Nervous Money

2021

GLOBAL LNG TERMINALS UPDATE

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Thursday June 24, 2021 - 06.01 am - New York
Thursday, June 24, 2021 - 11.01 am - London
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Lydia Plante and Ted Nace

Global Energy Monitor

ABOUT GLOBAL ENERGY MONITOR

Global Energy Monitor (GEM) develops and shares information on energy projects in support of the worldwide movement for clean energy. Current projects include the Global Coal Mine Tracker, Global Coal Plant Tracker, Global Fossil Infrastructure Tracker, Europe Gas Tracker, CoalWire newsletter, Global Gas Plant Tracker, Global Renewable Power Tracker, Global Steel Plant Tracker, Latin America Energy Portal, and GEM.wiki.

ABOUT THE GLOBAL FOSSIL INFRASTRUCTURE TRACKER (GFIT)

The Global Fossil Infrastructure Tracker is an online database that identifies, maps, describes, and categorizes oil and gas pipelines and terminals. Originally released by GEM in January 2019 and updated twice annually, the tracker uses footnoted wiki pages to document each pipeline or terminal. For further details see the tracker landing page and methodology overview.

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ABOUT THE COVER

Photo of LNG tanker in Tokyo Bay. Copyright (c) Bill Chizek, 2019. Courtesy of Getty Images.

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FURTHER RESOURCES

For additional data on proposed and existing LNG terminals, see Summary Data. For links to reports based on GFIT data, see Reports & Briefings. To obtain primary data from the GFIT, use the Data Request Form.

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EXECUTIVE SUMMARY

Liquefied natural gas (LNG) terminals are among the largest capital projects ever attempted in modern industry, including some projects costing over US$30 billion. At that scale, a project can appear unstoppable, especially when backed by multiple governments. But big money is also nervous money, and the go-go atmosphere that characterized the liquefied natural gas (LNG) sector just two years ago now lies in what seems like the distant past. This is particularly true in North America, which leads the world in LNG export expansion plans.

This report provides the results of a worldwide survey of LNG terminals completed in May 2021 by Global Energy Monitor. The report includes the following highlights:

- At least 21 LNG export terminals totaling 265 million tonnes per annum (MTPA) of capacity continue to report final investment decision (FID) or other serious delays—38% of the 700 MTPA of export capacity under development worldwide.
- Total's declaration of *force majeure* for the Mozambique LNG Terminal, following an attack by insurgents, has highlighted the vulnerability of terminals priced in the tens of billions of dollars.
- The cost overruns, scheduling delays, and high outage rates that plagued the LNG sector were further exacerbated in the past year by Covid-related workforce disruption.

- Once regarded as a potential climate solution, LNG is increasingly regarded as a climate problem, particularly for European buyers. According to the IEA, inter-regional LNG trade would need to decline rapidly after 2025 under a 2050 net zero scenario.
- Globally, only one LNG export project has reached FID in the past year, Costa Azul LNG terminal in Mexico.
- North America accounts for 64% of the global export capacity in construction or pre-construction. North America also has the most troubled projects, with 10 of the 18 LNG export terminals reporting FID delays.
- Aggressive expansion of capacity in low-production-cost Qatar and the Russian Arctic has increased risks to higher cost U.S. LNG export developers.
- LNG import capacity continues on a rapid expansion path, with enough projects in construction or pre-construction to increase global capacity by 70%. Of the capacity in construction or pre-construction, 32% is in China, 11% is in India, and 7% is in Thailand. Outside Asia, Brazil is a hotspot with 13 LNG import terminals in construction or pre-construction.

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INTRODUCTION

In the world of business, bad news can arrive in many forms. It can come as the drip, drip, drip of a slowly deteriorating outlook. Or it may come as the shock of a "black swan" event that arrives suddenly, drastically, and unpredictably.

For developers of LNG terminals, especially the massively expensive liquefaction terminals that compress fossil gas for export on specialized tanker ships, the past two years have seen both kinds of bad news, leaving business conditions drastically diminished and even calling into question the basic rationale of an industry that is built around a relatively small number of massive but highly vulnerable facilities.

In 2019, the international gas sector was in the midst of a rapid expansion of LNG infrastructure driven by several positive factors: forecasts of long-term increased demand in Asia, surging gas output in the United States, the widespread portrayal of gas as a positive tool for transitioning economies away from coal, and a coordinated diplomatic push by the US and its Pacific and Atlantic allies based on a view of gas as a guarantor of energy security. The year 2019 set a record for the largest amount of new LNG capacity to reach the final investment decision (FID): 71 billion tonnes per annum (MTPA) of new capacity, greater than the entire gas consumption of Germany.

That go-go atmosphere for LNG developers now lies in what seems like the distant past. Most striking is the shift in LNG's public image from climate solution to climate problem. There has been growing international recognition that scenarios for avoiding the worst impacts of climate change simply allow no room for any sort of large fossil fuel expansion. Steadily mounting doubts about the rationales and social license for LNG in a climate-constrained world come on top of the abrupt recessionary shock of 2020, which triggered delays in FID for projects representing nearly half of global LNG export capacity in development. While the economic freeze that occurred in the spring and summer of 2020 has now eased due to the ongoing revival of the international economy, the pandemic also revealed deeper concerns about the vulnerability of capital investments for fossil mega-projects in a rapidly transforming political and social environment.

On April 26, 2021, the French petroleum company Total shocked the world by announcing *force majeure* for the Mozambique LNG Terminal, following an attack on the town of Palma by insurgents. *Force majeure*—the legal term for occurrences beyond the reasonable control of a party—implies a level of vulnerability that would seem improbable for a US$20 billion project funded by one of the most widely supported pools ever assembled, including private and public banking and credit institutions of the United States, China, Japan, and Europe.

What makes the Mozambique crisis particularly significant is that LNG itself has long been sold as a solution to energy insecurity. In Europe, US LNG imports have been promoted by US diplomats since the end of export controls in 2015, as a way of reducing European dependence on Russian gas. In the Pacific region, the US and Japan launched an initiative following the 2011 Fukushima disaster to promote LNG as a means of shoring up Japan's energy security. But even before the Mozambique crisis, the vulnerability of LNG to supply chain disruption had raised questions about its value as a provider of energy security. For example, in 2020, Japan's LNG stockpile dropped to a two-week supply due to Covid-related disruptions. And in March 2021, spot prices for LNG reacted when the week-long grounding of the massive *Ever Given* container ship caused LNG tankers to be rerouted around the Cape of Good Hope.

