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Qatar expedites LNG expansion at time of pre-FID delays elsewhere

QatarEnergy's decision to fast-track the North Field West project and add 16 million metric tons of LNG per year to its expansion plans will squeeze, if not squash, some rivals. With this move, CEO Saad al-Kaabi seeks to reassure buyers that while there are uncertainties and delays in other pre-FID projects, notably in the U.S. – Qatar has the volumes and can develop them at a substantially lower cost than most; our Markets Editor Anja Karl has more.

Come 2030, Qatar could control nearly a quarter of the global LNG market as the envisaged expansion would boost its output from currently 77 million tons per annum to 142 mtpa, up from the previously planned 126 mtpa. As a player of this scale – and with units cost of LNG production at just \$0.3 per million British thermal units, compared with \$3-\$5 per mmBtu globally – QatarEnergy will be able to marginalise projects in the United States, East Africa and elsewhere which struggle to sign on enough long-term offtake to get debt financing and reach financial close.

Sitting on massive gas and liquids reserves, and able to build incremental capacity for cheap with southeast Asian workers, QatarEnergy jumped to the opportunity when the Biden administration paused US LNG export approvals which made cautious buyers fear future supply shortages.

Though the US Department of Energy (DOE) claims only four liquefaction projects are directly affected by the halt in exports approvals to countries that the US does not have a Free Trade Agreement with (non-FTA), analysts warned it also hits many projects that aim for first exports before 2027. Currently, almost 90 mtpa of planned US LNG capacity needs non-FTA approval – and without such permit, projects are unlikely to proceed to FID, let alone get built and commissioned.

Jumping to the opportunity

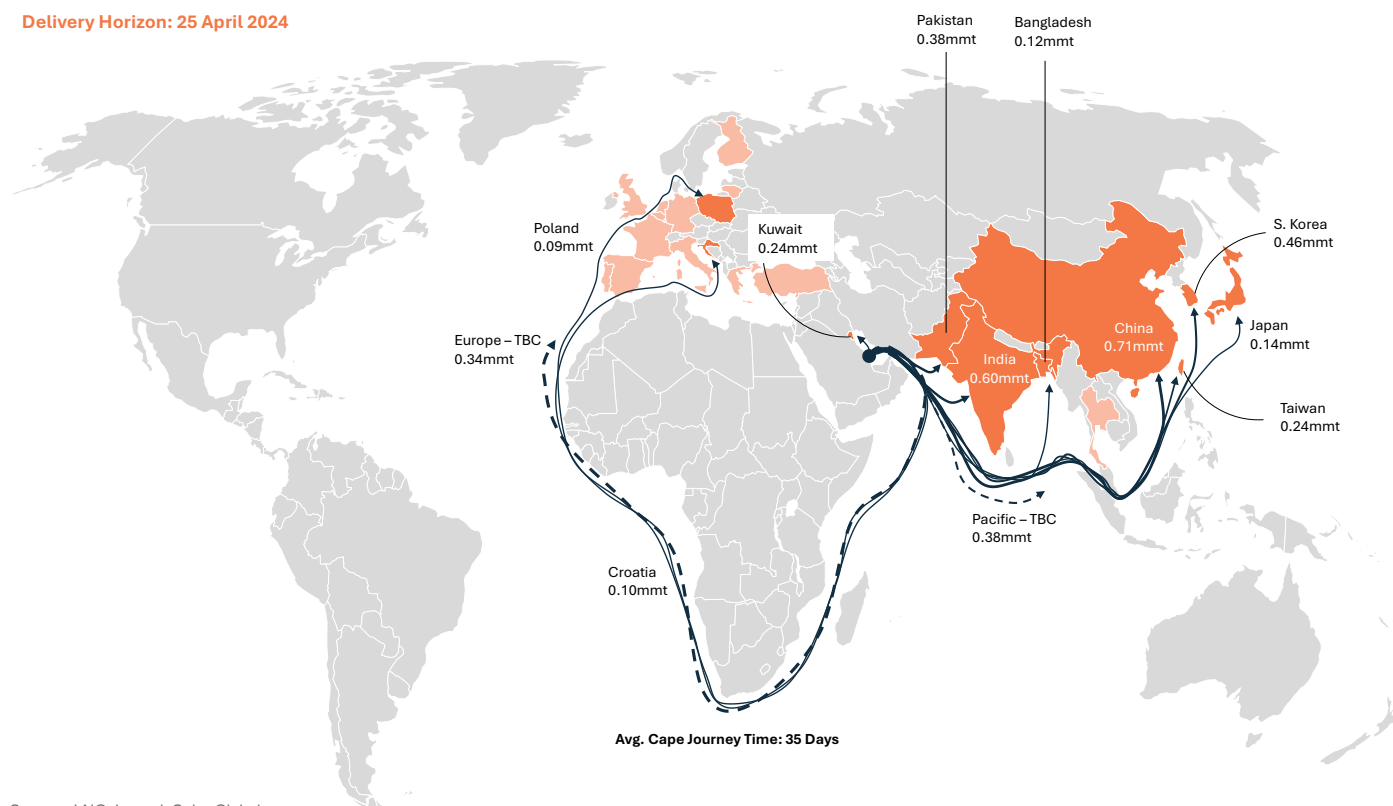
Reacting to the perceived risk of supply shortages, QatarEnergy is expediting its North Field development which holds massive reserves. Appraisal drilling and studies have increased recoverable gas estimates from 240 trillion cubic feet (tcf) to over 2,000 tcf, while corresponding

condensate volumes were revised up from 70 billion barrels to over 80 billion bbl. "They have the reserves, lower costs for building incremental capacity, the relationship with engineering firms and existing clients, so why stop here?" said Ira Joseph, senior research associate at Columbia University's Center on Global Energy Policy. In his view, the Qataris are "hurtling into use it or lose it mode" as they seem to intend to "scare away any competition that is requiring long-term customers and financing."

Expanding production at a massive resource like North Field, however, needs reliable long-term partners for firm offtake and technology support, and especially a feel for when to best proceed. "The timing is fortuitous – the Biden administration has paused US LNG export approvals, Russian LNG is sanctioned and civil unrest continues in Mozambique," said Fraser Carson, Wood

Qatar LNG Exports, 1-20 March 2024 (MMt)

Delivery Horizon: 25 April 2024



Source: LNG Journal, Spire Global

LNG journal



The World's Leading LNG publication

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Print & online £900/€1020/US\$1320

Online only £830/€920/US\$1190

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

Mackenzie’s research analyst of Global LNG. “As other major LNG competitors stall, QatarEnergy continues to expand its capacity at pace.”

North Field West LNG is designed to have a capacity of 16 mtpa, likely from a pair of 8 mtpa mega trains, as utilised in the recent North Field South expansion. Once fully ramped up, the new liquefaction plant will propel up Qatar’s overall LNG production capacity by nearly 85 percent to a staggering 142 mtpa. And with global gas demand forecast to grow by 13.5 percent, or more than 500 billion cubic metres, between 2023 and 2033 – spurred primarily by Asian demand – Qatar is keen to show it can deliver.

China, India and some Southeast Asian countries are driving a demand rebound in Asia – but growth is currently capped by a limited rise in LNG supply, the International Energy Agency (IEA) finds. China’s demand jumped by 7 percent or 26 bcm last year on the back of higher gas use from power generators and industry which pushed up LNG inflows by a substantial 14 percent, or 12 bcm – though the IEA pointed out this is still below 2021-highs.

Affordable supply for long-term demand in Asia

QatarEnergy seeks to ensure its gas remains affordable to emerging LNG buyers to entrench the role of gas and LNG in these economies, Carson noted, pointing at Qatar’s advantaged geographical location for meeting long-term demand growth in South and South East Asia, while still delivering some spot



cargoes elsewhere if needed. In 2024, global gas demand could expand by 2.5 percent, or 100 bcm – driven by Asia – while gas-burn in Europe continues to fall as the continent decarbonises. Further out, gas demand in Asia Pacific is expected to rise by close to 4 percent supported by both industrial activity and coal-to-gas switching in the power generation sector.

Yet Qatar’s LNG aspirations seem to clash with geopolitics. State-owned QatarEnergy has conceded shipments to Europe are delayed as carriers take the longer route around the Cape of Good Hope to avoid attacks when crossing the Red Sea to reach the Suez Canal. Though LNG production “continues uninterrupted,” QatarEnergy noted the armed conflict “may impact the scheduling of some deliveries as they take alternative routes.”

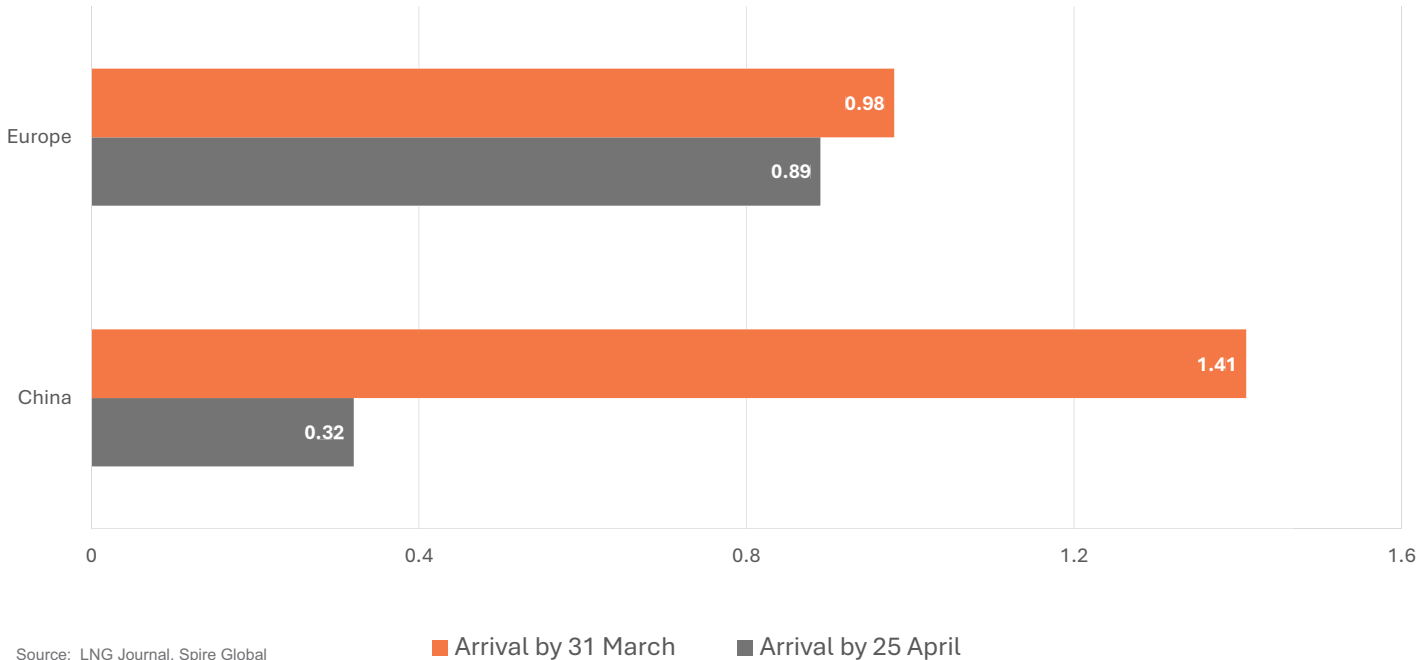
At least a dozen Qatari cargoes destined for Europe are understood to have been re-routed since January 15,

which prolongs the journey to the UK by about nine days. But despite the extended shipping times, Qatar has not curtailed its exports: On the contrary, shipments were reportedly some 7 percent higher in January alone, compared with the same period last year.

Cargo re-routings pose supply risk

For European utilities, an extended shut-in of the Red Sea route from the Middle East poses a supply risk although the price impact will be delayed until Europe’s gas storage has been drawn down sufficiently. Approximately 15.5 million tonnes of LNG were sent through the Red Sea from the Middle East to Europe in 2023 – a crucial 12.9 percent of the continent’s LNG supply, according to Rystad data. Analysts at ING bank even reckon Qatari gas supplies last year amounted to a bit more than 20 bcm, or 16 percent of total European LNG imports.

Qatar LNG Cargoes To China & Europe (MMt) Shipped since 1 March 2024



Projected Arrival Date	China	Pacific TBC	Europe TBC	Croatia	Poland	Total
20/03/2024	0.06					0.06
23/03/2024	0.09					0.09
24/03/2024	0.09					0.09
25/03/2024	0.06					0.06
28/03/2024	0.09					0.09
30/03/2024		0.18				0.18
02/04/2024		0.06				0.06
04/04/2024	0.11					0.11
05/04/2024	0.09	0.06				0.15
06/04/2024			0.09			0.09
07/04/2024		0.08				0.08
08/04/2024	0.06					0.06
09/04/2024	0.06					0.06
13/04/2024			0.06			0.06
14/04/2024				0.10		0.10
15/04/2024			0.12			0.12
20/04/2024					0.09	0.09
25/04/2024			0.07			0.07
Total	0.71	0.38	0.34	0.10	0.09	1.62



Thankfully LNG carriers managed to avoid attacks by Houthi militants so far, but ING analysts anticipate a shift in trade flows if the armed conflict deteriorates. “This could include US LNG which was destined for Asia being re-routed to Europe, and Middle Eastern (notably Qatari) LNG moving into Asia rather than Europe,” they said. So far, healthy gas storage still insulates European electric power producers and energy-intensive industries from the impact of delayed LNG shipments.

Over the past months LNG flows through the Red Sea increased substantially, with around 8 percent of global LNG now passing through the region – prior to the terrorist attacks on various ships. And as US LNG exports have surged, more cargoes used to take this route to Asia considering the current constraints through the Panama Canal due to dry weather. Re-routing all these vessels through the Cape of Good Hope

adds around 12.5 days to the voyage each way at 16 knots which could require an additional 15-20 vessels to deliver the same volume over the year, Rystad analysts calculated, warning this could alter the bearish sentiment on the shipping market. Spot charter rates dropped 23 percent across the month (for two-stroke vessels, East of Suez) but it will take an increase in LNG prices before charter rates increase.

Term offtake in return for equity stake

Much of the upcoming additional volume from Qatar has already been sold to China’s largest buyers: China National Petroleum Corporation (CNPC), for once, agreed to procure 4 million tons of LNG from QatarEnergy over 27 years and will take an equity stake in the North Field LNG project. That stake equals about 5 percent of one liquefaction train with 8 mtpa capacity while the state-owned

Qatari company wants to retain a 75 percent majority stake in the overall project, meaning there is room for further equity holders.

North Field is part of the world’s largest offshore gas find that Qatar shares with Iran, which calls its share South Pars. The overall field is estimated to hold over 51 trillion cubic meters of natural gas and some 50 billion barrels of gas condensate. The initial phase of the North Field Expansion, carried out by QatarEnergy in joint ventures with Total, Eni, ExxonMobil and ConocoPhillips, includes plans to build six new LNG trains over a period of three years to push up capacity to 110 mtpa. That endeavour alone costs Qatar and partners nearly \$30 billion – hence long-term offtake is vital to guarantee a stable rate of return.

QatarEnergy said it is selling 5 percent in these trains to what it calls “value-added partners,” including Sinopec which already back in November 2022 signed a

\$60 billion agreement to buy 4 million tons of LNG from the North Field East project over 27 years – in a bid to insulate China from gas price volatility as its economy recovers. The deal marked China’s longest-reaching LNG supply accord at the time, but CNPC swiftly followed suit in June 2023 and also signed a 4 million tons offtake agreement over 27 years, again in return for a stake in the North Field LNG project.

“Long-term deals are important for both seller and buyer,” QatarEnergy CEO al-Kaabi said, singling out the SPAs with Sinopec and CNPC that will take firm offtake well into the 2050s. Considering the massive upstream costs, long-term offtakers were giving the option to buy equity stakes in the North Field East project and a similar offer might soon be on the table for partners in the North Field West expansion as Qatar seeks to cement its dominant position as a long-term LNG supplier for years to come. ■

Country	Project	Project Developers	Planned Start Up	Number of Trains	Capacity In MTPA
Mexico	Altamira FLNG Ph. I	NFE	2024	1	1.4
Mauritania	Greater Tortue Ahmeyim FLNG	BP, Kosmos Energy	2024	–	2.52
Mexico	Costa Azul Export	Sempra Energy, TotalEnergies	2024	1	3.25
United States	Plaquemines LNG Ph. I	Venture Global	2024	1	10
United States	Golden Pass LNG T1-2	Golden Pass LNG	2024	2	12
Nigeria	Nigeria LNG Expansion	Nigeria LNG	2024	1	8
Russia	Arctic LNG 2 T1	Novatek, et al	2024+	1	6.6
Indonesia	Sengkang LNG	Energy World	2024+	4	2
Mozambique	Mozambique LNG Ph. I	TotalEnergies, et al.	2024+	2	–
United States	Golden Pass LNG T3	Golden Pass LNG	2025	1	6.03
Canada	LNG Canada	Shell, Petronas, PetroChina, Mitsubishi	2025	2	14
Rep. of the Congo	Congo FLNG Expansion	Eni	2025	1	2.4
United States	Plaquemines LNG Ph. II	Venture Global	2025	1	10
United States	CP2 LNG Ph. I	Venture Global	2026+	9	10
United States	Lake Charles LNG	Energy Transfer	2026+	3	17.79
Canada	Woodfibre LNG	Pacific Energy Corp., Enbridge	2027	2	2.2
United States	CP2 LNG Ph. II	Venture Global	2027+	9	10
United States	Port Arthur LNG Ph. II	PALNG Common Facilities Co., Port Arthur LNG	–	2	13.5

From volatility to viability: India's path through the global LNG maze

India found itself amid global LNG market turbulence in 2022. Its LNG economy, however, continues to allow cautious optimism amid upcoming global capacity growth, our Markets Editor Alexander Wilk reports.

The global LNG market has experienced significant volatility, exacerbated by events such as the COVID-19 pandemic and the Russian invasion of Ukraine. This volatility has at times challenged the perception of natural gas as a low-cost alternative and raised concerns about its feasibility as a bridge fuel. India, as an emerging world-leading gas importer, has experienced a decline in LNG demand despite increase in import value. Demand-supply imbalances have on several occasions led to highly volatile LNG prices, with fluctuations influenced by factors such as LNG supply or demand shocks as well as oil price developments (a significant share of India's long-term LNG import contracts have been oil price-linked). If these fluctuations persist, volatile gas prices will turn out to be the new normal over the next decade.

The global LNG market has undergone significant structural changes, with shifts in key players and trade flows. Perhaps most prominently, the United States has ascended to become the world's most significant LNG exporter by installed capacity whilst Russia's war on Ukraine has perpetuated a European demand vortex since 2022. Concurrently, former LNG champion Qatar is playing catchup (but plans to regain supply dominance through a massive capacity expansion over the coming years) whilst Australia's available capacity is at risk of slowly regressing since the effective mothballing of Darwin LNG.

