160,000
	Qatargas III-T1	QP, ConocoPhillips, Mitsui	2010	1	7.8		
	Qatargas IV-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
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
Aamira	268,000	Nakilat SHI 1753 Inc.	Samsung	Apr-10	Marshall Is.	Diesel	TZ Mk. III	10	Qatargas IV
Abadi	135,000	BGC One Nbd Sdn Bhd.	Mitsubishi	May-02	Brunei	Steam	Moss	5	Lumut
Adam LNG	162,000	Adam Maritime Transportation	HHI	Jul-14	Marshall Is.	Diesel	Membrane	4	Oman LNG
Adamastos	170,800	Shin Doun Kisen Co. Ltd.	HHI	Aug-21	Malta	X-DF	Membrane	4	Portfolio
Adriano Knutsen	180,000	Hai Feng 1717 Ltd.	HHI	Jul-19	Spain	ME-GI	TZ Mk. III Flex Plus	4	Corpus Christi
Al Aamriya	210,168	J5 Nakilat No. 1 Ltd.	Daewoo	May-08	Marshall Is.	Diesel	GT NO 96	5	RasGas III
Al Areesh	148,786	Al Areesh LLC	Daewoo	Jan-07	Bahamas	Steam	GT NO 96	4	RasGas II
Al Bahiya	210,100	Nakilat DSME 2286 Inc.	Daewoo	Dec-09	Marshall Is.	Diesel	TZ Mk. III	5	Qatargas IV
Al Biddah	137,339	Mitsui/Nippon/Kawasaki/lino	Kawasaki	Nov-99	Japan	Steam	Moss	5	Qatargas I
Al Daayen	148,853	Al Daayen LLC	Daewoo	Mar-07	Bahamas	Steam	GT NO 96	4	RasGas II
Al Dafna	268,000	Nakilat SHI 1726 Inc.	Samsung	Oct-09	Marshall Is.	Diesel	GT NO 96	10	RasGas
Al Deebel	145,000	Peninsula LNG Transport No. 3	Samsung	Nov-05	Bahamas	Steam	TZ Mk. III	4	RasGas II
Al Gattara	216,200	Overseas LNG H1 Corp.	HHI	Nov-07	Marshall Is.	Diesel	TZ Mk. III	4	Qatargas II
Al Ghariya	210,150	Julia Neptora	Daewoo	Dec-07	Bahamas	Diesel	GT NO 96	4	Qatargas II
Al Gharrafa	216,200	Overseas LNG H2 Corp.	HHI	Jan-08	Marshall Is.	Diesel	TZ Mk. III	5	Qatargas II
Al Ghashamiya	217,591	Nakilat SHI 1696 Inc.	Samsung	Apr-09	Marshall Is.	Diesel	TZ Mk. III	10	Qatargas III
Al Ghuwairiya	263,300	Nakilat Al Ghuwairiya Inc.	Daewoo	Dec-08	Marshall Is.	Diesel	GT NO 96	5	Qatargas II
Al Hamla	216,200	Overseas LNG S2 Corp.	Samsung	Feb-08	Marshall Is.	Diesel	TZ Mk. III	4	Qatargas II
Al Hamra	137,000	Al Hamra Ltd.	STX	Nov-96	Liberia	Steam	Moss	4	Das Island
Al Huwaila	217,000	Al Huwaila Inc.	Samsung	May-08	Bahamas	Diesel	TZ Mk. III	10	RasGas III
Al Jasra	137,227	Mitsui/Nippon/Kawasaki/lino	Mitsubishi	Jun-00	Japan	Steam	Moss	5	Qatargas I
Al Jassasiya	145,700	Venice Maritime	Daewoo	May-07	Greece	Steam	GT NO 96	4	RasGas II
Al Karaana	210,100	Nakilat DSME 2284 Inc.	Daewoo	Oct-09	Marshall Is.	Diesel	GT NO 96	4	Qatargas III
Al Kharaitiyat	216,300	Nakilat HHI 1909 Inc.	HHI	Jun-09	Marshall Is.	Diesel	TZ Mk. III	4	Qatargas III
Al Kharsaah	217,000	Al Kharsaah Inc.	Samsung	Jun-08	Bahamas	Diesel	TZ Mk. III	10	RasGas III
Al Khatiya	210,150	Nakilat DSME 2283 Inc.	Daewoo	Jul-09	Marshall Is.	Diesel	GT NO 96	4	Qatargas IV
Al Khaznah	135,496	Al Khaznah Inc.	Mitsui E&S	Jul-94	Liberia	Steam	Moss	5	Das Island
Al Khor	137,354	Mitsui/Nippon/Kawasaki/lino	Mitsubishi	Nov-96	Japan	Steam	Moss	5	Qatargas I
Al Khuwair	217,000	Al Khuwair Inc.	Samsung	Jun-08	Bahamas	Diesel	TZ Mk. III	10	RasGas III
Al Mafyar	266,000	Nakilat SHI 1697 Inc.	Samsung	Apr-09	Marshall Is.	Diesel	TZ Mk. III	5	Qatargas III
Al Marrouna	149,539	Al Marrouna LLC	Daewoo	Sep-06	Bahamas	Steam	GT NO 96	4	RasGas II
Al Mayeda	266,000	Nakilat SHI 1694 Inc.	Samsung	Jan-09	Marshall Is.	Diesel	TZ Mk. III	5	Qatargas III
Al Nuaman	210,100	Nakilat DSME 2285 Inc.	Daewoo	Dec-09	Marshall Is.	Diesel	GT NO 96	4	Qatargas III
Al Oraiq	210,200	J5 Nakilat No. 3 Ltd.	Daewoo	Jun-08	Marshall Is.	Diesel	GT NO 96	18	RasGas III
Al Rayyan	137,420	Mitsui/Nippon/Kawasaki/lino	Kawasaki	Mar-97	Japan	Steam	Moss	5	Qatargas I
Al Rekayyat	216,293	Nakilat HHI 1910 Inc.	HHI	Jun-09	Marshall Is.	Diesel	TZ Mk. III	4	Qatargas III
Al Ruwais	210,150	Alexandra Neptana	Daewoo	Aug-07	Bahamas	Diesel	GT NO 96	4	Qatargas II
Al Sadd	210,200	Nakilat DSME 2265 Inc.	Daewoo	Mar-09	Marshall Is.	Diesel	GT NO 96	12	Qatargas III
Al Safliya	210,150	Britta Nausola	Daewoo	Sep-07	Bahamas	Diesel	GT NO 96	5	Qatargas II
Al Sahla	216,200	J5 Nakilat No. 5 Ltd.	HHI	Jun-08	Marshall Is.	Diesel	TZ Mk. III	4	RasGas III
Al Samriya	263,300	Nakilat Al Samriya Inc.	Daewoo	Feb-09	Marshall Is.	Diesel	GT NO 96	5	Qatargas II
Al Shamal	217,000	Al Shamal Inc.	Samsung	Apr-08	Bahamas	Diesel	TZ Mk. III	10	RasGas III
Al Sheehaniya	210,100	Nakilat DSME 2264 Inc.	Daewoo	Feb-09	Marshall Is.	Diesel	GT NO 96	12	Qatargas III
Al Thakhira	145,000	Peninsula LNG Transport No. 2	Samsung	Aug-05	Bahamas	Steam	TZ Mk. III	4	RasGas II
Al Thumama	216,200	J5 Nakilat No. 2 Ltd.	HHI	Feb-08	Marshall Is.	Diesel	TZ Mk. III	4	RasGas III
Al Utouriya	215,000	J5 Nakilat No. 8 Ltd.	HHI	Sep-08	Marshall Is.	Diesel	TZ Mk. III	4	RasGas III
Al Wajbah	137,308	Mitsui/Nippon/Kawasaki/lino	Mitsubishi	Jun-97	Japan	Steam	Moss	5	Qatargas I
Al Wakrah	137,371	Mitsui/Nippon/Kawasaki/lino	Kawasaki	Nov-98	Japan	Steam	Moss	5	Qatargas I
Al Zubarah	137,573	Mitsui/Nippon/Kawasaki/lino	Mitsui E&S	Nov-96	Japan	Steam	Moss	5	Qatargas I
Alto Acrux	147,798	Bahamas LNG Transport Ltd.	Mitsubishi	Mar-08	Bahamas	Steam	Moss	4	Darwin LNG
Amadi	154,800	BGC Four Nbd Sdn Bhd.	HHI	Jul-15	Brunei	DFDE	Membrane	4	Lumut
Amali	148,000	BGC Spv Nbd Sdn Bhd.	Daewoo	Aug-11	Brunei	DFDE	GT NO 96	4	Lumut
Amani	154,800	BGC Three Nbd Sdn Bhd.	HHI	Oct-14	Brunei	DFDE	Membrane	4	Lumut
Amberjack LNG	174,000	Xiang Ch17 HK International	HHI	Apr-20	Malta	X-DF	TZ MK. III Flex	4	Portfolio
Amur River	149,700	Seacrown Maritime Ltd.	HHI	Nov-07	Marshall Is.	Steam	TZ Mk. III	4	Sakhalin II
Arctic Aurora	155,000	Fareastern Shipping Ltd.	HHI	Jul-14	Malta	Diesel/Gas-Electric	TZ Mk. III	4	Snøhvit LNG
Arctic Discoverer	142,612	Northern LNG Trans Co. I Ltd.	Mitsui E&S	Feb-06	Bahamas	Steam	Moss	4	Hammerfest
Arctic Lady	147,200	Barents Leasing Ltd.	Mitsubishi	Apr-06	Norway	Steam	Moss	4	Hammerfest
Arctic Princess	147,200	Rb-Quadrangle Leasing Ltd.	Mitsubishi	Jan-06	Norway	Steam	Moss	4	Hammerfest
Arctic Spirit	89,800	Arctic Spirit LLC	Ishikawajima	Dec-93	Bahamas	Steam	IHI SPB	4	Atlantic LNG
Arctic Voyager	142,759	Northern LNG Trans Co. II Ltd.	Kawasaki	Jul-06	Bahamas	Steam	Moss	4	Hammerfest
Aristidis I	174,000	Atrotos Gas Carrier Corp.	HHI	Jan-21	Malta	X-DF	TZ Mk. III Flex	4	Portfolio
Aristos I	174,000	Xiang Ch25 HK International	HHI	Nov-20	Malta	X-DF	TZ Mk. III Flex	4	Portfolio
Arkat	148,000	BGC Spv Nbd Sdn Bhd.	Daewoo	Feb-11	Brunei	DFDE	GT NO 96	4	Lumut
Arwa Spirit	165,500	Membrane Shipping Ltd.	Samsung	Aug-08	Marshall Is.	Diesel/Gas-Electric	TZ Mk. III	4	Balhaf
Aseem	155,003	India LNG Transport Co. No. 3	Samsung	Nov-09	Malta	Diesel	TZ Mk. III	4	RasGas



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Asia Endeavour	160,000	Chevron Transport Corp. Ltd.	Samsung	Jun-15	Bahamas	Diesel/Gas-Electric	TZ MK. III	4	Gorgon
Asia Energy	154,800	Chevron Transport Corp. Ltd.	Samsung	Oct-14	Bahamas	DFDE	TZ MK. III	4	Gorgon
Asia Excellence	160,000	Chevron Transport Corp. Ltd.	Samsung	Feb-15	Bahamas	DFDE	TZ MK. III	4	Gorgon
Asia Integrity	160,000	Chevron Transport Corp. Ltd.	Samsung	Feb-17	Bahamas	DFDE	TZ Mk. III	4	Wheatstone
Asia Venture	160,000	Chevron Transport Corp. Ltd.	Samsung	Jul-17	Bahamas	Diesel/Gas-Electric	TZ Mk. III Flex	4	Wheatstone
Asia Vision	154,800	Chevron Transport Corp. Ltd.	Samsung	Jul-14	Bahamas	Diesel/Gas-Electric	TZ MK. III	4	Gorgon
Attalos	170,800	Sea 200 Leasing Co. Ltd.	HHI	Aug-21	Malta	X-DF	TZ Mk. III Flex	4	Portfolio