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SIZE, DELAYS, COST OVERRUNS, AND OUTAGES

Compounding the LNG sector's geopolitical and pandemic-related disruptions are issues of schedule and cost control that have plagued it for years. One industry journal described the sector as "infamous" for both project delays and cost "blowouts," citing a survey by Wood Mackenzie showing that just 10% of LNG projects have been built under budget, and 60% have experienced delays. A November 2019 study by researchers at Queensland University of Technology reported that "significant schedule overruns have become increasingly commonplace within LNG projects, contributing to severe cost blowouts" (Basak 2019). The survey was conducted prior to the raft of delays in 2020 related to Covid-19, environmental opposition, and political instability. The on-budget, on-time rate has undoubtedly fallen to an even lower level.

Liquefied natural gas (LNG) terminals are among the largest capital projects ever attempted in modern industry, including some projects costing over US$30 billion. At that scale, a project can appear unstoppable, especially when backed by multiple governments. On the other hand, the large amounts of capital involved in LNG also make project backers particularly sensitive to political instability and the risk of delays.

Perhaps nowhere does the expression "big money is nervous money" apply more aptly than to massive LNG export projects. The ability of such unanticipated events to throw the global gas trading system off balance, coupled with the wide swings in gas prices that occurred in 2020 and 2021, point to the scale of LNG projects as being part of the problem. With size comes complexity and the potential for delays.

Once operating, LNG terminals suffer a significant rate of unplanned outages due to storms, compressor fires, heat exchanger cracking, and safety issues. In September 2020, 80 billion cubic meters of capacity (59 million tonnes per annum) of liquefaction capacity was offline, representing 14% of global capacity (IEA 2021a).

With massive LNG terminals beginning to look more and more like expensive and fragile white elephants, it is likely that electricity system planners in countries such as Vietnam, Bangladesh, and South Korea will increasingly see renewables not only as an attractive alternative to new LNG on economic grounds, but also as more predictable and secure due to their more flexible deployment and greater overall simplicity.

COMPETITION INTENSIFIES FOR HIGH COST PROJECTS

For many project developers, particularly in North America, where production costs are high relative to global norms, simple delays have swelled into existential threats. High production costs present a twofold problem, especially when exacerbated by construction cost overruns.

The first problem is that in an increasingly oversupplied market, lower cost producers in the Persian Gulf and the Russian Arctic can easily underprice the higher cost producers in the U.S. and Canada. Consequently, LNG projects in the U.S., Mexico, and Canada are vulnerable to being crowded out. Despite Covid-19's effects on projects elsewhere, two massive projects totaling 55 MTPA in capacity have moved ahead in the past year in Qatar and Russia, and both Qatar and Russia are planning further large capacity expansions in the next decade.

The second problem arises due to the ever-declining cost of renewable alternatives, which are on pace to fall by 45% to 55% between 2019 and 2030, according to IRENA analysts (Taylor 2020). With coal-to-gas switching in the power sector the lead driver of gas demand increases (IEA 2020), every year of delay that an LNG project experiences means an even tougher competitive environment against renewables, and raises the probability that the project could become obsolete decades before the end of its intended lifespan.

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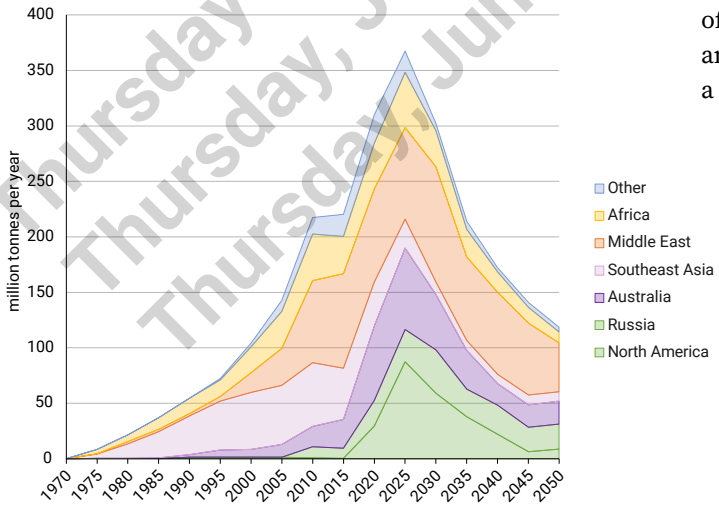
CLIMATE CONCERNS TAR THE IMAGE OF LNG

A key selling point for LNG projects has always been that burning gas causes only about half the carbon dioxide emissions of coal, and thus can be presented as a transition fuel to renewables. But carbon dioxide is not the only greenhouse gas emitted by the gas system. From the wellhead to the end user, the gas supply chain results in leakage of methane, a highly potent greenhouse gas. Due to mounting evidence that the magnitude of methane emissions is far greater than previously assumed, gas has shifted from the "solution" side of the climate ledger to the "problem" side. An example of this shift is the stance of the International Energy Agency, as laid out in the recent report Net Zero by 2050.

Net Zero by 2050 marks a stark departure from previous views of the future of LNG. In 2017, the IEA projected a near tripling of long-distance LNG trade by 2040 (WEO 2017). In contrast, the IEA in 2021 reported that under its 2050 net zero scenario, inter-regional liquefied natural gas (LNG) trade would grow from 310 million tonnes in 2020 over the next five years but then would fall to around 118 million tonnes in 2050 (IEA 2021), as shown in Figure 1.

Figure 1. LNG Exports Under the IEA's Net Zero 2050 Scenario



Source: International Energy Agency (2021b)

With respect to overall gas industry investments, the report states bluntly:

> *No new natural gas fields are needed in the [Net Zero Emissions scenario] beyond those already under development. Also not needed are many of the liquefied natural gas (LNG) liquefaction facilities currently under construction or at the planning stage. Between 2020 and 2050, natural gas traded as LNG falls by 60% and trade by pipeline falls by 65%. During the 2030s, global natural gas demand declines by more than 5% per year on average, meaning that some fields may be closed prematurely or shut in temporarily.*

Multiple projects have already lost developer support over climate concerns, including a new methane policy approved by the EU in October 2020 aimed at reducing emissions from imported gas. In June 2020, Ireland's three largest political parties issued a statement withdrawing from the expansion of the Shannon LNG import terminal on climate grounds. In November 2020 the French energy company Engie cancelled its US$7 billion deal to buy gas from NextDecade's Rio Grande LNG Terminal, reportedly over French government policy to avoid gas sources with high methane emissions. In January 2021 the Port of Cork cut ties with NextDecade and cancelled the Cork LNG import terminal project. In April 2021, Germany's Uniper officially cancelled its Wilhelmshaven LNG Terminal and announced the possibility of using the location as a hydrogen energy hub.