The volatility in global LNG markets has translated into the Indian market growing cautious of the fuel, as the country's gas market remains price regulated. The Institute of Energy Economics and Financial Analysis (IEEFA) argues that high prices have led to demand destruction and fuel switching, particularly in industrial and city gas distribution sectors. Accordingly, the future of gas expansion in India faces challenges following a wave of expensive infrastructure investments. However, Indian utilities have yet to turn their backs on LNG, working to further

establish the fuel as the country is moving towards cleaner fuels and renewable energy sources.

High Prices

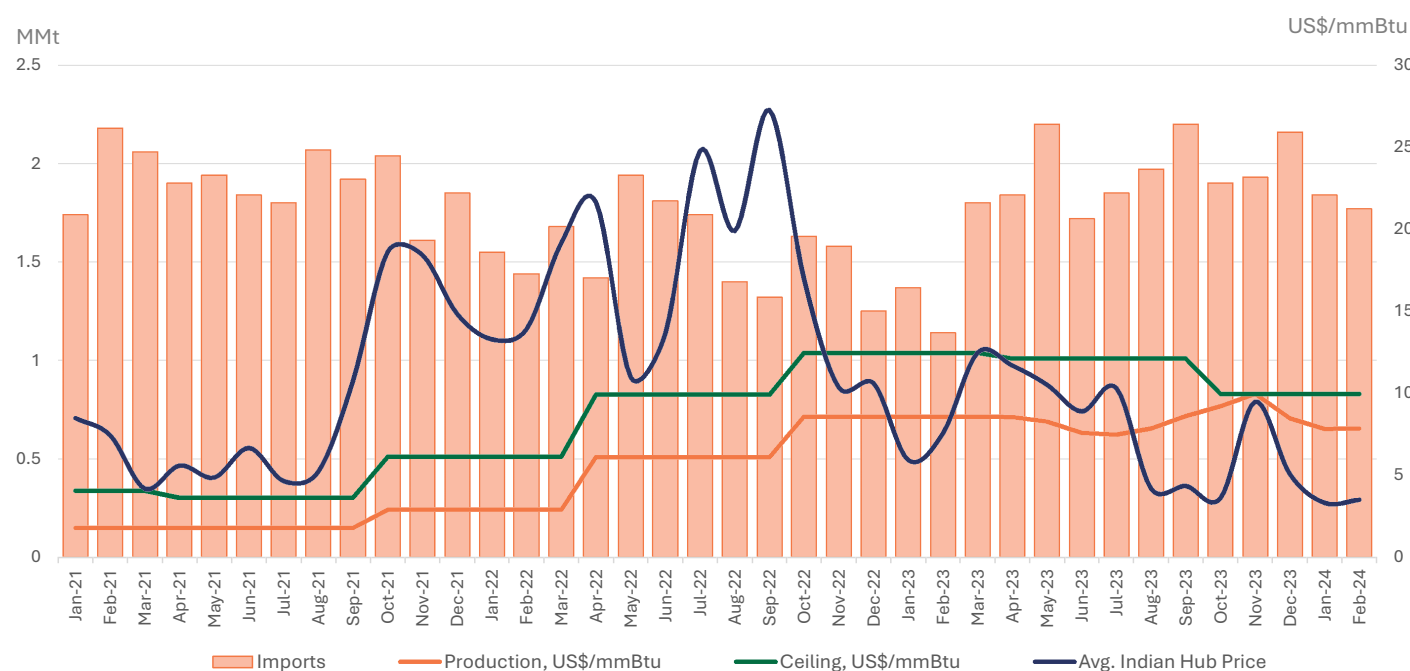
India, whilst being a major LNG importer in Asia, remains very price sensitive. The collapse of Russian pipeline gas supply to Europe following Russia's invasion of Ukraine (partly due to policy and the destruction of one of the Nord Stream trunk lines) has created a European demand vortex, which directly impacted LNG supply to India. LNG supply could not keep pace with rapacious European demand growth, which led to a price explosion. The Japan-Korea Marker (JKM), a benchmark for Asian LNG spot prices, peaked at US\$84.76/mmBtu on 7 March 2022. Concurrently, India's domestic gas price peaked at US\$66/mmBtu at the Hazira hub on 9 March.

The impact of the European demand shock came into further relief after Singaporean subsidiary of Gazprom Marketing & Trading (GM&T) discontinued LNG deliveries to GAIL, India's premier LNG aggregator and operator of the country's largest pipeline network, in the summer of 2022. GAIL had a long-term contract with GM&T for

roughly 40 LNG cargoes per year until 2038, according to our LNG contract database. However, GM&T itself was denied access to its contracted supply from Yamal LNG – amounting to 2.90 million tonnes per annum – after the German government appointed the Bundesnetzagentur, an independent German regulatory authority, as fiduciary for GM&T's parent Gazprom Germania GmbH (now known as SEFE) in early April.

Finding itself in a position to plug that gap, SEFE resorted to redirect its LNG flow from producers such as Cameroon away from India to Europe, increasing that flow from 0.87mmt in 2022 to 0.94mmt in 2023, according to our data. For context, there had been only five such shipments to Europe totalling 0.31mmt in the preceding four years. As we reported at the time, the missed cargoes were likely to be problematic since GAIL will have baked them into its own supply schedule as well as booked slots at terminals. It was left to scramble for replacements in a tight market. The shortfall highlighted an unintended consequence of Germany trying to disengage from Russian gas supply whilst simultaneously shoring up its own energy security.

Indian LNG Imports (MMt) & Prices (US\$/mmBtu)



Source: LNG Journal, PPAC, GIXI

Market volatility

India has previously been able to benefit from periods of price decline after the COVID-19 pandemic, even as the bulk of its supply comes from oil-linked long-term contracts with Qatar. Landed LNG prices in India and Pakistan have previously been linked to Brent and priced based on the arithmetic mean of Brent for the three months preceding the delivery month.

With prevailing low Brent as well as subdued demand growth as both countries were still reeling from strict lockdowns in response to the COVID-19 pandemic, spot and landed LNG term prices had decreased considerably since the beginning of the year. Landed Brent-linked LNG on term contracts averaged US\$8.02/mmBtu in January but stood at only US\$4.25/mmBtu in May 2020 on account of the slide in Brent the preceding quarter and climbed only a little to US\$5.39/mmBtu on average in August. Published spot prices for deliveries to Pakistan that year saw a similar downward trend, decreasing from US\$10.86/mmBtu in January to as low as US\$2.22/mmBtu in August.

However, the emergence of the European demand vortex highlights how geopolitical events or severe weather patterns can contribute to heightened

volatility within the LNG market. As we have reported in the past, the 2022 LNG demand shock was largely caused by plummeting Russian pipeline gas supply to Europe as well as a protracted drought that led to lower hydro power output in countries such as Brazil. The recent drop in US LNG prices as indicated by EIA data can thus also be attributed - at least in part - to subdued demand from Europe, brought about by mild winter weather and full inventories.

The previous price instability experienced in global markets had a ripple effect on the Indian market. This was not just due to supply curtailments such as the one highlighted above, but also the inert ability to react swiftly due to domestic regulations dating back to 2014. Documentation by India's Petroleum Planning & Analysis Cell shows that in the past, the prescribed pricing formula for domestic gas production and the national price ceiling relied on the volume-weighted average of several international benchmarks including the US Henry Hub. However, the inherent lag in calculating the domestic price bounds inevitably led to a disparity between domestic and spot gas prices.

These elevated prices prompted demand reduction and fuel switching within India's industrial and city gas distribution sectors, according to the IEFPA citing government data, which were beginning to emerge as significant gas consumers. Due to the pass-through pricing policy and the price sensitivity of consumers, the IEFPA argues, Indian utilities found it challenging to utilise LNG at high prices, consequently dampening demand.

In 2023, as a response to the impact of soaring LNG prices, monthly adjustments to domestic prices were introduced, tied to the Indian crude basket. The overarching goal is to gradually deregulate gas prices, notably aiming for full deregulation by 2027 in line with recommendations by an expert panel on gas pricing.

However, this measure will mainly work to stabilise domestic gas prices for producers. Meanwhile, nearly half of India's gas demand will still need to be met by imports. The country's domestic gas production is incapable of meeting national demand. Notably, the country's rapid economic growth means the government is investing in all forms of energy supply, according to the International Institute for Sustainable Development (IISD). In FY 2023, both clean energy and fossil fuel subsidies grew by around 40 percent, including subsidies for coal. Indeed, the IISD points to data by the IEA that shows that coal accounted for 45 percent of India's total primary energy supply in 2022, up from 43 percent in 2020.

Slow infrastructure roll-out

Slow infrastructure roll-out has also had a direct impact on India's LNG infrastructure expansion. For instance, the Jaigarh FSRU project is a rare instance where a planned FSRU terminal has yet to materialise several years after it was originally scheduled to enter the market. The delay was not due to a lack of FSRU; indeed, the arrival of the FSRU Höegh Giant at Jaigarh Port in April 2021 marked H-Energy's second attempt at installing India's first FSRU.

The LNG project was first envisioned to start operations in 2018 but has since suffered repeated delays.

In March 2020, H-Energy had planned to start commercial LNG operations using the 145,000m³ Cape Ann.

Unfortunately, Höegh LNG terminated the long-term charter deal, claiming H-Energy was unable to meet its contractual obligations. The two companies subsequently reached a settlement, but the FSRU had already left India on another charter until Germany's announcement to establish its emergency FSRU capacity rapidly tightened the FSRU market and elevated LNG prices. Both FSRUs once earmarked for Jaigarh have since been engaged in other deployments – the Höegh Giant for Brazilian energy company Cosan and the Cape Ann for TotalEnergies.

H-Energy was originally planning to install FSRU capacity at the Jaigarh LNG jetty by 3Q 2018 with commercial operations to begin in 4Q 2018. However, the terminal's commercial start of operations has been plagued by several

delays since the completion of its

The European LNG demand vortex highlights how geopolitical events or severe weather patterns can contribute to heightened market volatility

immediate infrastructure – from the original start date in 2018 to 1Q 2019, then to 2Q 2020 and ultimately 3Q 2021.

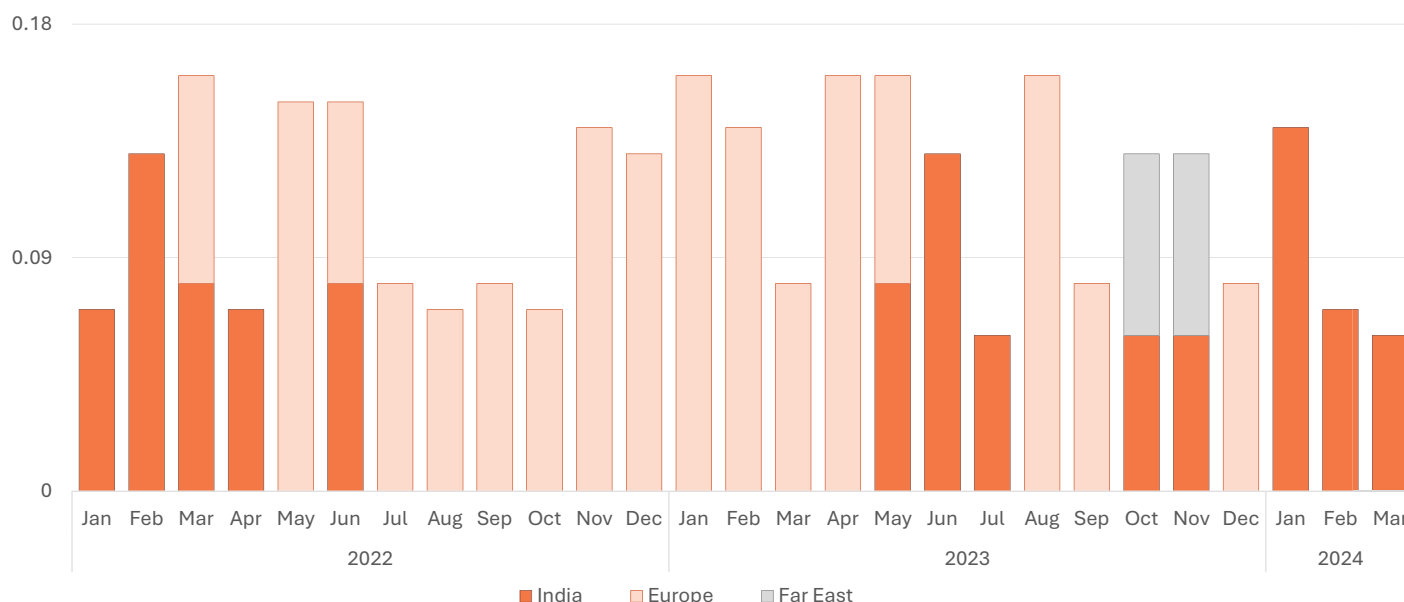
Monsoon rains and the Indian elections had previously contributed to the delayed start-up of the terminal. Subsequently, additional delays were due to hold-ups to the rolling out of associated pipeline infrastructure. H-Energy through its subsidiary H-Energy Gas Marketing was going to source LNG from Malaysia to supply regasified methane to downstream customers directly via a 56km pipeline connector to the national gas grid at Dabhol, namely the Dabhol-Bangalore and the Dahej-Uran-Dabhol-Panvel pipelines. Dabhol is already site to Maharashtra's first conventional LNG terminal, operated by GAIL. Moreover, H-Energy was building a 635km pipeline connecting Jaigarh to energy-hungry Mangalore, which was originally envisioned to be ready by 2023. Overall, the LNG project has now been nominally in development since 2015.

Supply capacity buildout

Setbacks and difficulties notwithstanding, GAIL continues with LNG investment plans in India, albeit more cautiously and on a smaller scale than during the previous decade. In a mid-March filing with India's National Stock Exchange, the company maintained that India's 'LNG business has potential to grow substantially' and that by expanding its foothold in the LNG retail sector for transportation fuel 'GAIL can take a central role in driving this growth [...] in next 5-6 years'.

Europe's Demand Vortex

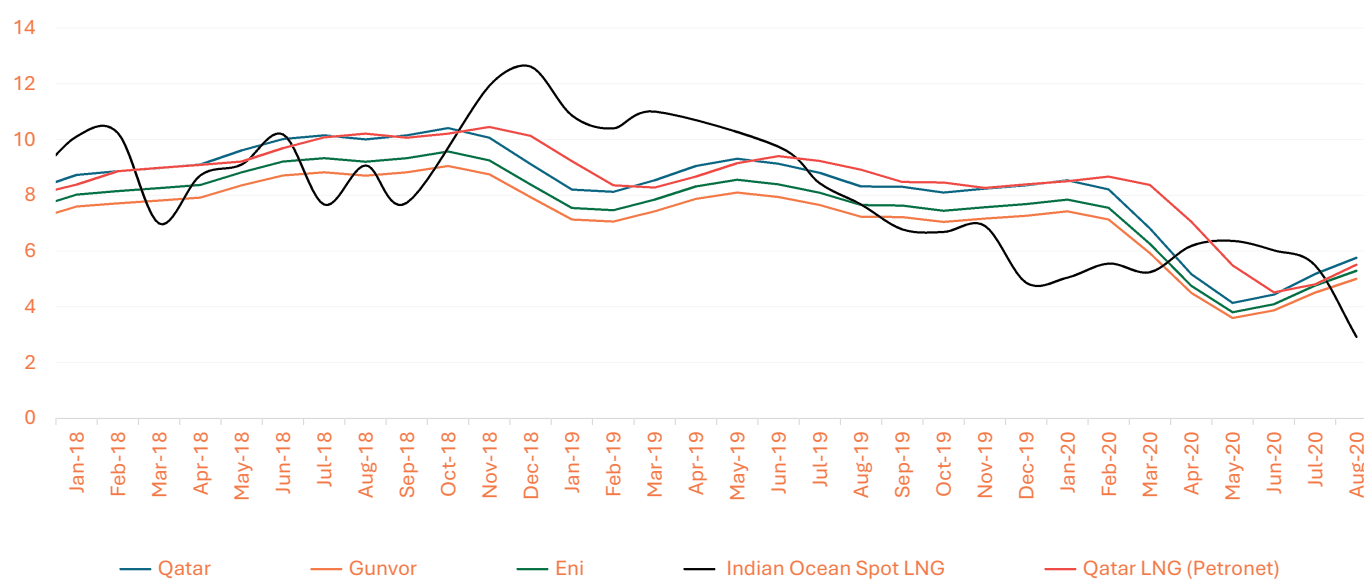
Evidence from Cameroon FLNG's Export Pattern



Source: LNG Journal

Middle Eastern Term Prices vs Spot: India & Pakistan

\$/mmBtu



Source: Author's research, Pakistan LNG, NYMEX

Although the investment may appear relatively small in the context of India's vast power market – it is valued at 6.5 billion rupees (roughly US\$78 million) – it demonstrates that India's leading LNG utility is continuing to invest in LNG. Moreover, the company has signed a memorandum of understanding with Shell Energy India in March last year to further explore scope to increase LNG imports. GAIL has also been expanding its international reach through direct control of LNG shipping capacity.

As we have reported previously, the company already owns 166 gas filling stations for cars and trucks. Overall, India has more than 4,000 such filling stations. Notably, India's Minister of Petroleum and Natural Gas Hardeep Singh Puri has called for steady supply of gas-powered vehicles as part of India's strategy to have net zero emissions by 2070. Apart from LNG as transport fuel, a GAIL presentation noted that city gas is

now available across roughly 88 percent of Indian territory.

GAIL boasts a network of over 16,000 km of natural gas pipelines across the country. It also holds a stake in Petronet LNG, the country's largest LNG importer, which incidentally is also involved in expanding its LNG filling station network.

Meanwhile, investments amounting to more than US\$290 billion globally are currently driving the LNG sector forward, thus affirming its pivotal role in the global energy transition, according to reporting by Bloomberg. This wave of investment indicates that natural gas will remain a crucial component of the energy mix until at least 2050, as countries strive to meet both energy demands and emissions reduction targets. In line with this development, the Indian government is increasingly seeing LNG as a transitional fuel towards a low-carbon future, offering a cleaner alternative to

coal and oil. Major LNG projects, particularly in Qatar and the United States, are poised to significantly expand export capacity.

The upcoming supply capacity expansions are thus likely to become a boon to India's LNG economy – not only because they will work to shrink the gap to established import capacity, but also because India is unlikely to be able to meet its economic expansion without fossil fuels. Notably, its net-zero target is set only for 2070 whilst the government raised the target share of gas in the country's primary energy mix to 15 percent by 2030. Accordingly, in an interview with India's Economic Times, Spencer Dale, BP's chief economist, describes a complex scenario where India, amid efforts to scale up renewable energy, faces significant challenges due to its concurrent growth in fossil fuel-fired power generation. Despite ambitions to significantly increase renewable power

capacity, India's energy demand forecasts necessitate continued reliance on coal and gas. Dale also maintains that this situation highlights tensions between developing nations like India and Western countries, with concerns about the imposition of Western climate policies that may not align with the practical realities and needs of developing economies.