Barcelona Knutsen	173,400	Norspan LNG V AS	Daewoo	Jan-10	Spain	Diesel/Gas-Electric	GT NO 96	4	Portfolio
Beidou Star	172,000	Capricorn LNG Shipping Ltd.	Hudong Zhonghua	Sep-15	Hong Kong	Diesel	TZ MK. III	4	PNG LNG
Berge Arzew	138,088	Berge Arzew/Sonatrach Berge	Daewoo	Jul-04	Bahamas	Steam	GT NO 96	4	Arzew
Bilbao Knutsen	138,000	Norspan LNG AS	Izar	Jan-04	Spain	Steam	GT NO 96	4	Portfolio
Bishu Maru	164,700	Trans Pacific Shipping 3 SA	Kawasaki	Dec-17	Panama	TFDE	Moss	4	Wheatstone
Bonito LNG	174,000	Xiang Ch18 HK International	HHI	May-20	Malta	X-DF	TZ MK. III Flex	4	Portfolio
Boris Davydov	172,410	Hai Kuo Shipping 1605 Ltd.	Daewoo	Dec-18	Cyprus	TFDE - Azipod	GT NO 96 GW	4	Yamal
Boris Vilkitsky	172,410	Hai Kuo Shipping 1601 Ltd.	Daewoo	Jun-17	Cyprus	TFDE - Azipod	GT NO 96 GW	4	Yamal
British Achiever	173,644	Ngoti No. 20 Spc B SA	Daewoo	Nov-18	Isle of Man	ME-GI	GT NO 96	4	Freeport
British Contributor	173,644	Hai Kuo Shipping 1533 Ltd.	Daewoo	Dec-18	Isle of Man	ME-GI	GT NO 96	4	Freeport
British Listener	173,644	Hai Kuo Shipping 1535 Ltd.	Daewoo	Jan-19	Isle of Man	ME-GI	GT NO 96	4	Freeport
British Mentor	173,644	Ngoti No. 20 Spc C SA	Daewoo	Mar-19	Isle of Man	ME-GI	GT NO 96	4	Freeport
British Partner	173,400	Ngoti No. 20 Spc A SA	Daewoo	Jun-18	Isle of Man	ME-GI	GT NO 96	4	Freeport
British Sapphire	155,000	Sg Leasing Gems Ltd.	HHI	Jun-08	Isle of Man	Diesel/Gas-Electric	TZ Mk. III	4	Portfolio
British Sponsor	173,644	Ngoti No. 20 Spc D SA	Daewoo	May-19	Isle of Man	ME-GI	GT NO 96	4	Freeport
Broog	137,529	Mitsui/Nippon/Kawasaki/Iino	Mitsui E&S	Apr-98	Japan	Steam	Moss	5	Qatargas I
Bu Samra	266,000	Nakilat Bu Samra Inc.	Samsung	Dec-08	Marshall Is.	DRL	TZ Mk. III	5	Qatargas II
Bushu Maru	180,000	Trans Pacific Shipping 6 Ltd.	Mitsubishi	Jul-19	Bahamas	Reheat Steam Turbine	TZ MK. III Flex	4	Sabine Pass
BW Boston	138,059	BW Gas Global LNG DA	Daewoo	Jan-03	Norway	Steam	GT NO 96	4	Atlantic LNG
BW Brussels	162,400	BW LNG IV Pte Ltd.	Daewoo	Aug-09	Singapore	Diesel/Gas-Electric	GT NO 96	4	Balhaf
BW Everett	138,028	Everett LNG Pte Ltd.	Daewoo	Jun-03	Singapore	Steam	GT NO 96	4	Atlantic LNG
BW Helios	174,000	Selene Navigation Pte Ltd.	Daewoo	May-21	Bermuda	ME-GI	Membrane	4	Portfolio
BW Lesmes	174,000	BW Gas AS	Daewoo	Mar-21	Bermuda	ME-GI	Membrane	4	Portfolio
BW Lilac	173,400	Helianthus Navigation Corp.	Daewoo	Mar-18	Malta	ME-GI	GT NO 96	4	Portfolio
BW Magna	173,000	BW FSRU III Pte Ltd.	Daewoo	Mar-19	Sinapore	DFDE	TZ MK. III Flex	4	Portfolio
BW Magnolia	173,400	Helen Navigation Pte Ltd.	Daewoo	Feb-20	Singapore	ME-GI	GT NO 96	4	Portfolio
BW Paris	162,400	BW FSRU IV Pte Ltd.	Daewoo	Jul-09	Sinapore	Diesel/Gas-Electric	GT NO 96	4	Balhaf
BW Pavilion Aranda	173,400	BW Diamond LNG Pte Ltd.	Daewoo	Sep-19	Singapore	ME-GI	TZ MK. III Flex	4	Portfolio
BW Pavilion Aranthera	173,400	BW Diamond LNG Pte Ltd.	Daewoo	Jul-20	Singapore	ME-GI	GT NO 96	4	Portfolio
BW Pavilion Leeara	158,629	BW Pavilion Leeara Pte Ltd.	HHI	Jun-15	Singapore	Diesel/Gas-Electric	Membrane	4	Portfolio
BW Pavilion Vanda	155,000	BW Pavilion Vanda Pte Ltd.	HHI	Feb-15	Singapore	DFDE	Membrane	4	Portfolio
BW Tatiana	135,269	FSRU Development Pte Ltd.	Mitsubishi	Dec-02	Marshall Is.	Steam	Moss	5	Atlantic LNG
BW Tulip	173,400	BW LNG I Pte Ltd.	Daewoo	Dec-17	Singapore	ME-GI	GT NO 96	4	Portfolio
Cadiz Knutsen	138,826	Norspan LNG II As	Navantia	Apr-04	Spain	Steam	GT NO 96	4	Portfolio
Cape Ann	145,130	SRV Joint Gas Two Ltd.	Samsung	Apr-10	Norway	Diesel/Gas-Electric	TZ Mk. III	4	Jaigarh LNG
Castillo De Caldelas	176,300	La Arena Nav SA	Imabari Shipbuilding	Jun-18	Malta	ME-GI	TZ Mk. III Flex	4	Portfolio
Castillo de Merida	176,300	San Isidro LNG I BV	Imabari Shipbuilding	Mar-18	Malta	ME-GI	TZ MK. III Flex	4	Portfolio
Castillo de Santisteban	170,000	Trans Gas Naviera Aie	STX	Jun-10	Malta	Diesel Electric	GT NO 96	4	Portfolio
Castillo de Villalba	138,000	Trans Gas Naviera Aie	Navantia Cadiz	Sep-03	Spain	Steam	GT NO 96	4	Portfolio
Catalunya Spirit	138,000	Teekay Gas III SL	Izar	Jun-03	Spain	Steam	GT NO 96	4	Atlantic LNG
Celsius Canberra	180,000	Xiang CH27 HK Int.	Samsung	Jan-21	Marshall Is.	X-DF	Membrane	4	Portfolio
Celsius Carolina	180,000	Oriental Fleet LNG 03 Ltd.	Samsung	Aug-21	Marshall Isl.	X-DF	Membrane	4	Portfolio
Celsius Copenhagen	180,000	Greenheart Gas Shipco I LLC	Samsung	Nov-20	Marshall Is.	X-DF	TZ Mk. III Flex Plus	4	Portfolio
CESI Beihai	174,000	China Energy Aspiration LNG	Hudong Zhonghua	Jun-17	Hong Kong	TFDE	GT NO 96	4	APLNG
CESI Gladstone	174,000	China Energy Aspiration LNG	Hudong Zhonghua	Oct-16	Hong Kong	TFDE	GT NO 96	4	APLNG
CESI LianYungAng	174,000	China Energy Glory LNG	Hudong Zhonghua	Jun-18	Hong Kong	TFDE	GT NO 97	4	APLNG
CESI Qingdao	174,000	China Energy Hope LNG	Hudong Zhonghua	Feb-17	Hong Kong	TFDE	GT NO 96	4	APLNG
CESI Tianjin	174,000	China Energy Pioneer LNG	Hudong Zhonghua	Jul-17	Hong Kong	TFDE	GT NO 96	4	APLNG
CESI Wenzhou	174,000	China Energy Peace LNG	Hudong Zhonghua	Feb-18	Hong Kong	Diesel-Electric	GT NO 96	4	APLNG
Cheikh Bouamama	75,558	Skikda LNG Trans Corp.	Universal SB	Jul-08	Bahamas	Steam	TZ Mk. III	4	Arzew/Skikda
Cheikh El Mokrani	75,759	Mediterranean LNG Transport	Japan Marine United	Jun-07	Bahamas	Steam	TZ Mk. III	4	Skikda
Christophe de Margerie	170,000	Zelitiko Shipping Co. Ltd.	Daewoo	Nov-16	Cyprus	Diesel/Gas-Electric	GT NO 96 GW	4	Yamal
Clean Energy	149,700	Pegasus Shipholding SA	HHI	Mar-07	Marshall Is.	Steam	TZ Mk. III	4	Portfolio
Clean Horizon	162,000	Sea 43 Leasing Co Ltd.	HHI	Apr-15	Malta	Diesel/Gas-Electric	Membrane	4	Portfolio
Clean Ocean	162,000	Cdbl Ocean Ltd.	HHI	May-14	Marshall Is.	Diesel/Gas-Electric	Membrane	4	Sabine Pass
Clean Planet	162,000	Cdbl Planet Ltd.	HHI	Aug-14	Marshall Is.	Diesel Electric	Membrane	4	Yamal
Clean Vision	162,000	Sea 44 Leasing Co. Ltd.	HHI	Aug-15	Malta	Diesel/Gas-Electric	TZ Mk. III	4	Portfolio
CNTIC VPower Global	28,260	CNTIC VPower LNG Logistics Shipyard Co.	COSCO (Dalian)	Apr-20	Hong Kong	Diesel/Gas-Electric	GT NO 96	4	Portfolio
Cobia LNG	174,000	Cardiff LNG ETA Owning LLC	HHI	Feb-21	Malta	X-DF	NO-96-GW+PRS	4	Portfolio
Cool Discoverer	174,000	Serendipity Maritime Ltd.	HHI	Sep-20	Malta	X-DF	TZ MK. III Flex	4	Portfolio
Cool Explorer	160,000	Safe Port Marine Ltd.	Samsung	Jan-15	Malta	DFDE	TZ Mk. III	4	Spot
Cool Racer	174,000	Eloquent Shipping	Samsung	Feb-21	Malta	X-DF	NO-96-GW+PRS	4	Portfolio
Cool Runner	160,000	Priority Maritime Corp.	Samsung	Mar-14	Malta	Diesel Electric	TZ Mk. III	4	Wheatstone



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Cool Voyager	160,000	Energy Shipping & Trading SA	Samsung	Oct-13	Malta	TFDE	TZ Mk. III	4	Wheatstone
Coral Encanto	30,000	Maxluck Plus Ltd.	Ningbo Xinle	Jul-20	Marshall Is.	DFDE	Cylinders	2	Portfolio
Corcovado LNG	160,162	Oceanus LNG Alpha LLC	Daewoo	Apr-14	Malta	Diesel Electric	GT NO 96	4	Spot
Creole Spirit	173,400	Hai Jiao 1601 Ltd.	Daewoo	Feb-16	Bahamas	ME-GI	GT NO 96	4	Sabine Pass
Cubal	160,276	Mint LNG IV Ltd.	Samsung	Jan-12	Bahamas	DFDE	TZ Mk. III	4	Soyo
Cygnus Passage	145,400	Cygnus LNG Shipping Ltd.	Mitsubishi	Jan-09	Bahamas	Steam	Moss	4	Sakhalin II
Dapeng Moon	147,200	Yue Gang LNG Shipping Co. Ltd.	Hudong Zhonghua	Jul-08	Hong Kong	Steam	TZ MK. III	4	Pluto
Dapeng Star	147,210	Yue Yang LNG Shipping Co. Ltd.	Hudong Zhonghua	Nov-09	Hong Kong	Steam	TZ MK. III	4	Pluto