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LNG FINANCE TIGHTENS

For LNG terminals—especially the more capital-intensive export terminals—the final investment decision (FID) is a key marker of a project's viability. In 2020, the combination of oversupply and recessionary concerns related to Covid-19 caused nearly half of projects in the pipeline as of mid-2020 to experience delays in their FID. For North America–based projects, finance remained tight throughout the year, with only a single project, Costa Azul LNG Terminal on the Pacific coast of Mexico, announcing FID.

While signs of renewed confidence by LNG financial backers have appeared recently, including a rise in Asia spot market prices, the picture remains uneven. As shown in Table 1 (on the next page), 26 LNG export terminals totaling 265 MTPA of capacity continue to report FID or other serious delays—38% of the 699 MTPA of export capacity under development worldwide.

North American LNG Developers Face Particular Difficulty with Finance

As shown in Table 1, North America accounts for 18 of the 26 projects reporting financing difficulties. For example, on March 22, 2021, Exelon Corporation announced that it had filed a request with FERC to withdraw the certificate of the Annova LNG Terminal. A company spokesperson said that the decision had been taken after the company had failed to find a "suitable offer" to sell its majority stake in the project, and that cancelling the project "better financially positions Exelon's generation business going forward." After more than six years of development, Annova LNG had not been able to announce any long-term offtake contracts, and had been unable to reach a final investment decision.

Another troubled US project is NextDecade's Rio Grande LNG Terminal. After cutting the project from six trains to five trains in July 2020, French utility Engie, which had been in negotiations over a potential 20-year, US$7 billion contract to buy LNG from the project, pulled out in the wake of French government concerns over the high methane emissions associated with the gas that NextDecade would be sourcing from Permian fields. The collapse of the Engie deal means that NextDecade has secured only one firm offtake deal for the Rio Grande terminal, a 20-year agreement with Shell to buy two million metric tonnes of LNG per year. To advance the project and reach FID on two or three trains at the terminal, NextDecade has said it still needs to sell another nine million metric tonnes of LNG per year under long-term contracts. In a June 2021 presentation, NextDecade stated that it expects to make FID on a minimum two trains in 2021.

In the US, Sempra Energy's Port Arthur LNG Terminal announced that it was abandoning its attempt to close its financing in 2021 and delaying the target for FID to 2022. The sponsor's infrastructure division has agreed to sell a 20% share to private equity firm KKR for $3.37 billion in cash, an indication that financing has become difficult.

A stark example of the roller coaster confronting US developers was Tellurian, the sponsor of the proposed Driftwood LNG Terminal in Louisiana. In January 2020, the company's stock was selling for $8.69 per share, but plunged by 92% to $0.70 cents per share in September. As a result the company received a delisting notice from Nasdaq. In November 2020, Tellurian's CEO Meg Gentle left the company. In April, 2021, Tellurian's chairman, Charif Souki, went on YouTube to denounce short sellers seeing blood in the water. Bloomberg News reported that the company's only confirmed buyer was Total, whose memo of understanding with Tellurian was scheduled to expire at the end of June. In an April 2021 research note, Morgan

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Stanley estimated that Tellurian had only enough cash to fund another four to six months of expenses. Some relief for Tellurian arrived in May and June, with commitments by Vitol and Gunvor to both enter into 10-year, 3 MPTA purchasing deals. But according to industry analyst Clark Williams-Derry, Tellurian's problems were far from over. Williams-Derry pointed out that the terms of the agreements were shorter than typical, that liquefaction fees were not guaranteed, and that Tellurian still faced multiple headwinds—including the fact that more than 17 MTPA of capacity in the U.S. was likely to be sold on spot markets or through short-term contracts.

In March 2020, Shell ended its participation in the Lake Charles LNG Terminal in Louisiana, citing low prices. As of May 2021, Jordan Cove LNG Terminal in Oregon was also seeing no progress, and company officials said that they "sadly" could no longer predict FID. The project was officially placed on hold.

With commitments by buyers hard to come by, Commonwealth LNG Terminal attempted an innovative new process of guaranteeing an outlet for its LNG. The company partnered with commodities trader Gunvor group, conducting an open bidding process for buyers, with notifications scheduled for April 30, 2021. However, as of early June, no announcement had been made about the result.

Mexico Pacific LNG Terminal had previously expected FID in early 2021, but in April 2021 S&P Global Market Intelligence reported that the company was delaying its FID until late in 2021 or early in 2022, with the FID expected to cover two of the three trains (8 MTPA).

In Canada, seven of the 12 LNG projects proposed for the West Coast have been cancelled (Discovery, Kitsault, NewTimes, Orca, Steelhead, Stewart, and Triton), and one of the five proposed on the East Coast (Stolt) has been cancelled. On the West Coast, this leaves Cedar, Kitimat, LNG Canada, WesPac, and Woodfibre still in development, and AC LNG, Bear Head, and Goldboro on the East Coast. Of these, only LNG Canada is in construction. Like other Canadian sources, LNG Canada is a relatively high-cost source of LNG. Due to delays attributed to Covid-19, the project is now delayed until 2025. Goldboro LNG Terminal will reach FID by the end of June, according to Pieridae Chief Executive Alfred Sorensen in a May 2021 earnings call. The company said engineering firm Bechtel Corp plans to deliver a fixed-price proposal to build the plant by the end of May, and that the project would employ about 3,500 workers during peak construction. Kitmat LNG Terminal appeared to be headed toward cancellation as sponsor Woodside energy pulled out in May 2021, following co-sponsor Chevron's exit in December 2019.