Concluding thoughts

It seems unlikely that India will be able to turn its back on LNG even after bouts of significant market volatility have made market players more cautious. As BP's Dale highlights, there will be an ongoing need of LNG in meeting projected power demand growth regardless of the level of commitment to renewable energy.

After benefitting from comparatively low prices that enticed LNG import terminal construction, India ran into problems both in terms of LNG procurement and infrastructure expansion after Russia's invasion of Ukraine and the emergence of the European demand vortex. Domestic gas price policy at the time demonstrated it had not accounted for sudden market shocks as India has to tread a fine line between switching to cleaner LNG in view of transitioning away from coal and maintaining affordable domestic gas price ranges. Nevertheless, important adjustments have been made, including future price deregulation and setting higher gas share targets. Accordingly, whilst remaining cautious, leading Indian LNG importers remain committed to the fuel.

Meanwhile, scheduled expansions of export capacity among key LNG producers globally are set to narrow the gap between production and demand, thereby reducing the potential for massive market swings as seen in 2022. ■

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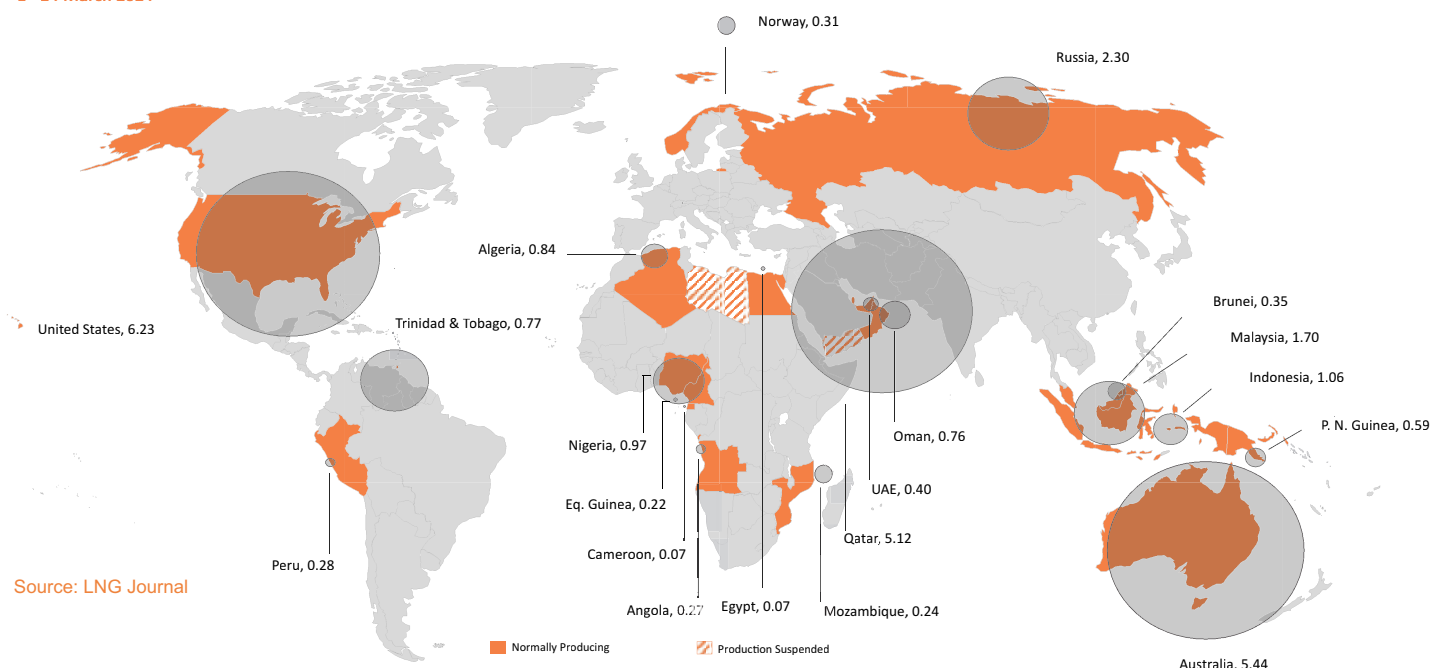
Atlantic and Pacific flows compensate for Middle Eastern dip

Our data on 24 March showed steady LNG output globally, signalling higher overall trade levels by the end of the month, our Market Editor Alexander Wilk reports.

Global LNG exports at the time of writing on 24 March amounted to 27.99mmt and thus saw exports remain broadly steady with only a marginal increase of 0.07mmt from the total of 27.92mmt we recorded on 24 February. Among the three most significant exporters, the United States decreased exports by 0.36mmt (-5 percent) to 6.23mmt from 6.59mmt in February. For Qatar, our data also showed a reduction of 0.11mmt (-2 percent) to 5.12mmt but Australian exports had remained flat at 5.44mmt. With only Malaysia left among those with significant month-on-month export reductions, this gave enough room for smaller producers to compensate. This group was led by Indonesia, which boosted its March to date exports by 58 percent. Trinidad & Tobago, Angola and Algeria also contributed significantly with respective monthly growth.

Global LNG demand was led by China with imports of 5.07mmt, up by 0.74mmt (17 percent). Japan, meanwhile, reduced imports by 0.36mmt (-7 percent) to 4.63mmt alongside an import increase by 0.22mmt (8 percent) to 3.00mmt in South Korea.

Global LNG Exports (MMt)
1 - 24 March 2024



Export - Pacific Basin

At the time of writing, Pacific exports had accrued to 10.32mmt and thus came in above their February equivalent of 10.22mmt by 0.10mmt (1 percent). Consequently, annualised capacity utilisation stood at 67 percent. Exports

were also up by 0.17mmt (2 percent) year-on-year.

Australia: The Pacific Basin's most significant exporter by installed capacity – Australia – saw exports remain steady at 5.44mmt although most Australian plants cut output.

NWS LNG decreased exports by 0.20mmt (-21 percent) to 0.76mmt from 0.96mmt in February. Concurrently, Prelude FLNG had reduced its exports by 0.04mmt (-15 percent) to 0.23mmt from 0.27mmt in February alongside similar minor reductions in volume terms by Queensland Curtis LNG, Australia Pacific LNG and Ichthys LNG.

These export cuts were compensated, however, by an export increase of 0.38mmt at Gladstone LNG, Gorgon LNG, Wheatstone LNG and Pluto LNG. Gladstone LNG had grown exports by 0.12mmt (35 percent) to 0.46mmt whilst Gorgon LNG's shipments stood 0.12mmt (11 percent) higher at 1.17mmt. Wheatstone LNG's export increase, meanwhile, was 0.09mmt (16 percent) to 0.66mmt alongside growth of 0.05mmt (17 percent) to 0.35mmt at Pluto LNG.

Australian exports at the time of writing were led by shipments to China amounting to 1.76, followed by Japan with 1.33mmt. South Korea was the third most significant importer of Australian LNG with 0.82mmt. Notably, we were also tracking 0.54mmt of Australian

exports that were headed to still undisclosed destinations within the Pacific Basin.

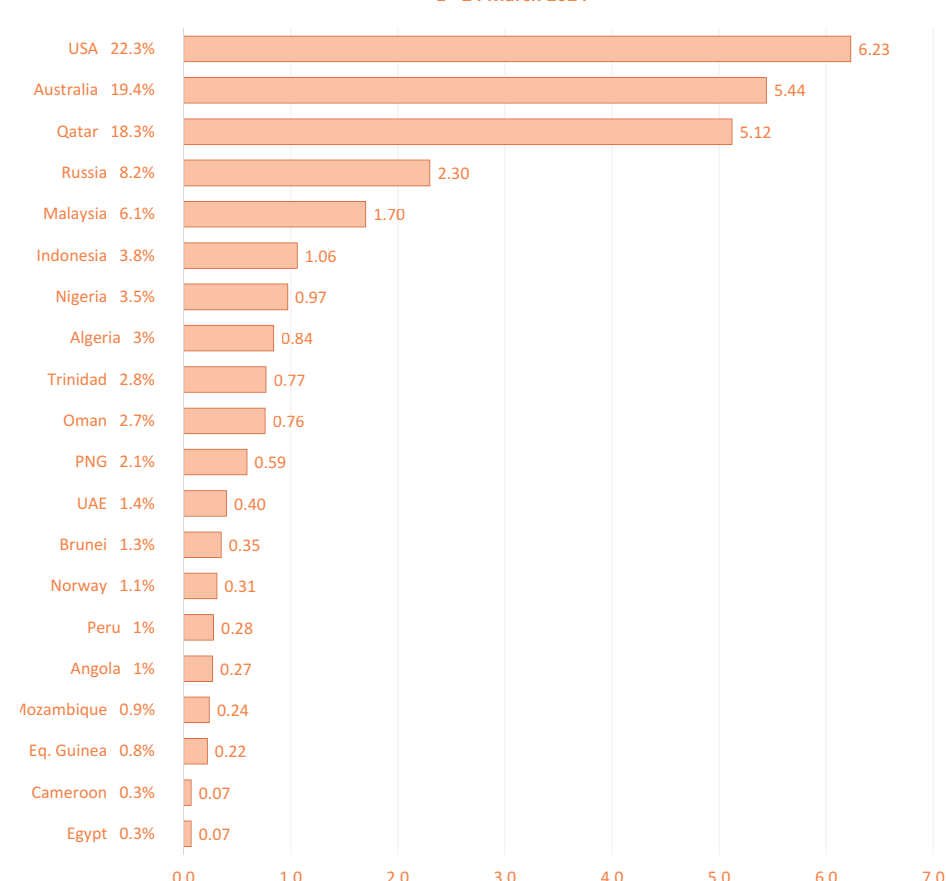
Southeast Asia: North of Australia, PNG LNG recorded an export increase of 0.09mmt to 0.59mmt in March, representing growth of 18 percent compared to February, when it shipped 0.50mmt. The plant's annualised capacity utilisation rate thus stood at 85 percent at the time of writing. PNG LNG exports were led by shipments to China and Japan, both amounting to 0.22mmt. Taiwan and South Korea, meanwhile, had maintained their respective import levels at 0.08mmt and 0.07mmt, respectively.

Indonesia, meanwhile, had boosted exports by 0.39mmt (58 percent) to 1.06mmt from 0.67mmt. Our data for Tangguh showed a significant increase of 0.37mmt (119 percent) to 0.68mmt in shipments alongside a substantial increase of 0.02mmt (13 percent) to 0.18mmt at Donggi-Senoro LNG. The Bontang plant, meanwhile, had maintained exports at 0.20mmt. Consequently, the Tangguh and Donggi-Senoro plants produced at 72 and 108 percent of annualised capacity utilisation, respectively, whilst Bontang remained at 21 percent, according to our data and calculations.

Malaysia, meanwhile, had seen a significant decrease in shipments of 0.41mmt (-19 percent) to 1.70mmt from

Market Share & LNG Exports by Country (MMt)

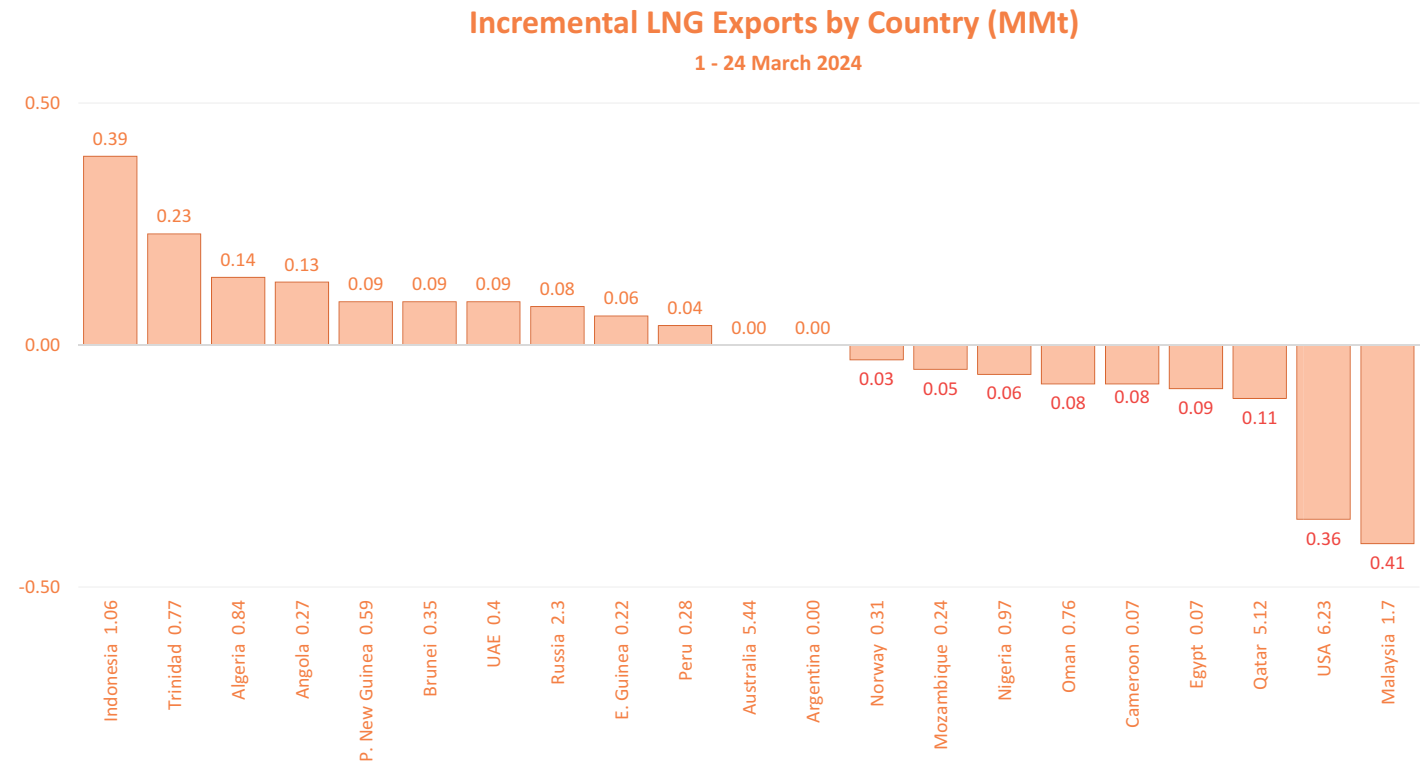
1 - 24 March 2024



2.11mmt this time in February. This was because Malaysia LNG had cut exports by 0.48mmt (-25 percent) to 1.42mmt from 1.90mmt in February. This substantial cut could thus not be compensated by an export increase of 0.07mmt (50 percent) to 0.21mmt at PFLNG 2. PFLNG 1, meanwhile, maintained exports at 0.07mmt. PFLNG 2's annualised capacity utilisation thus stood at 210 percent whilst PFLNG 1 saw utilisation of 70 percent, according to our data and calculations. Malaysia LNG, meanwhile, had also produced at only 58 percent annualised capacity utilisation for the month to date.

For Brunei LNG we recorded a production increase of 0.09mmt (35 percent) to 0.35mmt from 0.26mmt this time in February. The plant's annualised capacity utilisation rate at the time of writing thus stood at 58 percent. Although Taiwan and South Korea slashed their respective offtakes from Brunei LNG, these losses were compensated by higher exports to Japan and China. We were also tracking two Brunei LNG cargoes amounting to 0.14mmt that still had to declare their destinations within the Pacific.

Russia, Peru & Mozambique: Elsewhere in the Pacific, our data indicated Sakhalin-2 LNG had seen an export decrease of 0.05mmt to 0.66mmt, representing negative growth of 7 percent from 0.71mmt on 24 February. The plant's annualised capacity utilisation rate thus stood at 83 percent. The plant's LNG exports were led by shipments to Japan amounting to 0.42mmt, broadly steady month-on-month. China had also



Source: LNG Journal

maintained the same level of imports at 0.12mmt. However, South Korea had reduced imports by 0.06mmt (-33 percent) to 0.12mmt.

Pampa Melchorita LNG had increased exports by 0.04mmt (17 percent) to 0.28mmt from 0.24mmt in February. The plant's annualised capacity utilisation rate thus stood at 76 percent. LNG exports from Peru were led by shipments to the Pacific Basin amounting to 0.21mmt whilst South Korea had reduced imports by 0.17mmt to 0.07mmt at the time of writing.

Finally, Mozambique's Coral Sul FLNG recorded a production decrease of 0.05mmt (-17 percent) to 0.24mmt, which pegged the plant's annualised capacity utilisation rate at 85 percent.

Atlantic Basin

Alongside the export growth in the Pacific, the Atlantic Basin's overall shipped LNG had increased by 0.16mmt (1 percent) to 11.32mmt at the time of writing from 11.16mmt this time in February. This translated into annualised export capacity utilisation of 64 percent for the Basin. Exports were thus also up by 0.63mmt (6 percent) year-on-year.

North Africa & Europe: The amount of LNG shipped from within its north-eastern part - comprising the EEA, Russia and North Africa (and not including re-exports) - amounted to 4.32mmt as of 24 March and thus constituted an increase of 0.29mmt (7 percent) from 4.03mmt on 24 February.

Russia's Atlantic Basin capacity saw

an increase in shipments of 0.13mmt (9 percent) to 1.64mmt in March from 1.51mmt in February. Portovaya LNG maintained exports at 0.07mmt but Yamal LNG grew flows by 0.13mmt (9 percent) to 1.57mmt from 1.44mmt in February. Accordingly, the plant continued to produce well above nameplate capacity at 108 percent.

Our data also showed Algeria had boosted exports by 0.14mmt (20 percent) to 0.84mmt from 0.70mmt in February. Arzew had seen a significant increase in shipments by 0.15mmt (29 percent) to 0.67mmt, which was only slightly tempered by a 0.01mmt (-6 percent) reduction to 0.17mmt from 0.18mmt by Skikda LNG.