Dapeng Sun	147,200	Yue Peng LNG Shipping Co. Ltd.	Hudong Zhonghua	Apr-08	Hong Kong	Steam	GT NO 96	4	North West Shelf
Diamond Gas Crystal	174,000	Diamond LNG Shipping 5 Pte Ltd.	Hyundai Samho	Jun-21	Singapore	X-DF	TZ Mk. III Flex	4	Portfolio
Diamond Gas Metropolis	174,000	Diamond LNG Shipping 4 Ltd.	HHI	Nov-20	Bahamas	X-DF	TZ Mk. III Flex	4	Portfolio
Diamond Gas Orchid	165,000	Diamond LNG Shipping 1 Pte Ltd.	Mitsubishi	Jun-18	Bahamas	STaGE	Sayaringo	4	Cameron
Diamond Gas Rose	165,000	Diamond LNG Shipping 2 Pte Ltd.	Mitsubishi	Aug-18	Bahamas	STaGE	Sayaringo	4	Cameron
Diamond Gas Sakura	165,000	Diamond LNG Shipping 3 Pte Ltd.	Japan Marine United	May-19	Bahamas	STaGE	Sayaringo	4	Cameron
Diamond Gas Victoria	174,000	Diamond LNG Shipping 6 Pte Ltd.	Hyundai Samho	Jun-21	Bahamas	X-DF	Membrane	4	Portfolio
Disha	136,025	India LNG Transport Co. No. 1	Daewoo	Dec-03	Malta	Gas Turbine	GT NO 96	4	RasGas
Doha	137,262	Mitsui/Nippon/Kawasaki/Iino	Mitsubishi	Jun-99	Japan	Steam	Moss	5	Qatargas I
Dorado LNG	174,000	Cardiff LNG Epsilon Owning LLC	Samsung	Dec-20	Malta	X-DF	TZ Mk. III Flex	4	Portfolio
Duhail	210,150	Gabriela Nauranto	Daewoo	Dec-07	Bahamas	Diesel	GT NO 96	4	Qatargas II
Dukhan	137,661	LNG Water Lily Shipping Corp.	Mitsui E&S	Sep-04	Liberia	Steam	Moss	5	Qatargas II
East Energy	122,255	Sinokor Maritime Co. Ltd.	STX	Aug-82	South Korea	Steam	Membrane	4	NLNG
Eduard Toll	172,410	TC LNG Explorer I LLC	Daewoo	Sep-17	Bahamas	TFDE - Azipod	GT NO 96 GW	4	Yamal
Ejnan	145,000	Peninsula LNG Transport No. 4	Samsung	Jan-07	Bahamas	Steam	TZ Mk. III	4	RasGas II
Ekaputra	136,400	Hikmah Sarana Bahari Pt.	Mitsubishi	Jan-89	Indonesia	Steam	Moss	5	Bontang
Elisa Larus	174,000	Caroline 77 Sasu	Hyundai Samho	May-20	France	X-DF	TZ Mk. III Flex Plus	4	Portfolio
Energy Advance	147,624	Tokyo LNG Tanker/Toho LNG	Kawasaki	Mar-05	Japan	Steam	Moss	4	Portfolio
Energy Atlantic	156,000	Spectacle Shipping & Trading	STX	Sep-15	Malta	TFDE	Moss	4	Sabine Pass
Energy Confidence	153,000	Tokyo LNG Tanker/Nippon Yusen	Kawasaki	Apr-09	Japan	Steam	Moss	4	Darwin LNG
Energy Endeavour	173,400	Rossini Navigation SA	Daewoo	Jan-21	Marshall Is.	ME-GI	TZ Mk. III Flex	4	TBC
Energy Frontier	147,599	Tokyo LNG Tanker Co. Ltd.	Kawasaki	Sep-03	Japan	Steam	Moss	4	Sakhalin II
Energy Glory	165,000	Tokyo LNG Tanker/Nippon Yusen	Japan Marine United	Mar-19	Japan	TFDE	TZ Mk. III Flex Plus	4	Cove Point
Energy Horizon	177,000	Tokyo LNG Tanker/Nippon Yusen	Kawasaki	Aug-11	Japan	Steam	Moss	4	Pluto
Energy Innovator	165,000	Tokyo LNG Tanker/Mitsui OSK	Japan Marine United	Jun-19	Japan	TFDE	TZ Mk. III Flex Plus	4	Cove Point
Energy Integrity	173,400	Mozart Navigation SA	Daewoo	May-21	Marshall Is.	ME-GI	TZ Mk. III Flex	4	Portfolio
Energy Liberty	165,000	Tokyo LNG Tanker/Mitsui OSK	Japan Marine United	Oct-18	Japan	TFDE	TZ Mk. III Flex Plus	4	Cove Point
Energy Navigator	145,000	Tokyo LNG Tanker/Mitsui OSK	Kawasaki	May-08	Japan	Steam	Moss	4	Sakhalin II
Energy Pacific	173,400	Ravel Navigation SA	Daewoo	Aug-20	Marshall Is.	ME-GI	TZ Mk. III Flex	4	Portfolio
Energy Progress	147,558	Jovial Shipping Navigation SA	Kawasaki	Nov-06	Bahamas	Steam	Moss	4	Darwin LNG
Energy Universe	166,571	Lusby Shipping SA	Japan Marine United	Aug-19	Panama	TFDE	TZ Mk. III Flex	4	Cove Point
Enshu Maru	164,700	Trans Pacific Shipping 4 SA	Kawasaki	Aug-18	Panama	Reheat Steam Turbine	Moss	4	Wheatstone
Esshu Maru	153,000	Trans Pacific Shipping 2 Ltd.	Mitsubishi	Dec-14	Bahamas	Steam	Sayaendo	4	Portfolio
Etyfa Prometheas	135,269	Enlink Trading FZE	Mitsubishi	Oct-02	Cyprus	Steam	Moss	5	Portfolio
Excalibur	138,034	Solaia Shipping LLC	Daewoo	May-02	Belgium	Steam	GT NO 96	4	Portfolio
Fedor Litke	172,410	Hai Kuo Shipping 1602 Ltd.	Daewoo	May-17	Cyprus	TFDE - Azipod	GT NO 96 GW	4	Yamal
Flex Amber	174,000	Bund 10 Holding Ltd.	HHI	Oct-20	Marshall Is.	X-DF	TZ Mk. III Flex	4	Portfolio
Flex Artemis	174,000	Flex LNG Reliance Ltd.	Daewoo	Aug-20	Marshall Is.	ME-GI	NO-96-GW+FRS	4	Portfolio
Flex Aurora	174,000	Flex LNG Aurora Ltd.	HHI	Jun-20	Marshall Is.	X-DF	TZ Mk. III Flex	4	Portfolio
Flex Constellation	173,400	Flex LNG Constellation Ltd.	Daewoo	Jun-19	Marshall Is.	ME-GI	NO-96-GW+PRS	4	Portfolio
Flex Courageous	173,400	Flex LNG Courageous Ltd.	Daewoo	Aug-19	Marshall Is.	ME-GI	NO-96-GW+PRS	4	Portfolio
Flex Endeavour	172,400	Triple H No. 3 Ltd.	Daewoo	Jan-18	Malta	ME-GI	NO-96-GW+PRS	4	Portfolio
Flex Enterprise	172,400	Triple H No. 4 Ltd.	Daewoo	Jan-18	Malta	ME-GI	NO-96-GW+PRS	4	Portfolio
Flex Freedom	173,400	Flex Freedom Ltd.	HHI	Jan-21	Marshall Is.	ME-GI	NO-96-GW+FRS	4	Portfolio
Flex Rainbow	174,000	Xiang Ch13 HK International	Samsung	Jun-18	Marshall Is.	ME-GI	TZ Mk. III Flex	4	Spot
Flex Ranger	174,101	Flex LNG Ranger Ltd.	Samsung	Jun-18	Marshall Is.	ME-GI	TZ Mk. III Flex	4	Portfolio
Flex Resolute	173,400	Flex LNG Resolute Ltd.	HHI	Sep-20	Marshall Is.	ME-GI	NO-96-GW+FRS	4	Portfolio
Flex Vigilant	174,000	Flex Vigilant Ltd.	HHI	May-21	Liberia	X-DF	TZ Mk. III Flex	4	Portfolio
Flex Volunteer	174,000	Flex Volunteer Ltd.	HHI	Jan-21	Marshall Is.	X-DF	TZ Mk. III Flex	4	Portfolio
Fraiha	210,100	J5 Nakilat No. 6 Ltd.	Daewoo	Aug-08	Marshall Is.	Diesel	GT NO 96	18	RasGas III
Fuji LNG	149,172	Aletheia Owning Co Ltd.	Kawasaki	Mar-04	Malta	Steam	Moss	4	Sabine Pass
Fuwairit	138,200	Camartina Shipping Co.	Samsung	Jan-04	Bahamas	Steam	TZ Mk. III	4	RasGas II
Gail Bhuwan	180,000	Primavera Montana SA	Daewoo	Feb-21	Marshall Islnds.	X-DF	Membrane	4	Portfolio
Galia Spirit	140,624	Teekay Gas II SL	Daewoo	Jul-04	Spain	Steam	GT NO 96	4	Portfolio
Gaslog Chelsea	153,000	Gas-Fifteen Ltd.	Hanjin (Busan)	Jun-10	Bermuda	Diesel/Gas-Electric	Sayaendo	4	Portfolio
GasLog Galveston	174,000	Gas-Thirty Three Ltd.	Samsung	Jan-21	Bermuda	X-DF	TZ Mk. III Flex Plus	4	Portfolio
Gaslog Geneva	174,000	Gas-Thirteen Ltd.	Samsung	Oct-16	Bermuda	TFDE	TZ Mk. III	4	Portfolio
Gaslog Genoa	174,000	Gas-Twenty Two Ltd.	Samsung	Mar-18	Bermuda	X-DF	TZ Mk. III Flex Plus	4	Portfolio
GasLog Georgetown	174,000	Ceres Shipping Ltd.	Samsung	Nov-20	Bermuda	X-DF	TZ Mk. III Flex Plus	4	Portfolio
Gaslog Gibraltar	174,000	Gas-Fourteen Ltd.	Samsung	Nov-16	Bermuda	TFDE	TZ Mk. III	4	Portfolio
Gaslog Gladstone	174,000	Gas-Twenty Three Ltd.	Samsung	Mar-19	Bermuda	X-DF	TZ Mk. III Flex Plus	4	Portfolio
Gaslog Glasgow	174,000	Gas-Twelve Ltd.	Samsung	Jul-16	Bermuda	TFDE	TZ Mk. III	4	Portfolio
Gaslog Greece	174,000	Gas-Eleven Ltd.	Samsung	Mar-16	Bermuda	TFDE	TZ Mk. III	4	Portfolio



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Gaslog Hong Kong	174,000	Gas-Twenty Five Ltd.	HHI	Mar-18	Bermuda	X-DF	TZ Mk. III Flex	4	Portfolio
Gaslog Houston	174,000	Gas-Twenty Four Ltd.	HHI	Dec-18	Bermuda	X-DF	TZ Mk. III Flex	4	GoM
Gaslog Salem	155,000	Gas-Ten Ltd.	Samsung	May-15	Bermuda	Diesel/Gas-Electric	Membrane	4	Portfolio
Gaslog Santiago	155,000	Gas-Four Ltd.	Samsung	Mar-13	Bermuda	Diesel/Gas-Electric	TZ Mk. III	4	Portfolio
Gaslog Saratoga	155,000	Gas-Nine Ltd.	Samsung	Dec-14	Bermuda	Diesel/Gas-Electric	Membrane	4	Spot
Gaslog Savannah	155,000	Gas-One Ltd.	Samsung	May-10	Bermuda	Diesel	TZ Mk. III	4	Portfolio
Gaslog Seattle	155,000	Gas-Seven Ltd.	Samsung	Oct-13	Bermuda	TFDE	TZ Mk. III	4	Portfolio
Gaslog Shanghai	155,000	Gas-Three Ltd.	Samsung	Feb-13	Bermuda	Diesel/Gas-Electric	TZ Mk. III	4	Portfolio
Gaslog Singapore	155,000	Gas-Two Ltd.	Samsung	Aug-10	Bermuda	Diesel/Gas-Electric	TZ Mk. III	4	Portfolio