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Table 1. Troubled LNG Export Terminal Projects

Project	Country	Capacity (MTPA)	Issue
Annova LNG Brownsville Terminal	USA	5	Project abandoned March 2021
Bear Head LNG Terminal	Canada	8	Financing fell through
Browse LNG Terminal	Australia	12	FID delayed in March 2020; FID in 2021 considered possible but unlikely
Commonwealth LNG Terminal	USA	7	No FID as of May 2021
Corpus Christi LNG Terminal (Stage 3)	USA	11.5	FID delayed beyond 2022
Darwin LNG Train 2	Australia	6.3	FID delayed
Driftwood LNG Terminal	USA	4	FID delayed until 2023. Tellurian's stock delisted after shares plummet over 90%
Energie Saguenay	Canada	11	Project in trouble since withdrawal of Berkshire Hathaway in 2020
Freeport LNG Terminal Train 4	USA	5.1	FID delayed in 2020; company may reach FID in mid 2021
Goldboro LNG	Canada	10	FID delayed but CEO predicts FID in Summer 2021
Jordan Cove LNG Terminal	USA	7.5	Project shelved after denial of permits and lack of offtake agreements
Kitimat LNG Terminal	Canada	18	Project shelved after Chevron and Woodside pull out
Lake Charles LNG Terminal (Train 3)	USA	5.5	No FID as of May 2021
LNG Canada Terminal	Canada	14	In construction but completion delayed to 2025. Cost overruns likely.
Magnolia LNG Terminal	USA	8.8	Project dumped for $2 million after directors resign
Mexico Pacific LNG Terminal	Mexico	8	FID delayed to late 2021 or early 2022
Mozambique LNG Terminal	Mozambique	12.9	Force majeure declared after insurgent attack
Papua LNG (Total)	Papua New Guinea	5.4	FID delayed to 2023 after Covid delays
Papua New Guinea Exxon (Train 3)	Papua New Guinea	3.3	FID delayed
Plaquemines LNG Terminal	USA	20	FID delayed but predicted for mid-2021
Pluto LNG Terminal Train 2	Australia	5	FID delayed
Port Arthur LNG Terminal	USA	22	FID delayed to 2022
Rio Grande LNG Terminal	USA	27	FID delayed after Engie pullout; project reduced in size
Rovuma LNG	Mozambique	15.2	FID delayed; project impacted by crisis at Mozambique LNG Terminal
Scarborough LNG Terminal	Australia	7	FID delayed in 2020; may be reached in late 2021
Tangguh LNG Terminal T3	Indonesia	3.8	Construction delay
Woodfibre LNG Terminal	Canada	2.1	Construction delayed by 1 year due to Covid; sponsor aims for 2021 FID

Source: Global Fossil Infrastructure Tracker, May 2021

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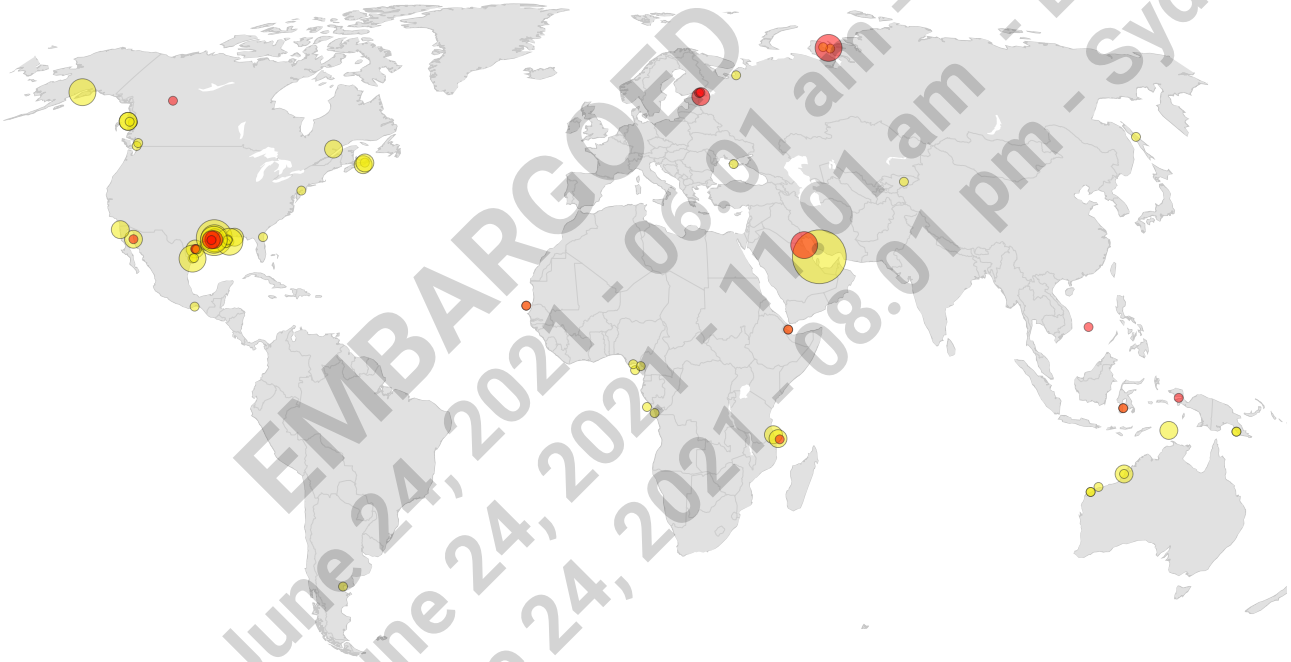
LNG EXPORT TERMINALS: MID-2021 UPDATE

As of May 2021, there was 448.3 MTPA of liquefaction capacity operating globally and another 699.7 MTPA was in development. As shown in Figure 3, the majority of operating liquefaction capacity is in the Middle East and North Africa (30.5%), Australia (19.5%), and North America (16%).

As shown in Figure 4, North America continues to dominate liquefaction infrastructure development, including 64.1% of capacity in construction or pre-construction. The Middle East and North Africa are responsible for another 10%, and sub-Saharan Africa another 8.7% of under-development capacity.