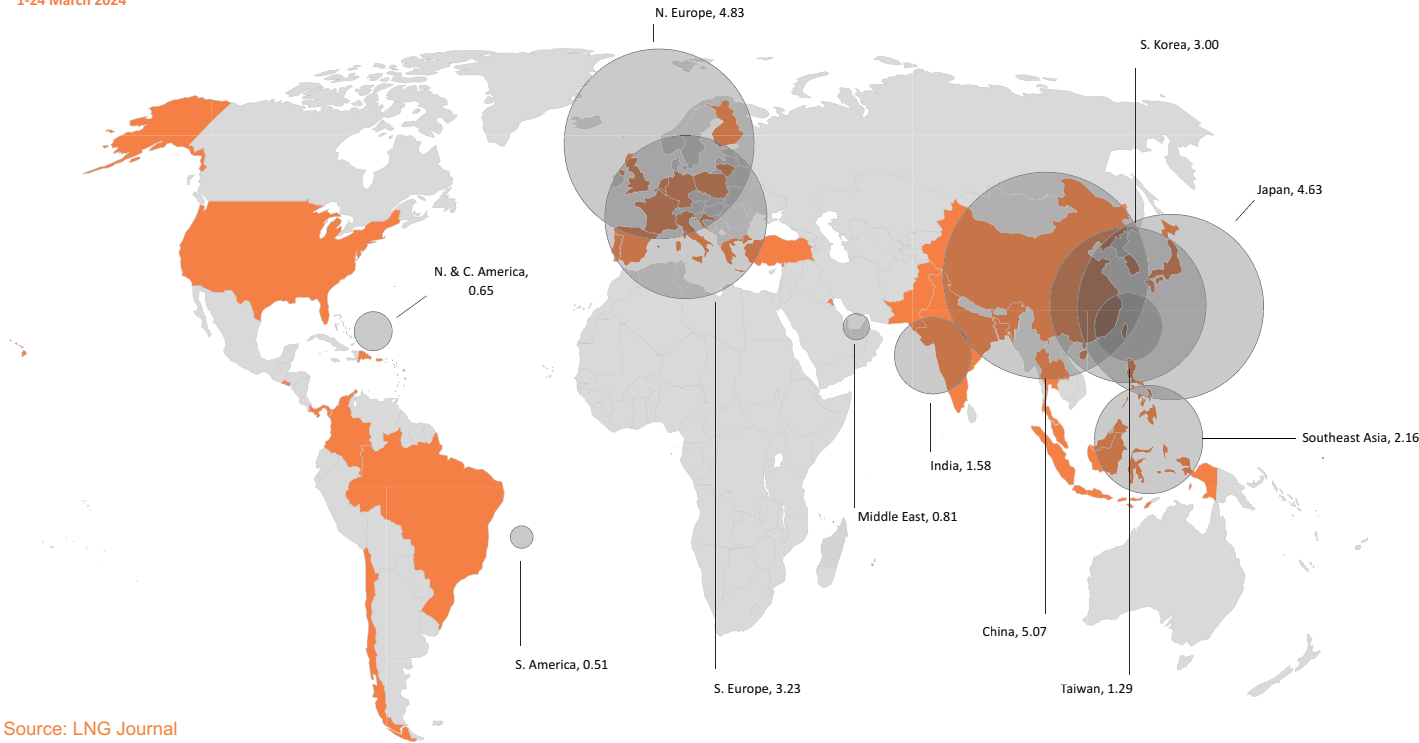
However, in contrast to growth in Russia and Algeria, our data at the time of writing showed an export decrease in Norway. For Snøhvit LNG, we had recorded a production decrease of 0.03mmt (-9 percent) to 0.31mmt from 0.34mmt by the time of writing. The plant's annualised capacity utilisation rate thus stood at 89 percent. Norwegian LNG exports to Finland and France were down by 0.05mmt and 0.08mmt, respectively, whilst they had not yet reoccurred to Spain compared to 0.03mmt in February. However, we were also tracking 0.12mmt of undeclared cargoes broadly headed for Europe.

West Africa: West African LNG flows had increased by 0.03mmt (3 percent) to 1.53mmt as of 24 March compared to 1.48mmt in February.

Angola LNG had boosted exports by 0.13mmt (93 percent) to 0.27mmt whilst EG LNG experienced a significant

Global LNG Imports (MMt)

1-24 March 2024



Source: LNG Journal

increase of 0.06mmt (38 percent) to 0.22mmt. These increases were tempered, however, by an export decrease amounting to 0.14mmt at Nigeria's Bonny Island LNG and Cameroon FLNG. Bonny Island had decreased cargo loadings by 0.06mmt (-6 percent) to 0.97mmt from 1.03mmt this time in February whilst Cameroon FLNG faced a decline of 0.08mmt (-53 percent) to 0.07mmt.

West Africa's exports continued to be led by shipments to India, which had amounted to 0.43mmt at the time of writing. They were closely followed by 0.29mmt destined for yet to be determined destinations within the Pacific Basin. Concurrently, however, important destinations such as South Korea and Thailand had yet to import LNG from West African producers in March at the time of writing.

Americas: Our US LNG export data on 24 March showed a significant decrease in shipments by 0.36mmt (-5 percent) to 6.23mmt from 6.59mmt for the equivalent period in February. According to our data at the time of writing, the most drastic change stemmed from Freeport LNG, which faced a decrease of 0.31mmt (-34 percent) to 0.61mmt. Calcasieu Pass LNG had also cut exports by 0.13mmt (-17 percent) to 0.63mmt whilst Sabine Pass LNG had reduced cargo loadings by 0.14mmt (-6 percent) to 2.30mmt. These reductions were cushioned, however, by an increase totalling 0.22mmt at Cameron LNG, Corpus Christi LNG and Cove Point LNG. Cameron LNG at the time of writing had grown exports by 0.11mmt (10 percent) to 1.16mmt from 1.05mmt in February. Corpus Christi LNG had also seen a substantial increase of 0.10mmt (12 percent) to 0.95mmt whilst Cove Point LNG had grown exports comparatively modestly by 0.01mmt (2 percent) to 0.43mmt. Elba Island LNG, meanwhile, had maintained output at 0.15mmt. US LNG cargo loadings were underpinned by apparent shipments to Northern Europe and the Atlantic Basin totalling 2.98mmt. Meanwhile, exports to the Far East and the rest of Asia had accrued to 2.03mmt at the time of writing.

In South America, Atlantic LNG in Trinidad & Tobago had boosted its month-on-month LNG exports by 0.23mmt (43 percent), according to our data, with shipments amounting to 0.77mmt compared to their February equivalent of 0.54mmt. The plant's annualised capacity utilisation rate thus stood at 60 percent.

Middle East

Middle Eastern LNG exports at the time of writing had amounted to 6.35mmt and thus showed a slight decrease of 0.19mmt (-3 percent) from 6.54mmt in February. Exports were also down by 0.34mmt (-5 percent) year-on-year. Accordingly, our data showed the Basin's annualised utilisation of operational export capacity (i.e., excluding Yemen) at

82 percent at the time of writing.

The Middle East's overall negative export growth was driven by Qatar's Ras Laffan LNG complex. Our March data at the time of writing indicated the facility had exported 5.12mmt, a decrease of 0.11mmt (-2 percent) month-on-month from 5.23mmt. The plant's annualised capacity utilisation rate thus stood at 79 percent. The necessity to avoid the Suez

Canal in favour of the Cape Route continued to have a trade reducing effect as it occupied more shipping capacity. As such, Qatar's apparent LNG flows to Europe had suffered by 0.08mmt. This reduction came in addition to less demand in Asia, which was down 0.26mmt at 3.65mmt. However, demand for Qatar's LNG had grown significantly by 0.23mmt (43 percent) to 0.76 in the Middle East.







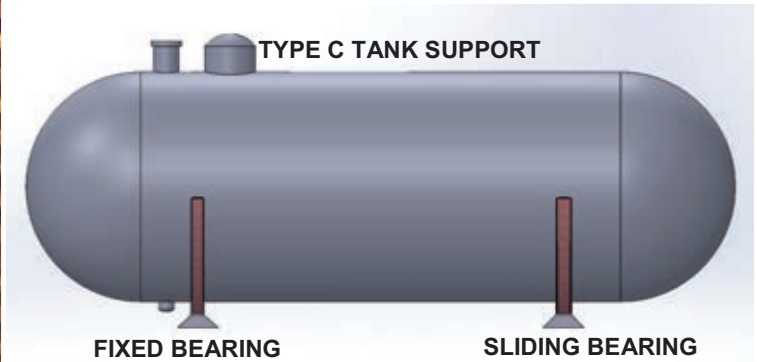




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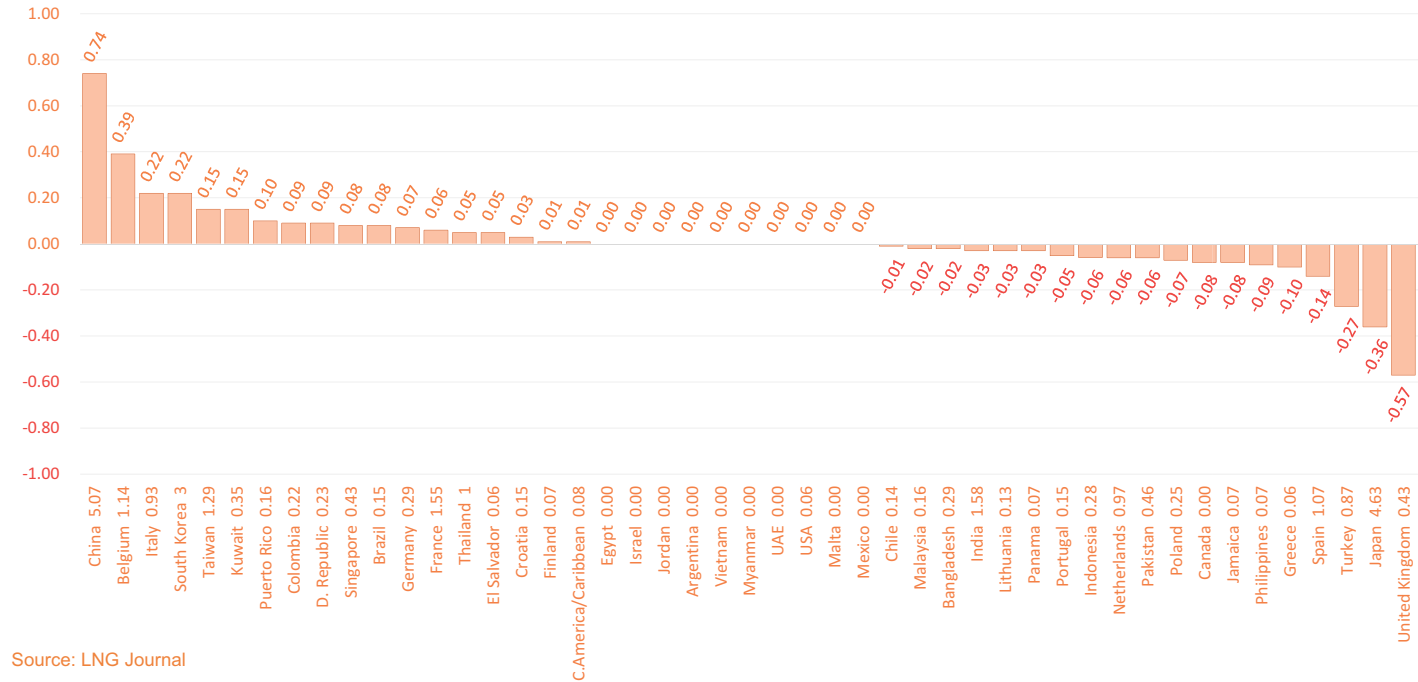
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Incremental LNG Imports by Country (MMt)

1 - 24 March 2024



Source: LNG Journal

Lower performance by Qatar was echoed by a significant decrease in Oman’s LNG exports, which were down by 0.08mmt (-10 percent) to 0.76mmt from 0.84mmt at the time of writing. The plant's annualised capacity utilisation rate thus stood at 88 percent.

The Middle East’s export reduction as of the time of writing was compounded by a reduction in Egypt, where Damietta SEGAS LNG had decreased shipments by 0.01mmt (-13 percent) to 0.07mmt at the time of writing. The plant's annualised capacity utilisation rate thus stood at just 17 percent. Neighbouring Idku LNG, meanwhile, had yet to ship a cargo in March compared to a single export of 0.08mmt this time in February.

As such, Middle Eastern export growth in the month to date had only come from the UAE, where LNG exports were up by 0.09mmt (29 percent) to 0.40mmt. This meant annualised capacity utilisation at Abu Dhabi’s Das Island plant stood at 87 percent.

Imports & Domestic Trade

Global LNG imports as of 24 March had increased slightly by 0.53mmt (2 percent) to 27.98mmt from the 27.45mmt we recorded this time last month. Demand growth at the time of writing was driven by the Pacific whilst Atlantic Basin offtakes had seen a net reduction of 0.33mmt (-3 percent). Middle Eastern demand, meanwhile, had increased by 0.09mmt (13 percent).

Pacific Basin

Month-on-month Pacific Basin imports were up by 0.77mmt (4 percent) net to 18.07mmt from 17.30mmt in February. Among larger-scale importers, China,

South Korea and Taiwan had increased their offtakes by 1.11mmt (13 percent) in total to 9.36mmt. As a result, this combined increase could not be negated even by a significant demand decrease of 0.36mmt (7 percent) to 4.63mmt in Japan that sat alongside a more modest reduction of 0.03mmt (-2 percent) to 1.58mm in India.

Concurrently, the roster of smaller Pacific buyers – including Thailand, Bangladesh, Singapore, Malaysia, Indonesia, Chile, El Salvador and the Philippines – collectively had seen imports increase by 0.05mmt to 2.50mmt at the time of writing. This increase was primarily due to demand growth in Singapore and El Salvador, where offtakes were up by 0.08mmt (23 percent) and by 0.05mmt (500 percent) to 0.43mmt and 0.06mmt, respectively. Thailand had also increased its offtakes by 0.05mmt (5 percent) to 1.00mmt. The roster’s overall growth was, however, tempered by demand reductions totalling 0.20mmt in Chile, Malaysia, Bangladesh, Indonesia and the Philippines.

Atlantic Basin

In contrast to the Pacific, LNG demand in the Atlantic Basin had decreased as of 24 March. Offtakes were down by 0.33mmt (-3 percent) to 9.10mmt, with annualised utilisation of installed capacity at 33 percent.

European demand saw a net decrease of 0.51mmt (-6 percent) to 8.06mmt. Although strong import growth in Belgium by 0.39mmt (52 percent) to 1.14mmt added to increases totalling 0.39mmt among some southern European importers and Germany, they were overshadowed by reductions totalling

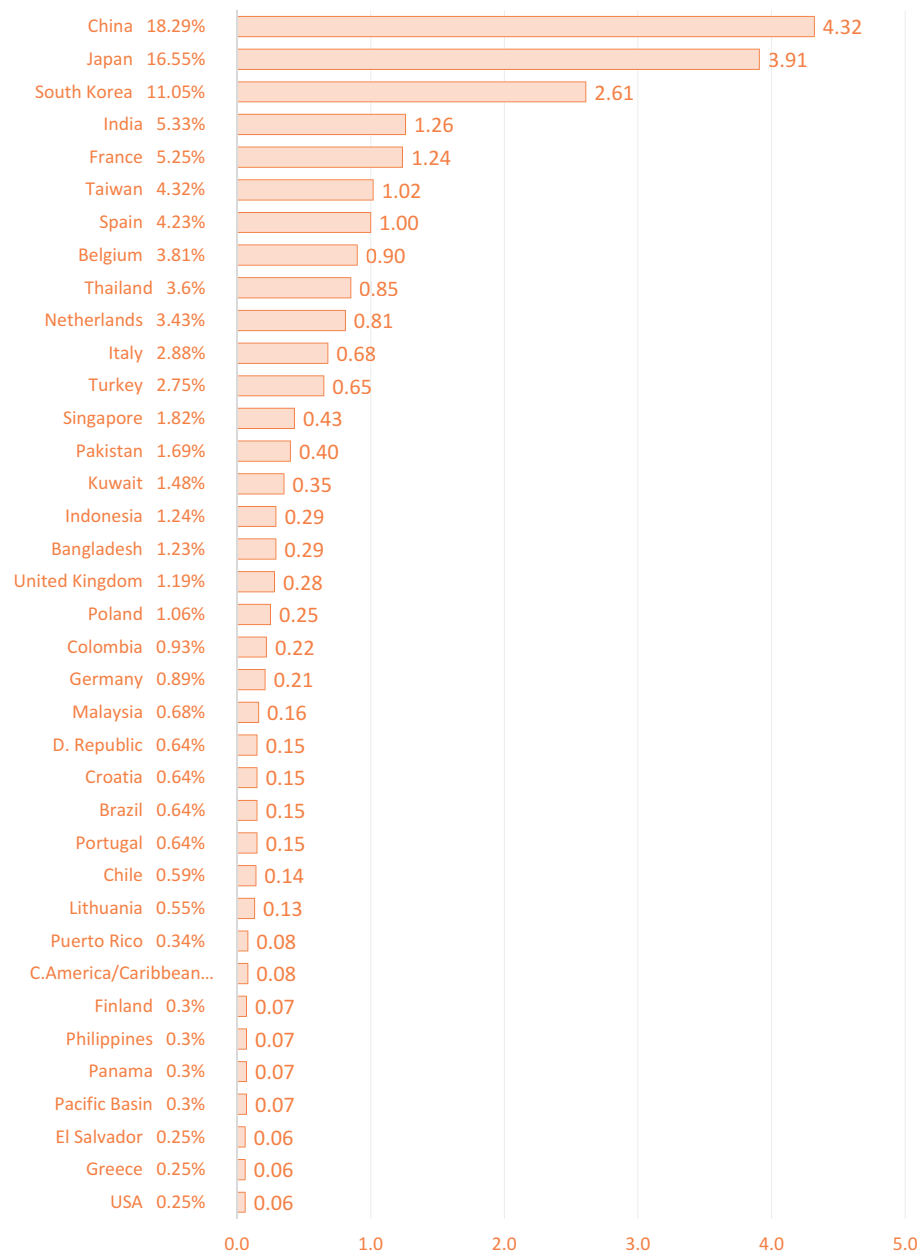
in the Americas. Puerto Rico, Colombia, the Dominican Republic and the OPT LNG Hub grew offtakes by a total of 0.29mmt. Concurrently, Brazil and the United States had kept their respective offtakes steady at 0.07mmt and 0.06mmt, respectively. As such, demand reductions totalling 0.19mmt in Panama, Canada and Jamaica could only temper the overall regional demand growth.

Middle East

Meanwhile, overall Middle Eastern LNG demand of 0.72mmt at the time of writing in March was up by 0.09mmt (13 percent) from 0.81mmt. Although our data for Pakistan showed a significant offtake decrease of 0.06mmt (-12 percent) to 0.46mmt, Kuwait had boosted its imports by 0.15mmt (75 percent) to 0.35mmt. However, Jordan and the UAE continued their market absences. As such, the Middle East’s annualised import capacity utilisation stood at only 15 percent at the time of writing.

Market Share & LNG Imports by Country (MMt)

1 - 24 March 2024



Source: LNG Journal

New air lubrication system to be fitted on an LNGC

A new air lubrication system (ALS) is to be tested on a CoolCo LNGC. Technical Editor Ian Cochran reports.

Developed by Armada Technologies, in co-operation with US engineering company Ecochlor, the company will design, engineer, procure, and provide support for the installation and commissioning of an ALS on a CoolCo vessel, which is scheduled to drydock this year.

Once fitted, CoolCo will conduct sea trials and provide documentation feedback to Armada, following ISO or ITTC guidance, to measure the system's performance.

Unlike other systems currently on the market, Armada's passive ALS (PALS) uses the ship's forward motion to create a precise air/water mixture for lubrication.