GasLog Skagen	155,000	Gas-Six Ltd.	Samsung	Aug-13	Bermuda	TFDE	TZ Mk. III	4	Portfolio
Gaslog Sydney	155,000	Gas-Five Ltd.	Samsung	Jun-13	Bermuda	DFDE	TZ Mk. III	4	Portfolio
Gaslog Wales	180,000	Gas-Thirty One Ltd.	Samsung	May-20	Bermuda	X-DF	TZ Mk. III Flex Plus	4	Portfolio
Gaslog Warsaw	180,000	GasLog Hellas-1 ENE	Samsung	Jul-19	Greece	X-DF	TZ Mk. III Flex Plus	4	Spot
GasLog Wellington	176,400	GAS-Thirty Four Ltd.	Samsung	Jun-21	Bermuda	X-DF	TZ Mk. III Flex Plus	4	Portfolio
Gaslog Westminster	180,000	Gas-Thirty Ltd.	Samsung	Jul-20	Bermuda	X-DF	TZ Mk. III Flex Plus	4	Portfolio
Gaslog Winchester	176,400	Gas-Thirty Five Ltd.	Samsung	Aug-21	Bermuda	X-DF	TZ Mk. III	4	Portfolio
Gaslog Windsor	180,000	Gas-Twenty Eight Ltd.	Samsung	Apr-20	Bermuda	X-DF	TZ MK. V	4	Portfolio
Gemmata	135,269	National Australia Finance	Mitsubishi	Feb-04	Singapore	Steam	Moss	5	Peru LNG
Georgiy Brusilov	172,410	Hai Kuo Shipping 1801 Pte Ltd.	Daewoo	Nov-18	Cyprus	TFDE - Azipod	GT NO 96 GW	4	Yamal
Georgiy Ushakov	172,652	DY Tankers Ltd.	Daewoo	Sep-19	Bahamas	ME-GI	GT NO 96 GW	4	Yamal
Ghasha	137,000	Ghasha Inc.	Mitsui E&S	Jun-95	Liberia	Steam	Moss	5	Das Island
Gigira Laitebo	177,419	Cleopatra LNG Shipping Co. Ltd.	HHI	Feb-10	Bahamas	DFDE	TZ Mk. III	4	RasGas
Global Energy	74,100	Global Energy Armateur SNC	STX	Jan-04	France	Diesel/Gas-Electric	CS1	4	Portfolio
Global Star	173,400	Global Star Inc.	Daewoo	Jan-21	Marshall Is.	ME-GI	TZ Mk. III Flex	4	Portfolio
Golar Arctic	140,648	Golar LNG 2216 Corp.	Daewoo	Oct-03	Marshall Is.	Steam	GT NO 96	4	Jamaica LNG
Golar Bear	160,000	Cool Bear Shipping Ltd.	Samsung	Sep-14	Marshall Is.	Diesel/Gas-Electric	TZ Mk. III	4	Spot
Golar Celsius	160,000	Noble Celsius Shipping Ltd.	Samsung	Oct-13	Marshall Is.	Diesel/Gas-Electric	TZ Mk. III	4	Spot
Golar Crystal	159,800	Oriental Fleet LNG 01 Ltd.	Samsung	Sep-14	Marshall Is.	TFDE	Membrane	4	Spot
Golar Frost	160,000	Golar LNG NB12 Corp.	Samsung	Oct-14	Marshall Is.	Diesel/Gas-Electric	Membrane	4	Portfolio
Golar Glacier	162,000	Hai Jiao 1401 Ltd.	Hyundai Samho	Nov-14	Marshall Is.	TFDE	Membrane	4	Spot
Golar Grand	145,700	Golar Grand Corp.	Daewoo	Jan-06	Marshall Is.	Steam	GT NO 96	4	Gorgon
Golar Ice	160,000	Hai Jiao 1406 Ltd.	Samsung	Jan-15	Marshall Is.	Diesel Electric	Membrane	4	Spot
Golar Kelvin	162,000	Hai Jiao 1405 Ltd.	Hyundai Samho	Jan-15	Marshall Is.	DFDE	Membrane	4	Spot
Golar Maria	145,700	Golar LNG 2234 LLC	Daewoo	Jun-06	Marshall Is.	Steam	GT NO 96	4	Spot
Golar Mazo	135,255	Faraway Maritime Shipping	Mitsubishi	Dec-99	Liberia	Steam	Moss	5	Bontang
Golar Penguin	160,000	Oriental Fleet LNG 02 Ltd.	Samsung	Sep-14	Marshall Is.	TFDE	Membrane	4	Spot
Golar Seal	160,000	Compass Shipping 1 Corp. Ltd.	Samsung	Sep-13	Marshall Is.	Diesel/Gas-Electric	TZ Mk. III	4	Spot
Golar Snow	160,000	Hai Jiao 1402 Ltd.	Samsung	Jan-15	Marshall Is.	Diesel/Gas-Electric	Membrane	4	Spot
Grace Acacia	149,700	Algawin Shipping Inc.	HHI	Feb-07	Bahamas	Steam	TZ Mk. III	4	Spot
Grace Barleria	149,700	NYK Line	HHI	Apr-07	Japan	Steam	TZ Mk. III	4	Portfolio
Grace Cosmos	150,000	Algahunt Shipping Inc.	HHI	Feb-08	Bahamas	Steam	TZ Mk. III	4	Portfolio
Grace Dahlia	177,000	NYK Line	Kawasaki	Sep-13	Japan	Steam	Moss	4	Spot
Grand Aniva	145,000	NYK-SCF LNG Shpg No. 2 Ltd.	Mitsubishi	Jan-08	Cyprus	Steam	Moss	4	Sakhalin II
Grand Elena	145,580	NYK-SCF LNG Shpg No. 1 Ltd.	Mitsubishi	Oct-07	Cyprus	Steam	Moss	4	Sakhalin II
Grand Mereya	147,000	Ice Gas LNG Shipping Co. Ltd.	Mitsui E&S	Mar-08	Cyprus	Steam	Moss	4	Sakhalin II
Hanjin Muscat	138,366	H-Line Shipping Co. Ltd.	Hanjin (Busan)	Jul-99	South Korea	Steam	GT NO 96	4	Oman LNG
Hanjin Pyeongtaek	130,636	H-Line Shipping Co. Ltd.	Hanjin (Busan)	Sep-95	South Korea	Steam	GT NO 96	4	Bontang
Hanjin Ras Laffan	138,214	H-Line Shipping Co. Ltd.	Hanjin (Busan)	Jul-00	South Korea	Steam	GT NO 96	4	RasGas I
Hanjin Sur	138,333	H-Line Shipping Co. Ltd.	Hanjin (Busan)	Feb-00	South Korea	Steam	GT NO 96	4	Oman LNG
Hellas Athina	170,520	Kronos Shipping LLC	Hyundai Samho	Sep-21	Malta	X-DF	Membrane	4	Portfolio
Hellas Diana	174,000	Zeus Shipping LLC	Hyundai Samho	Mar-21	Malta	X-DF	TZ Mk. III Flex	4	Portfolio
Hispania Spirit	145,500	Teekay Gas Naviera SL	Daewoo	Aug-02	Spain	Steam	GT NO 96	4	Peru LNG
Hoegh Giant	165,000	Hoegh LNG Giant Ltd.	HHI	Jan-17	Marshall Is.	Diesel/Gas-Electric	TZ MK. III Flex	4	Portfolio
Hongkong Energy	138,000	Ocean Trinity Sh No. 27 SA	Daewoo	Feb-04	Marshall Is.	Steam	GT NO 96	4	North West Shelf
Hyundai Aquapia	137,415	Hyundai LNG Shipping Co. Ltd.	HHI	May-00	South Korea	Steam	Moss	4	Oman LNG
Hyundai Cosmopia	137,415	Hyundai LNG Shipping Co. Ltd.	HHI	Feb-00	South Korea	Steam	Moss	4	RasGas I
Hyundai Ecopia	149,745	KLT 1 International SA	HHI	Nov-08	Panama	Steam	TZ Mk. III	4	Balhaf
Hyundai Greenpia	125,000	Hyundai LNG Shipping Co. Ltd.	HHI	May-96	South Korea	Steam	Moss	4	MLNG
Hyundai Oceanpia	135,000	Hyundai LNG Shipping Co. Ltd.	HHI	Jun-00	South Korea	Steam	Moss	4	Oman LNG
Hyundai Peacepia	174,000	Hlb SA	Daewoo	Jun-17	Panama	ME-GI	TZ Mk. III Flex	4	Sabine Pass
Hyundai Princepia	174,000	Hla SA	Daewoo	May-17	Panama	ME-GI	TZ Mk. III Flex	4	Sabine Pass
Hyundai Technopia	137,415	Hyundai LNG Shipping Co. Ltd.	HHI	Jul-99	South Korea	Steam	Moss	4	RasGas I
Hyundai Utopia	125,182	Hyundai LNG Shipping Co. Ltd.	HHI	Jun-94	South Korea	Steam	Moss	4	Donggi Senoro
Iberica Knutsen	138,000	Norspan LNG III AS	Daewoo	Aug-06	Norway	Ultra Steam Turbine	GT NO 96	4	Portfolio
Ibra LNG	147,000	Areej LNG Carrier SA	Samsung	Jul-06	Panama	Steam	TZ Mk. III	4	Oman LNG
Ibri LNG	147,569	Dune LNG Carrier SA	Mitsubishi	Jul-06	Panama	Steam	Moss	4	Oman LNG
Isabella	169,932	Kasimia Marine Co	Daewoo	Jul-21	Greece	ME-GI	Membrane	4	Portfolio
Ish	137,000	Ish Inc.	Mitsubishi	Nov-95	Liberia	Steam	Moss	5	Das Island
K. Acacia	138,017	Korea Line LNG Co. Ltd.	Daewoo	Dec-99	South Korea	Steam	GT NO 96	4	Oman LNG
K. Freesia	138,015	Korea Line LNG Co. Ltd.	Daewoo	Aug-00	South Korea	Steam	GT NO 96	4	RasGas I
K. Jasmine	145,878	Kolt JV No. 1 SA	Daewoo	May-08	Panama	Steam	TZ MK. III	4	Sakhalin II



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K. Mugungwha	151,812	Kolt JV No. 2 SA	Daewoo	Nov-08	Panama	Steam	TZ MK. III	4	Oman LNG
Kinisis	173,400	Danae Gas Shipping Inc.	Daewoo	Oct-18	Liberia	ME-GI	TZ Mk. III Flex	4	Portfolio
Kita LNG	147,895	Oceanus LNG Beta LLC	Daewoo	May-14	Malta	Diesel Electric	GT NO 96	4	Spot
Kmarin Diamond	155,000	Sg Leasing Gems Ltd.	Hyundai Samho	Jul-08	Isle of Man	Diesel/Gas-Electric	TZ Mk. III	4	Portfolio
Kmarin Emerald	155,000	Sg Leasing Gems Ltd.	HHI	May-07	Isle of Man	DFDE	TZ Mk. III	4	Portfolio
Kumul	170,000	Gemini LNG Shipping Ltd.	Hudong Zhonghua	Dec-15	Hong Kong	Diesel	TZ MK. III	4	PNG LNG
La Mancha Knutsen	176,300	Norspan LNG IX AS	HHI	Sep-16	Spain	ME-GI	Membrane	4	Portfolio
La Seine	174,000	Xiang Ch16 HK International	HHI	Feb-20	Malta	X-DF	TZ MK. III Flex	4	Portfolio
Lalla Fatma N'Soumer	145,000	Algeria Nippon Gas	Kawasaki	Oct-04	Bahamas	Steam	Moss	4	Arzew
Lena River	155,000	Solana Holding Ltd.	HHI	Sep-13	Marshall Is.	DFDE	TZ Mk. III	4	Portfolio
Lijmiliya	263,300	Nakilat Lijmiliya Inc.	Daewoo	Dec-08	Marshall Is.	Diesel	GT NO 96	5	Qatargas II
LNG Abalamabie	162,000	Bonny Gas Transport Ltd.	Samsung	Jul-16	Bermuda	DFDE	TZ Mk. III	4	NLNG