Figure 2. LNG Export Terminals in Development (red=construction, yellow=pre-construction)



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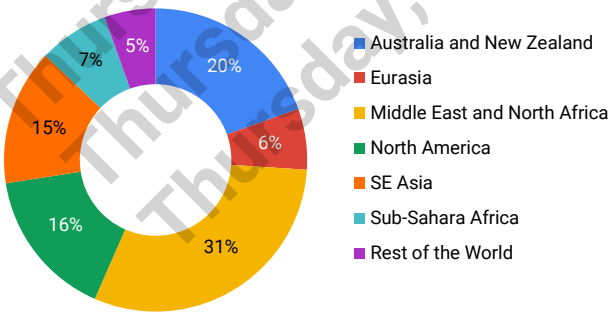
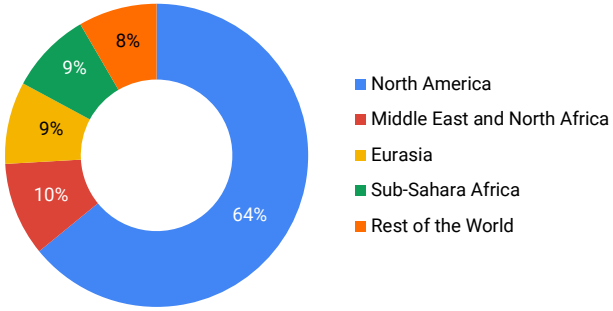
Source: Global Fossil Infrastructure Tracker, May 2021

Figure 3. Operating LNG Export Capacity by Region



Source: Global Fossil Infrastructure Tracker, May 2021

Figure 4. LNG Export Capacity in Development by Region (Construction + Pre-Construction)



Source: Global Fossil Infrastructure Tracker, May 2021

Between May 2020 and May 2021, three proposed liquefaction projects were formally cancelled by developers. All of these were to be located along the Gulf of Mexico in Texas. Meanwhile, two more liquefaction projects were put on indefinite hold by their developers, essentially cancelling them. (Table 3.)

Sempra's Costa Azul LNG Terminal was the only liquefaction project to receive its final investment decision (FID) in 2020, and the Calcasieu Pass LNG Terminal in the US and the Baltic LNG Terminal in Russia were the only liquefaction projects to begin construction (Paul 2021).

Meanwhile, four liquefaction projects began commercial operations, including an expansion project in the USA, two projects in Russia, and a project in Egypt re-started after a period of idleness which began in 2012. (Table 4, on the next page.)

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Table 2. Top 10 Countries by LNG Export Capacity in Development (Million Tonnes Per Annum)

Country	Proposed	Construction	Operating
USA	278.7	35.1	71.6
Canada	80.2	14.0	0.0
Russia	25.9	35.4	28.9
Qatar	48.0	0.0	77.4
Mexico	33.5	7.0	0.0
Australia	23.9	0.0	87.6
Kuwait	0.0	22.0	0.0
Mozambique	15.2	3.4	0.0
Indonesia	11.0	4.3	19.5
Djibouti	7.0	3.0	0.0

Source: Global Fossil Infrastructure Tracker, May 2021

Table 3. LNG Export Projects Cancelled or Put on Indefinite Hold From Mid-2020 to Mid-2021

Project	Country	Capacity (MTPA)	Status
Annova LNG Terminal	USA	6.5	Formally cancelled
Galveston Bay LNG Terminal	USA	16.5	Formally cancelled
Rio Grande LNG Terminal, Train 6	USA	4.5	Formally cancelled
Jordan Cove LNG Terminal	USA	7.5	Indefinite hold
Mozambique LNG Terminal	Mozambique	22.5	Indefinite hold

Source: Global Fossil Infrastructure Tracker, May 2021

Table 4. LNG Export Projects Beginning Operations From Mid-2020 to Mid-2021

Project	Country	Capacity (MTPA)
Cameron LNG Terminal, Train 3	USA	4.5
Yamal LNG Terminal, Train 4	Russia	0.9
Chelyabinsk-mini LNG Terminal	Russia	0.04
Damietta SEGAS LNG Terminal, Train 1	Egypt	5

Source: Global Fossil Infrastructure Tracker, May 2021

The most notable regional changes between mid-2020 and mid-2021 were a decline in the amount of liquefaction capacity under development in Africa, and an increase in capacity under development in Russia.

Russia

Five terminals are now proposed along Russia's northern coast within the Arctic Circle. The terminals are expected to begin operations between 2022 and 2026. (Table 5.)

In March 2021, the Russian government approved a long-term plan aimed at raising LNG production capacity three-fold (Warsaw Institute 2021), increasing natural gas exploitation in Russia's Arctic and Far East regions, and obtaining a 20% share of the global LNG market by 2035, an increase from 8% in 2019. The plan includes opening ten new liquefaction facilities. During this period, Russia's primary competitors in the LNG export market are projected to be Mozambique, Qatar, and the United States (Tanas, et al. 2019).

Russia is expected to remain the dominant gas supplier to Europe until 2040, with Russia's market share in Europe rising to approximately 40% by 2040 (Elliott 2021). Russia's market dominance in Europe is largely a result of declining domestic European gas production, particularly in Norway.

In China, there is an increasing demand for LNG from Russia, driving LNG liquefaction investment in Russia's Far East and Arctic Circle regions (Battersby 2021). Europe's interest in transitioning away from natural gas in the power sector, and Russian natural gas specifically, has only increased China's attractiveness as an LNG trading partner.

Table 5. LNG Export Projects Under Development in Russia's Arctic Circle

Project	Project Status	Capacity (MTPA)	Expected Start Year
Arctic LNG 1 Terminal	Proposed	6.6	2023
Arctic LNG 2 Terminal	Construction	19.8	Train 1: 2022 Train 2: 2024 Train 3: 2025
Arkhangelsk LNG Terminal	Proposed	0.12	2024
Obsky LNG Terminal	Proposed	unknown	2025
Utrenny LNG Terminal	Proposed	unknown	unknown

Source: Global Fossil Infrastructure Tracker, May 2021

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Mozambique

One of the most notable regional changes between mid-2020 and mid-2021 was the decline in the amount of export infrastructure under active development in Africa, due almost entirely to civil unrest in Mozambique's Cabo Delgado province, where the country's LNG development is concentrated. The Cabo Delgado province in Northern Mozambique is home to Africa's largest natural gas deposit, situated just off the coast in Afungi Bay. The deposit's discovery in the early 2010s led to a rapid wave of large investments, now compromised by the ongoing conflict.