More traditional ALS' rely on high-energy compressors. However, PALS consumes significantly less power, utilising small capacity water pumps only in sub-optimal conditions.

With its performance control system and machine learning, PALS ensures good bubble control and delivery, the company claimed. The engineered venturi system, together with the vessel's forward motion, naturally forms an optimal bubble spread that ensures thorough lubrication of the hull without the use of compressors.

PALS can be tailored to adapt bubble production precisely to a ship's type and operating conditions - speed, depth, or weather - guaranteeing continuous smooth sailing unlike other systems that struggle when fitted on vessels of deeper drafts and operating at lower speeds.

Slow steaming and energy regulations are the new industry norm, and PALS has been designed to thrive under these conditions, Armada said. Utilising minimal energy, the booster pumps can activate in under less-than-ideal circumstances

to maintain peak performance.

Regardless of rough or calm seas, PALS maintains its drag reduction effectiveness, the company said.

The cost of an installation varies, depending on the ship, but it has low capital investment and operating costs, compared to other hull lubrication technologies.

By eliminating compressors and using less power, PALS not only reduces drag but also provides economic benefits to shipowners in a short period of time.

This project comes under RETROFIT55 - an HorizonEU funded research programme - that aims to develop de-carbonisation solutions and green technologies, which can be used by shipowners to reduce fuel consumption and Greenhouse Gas (GHG) emissions.

Its overall objective is to create a web-based decision support system (DSS), featuring a catalogue of retrofitting solutions that are up-to-date and ready to be deployed at the end of the project, suitable for different ship types and operational contexts.

The DSS will allow combining retrofitting solutions in order to achieve a GHG emission reductions. The main components include:

- Modelling of different retrofitting solutions.
- Technology demonstrators.
- AI and DSS.
- Retrofitting configurators.

This project aims to implement the co-programmed European Partnership on 'Zero Emission Waterborne Transport' (ZEWT).

Its focus is to achieve the ZEWT partnership's targets, which are to develop and demonstrate solutions to be



Armada's Alex Routledge (left) and CoolCo's Richard Tyrell (right) celebrate the agreement

able to reduce the fuel consumption of waterborne transport by at least 55% before 2030, compared to 2008.

As no single GHG emission reduction solution can achieve this targeted fuel consumption, a combination of various systems is necessary.

DSS developed

A DSS will be developed within this project to leverage AI web-based tools that will provide a synthesis of the different technologies accounting for safety aspects, cost effectiveness and life-cycle costs, including the decommissioning phase.

The innovations to be developed under this project to reduce GHG emissions, cover the exploitation of renewable energies, design optimisation, solutions to reduce friction losses, increased ship electrification and the improved management of the operational phase and on board systems.

Most importantly, all these aspects are dealt with in an integrated way, ie taking account of the impact each solution has on other sub-systems.

Armada CEO, Alex Routledge, said: "We are delighted to introduce our advanced passive air lubrication system (PALS) to the maritime industry through this collaboration with CoolCo.

"Our PALS, which utilises tailored bubble production design for each ship's characteristics, including speed, draft and weather conditions, eliminates the need for continuously running compressors.

"Conducting sea tests with CoolCo will enable us to optimise the system even further using our machine learning algorithms," he said.

CoolCo's CEO, Richard Tyrrell, added,

"We are pleased to be working with Armada Technologies. We selected Armada for its system's performance potential and its minimal impact on the crew due to the absence of rotating equipment."

CoolCo said that it is committed to reducing its fleetwide carbon intensity and surpassing the IMO's targets for 2030. Its goal is to achieve a 35% reduction in carbon intensity, compared to 2019, which would significantly exceed the IMO's target.

Explaining the tie-up, Ecochlor CEO, Andrew Marshall, commented: "The affiliation between Ecochlor and Armada Technologies continues to support the development of a game-changing solution for hull air lubrication in the marine industry.

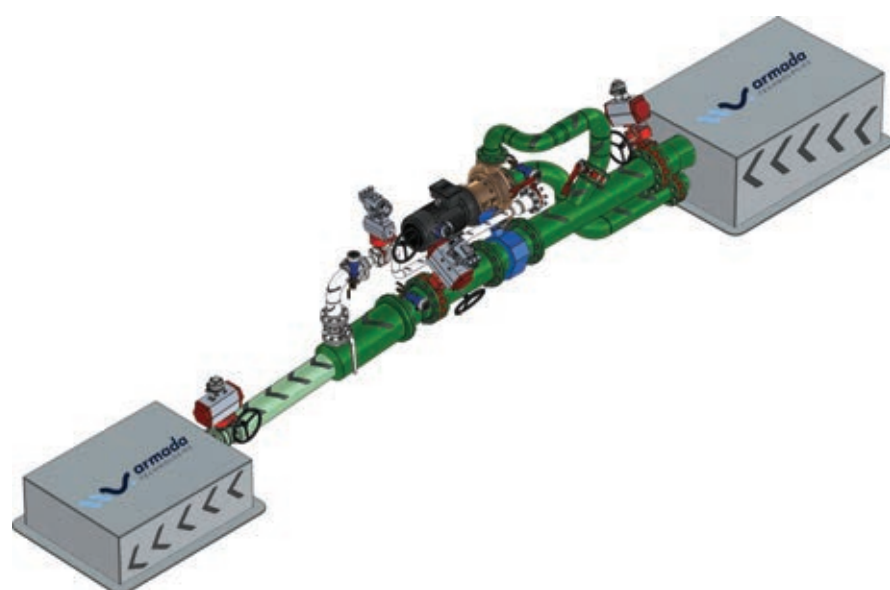
"As execution partner to this project, we are committed to leveraging our expertise in concept design and engineering, as well as developing a robust and reliable software solution to ensure PALS delivers consistent and ongoing fuel savings regardless of vessel type and operating condition.

"We are proud to have Armada as one of our partners and remain steadfast in our commitment to driving lasting, positive change for the benefit of our planet and future generations to come," he said.

Ecochlor is involved through its EcoOne Marine Technologies Group, in which Armada Technologies is an Associate Member.

Its sales team serves as Armada's worldwide distributor. Ecochlor has also helped with product engineering, parts and materials and will be assisting as an execution partner with the CoolCo installation.

Ecochlor also negotiated the sale. ■



A rendering of the Armada's PALS

India advances LNG-fuelled trucking ecosystem

As the fifth largest economy in the world, India provides a vast opportunity for LNG fuelling growth but to date much development has been sclerotic. Despite numerous logistic challenges however, the outlook is now changing as a range of companies invest in new LNG fuelling infrastructure across the country. Fuelling Editor Malcolm Ramsay has more.

One firm leading this approach is Blue Energy Motors, a designer and manufacturer of low and zero-emission trucks. Speaking to LNG Journal, Anirudh Bhuwalka, CEO of the firm explains, “the government is actively reducing the country's carbon footprint, placing a strong emphasis on developing LNG infrastructure and this positions LNG trucks as key players in the green trucking revolution, marking a significant step for India in leading the charge toward sustainable, long-haul transportation.

Based in Pune, in the east of India, Blue Energy Motors was founded in 2020 and aims to disrupt the heavy-duty trucking industry by offering both LNG-fuelled and fully electric trucks for the domestic market. The firm is also an investor in next generation transport ecosystems, working with strategic business partners and suppliers to create a pathway to zero-emission transportation.

LNG road transport milestone

Blue Energy recently reached a significant record as its fleet of LNG trucks crossed the milestone of 10 million kilometres of cumulative transport on Indian roads. This achievement was realised due to the wide customer base now relying on LNG in the subcontinent.

“Crossing this milestone is a significant achievement for Blue Energy Motors and a testament to the efficiency and reliability of our zero-emission trucking technology,” Bhuwalka said. “The government of India has been

encouraging the use of alternate fuelled Green Trucks and has been providing relentless support to streamline infrastructure for early adoption of LNG trucks. We are committed in this journey to provide a cleaner and greener environment by decarbonising heavy-duty trucking and mitigating the impact of transportation on climate change.”

While this achievement is noteworthy, the trucking market in India is currently poised for even greater growth, projected to expand fourfold by 2050, from 4 million trucks in 2022 to an estimated 17 million trucks. But even as this expansion promises economic benefits, it also raises concerns about increased transportation emissions, with ever more focus coming to bear on building a sustainable transportation system.

FPT units

Blue Energy has built its LNG trucking strategy around tried and tested Iveco units, following partnership with FPT Industrial, a subsidiary of the Italian manufacturer. The firm celebrated the launch of India's 100th LNG-powered truck last year at its manufacturing facility in Pune.

The latest units feature FPT's 6.7-litre engine, delivering 280 horsepower and 1000 Nm of torque. The trucks also feature the first 990-litre fuel tank, offering a range of up to 1,400 kilometres with a single refuelling.

According to a recent report from the National Institution for Transforming India (NITI Aayog), LNG is one of the most compelling alternatives to diesel



LNG-fuelled truck

trucks. Suman Bery, Vice Chairman of NITI Aayog, hailed the rapidly expanding LNG trucking market, noting that the “forward-looking ‘Panchamrit’ commitments and the updated Nationally Determined Contributions (NDCs) underscore the fact that India is a critical part of the global solution”.

Key sustainability commitment

Prime Minister Modi recently announced five commitments to fight against climate change, known as ‘Panchamrit’ which are expected to accelerate uptake of LNG-fuelled solutions. These objectives include reducing total carbon emissions by 1 billion tonnes, decreasing carbon intensity by 45 percent compared to 2005 levels, ensuring that 50 percent of energy needs are met by renewables, and reaching 500 gigawatts of non-fossil energy capacity, all by 2030. A fifth goal targets net-zero emissions by 2070.

“The Government of India has played a proactive role in the global conversation

on sustainability and the energy transition,” Bery states, adding that it now seeks to “leverage the use of LNG as a fuel in order to lower CO2 emissions and contribute towards the national goal of a gas-based economy by increasing the share of natural gas in the primary energy mix to 15% by 2030.”

Bhuwalka of Blue Energy sees huge potential for LNG in the coming six years as integration across the commercial trucking industry becomes more prevalent. Early feasibility work by the Ministry of Petroleum and Natural Gas to enhance gas storage capabilities is also expected to drive opportunities.

“India is actively setting up LNG dispensing stations, planning to construct 1,000 LNG stations along major highways, industrial corridors, and mining areas within the next three years,” Bhuwalka comments. “Additionally, the government is in the process of building extra LNG terminals, with a planned addition of 17 million tons of LNG capacity by next year, supplementing the existing annual capacity of 42.5 million tons.”

Despite this promise, many challenges still hinder LNG's widespread adoption in India as compared to more established markets such as Western Europe. Transporting LNG from production to consumption sites poses logistical hurdles as many roads are not currently up to standard.

Bhuwalka explains that transporting LNG is not easy and requires high initial capex, but “calls for accelerating the pace of new pump installations,” adding that there are currently “only 9 LNG pumps which are operational and only 25 more upcoming.”



India's LNG trucking fleet is growing

For the Record

ADRIATIC LNG, the import terminal offshore northeast Italy, reported a record year in terms of shipments and regasified volumes delivered into the Italian national grid.

The operating company, Terminale GNL Adriatico, is a gravity-based terminal that came on line in 2009 and 70-percent owned by ExxonMobil Corp.

The other minority shareholders include a subsidiary of QatarEnergy and the Italian grid operator and import terminals owner, SNAM.

“The regasification terminal located off the Veneto coast sent 8.5 billion cubic metres of natural gas into the national pipeline network, an increase of 7 percent from the previous year,” said Adriatic LNG.

A total of 75 LNG carriers called at the terminal last year, mainly from Qatar and the United States but also from other geographical areas, including, for the first time, Mozambique.

The volumes provided over 14 percent of natural gas consumption and confirmed itself as the third main entry source for Italian gas imports.

“The terminal therefore broke its previous best annual record, scored in 2022, when it sent 7.9 Bcm of gas into the national grid,” added the company.

Adriatic LNG noted that the results confirmed the increasing relevance of LNG in the Italian energy mix.

In 2023, total LNG imports to Italy amounted to 16.6 Bcm, a 16.8 percent increase compared with 2022.

The cargoes met 27 percent of the national natural gas needs of 61.5 Bcm.

For all of 2023 over 50 percent of Italian LNG imports were shipped through Adriatic LNG.

“Our terminal confirmed to be a strategic energy infrastructure for Italy and Europe,” said Alfredo Balena, Director of External Relations at Adriatic LNG.

“We can say that the 8.5 Bcm of natural gas injected by Adriatic LNG into the national grid represent an energy quantity equivalent to approximately 93 million megawatt-hours, equivalent to the total energy consumed the Veneto and Lombardy regions for a year,” stated Balena.

In total, from 2009 to 2023, 1,058 LNG carriers arrived at the regasification terminal for a total of 92 Bcm of gas

sent into the national gas grid.

“The security of energy supplies in Europe and Italy is and will increasingly be based on LNG,” Balena explained.

“The significant growth in LNG imports occurring over the last two years is linked to efforts being made to reduce dependence, and increase resilience, of the European gas system,” he concluded.

EQT Corp., the leading US natural gas producer in the Appalachian shale basins, is merging in a combination worth over \$23 billion with Equitrans Midstream, the operator of natural gas gathering systems and the owner of the key Mountain Valley Pipeline.

Pittsburgh, Pennsylvania-based EQT has shale-gas operations in the Marcellus and Utica formations of western Pennsylvania, Ohio and West Virginia.

A statement said that the merger would be completed by the fourth quarter of 2024.

The transaction closing is contingent on the US Federal Energy Regulatory Commission authorizing the start-up of the Mountain Valley Pipeline.

The all-stock transaction gives an implied value of \$12.50 per Equitrans share and one such share being worth 0.3504 of one share in EQT.

“The deal creates a vertically-integrated natural gas business, meaning that EQT can rely less on hedging and the midstream assets creates a more durable cash-flow profile,” the statement added.

The agreement to combine, the latest in over a dozen in the US energy industry over the past year, will create America's first large-scale, integrated natural gas producer with a very low-cost structure.

The deal additionally provides 2,000 miles of “irreplaceable pipeline infrastructure” with extensive overlap and connectivity in EQT's core area of operations.

The combined company will have 27.6 trillion cubic feet equivalent of proved reserves across 1.9 million net acres with 6.3 Bcfe per day of net production and 8.0 Bcfe per day of gathering throughput across 3,000 miles of pipelines.

Analysts were told that the deal provides a pathway to reduce EQT's long-term corporate free cash flow with US gas breakeven at less than \$2 per million British thermal units.

EQT is also a participant in the LNG industry and has signed three tolling agreements on the Gulf Coast while pursuing sales contracts.

On LNG strategy, EQT will deliver 1.2 billion cubic feet per day, or 20 percent of

EQT's production, to the Gulf Coast, where it can be sold into international markets through new LNG export facilities.

EQT has signed accords with the developers of the Lake Charles LNG, Commonwealth LNG and Texas LNG projects and negotiations towards finalising “definitive tolling agreements” were ongoing.

The company said it was also pursuing Sales and Purchase Agreements for its current total of 2.5 million tonnes per annum of LNG production with prospective international buyers and was additionally exploring more future tolling opportunities.

“Equitrans is the most strategic and transformational transaction EQT has ever pursued, and we see this as a once in a lifetime opportunity to vertically integrate one of the highest quality natural gas resource bases anywhere in the world,” said EQT President and Chief Executive Toby Z. Rice.

“As we enter the global era of natural gas, it is imperative for US natural gas companies to evolve their business models to compete on the global stage against vertically integrated rivals,” added Rice.

“We have identified multiple, high confidence near-term synergies, with significant upside from future infrastructure optimization projects that we believe will drive material value creation for shareholders over time,” he stated.

“Our modern, data-driven operating model, first-hand knowledge of Equitrans' operations and successful track record integrating \$9 billion of acquisitions, all of which included midstream assets, gives me tremendous confidence in EQT's ability to seamlessly combine the two companies and capture synergies,” Rice explained.

Thomas F. Karam, Executive Chairman of Equitrans, said the agreement was the culmination of an “exhaustive process”.

“Combining with EQT creates a premier vertically integrated natural gas business that is a game-changer for the natural gas industry and Appalachian Basin,” Karam stated.

“The transaction delivers full and fair value to ETRN shareholders and provides the opportunity to participate in future value growth as EQT executes on its strategy,” he added.

“We are proud of our employees who have worked hard to build one of the leading midstream companies in the Appalachian Basin. And we are excited for the future with EQT,” Karam declared.

Upon the closing of the transaction, three representatives from Equitrans will join EQT's Board of Directors.

EQT's executive management team will lead the combined company with headquarters remaining in Pittsburgh.

Guggenheim Securities acted as lead financial advisor and RBC Capital Markets, LLC acted as a financial advisor to EQT.

Kirkland & Ellis LLP is serving as EQT's legal counsel on the transaction.

Barclays and Citi served as financial advisors to Equitrans, and Latham & Watkins LLP is serving as legal counsel to Equitrans.

JAPANESE liquefied natural gas imports decreased for a second month in 2024 by almost 6 percent as milder winter weather and higher storage levels reduced cargo needs especially of more expensive spot shipments even at much lower prices.

Japan's network of 37 terminals received 6.02 million tonnes, or around 86 cargoes, in February 2024, down by 5.9 percent from the 6.40MT, or 94 shipments, imported in February 2023, according to provisional trade data from the Ministry of Finance.

The cargo deliveries in January 2024 had been 10.5 percent lower at 6.11MT versus 6.82MT in January 2023.

The Japanese paid 597.28 billion yen (\$3.94Bln) in February for the LNG, which made Japan's import bill 21.1 percent lower than in February 2023 when the cargoes had cost 756.78Bln yen (\$4.99Bln).

Japan's thermal coal imports dropped by 17.7 percent in February 2024 to 7.81MT and the cost of the coal was down 55.6 percent to 195.79Bln yen (\$1.29Bln) versus the previous year's February coal deliveries.

Japan's LNG imports for all of 2023 had dropped to a 14-year low and China regained the No. 1 spot as the largest global importer of the fuel with a late surge of deliveries.

Japan's annual LNG imports dropped by 8.1 percent last year to 66.15MT compared with China's overall imports of 71.35MT.

Japan imported much of its cargoes from Australia and the spot market in February 2024.

However, the portion of LNG deliveries in February 2024 from Australia and the spot market amounted to a total of 2.51MT, well down from the record level of 3.95MT in February 2023.

This portion of Australian or spot deliveries had amounted to 2.62MT in January 2024, also well down on the 3.86MT received in January 2023.

The Ministry data for February 2024 showed that deliveries of LNG from Asian nations like Malaysia and Indonesia amounted to 1.66MT, down 7.8 percent.

Deliveries from countries in the Middle

East like Qatar came to 714,000 tonnes in February, an increase of 44.3 percent on February 2023.

US deliveries to Japan increased by 44.3 percent year-over-year to 482,000 tonnes, while deliveries from Russia increased by 8.0 percent to 654,000 tonnes.