LNG Abuja II	162,000	Bonny Gas Transport Ltd.	Samsung	Mar-16	Bermuda	DFDE	TZ Mk. III	4	NLNG
LNG Adamawa	141,000	Bonny Gas Transport Ltd.	HHI	Apr-05	Bermuda	Steam	Moss	4	NLNG
LNG Adventure	170,520	NYK	Samsung	Apr-21	France	X-DF	Membrane	4	Portfolio
LNG Akwa Ibom	141,000	Bonny Gas Transport Ltd.	HHI	Oct-04	Bermuda	Steam	Moss	4	NLNG
LNG Alliance	154,472	NYK Armateur	STX	Mar-07	France	Diesel/Gas-Electric	CS1	4	Portfolio
LNG Aquarius	126,300	Hanochem Shipping Pt.	General Dynamics	Jan-77	Indonesia	Steam	Moss	5	Bontang
LNG Barka	155,982	Lloyds TSB General Leasing 3	Kawasaki	Dec-08	Bahamas	Steam	Moss	4	Oman LNG
LNG Bayelsa	137,500	Bonny Gas Transport Ltd.	HHI	Mar-03	Bermuda	Steam	Moss	4	NLNG
LNG Benue	145,952	BW Gas LNG Carriers Pte Ltd.	Daewoo	Apr-06	Bermuda	Steam	GT NO 96	4	NLNG
LNG Bonny li	174,000	Bonny Gas Transport Ltd.	HHI	Dec-15	Bermuda	Diesel/Gas-Electric	TZ Mk. III	4	NLNG
LNG Borno	149,600	Okra Shipping No. 1	Samsung	Aug-07	Bermuda	Steam	TZ Mk. III	4	NLNG
LNG Cross River	141,000	Bonny Gas Transport Ltd.	HHI	Aug-05	Bermuda	Steam	Moss	4	NLNG
LNG Dream	145,000	OJV Cayman 1 Ltd.	Kawasaki	Sep-06	Bahamas	Steam	Moss	4	North West Shelf
LNG Dubhe	174,000	Arctic Red LNG Shipping Ltd.	Hudong Zhonghua	Nov-19	Hong Kong	ME-GI	GTT NO96 L03+	4	Yamal
LNG Ebisu	147,546	LNG Ebisu Shipping Corp.	Kawasaki	Jul-08	Bahamas	Steam	Moss	4	Pluto
LNG Enugu	145,926	BW Gas LNG Carriers Pte Ltd.	Daewoo	Oct-05	Bermuda	Steam	GT NO 96	4	NLNG
LNG Finima II	162,000	Bonny Gas Transport Ltd.	Samsung	Dec-15	Bermuda	DFDE	TZ Mk. III	4	NLNG
LNG Fukurokuju	164,700	LNG Fukurokuju Shipping Corp. .	Kawasaki	Jul-16	Bahamas	Steam	Moss	4	APLNG
LNG Imo	148,452	Bergesen LNG XI Pte Ltd.	Daewoo	Jun-08	Bermuda	Steam	GT NO 96	4	NLNG
LNG Jamal	135,333	Jamal Shipholding SA	Mitsubishi	Oct-00	Japan	Steam	Moss	5	Oman LNG
LNG Juno	180,000	Mog-X LNG Shipholding SA	Mitsubishi	Oct-18	Bahamas	STaGE	Moss	4	Freeport
LNG Jupiter	153,000	Lloyds TSB Equipment No. 7 Ltd.	Kawasaki	Jul-09	Bahamas	Steam	Moss	4	PNG LNG
LNG Jurojin	160,000	LNG Jurojin Shipping Corp. .	Mitsubishi	Nov-15	Bahamas	Steam	Moss	4	Portfolio
LNG Kano	148,565	Bergesen LNG IX Pte Ltd.	Daewoo	Jan-07	Bermuda	Steam	TZ MK. III	4	NLNG
LNG Kolt	153,595	KLT 5 International SA	Hanjin (Busan)	Dec-08	Panama	Steam	TZ Mk. III	4	Portfolio
LNG Lagos II	174,000	Bonny Gas Transport Ltd.	HHI	Jan-16	Bermuda	DFDE	TZ Mk. III	4	NLNG
LNG Lerici	65,000	Portovenere & Lerici Pte Ltd.	Sestri Ponente	Apr-98	Singapore	Steam	GT NO 96	4	Malaysia LNG
LNG Lokoja	148,471	Bergesen LNG VIII Pte Ltd.	Daewoo	Nov-06	Bermuda	Steam	GT NO 96	4	NLNG
LNG Maleo	127,544	Nippon/Mitsui/Kawasaki	Mitsui E&S	Jan-89	Japan	Steam	Moss	4	North West Shelf
LNG Mars	155,693	Osaka Gas Int. & Mitsui OSK	Mitsubishi	Oct-16	Japan	Steam	Moss	4	PNG LNG
LNG Megrez	174,000	Arctic Indigo LNG Shipping Ltd.	Hudong Zhonghua	Nov-20	Hong Kong	ME-GI	GTT NO96 L03+	4	Yamal
LNG Merak	174,000	Arctic Yellow LNG Shipping Ltd.	Hudong Zhonghua	Jan-20	Hong Kong	ME-GI	GTT NO96 L03+	4	Yamal
LNG Ogun	149,000	Okra Shipping No. 2	Samsung	Jul-07	Bermuda	Steam	TZ Mk. III	4	NLNG
LNG Ondo	148,478	Bergesen LNG X Pte Ltd.	Daewoo	Sep-07	Bermuda	Steam	TZ MK. III	4	NLNG
LNG Oyo	145,842	BW Gas LNG Carriers Pte Ltd.	Daewoo	Jan-06	Bermuda	Steam	GT NO 96	4	NLNG
LNG Phecda	174,000	Arctic Orange LNG Shipping Ltd.	Hudong Zhonghua	Sep-20	Hong Kong	ME-GI	GTT NO96 L03+	4	Yamal
LNG Pioneer	138,121	M&S Shipping 3 SA	Daewoo	Jul-05	Bahamas	Steam	GT NO 96	4	Das Island
LNG Port-Harcourt II	162,000	Bonny Gas Transport Ltd.	Samsung	Dec-15	Bermuda	DFDE	TZ Mk. III	4	NLNG
LNG Portovenere	65,000	Portovenere & Lerici Pte Ltd.	Sestri Ponente	Apr-97	Singapore	Steam	GT NO 96	4	Portfolio
LNG River Niger	141,000	Bonny Gas Transport Ltd.	HHI	Jul-06	Bermuda	Steam	Moss	4	NLNG
LNG River Orashi	145,914	BW Gas LNG Carriers Pte Ltd.	Daewoo	Nov-04	Bermuda	Steam	GT NO 96	4	NLNG
LNG Rivers	137,200	Bonny Gas Transport Ltd.	HHI	Jun-02	Bermuda	Steam	Moss	4	NLNG
LNG Rosenrot	176,523	Fair Wind Navigation SA	Daewoo	Jan-21	Marshall Is.	X-DF	Membrane	4	Portfolio
LNG Sakura	177,000	LNG Sakura Shipping Corp.	Kawasaki	Feb-18	Bahamas	TFDE	Moss	4	Freeport
LNG Saturn	155,300	Mog-IX LNG Shipholding SA	Mitsubishi	Feb-16	Bahamas	Ultra Steam Turbine	Moss	4	Gorgon
LNG Schneeweisschen	180,000	LNG Rose Shipping Corp.	Daewoo	Sep-18	Panama	TFDE	TZ Mk. III Flex	4	Freeport
LNG Sokoto	137,425	Bonny Gas Transport Ltd.	HHI	Sep-02	Bermuda	Steam	Moss	4	NLNG
LNG Unity	154,472	Global LNG Armateur SAS	STX	Nov-06	France	Diesel/Gas-Electric	CS1	4	Portfolio
LNG Venus	153,000	Osaka Gas Int. & Mitsui OSK	Mitsubishi	Nov-14	Japan	Steam	Sayaendo	4	North West Shelf
LNG Vesta	127,386	Europe LNGT Co. Ltd.	Mitsubishi	Jun-94	Liberia	Steam	Moss	4	Portfolio
LNGShips Athena	170,618	Cardiff LNG Iota Owning LLC	HHI	Mar-21	Malta	X-DF	Membrane	4	Portfolio
LNGShips Empress	170,520	Cardiff LNG Kappa Owning LLC	Samsung	Mar-21	Malta	X-DF	Membrane	4	Portfolio
LNGShips Manhattan	174,000	Cardiff LNG Theta Owning LLC	HHI	May-21	Malta	X-DF-HPSCR	NO-96-GW+PRS	4	Portfolio
Lobito	160,276	Mint LNG III Ltd.	Samsung	Nov-11	Bahamas	DFDE	TZ Mk. III	4	Soyo
Lusail	145,000	Peninsula LNG Transport No. 1	Samsung	May-05	Bahamas	Steam	TZ Mk. III	4	RasGas II
Macoma	145,400	Compass Shipping 9 Corp. Ltd.	Daewoo	Sep-17	Bahamas	ME-GI	GT NO 96	4	Portfolio
Madrid Spirit	138,000	Teekay Gas IV SL	Navantia	Dec-04	Spain	Steam	GT NO 96	4	Atlantic LNG
Magdala	173,400	Hai Jiao 1606 Ltd.	Daewoo	Feb-18	Bahamas	ME-GI	GT NO 96	4	Portfolio
Magellan Spirit	165,500	Magellan Spirit Aps	Samsung	Apr-09	Denmark	Diesel/Gas-Electric	TZ Mk. III	4	Portfolio



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Malanje	160,276	Mint LNG II Ltd.	Samsung	Oct-11	Bahamas	DFDE	TZ Mk. III	4	Soyo
Maran Gas Achilles	174,000	Adonis Investment Corp.	Hyundai Samho	Jan-16	Greece	DFDE	TZ Mk. III	4	Portfolio
Maran Gas Agamemnon	174,000	Doris Navigation Inc.	Hyundai Samho	May-16	Greece	DFDE	TZ Mk. III	4	Portfolio
Maran Gas Alexandria	161,870	Greenmare Navigation Corp.	Hyundai Samho	Oct-15	Greece	DFDE	Membrane	4	QCLNG
Maran Gas Amphipolis	174,000	Nestor Navigation Corp.	Daewoo	Aug-16	Greece	DFDE	Membrane	4	Portfolio
Maran Gas Andros	173,400	Crusandel Marine Co.	Daewoo	Nov-19	Greece	ME-GI	GT NO 96	4	Freeport
Maran Gas Apollonia	161,870	Ilida Shipping Co. Ltd.	Hyundai Samho	Jan-14	Greece	Diesel Electric	TZ Mk. III	4	Punta Europa
Maran Gas Asclepius	145,000	Sea Satin Corp.	Daewoo	Jul-05	Greece	Steam	GT NO 96	4	RasGas II
Maran Gas Chios	170,000	Pleione Inc.	Daewoo	Mar-19	Greece	ME-GI	TZ Mk. III Flex	4	Portfolio
Maran Gas Coronis	145,700	Jopica Shipping Co.	Daewoo	Jul-07	Greece	Steam	TZ MK. III	4	RasGas II
Maran Gas Delphi	159,800	Ada Shipholding Inc.	Daewoo	Feb-14	Greece	Diesel Electric	TZ Mk. III	4	Portfolio
Maran Gas Efessos	159,800	Acrogiali Shipping & Trading	Daewoo	Jun-14	Greece	DFDE	Membrane	4	Portfolio
Maran Gas Hector	174,000	Dylan Corp.	Hyundai Samho	Nov-16	Greece	Diesel/Gas-Electric	TZ Mk. III	4	Portfolio
Maran Gas Hydra	173,400	Hai Jiao 1802 Ltd.	Daewoo	Feb-19	Greece	ME-GI	GT NO 96	4	Sabine Pass
Maran Gas Leto	174,000	Cherise Maritime Ltd.	Hyundai Samho	Mar-16	Greece	DFDE	TZ Mk. III	4	Portfolio
Maran Gas Lindos	161,870	Olivia International Shpg Corp.	Daewoo	Jul-15	Greece	DFDE	Membrane	4	Punta Europa
Maran Gas Mystras	155,900	Blueskies Shipping Co. Ltd.	Daewoo	Aug-15	Greece	DFDE	Membrane	4	QCLNG