Mozambique LNG Terminal

The Mozambique LNG Terminal represents the largest foreign investment in a single project in Africa; financing for trains 1 and 2 includes US$14.9 billion in loans from the African Development Bank, eight export credit agencies and 19 commercial banks, and an additional US$400 million in guarantees and direct lending from the African Export-Import Bank. It was expected to become fully operational by 2024 with a capacity of 22.5 MTPA across four liquefaction trains. However, on April 26, 2021, Total declared *force majeure*, a legal move which allows a company to suspend a project's development and all activity with contractors, usually associated with natural disasters (Total Energies 2021). The declaration followed a March 2021 attack by Ansar al-Sunna ("the youth") on the town of Palma, a staging site for the project. Two LNG liquefaction trains were already under construction when development was halted, with another two trains proposed.

Conflict in the Cabo Delgado province began in October 2017, when militants with Ansar al-Sunna attempted to establish an Islamic state in the region, targeting police stations, infrastructure, and towns throughout the province (Mukpo 2021). The Mozambican government responded with paramilitary organizations from Russia, the United States, South Africa, and France, drawing strong criticism from environmental and human rights organizations (Friends of the Earth International 2020). The conflict has resulted in at least 2,700 deaths and 700,000 refugees, according to the most recent figures from the UN High Commissioner for Refugees.

Rovuma LNG Terminal

Despite the civil unrest and militarization in Cabo Delgado, two competing LNG liquefaction projects remain under development in Afungi Bay. In 2014, ExxonMobil, Eni, and other project partners began developing the 15.2 MTPA Rovuma LNG Terminal. In 2018, developers submitted the development plan for the project's first phase, approved by the government a year later. The final investment decision (FID) was originally expected in 2019, but in July 2020, ExxonMobil announced that the FID would be "delayed until market conditions improve" (GIIGNL 2021).

Although the project officially remains under active development, its future is uncertain. In April 2021, Fitch Solutions wrote in an investor note: "Due to persistent militant activity and uncertainty regarding project financing, we are sceptical about ExxonMobil's Rovuma LNG project starting to bear fruit in the near term, and consequently do not foresee an FID until 2023, with risks trending to the downside" (Daily Advent 2021). In May, Rystad Energy pushed back its forecasted start-up date for Rovuma from 2027 to 2029 (Luna 2021).

Coral South FLNG Terminal

ExxonMobil has a second liquefaction project under development in the area, the Coral South FLNG Terminal, a floating liquefaction terminal with an expected capacity of 3.4 MTPA, which remains under construction. As a floating LNG terminal, the project is being constructed off-site in South Korea, allowing developers to avoid any delays related to Cabo Delgado's civil unrest. In January 2020, developers announced the launch of the terminal's hull in Geoje, South Korea. At that time, construction was over 60% complete, and the terminal was still expected to begin commercial operations by 2022 (Mostyn 2020).

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Ownership

Ownership of global LNG export capacity in development is spread across at least 94 companies, with US companies representing six of the top ten, as shown in Table 6, based on prorated ownership shares and ranked by total amount of capacity in construction or pre-construction development. State-owned Qatar Petroleum is the largest developer, with 10.92 MTPA in construction and 48 MTPA in pre-construction development. The top 20 companies account for 64.7% of the export capacity under development globally.

Table 6. Top 20 Owners of LNG Export Terminals, Ranked by Capacity Under Development (MTPA)

Company	HQ Country	Proposed	Construction	Operating
Qatar Petroleum	Qatar	48.00	10.92	52.76
Venture Global LNG	USA	44.00	10.00	0.00
Sempra Energy	USA	26.17	0.00	6.78
Royal Dutch Shell	Netherlands	18.06	5.60	27.68
Total S.A.	France	20.82	1.98	19.30
Venture Global	USA	22.60	0.00	0.00
NextDecade	USA	22.50	0.00	0.00
Kuwait National Petroleum Company	Kuwait	0.00	22.00	0.00
Cheniere Energy	USA	11.48	9.50	35.00
Alaska Gasline Development Corporation	USA	20.10	0.00	0.00
Novatek	Russia	6.60	12.44	9.08
ExxonMobil	USA	12.83	5.53	22.25
Energy Transfer Equity	USA	17.78	0.00	0.00
Woodside Energy	Australia	17.27	0.00	7.95
Tellurian Inc.	USA	13.80	0.00	0.00
H-Energy	India	13.50	0.00	0.00
Golar LNG Limited	Bermuda	10.53	2.50	0.00
Rockies LNG Partners	Canada	12.00	0.00	0.00
Fairwood Group	India	12.00	0.00	0.00
EnergyWorld	Australia	11.50	0.50	0.00

Source: Global Fossil Infrastructure Tracker, May 2021

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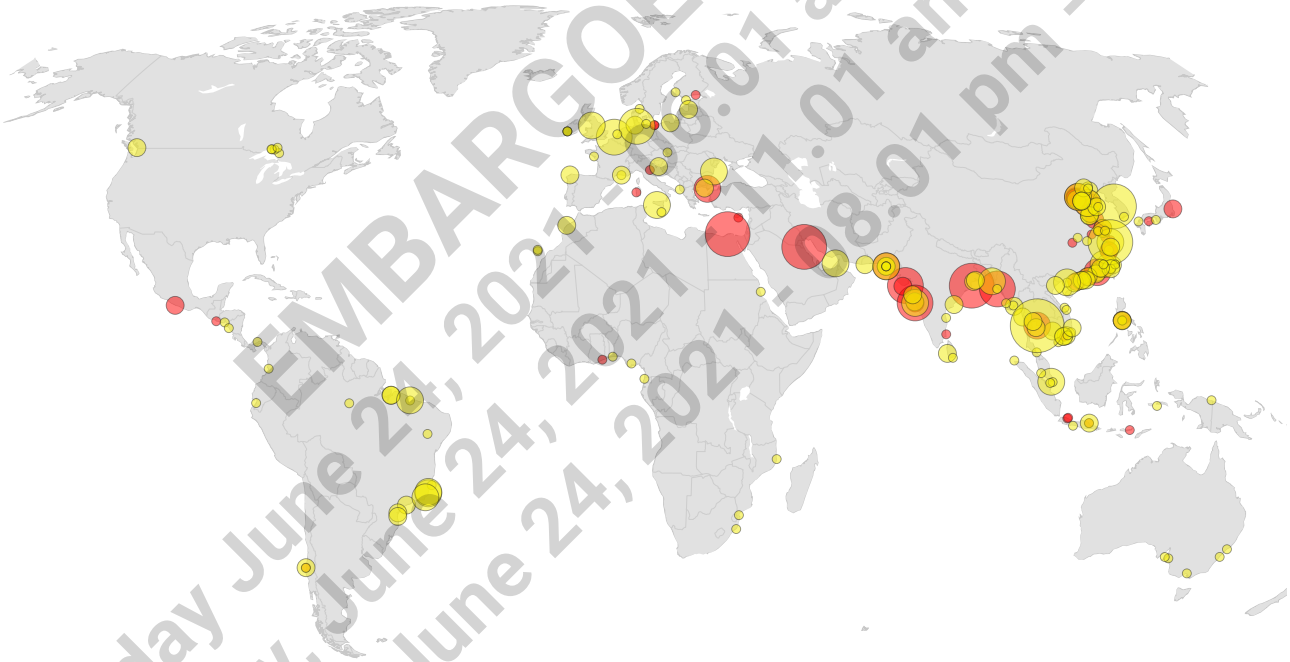
LNG IMPORT TERMINALS: MID-2021 UPDATE