Japan continues to receive deliveries of LNG from the Russian Far East plant at Sakhalin even after the invasion of Ukraine in February 2022 and the imposition of sanctions, while Western and other Asian nations still take deliveries from the Yamal LNG plant in the Russian Arctic.

Together with increased solar and wind generation, a steady return to more nuclear power has allowed a further reduction in LNG imports, which had reached a peak of 88.5MT in 2014.

A total of 11 nuclear reactors are now back in operation in Japan compared with the 54 that were online in 2011 before the Fukushima disaster and which had supplied around 30 percent of Japan's energy needs.

The latest nuclear restart was the Takahama-1 plant owned by LNG importing utility Kansai Electric Power and brought to 11 the number of plants in operation from the 33 that are capable of re-starting.

The 11 restarted reactors so far are: Genkai-3 and Genkai-4, Ikata-3, Mihama-3, Ohi-3 and Ohi-4, Sendai-1 and Sendai-2 and Takahama-1, Takahama-3 and Takahama-4.

Japan's Nuclear Regulation Authority is examining the re-start proposals for 10 more nuclear plants.

Among them is Chugoku Electric Power's plans to restart the No. 2 reactor at its Shimane nuclear power station in August 2024.

Japan's Tohoku Electric Power has also said that it planned to restart reactor No. 2 at its Onagawa nuclear plant around September 2024 after additional safety construction works had delayed the process.

Tohoku's Onagawa plant was known as having been the closest among Japan's nuclear facilities to the epicentre of the magnitude-9 earthquake that struck the region on March 11, 2011.

NEW FORTRESS Energy, the US integrated LNG and power company that owns, operates or provides natural gas to 30 facilities in five countries has been awarded a new gas supply contract in Puerto Rico.

NFE said the Puerto Rico gas contract more than doubles the volumes of gas it currently provides to power plants in the US territory in the Caribbean.

The New York-based company additionally sold two operating power plants to the Puerto Rico Electric Power Authority (PREPA).

NFE explained that it sold the emergency power plants it constructed on behalf of the US Army Corps of Engineers in San Juan and Palo Seco in Puerto Rico to PREPA for \$373 million in cash, subject to certain items and conditions.

"These plants were developed by the company in 2023 in rapid response to a competitive bid by the US Army Corps of Engineers to provide emergency power in order to stabilize the power grid in Puerto Rico," explained NFE.

"They have become a cornerstone of Puerto Rico's energy portfolio, delivering critical baseload power to stabilize the grid in the aftermath of recent natural disasters, and as contemplated, their ownership has been transferred to PREPA," NFE added.

Following a competitive bid process, NFE was awarded and has entered into a new island-wide gas supply contract with PREPA, ensuring continued gas supply to these power plants for up to four years.

"The expanded volumes under the contract will enable conversion of other plants on the island from diesel to gas, providing lower cost, cleaner energy to Puerto Rico," NFE stated.

As a result of the early termination of the contracts that have governed the construction, operations and associated costs of the two power plants, NFE said that it expected to negotiate a mutually beneficial settlement of all outstanding obligations in the near future.

"We entered the Puerto Rico market in 2017 based on the island's emergency need for natural gas and power," said Wes Edens, Chairman and Chief Executive of NFE.

"The transactions mark a significant milestone in our continued commitment to Puerto Rico's energy security and cost reduction efforts while significantly increasing our business in the region," Edens added.

In its most recently earnings, NFE reported net income for 2023 of \$547.88M, an almost three-fold increase from the \$194.48M achieved in 2022.

After the end of the financial year NFE noted that in February 2024 it completed the Brazilian Barcarena and Santa Catarina LNG import terminals and placed them into service.

In NFE's "Fast LNG" operation whereby it produces LNG from feed gas, it placed into service its first unit offshore the Gulf of Mexico and is now expecting first LNG in March and the first cargo in April 2024.

NEXTDECADE Corp., the company developing the Rio Grande LNG export plant on the north shore of the Brownsville Ship Channel in south Texas, has given a comprehensive update on strategic activities through the first quarter of 2024.

"We are committed to maximizing long-term value for NextDecade's shareholders by executing our business strategy efficiently and effectively," said Matt Schatzman, NextDecade's Chairman and Chief Executive.

"We are focused on constructing Phase 1 at the Rio Grande LNG Facility safely, on time, and on budget and delivering a positive final investment decision of our fully permitted expansion capacity to meet growing global demand for cleaner energy sources including LNG," Schatzman explained.

The Rio Grande project is located on 984 acres of land which has been leased long term and includes 15,000 feet of frontage on the Brownsville Ship Channel.

The venture has received all necessary approvals and authorizations required for construction, including those from the Federal Energy Regulatory Commission, which allow for development, construction and operation of up to five Trains and 27 million tonnes per annum of LNG exports.

"We have a steadfast commitment to upholding the highest standards of safety and excellence in project management and are working alongside our EPC partner, Bechtel, and other counterparties to ensure that construction activities proceed smoothly and in line with contractual schedules," the CEO stated.

"Through rigorous planning, diligent execution, and proactive risk management, together we are seeking to maximize the efficiency of construction efforts," the CEO said.

Schatzman noted that the Houston, Texas-based company was actively working to capitalize on market opportunities and position NextDecade for sustained growth through expansion.

"With regulatory approvals in place, our Train 4 and 5 expansion capacity is well-positioned to meet growing global demand for LNG," the CEO said.

"Supportive market conditions provide tailwinds to continue progressing toward FID of Train 4, which is well underway," Schatzman added.

"Commercial discussions with various potential counterparties and the FEED and EPC contracting processes are proceeding well. Our progress remains aligned with our goal of reaching a positive FID decision for Train 4 in the

second half of this year," he added.

NextDecade said that the overall project completion percentage for Trains 1 and 2 and the common facilities of the Rio Grande LNG Facility was 14.3 percent, which is in line with the schedule under the EPC contract.

"Within this project completion percentage, engineering was 47.9 percent complete, procurement was 26.8 percent complete, and construction was 1.0 percent complete," said NextDecade.

On the financial front, NextDecade in February 2024, issued and sold \$190 million of senior secured notes for the Rio Grande in a private placement transaction to finance a portion of Phase 1.

"The senior secured notes were issued on February 9, 2024 and resulted in a reduction in the commitments outstanding under Rio Grande's existing bank credit facilities for Phase 1," it added.

Rio Grande has syndicated a portion of its bank credit facility commitments, resulting in a supporting lender group of around 40 international banks.

NextDecade recalled that French major TotalEnergies has LNG purchase options of 1.5 MTPA for each of Train 4 and Train 5.

"If TotalEnergies exercises its LNG purchase options, the company currently estimates that an additional approximately 3 MTPA of LNG must be contracted on a long-term basis for each of Train 4 and Train 5 prior to making a positive FID for the respective Train," the company said.

PEMBINA Pipeline Corp., the developer of the Cedar LNG project in British Columbia and the owner of North American pipelines and terminals, has received regulatory approval for a deal agreed with Canadian pipelines company peer, Enbridge Inc., to acquire stakes in pipeline and processing systems and power assets for C\$3.1 billion (US\$2.28Bln).

Pembina has entered into an agreement to acquire Enbridge's interests in the Alliance pipeline and Aux Sable facilities in Chicago as well as a stake in the NRGreen power partnership.

"Pembina has received a 'no-action letter' from the Canadian Competition Bureau confirming that the Commissioner of Competition does not intend to challenge the proposed acquisition by Pembina of Enbridge's interest in the Alliance, Aux Sable, and NRGreen joint ventures," said Calgary, Alberta-based Pembina.

"The receipt of the 'no-action letter' satisfies the last material regulatory condition necessary for completion of the

transaction, which is expected to occur on April 1, 2024,” Pembina added.

The cash and debt deal was said by Pembina to be part of its strategy of providing access for end-markets to the world-class, long-life resources from the Western Canadian Sedimentary Basin and increasing its exposure to natural gas and natural gas liquids.

Pembina had earlier closed its previously announced offering of \$1.8Bln of aggregate senior unsecured medium-term notes to help finance the Enbridge deal.

The Alliance pipeline is 3,848 kilometres (2,390 miles) in length and stretches southeast from BC to bring gas into Chicago's Aux Sable facilities, one of the largest natural gas liquids processing plants in North America.

Alliance connects northwest Alberta and northeast BC to Illinois in the Midwest by way of the Canadian province of Saskatchewan and the US states of Iowa, North Dakota and Minnesota.

Enbridge currently owns 50 percent of Alliance and 42.7 percent of Aux Sable, while Pembina Pipeline owns the remaining 50 percent of Alliance and 42.7 percent of Aux Sable.

As part of the transaction, Pembina, which is the current operator of Aux Sable, will become the sole operator of Alliance.

Pembina's newly agreed purchase of an additional stake in the Alliance pipeline delivers liquids rich natural gas sourced in Northeast BC.

The Enbridge deals near completion as Pembina and the Haisla Nation who live around Kitimat in BC are progressing with the floating export project with liquefaction capacity of 3 million tonnes per annum of LNG.

Pembina expects to make a final investment decision on Cedar FLNG by the middle of 2024 after previously expecting the FID by the end of March.

Feed gas for Cedar FLNG will be sourced from the prolific Montney natural gas resource basin in northeast BC. The FLNG facilities will be located near-shore on the Douglas Channel.

PETRONAS, the Malaysian state-owned energy company with oil and gas projects and onshore and offshore LNG production plants, reported quarterly net profits down by a third while expecting its cargo portfolio to increase after LNG Canada comes on stream and overall cargo sales and prices to improve.

Petronas reported a 21 percent fall in annual profits to 80.7 billion Malaysian ringgit (\$17.1 billion) from 101.6Bln

ringgit (\$21.6Bln) in 2022 when LNG prices hit record highs and crude oil prices were also up.

In its quarterly results, the company's fourth-quarter net profits came to 16.6Bln ringgit (\$3.5Bln) a fall of around 33 percent from the 24.4Bln ringgit (\$5.2Bln) reported in the same three months of 2022.

Petronas said it delivered 403 cargoes from the Bintulu LNG complex on Sarawak during 2023 and 38 cargoes from its two floating LNG facilities, “PFLNG Satu” and “PFLNG Dua”.

The Kuala Lumpur-based company posted revenues for the year of 343.6Bln ringgit (\$73.6Bln), down by around 8 percent from 372.3Bln (\$79.1Bln) in the previous year.

Petronas reported revenues of \$91.7Bln ringgit (\$19.5Bln) in the three months to the end of December 2023, a decline of 12 percent from the prior-year quarter when the income amounted to 104.2Bln ringgit (\$22.1Bln).

“The was mainly due to lower average realised prices of LNG and processed gas partially offset by higher LNG sales volumes and the impact from foreign exchange,” Petronas said.

Malaysian average gas sales volumes increased slightly by 74 million standard cubic feet per day, due to higher offtake from the power sector in Peninsular Malaysia.

The nation's average gas sales volumes decreased marginally by 60 million standard cubic feet per day because of lower offtake from the non-power sector offshore the Malaysian states of Sabah and Sarawak located on the island of Borneo.

“This includes Bintulu LNG on Sarawak. Gross LNG sales volumes decreased by 1.33 million tonnes mainly due to lower plant production and fewer trading opportunities compared with the last financial year,” Petronas explained.

Total daily production in the fourth quarter from Petronas oil and gas projects averaged 2.55 million barrels of oil equivalent per day, an increase of 64,000 barrels of oil equivalent per day due to higher natural gas production from offshore Malaysia.

Capital expenditure remained high for overseas projects such as recent investments in Block 20 offshore Angola in southwest Africa and the Masela Block in Indonesia that will underpin a new Malaysian investment in an onshore Indonesian LNG export plant to be operated by Japanese oil and gas company Inpex Corp.

“There were also higher domestic capital

expenditures planned on the near-shore floating LNG project in Sabah and the Kasawari Gas Field (cavern) Development and CO2 sequestration facilities planned for Sarawak,” Petronas added.

Petronas Group President and Chief Executive Tengku Muhammad Taufik said at a later briefing that 2023 had been a year marked by market volatility.

“Petronas delivered a resilient performance in 2023 amid a volatile operating environment. As we move forward, the group will continue to uphold prudent financial management and discipline,” stated the CEO.

He explained that Petronas was aiming to produce 2.7 million barrels of oil a day and to have an LNG portfolio amounting to 55 million tonnes per annum (MTPA) by 2030.

This would include the company's equity share of the LNG Canada project in British Columbia and Indonesian LNG plans.

“Petronas continues to progress towards commissioning its LNG plant in Canada and intensifying value-accretive renewables elsewhere,” the Petronas CEO added.

In its outlook for 2024, Petronas said that the global economy was still on a “weak footing” following softer than expected economic performances.

“Amid these macroeconomic headwinds, the oil and gas markets face uncertainties due to slower global demand, while supply risks are heightened following increased geopolitical tension in the Middle East and Europe,” the company said.

“At the same time, the energy industry is experiencing a shift towards cleaner solutions,” Petronas added in relation to its own carbon-capture and storage ventures in partnership with several Japanese companies.

“Notwithstanding these challenges, Petronas remains steadfast in upholding capital discipline by striking the right balance between strengthening our core business and capturing new opportunities in clean energy solutions and managing carbon emissions,” Petronas concluded.

PTTEP, the state-run energy company of Thailand, has ramped up offshore domestic natural gas production and then nation is expected to require less LNG after last year's surge of more than 32 percent in additional cargoes.

The company said production has increased at the G1-61 gas project comprising the Erawan, Platong, Satun and Funan fields in the Gulf of Thailand.

PTTEP had replaced US major Chevron Corp. as the operator of the project in 2022.

The Thai company said that sales volume for the G1-61 project had now reached 800 million cubic feet per day (MMscf per day) as planned in a country where gas-fired generation is the main power source.

“The increased gas delivery will help lower electricity prices and enhance national energy security,” said PTTEP.

Montri Rawanchaikul, Chief Executive of PTTEP, noted that PTTEP won the bid for the G1/61 project in the Gulf of Thailand from the Department of Mineral Fuels in 2018 and signed the production sharing contract (PSC) in 2019.

“After becoming the operator, PTTEP put all its efforts into speeding up the production rate and improving the integrity of facilities and equipment to ensure safety,” Montri explained.

“To date, 12 wellhead platforms and subsea pipelines were installed, along with the drilling campaign of more than 300 producing wells,” he added.

“The gas delivery increased to 800 MMscf per day on March 20, 2024, to meet rising energy demand and support Thailand's economy,” the CEO stated.

The natural gas supply for Thailand comes from a mix of domestic production sources, LNG imports and pipeline gas deliveries from neighbouring Myanmar.

The two Thai LNG import terminals have a combined six storage tanks and are operated by a PTTEP subsidiary, PTT LNG.

The LNG import facilities are called Map Ta Phut Terminal 1 and Map Ta Phut Terminal 2 with nominal capacities of 11.5 MTPA and 7.5 MTPA respectively.

The country imported 11.55 million tonnes of LNG in 2023, up more than 32 percent year-on-year from the 8.72MT received in 2022.

In addition to the rising natural gas production Thailand also imports around 588 MMcf per day of natural gas from Myanmar.

Analysts said that the outlook for LNG imports in 2024 could be more subdued than in 2023 owing to the Ministry of Energy's plans to minimize LNG deliveries and reduce power costs.

“Increasing natural gas delivery from the G1/61 Project has been PTTEP's priority over the past two years,” CEO Montri said.

“As gas from the Gulf of Thailand is a primary source of energy serving both households and industries, PTTEP, therefore has accelerated all operations,” he added.

“This achievement is attributed to the determination of all employees and supports from the government and related

agencies to not only mitigate the impact of energy prices but also sustain energy security for the country,” Montri declared.

PTTEP will continue its annual workplan by installing with new wellhead platforms and drilling the hundreds of new wells for the G1-61 project.

The CEO stated that for 2024 funds of around 30 billion Thai baht (\$830 million) had been set aside for the G1-61 project work plan as it was one of the primary sources of Thailand’s energy security.

SNAM, the Italian gas grid operator and liquefied natural gas import terminals owner, reported an almost 70 percent surge in net profits as it advanced with its latest floating LNG venture at Ravenna on Italy’s East Coast.

The company reported net profits for 2023 of €1.135 billion (\$1.241Bln), up from \$671 million in 2022.

Adjusted net profits increase by 0.5 percent to €1.168Bln from €1.163Bln.

Revenues for the year jumped by 16.8 percent to €3.875Bln compared with €3.317Bln in the previous year.

Gas infrastructure business revenues rose by 5.4 percent to €2.770Bln from €2.622Bln in 2022.

SNAM added in the earnings statement that it had already started the construction of the associated facilities for the new Floating Storage and Regasification Unit (FSRU) to be deployed at Ravenna in the form of the FSRU “BW Singapore”.

“The work is progressing on Ravenna with a capacity booking auctions to begin by April 2024,” SNAM stated.

The FSRU is the second purchased by SNAM to improve Italy’s energy security and will be operational by the end of 2024.

The ship will provide the country with an additional 5 billion cubic metres of gas, in addition to those already supplied by the FSRU “Golar Tundra” which has been operational on Italy’s West Coast port of Piombino in Tuscany since July 2023.

“Piombino’s capacity for the 2023-2024 thermal year is now fully booked,” the company added.

Snam’s Chief Executive Stefano Venier said that the company closed 2023 with solid results which were accomplished in a context of volatility and uncertainty.

“The key economic and financial indicators show a positive performance and are better than guidance, with technical investments growing by more than 30 percent year-on-year,” Venier stated.

SNAM stated that total investments increased by almost 14 percent to €2.194Bln of which €1.774Bln was for

technical investments.

“In a global energy scenario that remains challenging and volatile, SNAM’s goal is to ensure the development of increasingly flexible infrastructure capable of handling a multiplicity of molecules, thus supporting path to carbon neutrality for Italy,” said the company in its 2024 outlook.

“With regard to the development of events in the Middle East and in particular in the Red Sea, SNAM will continue to monitor the possible consequences and effects on the group’s activities,” it added.

“To date, with regard to the management of operations and implementation of the investment programme, there are no critical issues associated with these events,” the company stated.

“However, a possible, prolonged interruption of shipping (e.g. LNG ships) from the Suez Canal in the current year could lead to international tensions, with consequent impacts on the price of energy goods for which Italy, and Europe in general, are heavily dependent on foreign imports,” the company concluded.

In addition to the Piombino FSRU terminal on the West Coast, SNAM also operates the onshore Panigaglia LNG facility on the northwest coast near Genoa and which has been in service since 1969.

The grid operator also has a controlling stake in the “FSRU Toscana” moored off the West Coast Italian port of Livorno and which will be offline from April until October 2024 for maintenance.

TEXAS LNG, the US export project being constructed in the Port of Brownsville in Texas as a subsidiary of New York-based Glenfarne Energy Transition, has signed a supply accord with the Singapore-based trading unit of global commodities firm Gunvor.

The Heads of Agreement is for a period of 20 years for volumes of 500,000 tonnes per annum.