Maran Gas Olympias	174,000	Cygnus Enterprises Inc.	Daewoo	Feb-17	Greece	ME-GI	GT NO 96	4	Portfolio
Maran Gas Pericles	173,400	Anguilla Navigation Corp.	Hyundai Samho	Aug-16	Greece	DFDE	TZ Mk. III	4	Portfolio
Maran Gas Posidonia	161,870	Felicite Navigation Inc.	Hyundai Samho	May-14	Greece	DFDE	Membrane	4	Punta Europa
Maran Gas Psara	173,595	Highseas Shiptrade Co.	Daewoo	May-20	Greece	ME-GI	GT NO96	4	Portfolio
Maran Gas Roxana	174,000	Elisa International Ltd.	Daewoo	Jan-17	Greece	ME-GI	TZ Mk. III	4	Portfolio
Maran Gas Sparta	159,800	Lettuce Maritime Corp.	Hyundai Samho	Apr-15	Greece	DFDE	Membrane	4	QCLNG
Maran Gas Spetses	173,400	Hai Jiao 1801 Ltd.	Daewoo	Jul-18	Greece	ME-GI	TZ Mk. III Flex	4	GoM
Maran Gas Troy	155,000	Helianthus Navigation Corp. .	Daewoo	Sep-15	Greece	DFDE	Membrane	4	Portfolio
Maran Gas Ulysses	173,400	Ariel Sails Navigation SA	Hyundai Samho	Jan-17	Greece	Diesel/Gas-Electric	TZ Mk. III	4	Portfolio
Maran Gas Vergina	174,000	Santa Lucia Enterprises Inc.	Daewoo	Dec-16	Greece	ME-GI	GT NO 96	4	Portfolio
Maria Energy	174,000	Canyon Trading Corp.	HHI	Sep-16	Liberia	Diesel/Gas-Electric	TZ Mk. III	4	Portfolio
Marib Spirit	165,500	Membrane Shipping Ltd.	Samsung	Apr-08	Marshall Is.	Diesel/Gas-Electric	TZ Mk. III	4	Balhaf
Marshal Vasilevskiy	170,000	Gazprom Flot LLC	HHI	Jan-19	Russian Fed	Diesel/Gas-Electric	Membrane	4	Kaliningrad LNG
Marvel Crane	177,000	Rosewood Shipping Pte Ltd.	Mitsubishi	Mar-19	Singapore	STaGE	Moss	4	Cameron
Marvel Eagle	155,000	Mevius Lines SA	Kawasaki	Oct-18	Panama	Reheat Steam Turbine	Moss	4	Cameron
Marvel Falcon	174,000	Tea Tree Shipping Pte Ltd.	Samsung	Apr-18	Singapore	TFDE	TZ Mk. III Flex	4	Cameron
Marvel Hawk	177,000	Comet Arrow Gas Transport	Samsung	Dec-18	Singapore	TFDE	TZ Mk. III Flex	4	Cameron
Marvel Heron	177,000	Heron Gas Shipping SA	Mitsubishi	Sep-19	Panama	STaGE	Moss	4	Cameron
Marvel Kite	177,000	Comet Gyro Gas Transport Pte	Samsung	Jan-19	Singapore	TFDE	TZ Mk. III Flex	4	Cameron
Marvel Pelican	156,265	Pelican Gas Shipping SA	Kawasaki	Dec-19	Panama	Reheat Steam Turbine	Moss	4	Cameron
Marvel Swan	174,000	MIF I NO 20 K/S	Samsung	Apr-21	Denmark	X-DF	Membrane	4	Portfolio
Megara	173,400	Hai Jiao 1607 Ltd.	Daewoo	Jul-18	Bahamas	ME-GI	GT NO 96	4	Portfolio
Mekaines	266,000	Nakilat SHI 1695 Inc.	Samsung	Apr-09	Marshall Is.	DRL	TZ Mk. III	5	Qatargas III
Merchant	138,000	Ocean Tiger Shipping Ltd.	Samsung	Jul-03	Marshall Is.	Steam	TZ Mk. III	4	Portfolio
Meridian Spirit	165,500	Meridian Spirit Aps	Samsung	Jan-10	Denmark	Diesel/Gas-Electric	TZ Mk. III	4	Hammerfest
Mesaimeer	216,312	Nakilat HHI 1908 Inc.	HHI	Mar-09	Marshall Is.	Diesel	TZ Mk. III	4	Qatargas III
Methane Alison Victoria	145,000	Gas-Nineteen Ltd.	Samsung	Apr-07	Bermuda	Steam	TZ Mk. III	4	Punta Europa
Methane Becki Anne	170,000	Gas-Twenty Seven Ltd.	Samsung	Sep-10	Bermuda	TFDE	TZ Mk. III	4	Singapore
Methane Heather Sally	145,000	Gas-Twenty One Ltd.	Samsung	Jan-07	Bermuda	Steam	TZ Mk. III	4	Punta Europa
Methane Jane Elizabeth	145,000	Gas-Seventeen Ltd.	Samsung	Jun-06	Bermuda	Steam	TZ Mk. III	4	Idku
Methane Julia Louise	170,000	Southern Route Maritime SA	Samsung	Apr-10	Bermuda	TFDE	TZ Mk. III	9	Singapore
Methane Kari Elin	138,267	Lombard Corporate December 1	Samsung	May-04	Bermuda	Steam	TZ Mk. III	4	Singapore
Methane Lydon Volney	145,000	Gas-Eighteen Ltd.	Samsung	Aug-06	Bermuda	Steam	TZ Mk. III	4	Idku
Methane Mickie Harper	170,000	Methane Services Ltd.	Samsung	Dec-10	Bermuda	Diesel/Gas-Electric	TZ Mk. III	4	Singapore
Methane Nile Eagle	145,000	Egypt LNG Shipping Ltd.	Samsung	Dec-07	Bermuda	Steam	TZ Mk. III	4	Idku
Methane Patricia Camila	170,000	Methane Services Ltd.	Samsung	Oct-10	Bermuda	TFDE	TZ Mk. III	4	Singapore
Methane Princess	138,000	Methane Services Ltd.	Daewoo	Aug-03	Bermuda	Steam	GT NO 96	4	Portfolio
Methane Rita Andrea	145,000	Gas-Sixteen Ltd.	Samsung	Apr-06	Bermuda	Steam	TZ Mk. III	4	Idku
Methane Shirley Elisabeth	145,000	Gas-Twenty Ltd.	Samsung	Feb-07	Bermuda	Steam	TZ Mk. III	4	Punta Europa
Methane Spirit	165,500	Methane Spirit LLC	Samsung	Feb-08	Bahamas	Diesel/Gas-Electric	TZ Mk. III	4	Atlantic LNG
Milaha Qatar	145,500	Milaha Qatar GmbH & Co. KG	Samsung	Apr-06	Malta	Steam	TZ Mk. III	4	RasGas II
Milaha Ras Laffan	138,270	Milaha Ras Laffan GmbH & Co.	Samsung	Apr-04	Malta	Steam	TZ Mk. III	4	RasGas II
Min Lu	147,100	Min Lu LNG Shipping Co. Ltd.	Hudong Zhonghua	Aug-09	Hong Kong	Steam	GT NO 96	4	Tangguh
Min Rong	145,000	Min Rong LNG Shipping Co. Ltd.	Hudong Zhonghua	Feb-09	Hong Kong	Steam	GT NO 96	4	Tangguh
Minerva Chios	170,520	Peninsula Shipping SA	Samsung	Aug-21	Greece	X-DF	Membrane	4	Portfolio
Minerva Kalymnos	174,000	Koje Shipping SA	Samsung	Feb-21	Malta	X-DF	TZ Mk. III Flex Plus	4	Portfolio
Minerva Psara	173,400	Wimbledon Shipping	Daewoo	Jan-21	Malta	ME-GI	TZ Mk. III Flex Plus	4	Portfolio
MOL Hestia	173,400	LNG Harmonia Shipping Corp.	Daewoo	Jul-21	Marshall Is.	X-DF	Membrane	4	Portfolio
Mozah	266,000	Nakilat Haloul Inc.	Samsung	Aug-09	Marshall Is.	Diesel	TZ Mk. III	5	Qatargas II
Mraweh	137,000	Mraweh Ltd.	STX	Apr-96	Liberia	Steam	Moss	4	Das Island
Mu Lan	174,400	Fortune Great Shipping Ltd.	Hudong Zhonghua	Aug-21	Liberia	X-DF	TZ Mk. III	4	Portfolio
Mubaraz	137,000	Mubaraz Ltd.	STX	Dec-95	Liberia	Steam	Moss	4	Das Island
Murex	173,400	Hai Jiao 1605 Ltd.	Daewoo	Jul-17	Bahamas	ME-GI	GT NO 96	4	Portfolio
Murwab	210,100	J5 Nakilat No. 4 Ltd.	Daewoo	Jun-08	Marshall Is.	Diesel	GT NO 96	18	RasGas III



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Myrina	173,400	Xiang Ch1 HK International	Daewoo	May-18	Bahamas	ME-GI	GT NO 96	4	Portfolio
Neo Energy	150,000	Sea Optima SA	HHI	Jan-07	Liberia	Steam	Moss	4	Portfolio
Neptune	145,130	SRV Joint Gas Ltd.	Samsung	Nov-09	Norway	DFDE	TZ Mk. III	4	Portfolio
Nikolay Urvantsev	172,658	Dy Maritime Ltd.	Daewoo	Jul-19	Hong Kong	ME-GI	GT NO 96 GW	4	Yamal
Nikolay Yevgenov	172,410	TC LNG Explorer III LLC	Daewoo	Apr-19	Bahamas	ME-GI	GT NO 96 GW	4	Yamal
Nikolay Zubov	172,410	Hai Kuo Shipping 1606 Ltd.	Daewoo	Nov-18	Cyprus	TFDE - Azipod	GT NO 96 GW	4	Yamal
Nizwa LNG	147,684	Oryx LNG Carrier SA	Kawasaki	Dec-05	Panama	Steam	Moss	4	Oman LNG
Nohshu Maru	180,000	Trans Pacific Shipping 5 Ltd.	Mitsubishi	Feb-19	Bahamas	Reheat Steam Turbine	Moss	4	Portfolio
Northwest Sanderling	127,525	BHP/BP/Chevron/Japan & Others	Mitsubishi	Jan-89	Australia	Steam	Moss	4	North West Shelf
Northwest Sandpiper	125,042	BHP/BP/Chevron/Japan & Others	Mitsui E&S	Jan-93	Australia	Steam	Moss	4	North West Shelf
Northwest Snipe	127,500	BHP/BP/Chevron/Japan & Others	Mitsui E&S	Jan-90	Australia	Steam	Moss	4	North West Shelf
Northwest Stormpetrel	127,500	BHP/BP/Chevron/Japan & Others	Mitsubishi	Dec-94	Australia	Steam	Moss	4	North West Shelf
Oak Spirit	173,400	Sea 64 Leasing Co Ltd.	Daewoo	Mar-16	Bahamas	ME-GI	GT NO 96	4	Sabine Pass
Ob River	149,700	Lance Shipping SA	HHI	May-07	Marshall Is.	Steam	TZ Mk. III	4	Sakhalin II
Oceanic Breeze	155,300	Oceanic Breeze LNG Transport	Mitsubishi	Apr-18	Marshall Is.	Reheat Steam Turbine	Moss	4	Ichthys
Onaiza	210,150	Nakilat DSME 2266 Inc.	Daewoo	Apr-09	Marshall Is.	Diesel	GT NO 96	12	Qatargas III
Ougarta	170,000	Hyproc Shipping Co.	HHI	Mar-17	Algeria	DFDE	TZ Mk. III Flex	4	Arzew
Pacific Arcadia	145,400	Bahamas LNG Shipping Ltd.	Mitsubishi	Oct-14	Bahamas	Steam	Moss	4	PNG LNG