As of May 2021, there was 910.1 MTPA of regasification capacity in operation globally. Despite effects of the Covid-19 pandemic lockdown, from mid-2020 to mid-2021, LNG import capacity under development grew to 635.5 MTPA, including 191.9 MTPA of regasification capacity under construction, and 443.6 MTPA of regasification capacity in the pre-construction stage.

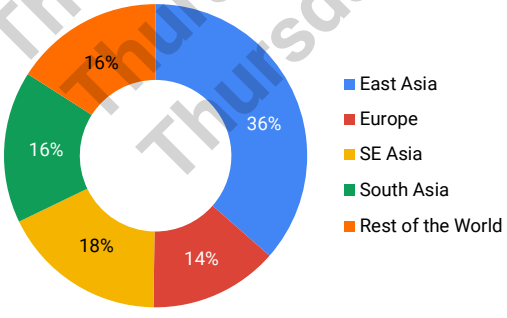
As shown in Figure 6, the majority of the operating regasification capacity is in East Asia (46.9%). It appears that East Asia will continue to dominate regasification capacity, as it is responsible for another 36.5% of global capacity in construction and pre-construction development. Overall, Asia is responsible for 70.3% of global LNG regasification capacity in construction or pre-construction, led overwhelmingly by China. (See Figure 7 and Table 7.)

Figure 5. LNG Import Terminals Under Development (red=construction, yellow=pre-construction)



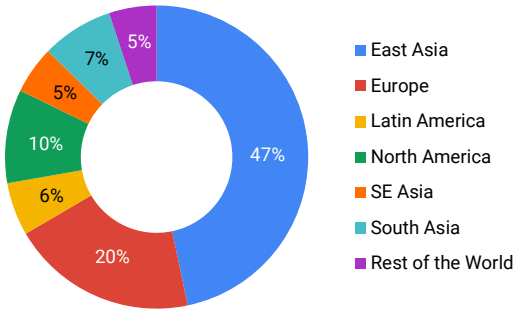
Source: Global Fossil Infrastructure Tracker, May 2021

Figure 6. Operating LNG Import Capacity by Region



Source: Global Fossil Infrastructure Tracker, May 2021

Figure 7. LNG Import Capacity In Development (Proposed + Construction) by Region



Source: Global Fossil Infrastructure Tracker, May 2021

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As shown in Table 8, from mid-2020 to mid-2021 at least 19 proposed regasification projects began construction, totaling 54.8 MTPA of regasification capacity. Of these, 18 (95%) are in Asia, and 10 (53%) are in China.

Table 7. Top 10 Countries by Under-Development LNG Import Capacity (Million Tonnes per Annum)

Country	Proposed	Construction	Operating
China	121.7	81.4	83.8
India	27.5	40.0	47.5
Thailand	37.8	7.5	11.5
Brazil	41.6	0.0	22.6
Pakistan	18.4	5.9	14.9
Vietnam	19.6	1.0	0.0
Myanmar	7.8	9.0	0.4
Germany	14.1	0.0	0.0
South Korea	11.6	0.0	102.5
Kuwait	0.0	11.3	5.8

Source: Global Fossil Infrastructure Tracker, May 2021

Table 8. LNG Import Terminals Entering Construction, Mid-2020 to Mid-2021

Country	Project	Capacity (MTPA)
China	Guangzhou Nansha LNG Terminal	1.0
China	Longkou LNG Terminal	6.0
China	Qidong LNG Terminal expansion II	1.0
China	Rudong LNG Terminal (Jiangsu Guoxin)	2.95
China	Tianjin LNG Terminal (Beijing Gas Group)	5.0
China	Wuhu LNG Terminal	1.5
China	Yangjiang LNG Terminal	2.8
China	Yantai LNG Terminal	5.0
China	Yueyang LNG Terminal	2.0
China	Zhoushan LNG Terminal expansion	2.0
Philippines	Filipinas FSRU LNG Gateway Project	unknown
Philippines	Philippines LNG Terminal	3.0
India	Karaikal LNG Terminal	1.0
Indonesia	Flores LNG Terminal	0.1
Japan	Niihama LNG Terminal	0.5
Myanmar	Rakhine LNG Terminal	9.0
Thailand	Nong Fab LNG Terminal	7.5
Turkey	Gulf of Saros FSRU	4.4
Vietnam	Hai Linh LNG Terminal	unknown

Source: Global Fossil Infrastructure Tracker, May 2021

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As shown in Table 9, during the same time period, 17.1 MTPA of regasification capacity came online. Five of the projects are in Asia, totaling 8.3 MTPA (49%) of newly added regasification capacity.

The most notable of these newly operating LNG import terminals is the first phase of the Krk LNG Terminal in Croatia, which began commercial operations despite a long opposition campaign from both grassroots organizations and environmental NGOs.

During the same time period, at least five regasification project proposals were cancelled. (See Table 10.) Of these, three were to be built in Europe. Ireland's Cork FSRU is particularly notable, given the large opposition it faced from grassroots resistance groups (Ashmore 2019), Ireland's Green Party (O'Riordan 2020), and others. A large part of the project's controversy centered around the FSRU's planned use of hydraulically fracked natural gas. Despite Ireland having banned the use of hydraulic fracturing as a natural gas extraction method, Cork FSRU intended to import LNG from the United States, which relies increasingly on hydraulic fracturing for its gas production (English 2020).