The Texas LNG project aims to construct a medium-sized plant with 4 million tonnes per annum of output.

“We’re thrilled to welcome Gunvor to our portfolio of customers, connecting Texas LNG, one of the lowest-emitting liquefaction facilities in the world, with global economies in need of reliable, sustainable energy,” said Brendan Duval, Chief Executive and Founder of Glenfarne Energy Transition and Co-President of Texas LNG.

The Texas LNG-Gunvor deal was described as aligning with Glenfarne’s plan to take a final investment decision on Texas LNG this year.

“We are pleased to have executed this agreement and become one of the foundation buyers of the Texas LNG project,” said Kalpesh Patel, Co-Head of LNG Trading at Gunvor.

“Gunvor continues to support US LNG export projects, unlocking new supplies for the global energy market and providing energy security especially to our customers in Europe and Asia,” Patel stated.

Texas LNG earlier in 2024 announced the signing of a deal with EQT Corp., the leading Appalachia shale-gas producer, for liquefaction tolling of 500,000 tonnes a year of feed gas.

Glenfarne said that the company was in advanced stages of negotiations for the remaining volumes from the Texas project.

Glenfarne is also the sole owner of a second project, Magnolia LNG, proposed for development at Lake Charles in Louisiana with plans to export 8.8 MTPA of LNG.

The Federal Energy Regulatory Commission had previously approved construction of the Magnolia LNG plant proposed for a 115-acre site near the Calcasieu Ship Channel.

The Magnolia development was owned at one time by an Australian-listed company, LNG Ltd., that ceased trading amid financial difficulties and the assets were acquired by Glenfarne.

Glenfarne also said in March 2024 that the firm had received sufficient “expressions of interest from leading project finance banks” to move to the execution phase of project financing.

The firm said it had also appointed Latham & Watkins as Borrower’s counsel and Milbank as Lenders’ counsel for the issuance.

Glenfarne noted that these lenders have been key supporters of Glenfarne, having led over \$4 billion of financing to its businesses over the last 10 years for various energy transition-focused assets.

TC ENERGY Corp., the North American pipeline operator already supplying two LNG projects with feed-gas near Kitimat in British Columbia via the Coastal GasLink, has linked up with another First Nation-backed LNG project near Prince Rupert in BC with a potential feed-gas pipeline sale deal.

Calgary, Alberta-based TC Energy has entered into a binding letter agreement with the Nisga’a Nation and Western LNG (the buyers) regarding the purchase and sale of all outstanding shares in Prince Rupert Gas Transmission Holdings Ltd. and the limited partnership interests in Prince Rupert Gas Transmission (PRGT).

The Ksi Lisims LNG Partnership, a development joint venture of the Nisga’a Nation, Rockies LNG and Western LNG for a floating liquefaction and export plant near Prince Rupert.

This project has already signed a 20-year sale and purchase agreement with the Shell subsidiary, Shell Eastern Trading.

The FLNG project run by the Ksi Lisims LNG Partnership will be located at Wil Milit on the northern end of Pearse Island.

Shell and Asian partners are developing the LNG Canada plant near Kitimat while the Haisla Nation from Kitimat are developing the Cedar FLNG project, both to be served by TC Energy’s now completed Coastal GasLink pipeline.

Prince Rupert Gas Transmission is a separate pipeline project owned by TC Energy and now in the process of being off-loaded to the Ksi Lisims LNG Partnership players.

“PRGT is a wholly owned subsidiary of TC Energy and the developer of a natural gas pipeline project in BC and a potential delivery corridor that would further unlock Canada as a secure, affordable and sustainable source of LNG,” explained TC Energy.

The company said that this transaction demonstrates TC Energy’s resolve to deliver its 2024 strategic priorities while facilitating the development of critical energy infrastructure.

“We are pleased to see this important project move forward while remaining firm on our commitment to our strategic priorities,” said François Poirier, President and Chief Executive of TC Energy.

“This is an important agreement that will see Indigenous co-ownership and development of an integrated LNG project,” stated Poirier who has also set limits and priorities on his company spending.

“Enabling LNG development in British Columbia is good for Indigenous communities, our customers, supports the long-term growth of the Western Canadian Sedimentary Basin (WCSB) and global emissions reduction through the export of responsibly produced Canadian natural gas,” stated Poirier.

As part of the agreement, TC Energy has committed to provide transition services, on a reimbursable basis, to facilitate the seamless transition of the Prince Rupert pipeline project and support development work planned for this year.

“Subject to the execution of definitive agreements and customary closing conditions, the transaction is expected to close in the second quarter of 2024,” said TC Energy. ■

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.

In addition to our own database, the information in these tables has been derived and cross-referenced from multiple sources, including GEM, IEEJ, IGU, GIE, GIIGNL and facility operators/ developers.

Comments, corrections or additional information would be most welcome. They should be sent to alexander@lngjournal.com

Conventional LNG Terminals

Country	Location (Project)	Owners	Start up	Nom. Capacity (MTPA)	Storage Tanks	Capacity
Belgium	Zeebrugge	Fluxys	1987	6.6	5	566,000
Canada	St. John (Canaport) LNG	Repsol	2009	7.1	3	480,000
Chile	Mejillones LNG	Tractebel Engie, Ameris Capital AGF	2010	1.5	1	187,000
	Quintero	ENAP, Metrogas, Enagas	2009	3.8	3	334,000
China	Beihai LNG	PipeChina	2013	6.0	4	640,000
	Caofeidian LNG	PetroChina	2012	10.0	8	1,280,000
	Caofeidian Xintian LNG	China Suntien Green Energy Corp.	2023	5.0	2	–
	Dalian LNG	PipeChina	2011	6.0	3	480,000
	Dongguan LNG	JOVO Energy	2010	1.5	2	160,000
	Fujian LNG	CNOOC	2008	6.3	6	960,000
	Guangdong Dapeng LNG	CNOOC	2006	6.8	4	640,000
	Hainan LNG	PipeChina	2014	3.0	2	320,000
	Hainan Transfer Station	PetroChina	2020	0.6	2	40,000
	Jiangsu LNG	PetroChina	2011	10.0	5	1,080,000
	Jieyang LNG	PipeChina	2018	4.2	3	480,000
	Nansha LNG	Guangzhou Gas	2023	1.0	2	160,000
	Pinghu LNG	Zhejiang Hangjiaxin Clean Energy	2022	1.0	2	200,000
	Qidong LNG	Guanghui Energy	2009	4.0	5	620,000
	Qingdao LNG	Sinopec	2006	7.0	6	960,000
	Shanghai (Yangshan) LNG	CNOOC	2009	3.0	5	895,000
	Shanghai Peak Shaving	Shenergy	2008	1.5	5	320,000
	Shenzhen Peak Shaving	Hua'an	2012	0.8	1	80,000
	Shenzhen Diefu LNG	PipeChina	2018	4.0	4	640,000
	Tianjin - Nangang LNG	Sinopec	2018	6.0	4	640,000
	Tianjin LNG	PipeChina	2013	6.0	7	397,000
	Tianjin Binhai LNG	Beijing Gas	2023	5	10	–
	Wenzhou LNG	Zhejiang Energy, Sinopec	2023	3.0	4	–
	Yancheng LNG	CNOOC	2022	3.0	4	880,000
	Zhejiang LNG	CNOOC	2018	6.0	6	960,000
	Zhoushan LNG	ENN	2018	5.0	4	640,000
	Zhuhai LNG	CNOOC	2014	3.4	3	480,000
Dominican Republic	Andres LNG	AES Andres	2003	1.9	1	160,000
France	Dunkerque Le Clijton	EDF, Fluxys, TotalEnergies	2016	9.5	3	600,000
	Fos-sur-Mer	TotalEnergies, Elengy	2010	9.2	4	410,000
	Montoir-de-Bretagne	Elengy	1980	8.0	3	360,000
Greece	Revithoussa	DESFA	2000	7.1	3	225,000
India	Cochin	Petronet	2013	5.0	2	368,000
	Dabhol	GAIL, NTPC	2007	5.0	3	480,000
	Dahej	Petronet	2004	17.5	6	932,000
	Ennore LNG	IndianOil LNG	2019	5.0	2	360,000
	Hazira	Shell, TotalEnergies	2005	5.0	2	320,000
	Mundra LNG	Adani, GSP	2019	5.0	2	320,000
	Dhamra LNG	Adani, TotalEnergies	2023	6.5	2	360,000
Indonesia	Arun Conversion	Pertamina	2015	3.0	4	508,000
Italy	Panigaglia	Snam	1963	2.5	2	100,000
	Rovigo Adriatic LNG	QatarEnergy, ExxonMobil, Snam	2009	6.6	2	250,000
Jamaica	Montego Bay	New Fortress Energy	2020	0.5	7	7,000
Japan	Chita	JERA, Toho Gas	1977	24.0	14	1,560,000
	Fukuoka	Saibu Gas	1993	0.8	1	70,000
	Futtsu	JERA	1985	20.0	10	1,110,000
	Hachinohe	ENEOS	2015	1.6	2	280,000
	Hatsukaichi	Hiroshima Gas	1996	0.9	2	170,000
	Hibiki LNG	Saibu Gas, Kitakyushu Gas	2014	4.0	2	360,000
	Higashi-Ogishima	Tokyo Electric	1984	15.0	9	540,000
	Himeji	Kansai Electric, Osaka Gas	1979	12.9	15	1,360,000
	Hitachi LNG	JERA	2015	2.2	2	230,000
	Ishikari LNG	Hokkaido Gas	2012	1.4	1	180,000
	Joetsu LNG	JERA	2012	2.3	3	540,000
	Kagoshima	JERA	1996	0.2	1	86,000
	Kawagoe	Chubu Electric	1997	8.0	3	480,000
	Mizushima	Chugoku Electric, ENEOS	2006	1.7	2	320,000
	Nagasaki LNG	Saibu Gas	2003	0.1	1	35,000
	Nakagusuku LNG	Okinawa Electric	2012	0.7	2	280,000
	Negishi	TEPCO, JERA	1969	11.0	14	1,180,000
	Niigata	Tohoku Electric	1984	10.0	8	720,000

Conventional LNG Terminals (Continued)

Country	Location (Project)	Owners	Start up	Nom. Capacity (MTPA)	Storage Tanks	Storage Capacity
Japan (continued)	Ogishima	JERA	1998	3.0	4	850,000
	Oita	Kyushu Electric	1990	5.1	5	460,000
	Sakai	Kansai Electric	2006	6.4	4	420,000
	Sakaide	Shikoku Electric, Cosmo Oil, Shikoku-Gas	2010	1.2	1	180,000
	Senboku	Osaka Gas	1972	12.5	20	1,675,000
	Shin Sendai	Tohoku Electric	2016	1.0	2	320,000
	Sodegaura	JERA	1973	29.4	35	2,660,000
	Sodeshi Shimizu	Shizuoka Gas, ENEOS	1996	2.9	3	337,200
	Soma LNG	JAPEX	2018	1.5	2	460,000
	Tobata Ward	Kita-Kyushu LNG	1977	7.6	8	480,000
	Toyama LNG	Hokuriku Electric	2018	1.8	1	180,000
	Yanai	Chugoku Electric	1990	2.4	6	480,000
	Yokkaichi	Chubu Electric	1987	7.2	2	320,000
Kuwait	Al Zour LNG	KIPIC	2022	22.0	8	1,800,000
Malaysia	Pengerang LNG	Petronas	2017	3.5	2	400,000
Mexico	Energia Costa Azul	Sempra	2008	7.6	2	320,000
	Manzanillo	Samsung, KOGAS, Mitsui	2012	3.8	2	300,000
Netherlands	Maasvlakte Gate Terminal	Gasunie	2011	8.9	3	540,000
Panama	AES Costa Norte LNG	AES	2018	1.5	1	130,000
Philippines	PHLNG	AG&P	2023	5.0	1	137,512
Poland	Swinoujscie LNG	Polskie LNG	2015	3.6	2	320,000
Portugal	Sines	REN	2004	5.6	3	390,000
Puerto Rico	Penuelas	EcoElectrica	2000	1.4	1	160,000
Singapore	Singapore LNG	Singapore LNG Corp.	2013	11.0	4	800,000
South Korea	Boryeong	GS Energy	2017	10.8	6	1,200,000
	Gwangyang	POSCO Energy	2005	7.1	5	730,000
	Incheon	KOGAS	1996	54.4	23	3,480,000
	Pyeongtaek	KOGAS	1986	41.0	23	3,360,000
	Samcheok	KOGAS	2014	11.6	12	2,400,000
	Tongyeong	KOGAS	2002	26.6	17	2,600,000
	Jeju Island	KOGAS	2019	1.1	2	90,000
Spain	Bahia de Bizkaia LNG	BP, Enagás, EVE	2003	6.9	3	450,000
	Barcelona	Enagás	1969	12.6	6	760,000
	Cartagena	Enagás	1989	8.7	5	587,000
	Huelva	Enagás	1988	8.7	5	619,500
	Mugardos	Reganosa	2007	2.6	2	300,000
	Sagunto	Enagás	2006	6.4	4	600,000
	El Musel	Enagás	2023	5.8	2	300,000
Taiwan	Taichung	CPC	2009	7.0	6	960,000
	Yung-An	CPC	1990	10.5	6	690,000
Thailand	Map Ta Phut LNG	PTT	2011	19.0	6	940,000
Turkey	Izmir	EgeGaz	2006	10.6	2	280,000
	Marmara Ereglisi	BOTAS	1994	4.2	3	255,000
UK	Dragon LNG	Shell, Ancala Partners	2009	6.5	2	320,000
	Isle of Grain	National Grid	2005	14.8	8	1,000,000
	South Hook LNG	QatarEnergy, ExxonMobil, TotalEnergies	2009	15.6	5	775,000
United States	Everett Marine Terminal	Constellation Energy	1971	5.1	2	155,000
Vietnam	Thi Vai LNG	PetroVietnam Gas	2023	1.0	1	180,000

FSRU Terminals

Country	Location (Project)	Owners	Start up
Argentina	Escobar GasPort	Excelerate/Enarsa	2011
	Bahia Blanca	YPF	2023
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
	Terminal Gás Sul	New Fortress Energy	2024
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
El Salvador	Acajutla	Energía del Pacifico	2022
Finland	Inkoo FSRU	Gasgrid Finland	2022
France	Le Havre	TotalEnergies	2023
Germany	Wilhelmshaven FSRU	Uniper	2022
	Lubmin FSRU	Deutsche ReGas	2022
	Brunsbüttel	RWE	2023
Ghana	Tema LNG	Helios/GNPC	2021
Greece	Revithoussa FSU	DESFA	2022
	Alexandroupolis	Gastrade	2024
Hong Kong, China	FSRU Bauhinia	CLP Power	2023

Country	Location (Project)	Owners	Start up
India	Jaigarh (Mothballed)	H-Energy	2022
Indonesia	Lampung	Hoegh LNG, PGN LNG	2014
	Nusantara (Jakarta Bay)	Golar LNG, Pertamina	2012
	Benoa LNG	PT Pertamina Niaga	2016
	Amurang	Karadeniz	2020
	Jawa Satu FSRU	Pertamina	2021
Italy	Livorno	OLT Offshore LNG Toscana	2013
	Piombino	Snam	2023
Jamaica	Old Harbour	Golar FSRU, New Fortress	2019
Jordan	Aqaba, Jordan	Golar LNG	2015
Lithuania	Klaipeda	Klaipedos Nafta Hoegh LNG	2014
Malaysia	Malacca FSRU	Petronas	2012
Malta	FSU Armada Mediterrana	ElectroGas	2016
Myanmar	Thanlyin	CNTIC Vpower	2020
Netherlands	Eemshaven	Gasunie	2022
Pakistan	Port Qasim	Excelerate, Engro Corp	2015
	Port Qasim	BW-Mitsui, PGP Consortium	2017
Philippines	PHLNG	AG&P International	2023
	FGEN Batangas LNG	First Gen Corp.	2023
Russia	Kaliningrad FSRU	Gazprom	2020
Senegal	Dakar	KarMOL	2023
Turkey	Iskenderun & Saros FSRUs	BOTAS	2016 & 2023
	Aliaga (ETKI LNG)	Etki Liman	2017
UAE	Ruwais, Abu Dhabi	Gasco (UAE)	2016
	Jebel Ali Port, Dubai	DSA (UAE)	2010