Pacific Breeze	180,000	Pacific Breeze LNG Transport	Kawasaki	Mar-18	Marshall Is.	TFDE	Moss	4	Ichthys
Pacific Enlighten	145,400	Pacific Hope Shipping Ltd.	Mitsubishi	Mar-09	Bahamas	Steam	Moss	4	North West Shelf
Pacific Eurus	137,000	Pacific Eurus Shipping	Mitsubishi	Mar-06	Bahamas	Steam	Moss	4	Das Island
Pacific Mimosa	155,300	Kaede Shipholding SA	Mitsubishi	Mar-18	Japan	Reheat Steam Turbine	Moss	4	Wheatstone
Pacific Notus	137,006	Pacific LNG Shipping	Mitsubishi	Sep-03	Bahamas	Steam	Moss	5	Darwin LNG
Palu LNG	159,800	Oceanus LNG Gamma LLC	Daewoo	Nov-14	Malta	TFDE	GT NO 96	4	Spot
Pan Africa	174,000	Pan Africa LNG Transportation	Hudong Zhonghua	Jan-19	Hong Kong	TFDE	GT NO 96	4	QCLNG
Pan Americas	174,000	Pan Americas LNG Trans	Hudong Zhonghua	Jan-18	Hong Kong	TFDE	GT NO 96	4	QCLNG
Pan Asia	174,000	Pan Asia LNG Transportation	Hudong Zhonghua	Sep-17	Hong Kong	TFDE	GT NO 96	4	QCLNG
Pan Europe	174,000	Pan Europe LNG Transportation	Hudong Zhonghua	Jul-18	Hong Kong	TFDE	GT NO 96	4	QCLNG
Papua	170,000	Aquarius LNG Shipping Ltd.	Hudong Zhonghua	Nov-14	Hong Kong	DFDE	TZ MK. III	4	PNG LNG
Patris	174,000	Artemis Gas 1 Shipping Inc.	Daewoo	Jan-18	Liberia	ME-GI	GT NO 96	4	Freeport
Pearl LNG	174,000	Cardiff LNG Delta Owning LLC	HHI	Aug-20	Malta	X-DF	NO-96-GW+PRS	4	Portfolio
Point Fortin	154,200	Los Halillos Shipping Co. SA	Koyo Dockyard	Jan-10	Panama	Steam	TZ Mk. III	4	Portfolio
Polar Spirit	89,800	Polar Spirit LLC	Ishikawajima	Jun-93	Bahamas	Steam	IHI SPB	4	Atlantic LNG
Portovyy	138,107	Global LNG Ltd.	Daewoo	Aug-03	Malta	Steam	GT NO 96	4	Portfolio
Prachi	162,000	India LNG Transport Co. No. 4	HHI	Nov-16	Singapore	Diesel/Gas-Electric	TZ Mk. III	4	Gorgon
Prism Agility	180,000	HHI ENS1 Shipholding SA	HHI	May-19	Panama	X-DF	TZ Mk. III Flex Plus	4	Portfolio
Prism Brilliance	180,000	HHI ENS2 Shipholding SA	HHI	May-19	Panama	X-DF	TZ Mk. III Flex Plus	4	Portfolio
Pskov	170,200	Scalpay Shipping Ltd.	STX	Sep-14	Liberia	DFDE	GT NO 96	4	Portfolio
Puteri Delima	130,400	Puteri Delima Sdn Bhd.	STX	Jan-95	Malaysia	Steam	GT NO 96	4	MLNG II
Puteri Delima Satu	137,100	Puteri Delima Satu L Pte Ltd.	Mitsui E&S	Oct-02	Malaysia	Steam	GT NO 96	4	MLNG III
Puteri Firus Satu	137,100	Puteri Firus Satu	Mitsubishi	Aug-04	Malaysia	Steam	GT NO 96	4	MLNG III
Puteri Intan	137,100	Puteri Intan Sdn Bhd.	STX	Aug-94	Malaysia	Steam	GT NO 96	4	MLNG II
Puteri Intan Satu	137,100	Puteri Intan Satu L Pte Ltd.	Mitsubishi	Aug-02	Malaysia	Steam	GT NO 96	4	MLNG III
Puteri Mutiara Satu	137,100	Puteri Mutiara Satu	Mitsui E&S	Apr-05	Malaysia	Steam	GT NO 96	4	MLNG III
Puteri Nilam	130,400	Puteri Nilam Sdn Bhd.	STX	Jul-95	Malaysia	Steam	GT NO 96	4	MLNG II
Puteri Nilam Satu	137,100	Puteri Nilam Satu L Pte Ltd.	Mitsubishi	Jul-03	Malaysia	Steam	GT NO 96	4	MLNG III
Puteri Zamrud	130,400	MISC Bhd.	STX	Jun-96	Malaysia	Steam	GT NO 96	4	MLNG II
Puteri Zamrud Satu	137,100	Puteri Zamrud Satu L Pvt Ltd.	Mitsui E&S	Feb-04	Malaysia	Steam	GT NO 96	4	MLNG III
Qogir	174,000	Xiang Ch15 HK International	Samsung	Jun-20	Malta	X-DF	TZ MK. III Flex	4	Portfolio
Raahi	138,076	India LNG Transport Co. No. 2	Daewoo	Oct-04	Malta	Steam	GT NO 96	4	RasGas
Ramdane Abane	126,130	Hyproc Shipping Co.	STX	Jun-81	Algeria	Steam	GT NO 85	5	Arzew
Rasheeda	266,000	Nakilat SHI 1754 Inc.	Samsung	Aug-10	Marshall Is.	Diesel	TZ Mk. III	10	Qatargas IV
Rias Baixas Knutsen	180,000	Knutsen OAS Espana SL	HHI	Sep-19	Spain	ME-GI	TZ Mk. III Flex Plus	4	Corpus Christi
Ribera Del Duero Knutsen	173,400	Norspan LNG VIII AS	Daewoo	Dec-10	Norway	DFDE	GT NO 96	4	Portfolio
Rioja Knutsen	170,000	Norspan LNG X As	HHI	Dec-16	Spain	ME-GI	TZ Mk. III	4	Portfolio
Rudolf Samoylovich	172,410	TC LNG Explorer II LLC	Daewoo	Aug-18	Bahamas	ME-GI	GT NO 96 GW	4	Yamal
Saga Dawn	45,000	Saga LNG Shipping Pte Ltd.	China Merchants H.I.	Aug-19	Singapore	Diesel/Gas-Electric	TZ MK. III Flex	4	Portfolio
Salalah LNG	147,000	Tiwi LNG Carrier SA	Samsung	Dec-05	Panama	Steam	TZ Mk. III	4	Oman LNG
SCF Barents	174,000	Heliconia Maritime SA	HHI	Sep-20	Liberia	DFDS	TZ Mk. III Flex	4	Portfolio
SCF La Perouse	174,000	Albus Shipping Ltd.	HHI	Feb-20	Liberia	X-DF	NO-96-GW+PRS	4	Portfolio
SCF Melampus	170,200	Pabbay Shipping Ltd.	STX	Jan-15	Liberia	Diesel Electric	Membrane	4	Portfolio
SCF Mitre	170,200	Ensay Shipping Ltd.	STX	Apr-15	Liberia	Diesel Electric	Membrane	4	Portfolio
SCF Timmerman	174,000	Headliner Maritime SA	HHI	Jan-21	Liberia	X-DF	NO-96-GW+PRS	4	Portfolio
Sean Spirit	174,162	HHI Hull No. S856 LLC	Hyundai Samho	Dec-18	Bahamas	ME-GI	TZ Mk. III Flex	4	Freeport
Seishu Maru	138,000	Trans Pacific Shipping 1 Ltd.	Mitsubishi	Sep-14	Bahamas	Steam	Moss	4	PNG LNG
Senshu Maru	127,167	Nippon/Mitsui/Kawasaki	Mitsui E&S	Feb-84	Japan	Steam	Moss	5	Bontang
Seri Alam	145,572	MISC Bhd.	Samsung	Jul-05	Malaysia	Steam	Moss Seri-C	4	Bintulu
Seri Amanah	145,709	MISC Bhd.	Samsung	Mar-06	Malaysia	Steam	TZ Mk. III	4	Bintulu
Seri Anggun	145,731	MISC Bhd.	Samsung	Oct-06	Malaysia	Steam	TZ Mk. III	4	North West Shelf
Seri Angkasa	145,130	MISC Bhd.	Samsung	Dec-06	Malaysia	Steam	TZ Mk. III	4	Bintulu
Seri Ayu	145,894	MISC Bhd.	Samsung	Oct-07	Malaysia	Steam	TZ Mk. III	4	Bintulu



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Seri Bakti	152,944	MISC Bhd.	Mitsubishi	Apr-07	Malaysia	Steam	TZ MK. III	4	Gladstone
Seri Balhaf	152,000	MISC Bhd.	Mitsubishi	Jan-09	Malaysia	Steam	TZ MK. III	4	Bontang
Seri Balqis	152,000	MISC Bhd.	Mitsubishi	Mar-09	Malaysia	Steam	TZ MK. III	4	NLNG
Seri Begawan	152,900	MISC Bhd.	Mitsubishi	Nov-07	Malaysia	Steam	TZ MK. III	4	Bintulu
Seri Bijaksana	152,300	MISC Bhd.	Mitsubishi	Apr-08	Malaysia	Steam	TZ MK. III	4	Bintulu
Seri Camar	150,000	Seri Camar L Pte Ltd.	HHI	Feb-18	Malaysia	Ultra Steam Turbine	Moss	4	Pacific Northwest
Seri Camellia	159,800	Seri Camellia L Pte Ltd.	HHI	Sep-16	Malaysia	Steam	Moss Seri-C	4	Pacific Northwest
Seri Cemara	150,200	Seri Cemara L Pte Ltd.	HHI	Apr-18	Malaysia	Reheat Steam Turbine	Moss	4	Portfolio
Seri Cempaka	162,000	Seri Cempaka L Pte Ltd.	HHI	Aug-17	Malaysia	Steam	Moss Seri-C	4	Pacific Northwest
Seri Cenderawasih	162,000	Seri Cenderawasih L Pvt Ltd.	HHI	Feb-17	Malaysia	Steam	Moss Seri-C	4	Pacific Northwest
Sestao Knutsen	136,947	Norspan LNG IV AS	Navantia Cadiz	Oct-07	Spain	Steam	TZ MK. III	4	Portfolio
Sevilla Knutsen	173,400	Norspan LNG VI AS	Daewoo	May-10	Spain	Diesel/Gas-Electric	GT NO 96	4	Portfolio
Shagra	268,000	Nakilat SHI 1751 Inc.	Samsung	Nov-09	Marshall Is.	Diesel	TZ Mk. III	10	Qatargas IV
Shahamah	135,496	Shahamah Inc.	Kawasaki	Oct-94	Liberia	Steam	Moss	5	Das Island
Shen Hai	147,200	Shanghai LNG Shipping Co. Ltd.	Hudong Zhonghua	Dec-12	Hong Kong	Steam	TZ MK. III	4	Bintulu
Shinshu Maru	180,000	Trans Pacific Shipping 7 Ltd.	Kawasaki	Feb-19	Bahamas	DERST	Moss	4	Freeport
Simaisma	145,889	Greenwell Corp.	Daewoo	Jul-06	Greece	Steam	GT NO 96	8	RasGas II
Singapore Energy	138,000	KSF Global No. 6 SA	Samsung	Feb-03	Marshall Is.	Steam	TZ Mk. III	4	Portfolio
SK Audace	174,000	Milestone LNG Transport SA	Samsung	Aug-17	Panama	X-DF	TZ Mk. III	4	Portfolio
SK Resolute	180,000	Great Shale LNG Transport SA	Samsung	Nov-17	Panama	X-DF	TZ Mk. III	4	Ichthys
SK Serenity	174,000	Shikc 1 Shipholding SA	Samsung	Feb-18	Panama	TFDE	KC-1	4	Sabine Pass
SK Spica	174,117	Shikc 2 Shipholding SA	Samsung	Mar-18	Panama	TFDE	KC-1	4	Sabine Pass
SK Splendor	138,370	SK Shipping Co. Ltd. -Krs	Samsung	May-00	South Korea	Steam	TZ Mk. III	4	Oman LNG
SK Stellar	138,375	Stellar Shipholding SA	Samsung	Dec-00	Panama	Steam	TZ Mk. III	4	RasGas I
SK Summit	138,003	SK Shipping Co. Ltd. -Krs	Daewoo	Aug-99	South Korea	Steam	GT NO 96	4	RasGas I
SK Sunrise	138,306	Methane Navigation SA	Samsung	Aug-03	Panama	Steam	TZ Mk. III	4	RasGas II
SK Supreme	138,225	SK Shipping Co. Ltd. -Krs	Samsung	Feb-00	South Korea	Steam	TZ Mk. III	4	RasGas I
SM Eagle	174,000	SMKLC LNG1 SA	Daewoo	May-17	Panama	ME-GI	TZ Mk. III Flex	4	Sabine Pass
SM Seahawk	174,000	SMKLC LNG2 SA	Daewoo	Jun-17	Panama	ME-GI	TZ Mk. III Flex	4	Sabine Pass
Sohar LNG	137,248	Energy Spring LNG Carrier SA	Mitsubishi	Oct-01	Panama	Steam	Moss	5	Oman LNG
Sohshu Maru	177,000	Trans Pacific Shipping 8 Ltd.	Kawasaki	Jul-19	Bahamas	DERST	Moss	4	Freeport
Solaris	155,000	Gas-Eight Ltd.	Samsung	Jul-14	Bermuda	Diesel/Gas-Electric	Membrane	4	Spot
Sonangol Benguela	160,500	Sonangol Benguela Ltd.	Daewoo	Dec-11	Bahamas	Steam	GT NO 96	4	Soyo
Sonangol Etosha	160,500	Sonangol Etosha Ltd.	Daewoo	Sep-11	Bahamas	Steam	GT NO 96	4	Soyo
Sonangol Sambizanga	160,500	Sonangol Sambizanga Ltd.	Daewoo	Aug-11	Bahamas	Steam	GT NO 96	4	Soyo
Southern Cross	172,000	Aries LNG Shipping Ltd.	Hudong Zhonghua	Jul-15	Hong Kong	DRL	TZ Mk. III	4	PNG LNG
Soyo	160,276	Mint LNG I Ltd.	Samsung	Aug-11	Bahamas	DFDE	TZ Mk. III	4	Soyo
Spirit Of Hela	177,000	Nefertiti LNG Shipping Co. Ltd.	Hyundai Samho	Nov-10	Bahamas	Diesel Electric	TZ Mk. III	4	PNG LNG
Stena Blue SKy	145,700	Blue Shipping KB	Daewoo	Aug-06	U.K.	Steam	GT NO 96	4	Spot
Stena Clear Sky	171,800	Clear Sky KB	Daewoo	May-11	U.K.	Diesel/Gas-Electric	GT NO 96	4	Portfolio
Stena Crystal SKy	171,800	Crystal Sky KB	Daewoo	May-11	U.K.	Diesel/Gas-Electric	GT NO 96	4	Portfolio
Symphonic Breeze	145,394	Reborn Maritime SA	Kawasaki	Dec-07	Bahamas	Steam	Moss	4	Portfolio
Taitar No. 1	145,000	NIMIC No. 1 SA	Mitsubishi	Oct-09	Panama	Steam	Moss	4	RasGas
Taitar No. 2	145,000	NIMIC No. 2 SA	Kawasaki	Dec-09	Panama	Steam	Moss	4	RasGas
Taitar No. 3	145,000	NIMIC No. 3 SA	Mitsubishi	Dec-09	Panama	Steam	Moss	4	RasGas
Taitar No. 4	147,000	NIMIC No. 4 SA	Kawasaki	Aug-10	Panama	Steam	Moss	4	RasGas
Tangguh Batur	145,700	LNG North-South Shipping Co.	Daewoo	Dec-08	Singapore	Steam	TZ MK. III	4	Tangguh
Tangguh Foja	155,000	Ocean1919 Shipping No. 1 SA	Samsung	Nov-08	Panama	DFDE	TZ Mk. III	4	Tangguh
Tangguh Hiri	155,000	Tangguh Hiri Finance Ltd.	HHI	Dec-08	Bahamas	DFDE	TZ Mk. III	4	Tangguh
Tangguh Jaya	155,000	Ocean1919 Shipping No. 2 SA	Samsung	Dec-08	Panama	DFDE	TZ Mk. III	4	Tangguh
Tangguh Palung	155,000	Ocean1919 Shipping No. 3 SA	Samsung	Mar-09	Panama	DFDE	TZ Mk. III	4	Tangguh
Tangguh Sago	155,000	Tangguh Sago Finance Ltd.	Hyundai Samho	Dec-08	Bahamas	Diesel/Gas-Electric	TZ Mk. III	4	Tangguh
Tangguh Towuti	145,700	LNG East-West Ship Singapore	Daewoo	Oct-08	Singapore	Steam	TZ MK. III	4	Tangguh
Tembek	216,200	Overseas LNG S1 Corp.	Samsung	Nov-07	Marshall Is.	Diesel	TZ Mk. III	4	Qatargas II
Tessala	170,000	Hyproc Shipping Co.	HHI	Feb-17	Algeria	Diesel/Gas-Electric	TZ Mk. III Flex	4	Arzew
Torben Spirit	173,400	Sea 168 Leasing Co. Ltd.	Daewoo	Nov-16	Bahamas	ME-GI	GT NO 96	4	Portfolio
Trader	138,000	Lloyds Industrial Leasing	Samsung	Nov-02	Isle of Man	Steam	TZ Mk. III	4	Portfolio
Traiano Knutsen	180,000	Hai Kuo Shipping 1901 G Ltd.	HHI	Jul-20	Norway	ME-GI	TZ Mk. III Flex Plus	4	Portfolio
Trinity Arrow	154,982	Cypress/Luster/Los Halillos	Koyo Dockyard	Feb-08	Panama	Steam	TZ Mk. III	4	Portfolio
Trinity Glory	154,000	Cypress/Luster/Los Halillos	Koyo Dockyard	Nov-08	Panama	Steam	TZ Mk. III	4	Bontang
Tristar Ruby	155,000	Sg Leasing Gems Ltd.	HHI	Apr-08	Liberia	Diesel/Gas-Electric	TZ Mk. III	4	Portfolio
Umm Al Amad	210,200	J5 Nakilat No. 7 Ltd.	Daewoo	Sep-08	Marshall Is.	Diesel	GT NO 96	18	RasGas III
Umm Al Ashtan	137,000	Umm Al Ashtan Ltd.	STX	May-97	Liberia	Steam	Moss	4	Das Island
Umm Bab	145,000	Sea Trade International	Daewoo	Nov-05	Greece	Steam	GT NO 96	4	RasGas II
Umm Slal	266,000	Shi Hull No. 1676 Inc.	Samsung	Nov-08	Marshall Is.	DFDE	TZ Mk. III	5	Qatargas II
Valencia Knutsen	173,400	Norspan LNG VII AS	Daewoo	Sep-10	Spain	DFDE	GT NO 96	4	Portfolio
Velikiy Novgorod	170,200	Boreray Shipping Ltd.	STX	Dec-13	Liberia	DFDE	GT NO 96	4	Portfolio
Vivit Americas LNG	180,000	Cardiff LNG Zeta Owning LLC	HHI	Oct-20	Malta	X-DF	TZ Mk. III Flex	4	Portfolio
Vladimir Rusanov	174,000	DY Maritime Ltd.	Daewoo	Jan-18	Hong Kong	ME-GI	GT NO 96 GW	4	Yamal
Vladimir Vize	172,000	Dy Maritime Ltd.	Daewoo	Sep-18	Hong Kong	ME-GI	GT NO 96 GW	4	Yamal
Vladimir Voronin	172,652	TC LNG Explorer IV LLC	Daewoo	Jul-19	Bahamas	ME-GI	GT NO 96 GW	4	Yamal



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Wilforce	155,900	Compass Shipping 84 Corp. Ltd.	Daewoo	Sep-13	Norway	DFDE	GT NO 96	4	Portfolio
Wilpride	155,900	Compass Shipping 85 Corp. Ltd.	Daewoo	Nov-13	Norway	DFDE	GT NO 96	4	Portfolio
Woodside Chaney	174,000	Lamkos Seaways Ltd.	Daewoo	Jul-19	Greece	ME-GI	TZ MK. III Flex	4	Portfolio
Woodside Charles Allen	173,400	Newberry Shiptrade Ltd.	Daewoo	Oct-20	Greece	ME-GI	Membrane	4	Portfolio
Woodside Donaldson	165,500	Malt Singapore Pte Ltd.	Samsung	Oct-09	Singapore	Diesel/Gas-Electric	TZ Mk. III	4	Pluto
Woodside Goode	159,800	Armour Co. Ltd.	Daewoo	Nov-13	Greece	Diesel Electric	GT NO 96	4	RasGas
Woodside Rees Withers	173,400	Franklin Navigation Co.	Daewoo	Oct-19	Greece	ME-GI	GT NO 96	4	Portfolio
Woodside Rogers	159,800	Margie Seaway Corp.	Daewoo	Jul-13	Greece	Diesel/Gas-Electric	GT NO 96	4	Pluto
Yakov Gakkel	172,658	TC LNG Explorer VI LLC	Daewoo	Nov-19	Bahamas	ME-GI	GT NO 96 GW	4	Yamal
Yamal Spirit	174,000	Xiang Ch2 HK International	Hyundai Samho	Jan-19	Bahamas	ME-GI	TZ Mk. III Flex	4	Freeport
Yari LNG	159,800	Oceanus LNG Delta LLC	Daewoo	Nov-14	Malta	TFDE	GT NO 96	4	Portfolio
Yenisei River	155,000	Navajo Marine Ltd.	HHI	Jul-13	Marshall Is.	DFDE	TZ Mk. III	4	Yamal
YK Sovereign	127,125	SK Shipping Co. Ltd. -Krs	HHI	Dec-94	South Korea	Steam	Moss	4	MLNG
Zarga	268,000	Nakilat SHI 1752 Inc.	Samsung	Jan-10	Marshall Is.	DRL	TZ Mk. III	5	Qatargas IV
Zekreet	137,482	Mitsui/Nippon/Kawasaki/Iino	Mitsui E&S	Dec-98	Japan	Steam	Moss	5	Qatargas I

Fleet – LNG Bunkering

Name	Built	Capacity	Registered Owner	Builder	Flag	Engine Type	Cargo System	No. of tanks	Project
Seagas	Sep-74	170	Linde Gas AB	Havyard Leirvik	Sweden	Diesel	Cylinder	1	Stockholm Viking Line
Coral Methane	Apr-09	7,551	Coral Methane Shipping BV	AVIC Dingheng	Netherlands	Gas-Diesel	Cylinder	4	Portfolio
Oizmendi	Jul-09	600	Itsas Gas Bunker Supply SL	Astilleros Zamakona	Spain	Diesel	Cylinder	2	Huelva
Green Zeebrugge	Feb-17	5,000	LNG Link Investment AS	Hanjin Heavy Industries	Belgium	Diesel/Gas-Electric	Cylinder	2	Zeebrugge
Cardissa	Jun-17	6,500	Shell Western LNG BV	STX	Netherlands	Diesel/Gas-Electric	Cylinder	1	Portfolio
Coralius	Aug-17	5,800	Sirius Veder Gas AB	Bodewes Shipyards	Sweden	DFDE	Cylinder	4	Portfolio
Kairos	Oct-18	7,500	Uranos 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 Schifffahrts 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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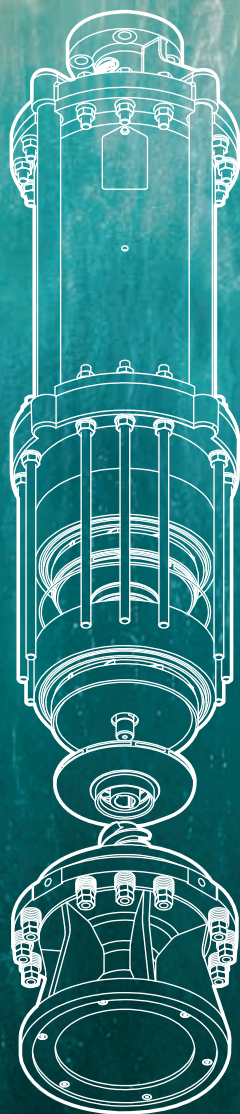
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