Future LNG Import Projects

Country	Location/Project	Owners	Start up	Nom. Capacity (MTPA)	Storage Tanks	Capacity	Status
Albania	Port of Vlora FSRU	Excelerate Energy, ExxonMobil	–	3.5	–	–	Speculative
Australia	Port Phillip Bay FSRU	Vopak	2024	–	–	–	Speculative
	Geelong FSRU	Viva Energy	2024	–	–	–	Speculative
	Adelaide FSRU	Venice Energy	2024	–	–	–	Speculative
	Port Kembla FSRU	Squadron Energy	2026	1.9	1	170,000	U. Construction
Bangladesh	Matarbari LNG	Petrobangla	2028	7.5	–	–	Speculative
	Payra FSRU	Excelerate Energy	2028	–	–	–	Speculative
Belgium	Zeebrugge Exp. I	Fluxys	2024	4.6	–	–	U. Construction
	Zeebrugge Exp. II	Fluxys	2026	1.3	–	–	U. Construction
Brazil	Tergás Rio Grande LNG	Grupo Cobra	2024	1.61	–	–	Speculative
	Geramar FSRU	–	2026	–	–	–	Speculative
	Porto Norte Fluminense FSRU	Porto Norte Fluminense SA	2027	5.64	–	–	Speculative
	Imetame LNG	Imetame	2025	–	–	–	Speculative
China	Penglai LNG	Shandong Penglai Baota Ina Natural Gas Co., Ltd.	2026	2.8	–	–	Proposed
	Wuhan LNG	Hubei Minsheng Petroleum Liquefied Gas Co., Ltd.	2035	1.86	–	–	Speculative
	Zhiwan Island LNG	Macau Gas Co.	–	5	–	–	Speculative
	Yueyang LNG	Yueyang LNG Co., Ltd.	2024+	1.5	–	–	Speculative
	Yangjiang LNG	Guangdong Yangjiang Hailing Bay LNG Co., Ltd.	2024+	2.8	2	–	U. Construction
	Rudong LNG (Jiangsu Guoxin)	Jiangsu Guoxin LNG Co., Ltd.	2024	2.95	–	–	U. Construction
	Jiangyin LNG (Garson Gas)	Jiangsu Jiasheng Gas Co., Ltd.	2024	3	–	–	U. Construction
	Huizhou LNG	Guangdong Huizhou LNG Co., Ltd.	2024	4	–	–	U. Construction
	Longkou	PipeChina	2024	5	6	1,420,000	U. Construction
	Yingkou LNG	China Urban Rural Energy	2025	6.5	4	800,000	U. Construction
	Yancheng LNG Expansion	CNOOC	2024	3	–	1,620,000	U. Construction
	Yantai LNG	China Urban Rural Energy	–	5.9	5	1,000,000	U. Construction
	Zhangzhou LNG	PipeChina	2024	3	3	–	U. Construction
Colombia	Buenaventura FSRU	Unidad de Planeación Minero Energética (UPME)	2024	–	–	–	Speculative
Cyprus	Vasilikos FSRU	DEFA	2024	0.6	–	–	U. Construction
Ecuador	Jambelí FSRU	Sycar LLC	2025	0.38	–	–	Proposed
Estonia	Paldiski LNG	Espa	2024	1.8	–	–	Proposed
Germany	Stade LNG	Buss Group, Dow Chemical, Fluxys, Partners Group	2026	9.78	–	–	Proposed
	TES Wilhelmshaven LNG	Tree Energy Solutions	2025	11.76	–	–	Proposed
	Stade FSRU	German company Hanseatic Energy Hub	2024	3.5	–	–	U. Construction
Greece	Dioriga FSRU	Motor Oil	2024	1.91	–	–	Proposed
	Argo FSRU	Mediterranean Gas	2024	3.38	–	–	Proposed
	Thessaloniki FSRU	Edison, Hellenic Petroleum	2025	5.37	–	–	Proposed
India	Jaigarh LNG	H-Energy	–	8	–	–	Speculative
	Kakinada FSU	H-Energy	2024	4	–	–	Speculative
	Kukrahati LNG	H-Energy	2024	3	–	180,000	Speculative
	Chhara LNG Terminal	Hindustan Petroleum	2025	5	–	–	U. Construction
	Karaikal LNG	AG&P	TBC	5	–	–	Speculative
Indonesia	Karimun Island LNG	Panbil Group	2024	–	–	–	Speculative
	Sengkang LNG	Energy World	–	2	–	–	U. Construction
Ireland	Mag Mell FSRU	Predator Oil & Gas	–	1.91	–	–	Speculative
Italy	Porto Torres FSRU	Snam	2024	0.5	–	–	Proposed
	Gioia Tauro LNG	Iren Group, Sorgenia	2026	8.6	–	–	Proposed
	Portovesme FSRU	Snam SpA	2024	–	–	–	Speculative
Morocco	Jorf Lasfar LNG	SIGER/ERGIS Group	2025	5.15	–	–	Speculative
Mozambique	Matola FSRU	Gigajoule, TotalEnergies, CTB, Matola Gas Co.	2025	0.5	–	–	Speculative
Myanmar	Mee Laung Gyaing FSRU	Supreme Group, ZHEFU Hydropower	2025+	–	–	–	Speculative
	Ahlone LNG	TTCL	2025+	–	–	–	Speculative
	Thilawa LNG	Eden Group, Marubeni Corp., Mitsui, Sumitomo Corp.	2026	–	–	–	Speculative
Pakistan	Tabeer Energy FSRU	Mitsubishi	–	5.7	–	–	Speculative
Philippines	Vires FSRU	Argo Group	–	3	–	–	Speculative
	Pagbilao Power	Energy World	–	3	2	260,000	U. Construction
Poland	Gdańsk FSRU	PGNiG	2028	8.82	–	–	Speculative
South Africa	Richards Bay FSRU	South Africa Department of Public Enterprises	2027	1	–	–	Speculative
South Korea	Dangjin LNG	POSCO	2027	3.5	–	–	Proposed
	Hanyang LNG	Hanyang Group	2024	–	–	–	Speculative
Sri Lanka	New Fortress Colombo LNG	New Fortress Energy	–	0.71	–	–	Speculative
Taiwan	Hsieh-Ho LNG	Taipower	2025	1.8	–	–	Proposed
	Taichung (TaiPower) LNG	Taipower	2025	3	–	–	Proposed
Thailand	Chana LNG	–	2028	2	–	–	Speculative
Vietnam	Hai Linh	Hai Linh Co. Ltd.	2020	3	3	219,000	Mothballed
	Mui Ke Ga FSRU	B.Grimm Power, Energy Capital Vietnam, Gunvor	2025	1.5	–	–	Proposed
	Son My LNG	AES, PetroVietnam	2026	3.6	–	–	Proposed
	Thai Binh FSRU	–	2026	0.5	–	–	Speculative
	South West FSRU	–	2030	1	–	–	Speculative
	Bac Lieu LNG	Delta Offshore Energy	–	2	–	–	Speculative
	Cat Hai FSRU	Chubu Electric, ExxonMobil, Government of Hai Phong, TEPCO	2030	3	–	–	Speculative
	Khanh Hoa LNG	Millenium Energy	2030	3	–	–	Speculative
	Long Son LNG	EVN	2025	4.4	–	–	Speculative
	Tien Lang FSRU	ExxonMobil, Chubu Electric Power, Tokyo Electric Power Co.	2026	–	–	–	Speculative
	Ca Na LNG	Novatek	2024	–	–	–	Speculative
	Chan May LNG	Chan May LNG	2024	–	–	–	Speculative
	Vung Ang LNG	KG Electric Power Corp., PECC2, Siemens	2026	–	–	–	Speculative
	Hai Lang LNG	T&T Group, Hanwa, KOGAS, KOSPO	2026	1.5	2	160,000	U. Construction

LNG Export Plants

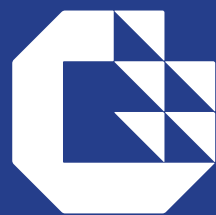
Country	Location/Project	Shareholders	Start up	Liquefaction		Storage	
				Trains	Nom. capacity (MTPA)	No. of tanks	Capacity m³
UAE	Das Island	ADNOC, Mitsui, BP, TotalEnergies	1977/1994	3	5.7	3	240,000
Algeria	Arzew	Sonatrach	1964-2014	13	20.8	6	920,000
	Skikda	Sonatrach	1980/2013	4	7.9	5	308,000
Angola	Soyo	Sonangol, Chevron, BP, Eni, TotalEnergies	2012	1	5.2	2	370,000
Australia	NWS LNG	BP, Chevron, MIMI, Shell, Woodside Energy, CNOOC	1989-2004	5	16.3	6	520,000
	Darwin LNG	Santos, Eni, INPEX, JERA, Tokyo Gas	2006	1	3.7	1	188,000
	Australia Pacific LNG	ConocoPhillips, Origin, Sinopec	2016	2	9.0	2	320,000
	Gladstone LNG	Santos, Petronas, TotalEnergies, KOGAS	2015-2016	2	7.8	2	280,000
	Gorgon LNG	Chevron, Shell, ExxonMobil, Osaka Gas, Tokyo Gas, JERA	2016-2017	3	15.6	2	360,000
	Pluto LNG	Woodside Energy, Kansai Electric, Tokyo Gas	2012	1	4.9	2	240,000
	Queensland C. LNG	Shell, CNOOC	2014	2	4.5	2	280,000
	Wheatstone LNG	Chevron, KUFPEC, Woodside Petroleum, Kyushu Electric Power Co., PEW	2017	2	8.9	2	300,000
	Ichthys LNG	INPEX, TotalEnergies, CPC, Tokyo Gas, Osaka Gas, Kansai Electric, JERA, Toho Gas	2018	2	8.9	2	330,000
	Prelude FLNG	Shell, INPEX, CPC, KOGAS	2018	1	3.6	6	228,000
Brunei	Brunei LNG	Gov. of Brunei, Shell, Mitsubishi	1972-74	5	7.2	3	195,000
Cameroon	Cameroon FLNG	Golar LNG	2018	4	2.4	1	125,000
Egypt	Damietta	Eni, EGAS, EGPC	2004	1	5.0	2	300,000
	Idku	EGPC, EGAS, Shell, Petronas, TotalEnergies	2005	1	7.2	2	280,000
Equ. Guinea	EG LNG	Marathon, Sonagas, Marubeni	2007	1	3.4	2	272,000
Indonesia	Bontang (E-H)	Pertamina, VICO, JILCO, TotalEnergies	1990-1998	4	11.5	5	635,000
	Dongi-Senoro	Medco Energi, Pertamina, Mitsubishi	2015	1	2.0	1	170,000
	Tangguh	BP, Mitsubishi, Inpex, CNOOC, JX Nippon, KG Mitsui, LNG Japan	2008-2023	3	11.4	2	340,000
Malaysia	Malaysia LNG	Petronas, Shell, Sarawak, Mitsubishi, Nippon Oil	1983-2016	9	29.3	6	445,000
	PFLNG Satu	Petronas	2016	1	1.2	4	177,000
	PFLNG Dua	Petronas	2020	1	1.5	4	177,000
Mozambique	Coral Sul FLNG	Eni, ExxonMobil, CNPC, GALP, KOGAS, ENH	2022	1	3.4	8	227,840
Nigeria	Bonny Island	NNPC, Shell, TotalEnergies, Eni	1999-2007	6	22.2	6	505,200
Norway	Snøhvit LNG	Equinor, TotalEnergies, Petoro, Neptune Energy, Wintershall DEA Norge	2007	1	4.2	2	250,000
Oman	Oman LNG	Oman Gov., Shell, TotalEnergies, Korea LNG, Mitsubishi, Mitsui, Partex O&G, Itochu Corp.	2000	3	10.4	4	480,000
Papua New Guinea	PNG LNG	ExxonMobil, Oil Search, Santos, JX Nippon Oil	2014	2	8.3	2	320,000
Peru	Pampa Melchorita	Hunt Oil, Shell, Marubeni, SK Group	2010	1	4.5	2	260,000
Qatar	Ras Laffan	QatarEnergy, Shell, ExxonMobil, TotalEnergies, ConocoPhillips et al.	1997-2010	14	77.4	18	2,340,000
Republic of the Congo	Congo FLNG Ph. I	Eni	2024	1	0.6	1	177,000
Russia	Sakhalin-2 LNG	Gazprom, Sakhalin Energy, Mitsubishi, Mitsui	2009	2	9.6	2	200,000
	Yamal LNG	Novatek, TotalEnergies, CNPC, Silk Road Investment Fund	2017-2019	3	17.4	4	640,000
	Portovaya LNG	Gazprom	2022	1	1.5	-	-
Trinidad & Tobago	Atlantic LNG	BP, Shell, NGC	1999-2005	4	15.3	4	640,000
USA	Sabine Pass LNG	Cheniere	2016-2022	6	30.0	5	800,000
	Corpus Christi LNG	Cheniere	2019-2021	3	15.0	3	480,000
	Freeport LNG	Freeport LNG, JERA, Osaka Gas	2019-2020	3	15.5	3	480,000
	Cameron LNG	Sempra, TotalEnergies, Mitsui, Mitsubishi	2019	3	15.0	3	480,000
	Calcasieu Pass LNG	VentureGlobal	2022-2023	18	11.3	2	440,000
	Cove Point LNG	BHE GT&S, Dominion Energy, Brookfield Asset Management	2017	1	5.3	7	695,000
	Elba Island LNG	Kinder Morgan, EIG Energy, Blackstone	2019-2020	10	2.5	5	560,000
Yemen	Balhaf LNG (Mothballed)	TotalEnergies, Hunt Oil, SK Innovation, Hyundai, KOGAS, Yemen Gas Corp., GASSP	2009	2	6.7	2	320,000

LNG Export Projects U. Construction

Country	Project	Project Developers	Planned Start Up	Number of Trains	Capacity In MTPA
Canada	LNG Canada	Shell, Petronas, PetroChina, Mitsubishi	2025	2	14
	Woodfibre LNG	Pacific Energy Corp., Enbridge	2027	2	2.2
Indonesia	Sengkang LNG	Energy World	2023+	4	2
Malaysia	ZLNG FLNG	Petronas	2027	1	2
Mauritania	Greater Tortue Ahmeyim FLNG	BP, Kosmos Energy	2024	–	2.52
Mexico	Costa Azul Export	Sempra Energy, TotalEnergies	2024	1	3.25
Mozambique	Mozambique LNG Ph. I	TotalEnergies, Mitsui, ONGC, ENH, PTTEP, Bharat Petroleum, Oil India	2024+	2	–
Nigeria	Nigeria LNG Expansion	Nigeria LNG	2024	1	8
Qatar	Ras Laffan Expansion I	QatarEnergy	2026	4	33
	Ras Laffan Expansion II	QatarEnergy	2027	2	16
Russia	Ust Luga LNG	RusKhimAlyans	2027	2	13
	Arctic LNG 2 T1	Novatek et al	2024+	1	6.6
United States	Golden Pass LNG T1-2	Golden Pass LNG	2024	2	12
	Golden Pass LNG T3	Golden Pass LNG	2025	1	6.03
	Corpus Christi LNG Stage 3	Cheniere Energy	2027	7	11.48
	Plaquemines LNG Ph. I	Venture Global	2024	1	10
	Plaquemines LNG Ph. II	Venture Global	2025	1	10

Future LNG Export Projects

Country	Project	Project Developers	Estimated Start Up	Number of Trains	Capacity In MTPA
Argentina	Vaca Muerta (YPF) LNG	YPF	2024+	–	5.37
Australia	Browse FLNG	Woodside Energy, Japan Australia LNG, Shell, BP, PetroChina	–	2	11.4
	Darwin LNG Life Extension	Santos, SK E&S, JERA, INPEX, Eni SpA, Tokyo Gas	2025	1	3.7
	Pluto LNG T2	Woodside Burrup Train 2A Pty Ltd., Global Infrastructure Partners	2026	1	5
Cameroon	Etinde FLNG	Perenco, Bowleven	2023+	–	1.3
Canada	Bear Head LNG	Bear Head LNG	2027	4	12
	Cedar FLNG	Haisla Nation, Pembina Pipeline Corp.	2027	–	3
	Energie Saguenay LNG	GNL Quebec	2026	2	11
	Ksi Lisims FLNG	Ksi Lisims LNG GP Ltd.	2027	–	12
	Placentia Bay FLNG	Horizon Maritime Services, LNG Newfoundland and Labrador Ltd.	2030	–	4
	Tilbury Island LNG T1	FortisBC	2026	1	0.9
	Tilbury Island LNG T2	FortisBC	2028	1	2.5
Equatorial Guinea	Fortuna FLNG	New Fortress Energy	–	1	–
Gabon	Boudji FLNG	Petronas	–	–	–
Guinea	Guinea LNG	West Africa LNG Group	2026+	1	–
Indonesia	Abadi FLNG	INPEX Masela Ltd.	2030	–	9.5
Israel	NewMed FLNG	NewMed Energy	2026	–	5
Mauritania	New Fortress Banda LNG	New Fortress Energy	2024	–	1.4
Mexico	Mexico Pacific LNG Ph. I	AECOM Capital, DKRW Energy	2025	2	9.4
	Mexico Pacific LNG Ph. II	AECOM Capital, DKRW Energy	2026+	1	4.7
	AMIGO LNG	Epsilon LNG, LNG Alliance	2026	1	4.2
	Vista Pacifico LNG	Sempra Energy	2025+	–	4
	Lakach FLNG	New Fortress Energy	–	1	1.4
	Altamira FLNG	New Fortress Energy	–	2	2.8
Mozambique	Rovuma LNG	Eni, ExxonMobil, CNPC, ENH, Galp, KOGAS	2025+	2	15.2
Nigeria	Brass LNG	Brass LNG Ltd.	–	2	10
	Greenville LNG	Greenville LNG	–	1	1.1
	UTM Offshore FLNG	UTM Offshore	2026	–	1.52
Papua New Guinea	Papua LNG	TotalEnergies, ExxonMobil, Papua New Guinea Gov., Santos	2027	2	5.4
	PNG LNG Expansion	ExxonMobil, Kumul Petroleum, Santos, JX Nippon O&G, MRDC	2025	1	2.6
Republic of the Congo	Congo FLNG Ph. II	Eni Congo	2025	1	2.4
Russia	Yakutia LNG	A-Property, Globaltek, Zhejiang Energy	2027	–	18
	Far East LNG I	ExxonMobil, SODECO, ONGC, Rosneft	2027+	1	6.2
	Far East LNG II	ExxonMobil, SODECO, ONGC, Rosneft	2035	1	10
	Vladivostok LNG	Gazprom, INPEX, Itochu Corp., JAPEX, Marubeni Corp.	2025	3	1.5
	Arctic LNG II	Novatek	2027	–	19.8
	Obsky LNG	Novatek	2026	–	6.6
	Chernomorsky LNG	Gazprom	2025	–	1.5
	Arctic LNG III	OOO Arctic LNG 3	2032	–	19.8
	Kara LNG	Rosneft	2030	–	30
Tanzania	Tanzania LNG	Equinor, ExxonMobil, Ophir Energy, Pavilion Energy, Shell, TPDC	2027	2	10
United Arab Emirates	Ruwais (ex Fujairah) LNG	ADNOC	2027+	2	6
United States	Fourchon LNG	Energy World	–	1	2
	Alaska LNG	Alaska Gasline Development Corp.	2030	3	20.1
	Cameron LNG Expansion	Cameron LNG LLC	2026	1	6.75
	Commonwealth LNG	Commonwealth LNG	2026	6	9.3
	Corpus Christi LNG Midscale Expansion	Cheniere Energy	2031	2	3.28
	Delfin FLNG	Delfin LNG LLC	2026+	4	12
	Driftwood LNG T1-5	Tellurian	–	5	27.6
	Freeport LNG Expansion	Freeport LNG Dev.	2026	1	5.1
	Gulf LNG	KinderMorgan	–	2	10.86
	Lake Charles LNG	Energy Transfer	2026+	3	17.79
	Magnolia LNG	Glenfarne Group	–	4	8.8
	Port Arthur LNG Ph. I	PALNG Common Facilities Co., Port Arthur LNG, LLC	–	2	13.5
	Port Arthur LNG Ph. II	PALNG Common Facilities Co., Port Arthur LNG, LLC	–	2	13.5
	Texas LNG	Glenfarne Energy Transition	2027	2	4
	Rio Grande LNG Ph. I	NextDecade	2026	2	10.8
	Rio Grande LNG Ph. II	NextDecade	–	3	16.2
	Pointe LNG	Pointe LNG, Pointe Pipeline Co.	2026	3	6
	Repauno Works LNG	Delaware River Partners LLC	–	–	1.5
	Qilak LNG	Qilak Energy	2026	–	4
	CP2 LNG Ph. I	Venture Global	2026+	9	10
	CP2 LNG Ph. II	Venture Global	2027+	9	10
	Delta LNG Ph. I	Venture Global	2028+	–	10
	Delta LNG Ph. II	Venture Global	2029+	–	10
	West Delta LNG Deepwater Port	LNG21 Group	2026+	6	6.1
	Grand Isle FLNG	New Fortress Energy	2025+	–	2.8



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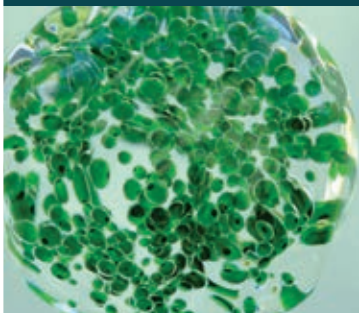
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