Although it garnered less international attention, the Crib Point LNG Terminal cancellation is also notable, since the Victoria, Australia government rejected the project due to environmental concerns.

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Table 9. LNG Import Terminals Beginning Operations, Mid-2020 to Mid-2021

Country	Project	Capacity (MTPA)
Croatia	Krk LNG Terminal, Phase I	2.0
Brazil	Porto do Açu FSRU	5.6
Puerto Rico	San Juan LNG Terminal	1.1
Indonesia	Hua Xiang-Zaynep Sultan LNG Terminal	0.1
Myanmar	Thaketa LNG-to-Power LNG Terminal	0.4
China	Qidong LNG Terminal expansion I	1.85
China	Shanghai Yangshan LNG Terminal expansion	3.0
China	Zhejiang Ningbo LNG Terminal expansion	3.0

Source: Global Fossil Infrastructure Tracker, May 2021

Table 10. Proposed LNG Import Terminals Cancelled, Mid-2020 to Mid-2021

Country	Project	Capacity (MTPA)
Australia	Crib Point LNG Terminal	1.75
Cyprus	Hoegh FSRU	unknown
Germany	Wilhelmshaven LNG Terminal	7.3
Ireland	Cork FSRU	4.0
Bangladesh	Moheshkhali Island Onshore LNG Terminal	7.5

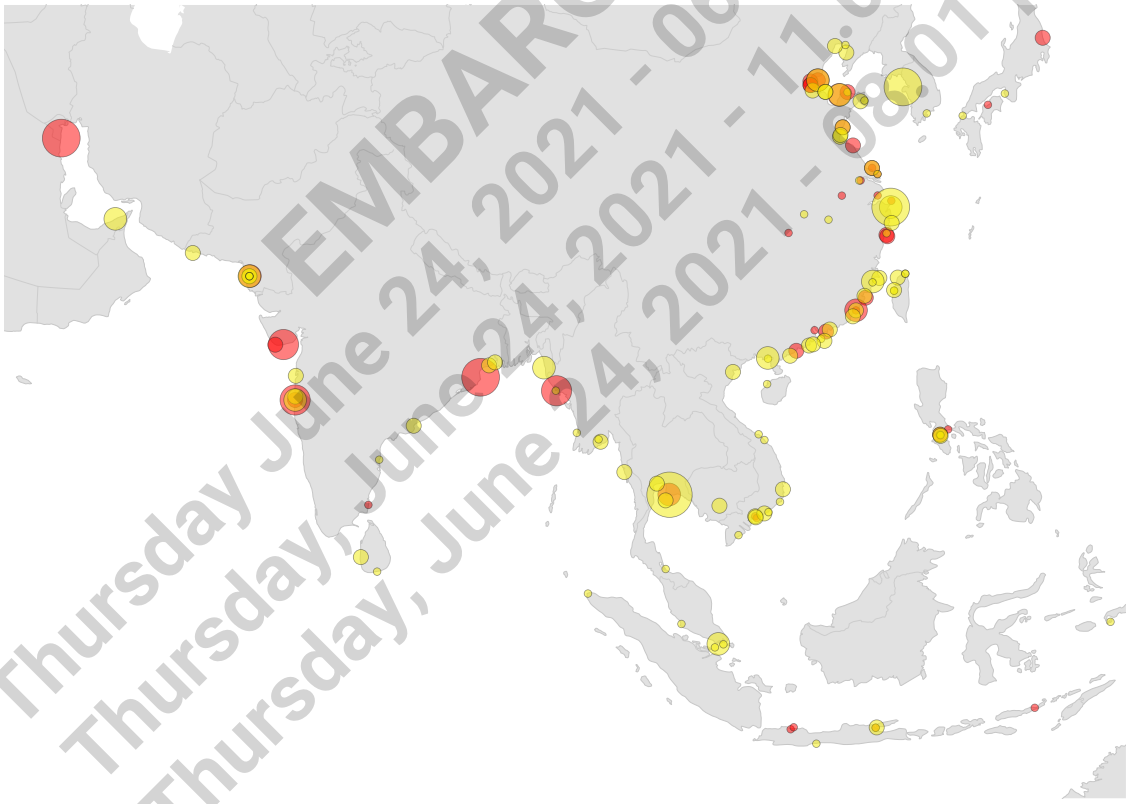
Source: Global Fossil Infrastructure Tracker, May 2021

Asia Leads the Way in LNG Import Development

As of May 2021, the top three countries responsible for global regasification capacity in construction or in pre-construction were in Asia: China (32% of the global regasification capacity), India (10.6%), and Thailand (7.1%). Furthermore, Asia is home to seven of the top 10 countries with the most regasification capacity in construction or pre-construction.

Asia's LNG import infrastructure is developing in step with the region's continuing economic growth, despite economic setbacks following the Covid-19 pandemic lockdown. Four of the five countries with the highest projected economic growth by 2025 are in Asia: India, Bangladesh, Vietnam, and Cambodia (Reynolds 2021). The International Monetary Fund (IMF) expects economic growth in 2021 to be 12.4% in India and 7.8% in China (The Week 2021). Deployment of floating gas infrastructure units (FSRUs) expedites rapid capacity expansion, since FSRUs require 10 to 20 fewer months from planning to operations than similarly sized onshore terminals, allowing them to be brought online in half the time (Offshore Magazine 2017).

Figure 8. LNG Import Terminals Under Development in Asia (red=construction, yellow=pre-construction)



Source: Global Fossil Infrastructure Tracker, May 2021

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Brazil Becomes a Hotspot for LNG Import Infrastructure

Brazil is the fourth largest developer of new LNG import terminals, with 13 projects under development.

Until March of 2021, Brazil's LNG import market was monopolized by Petrobras, the state's oil and gas firm, which imported LNG through its own FSRU terminals in Guanabara Bay, Bahia, and Pecem (Robinson 2021). Government regulations had not explicitly prohibited third-party imports, but Petrobras's control of onshore transportation had impeded third-party access to the country's natural gas pipeline network.

This changed in March of 2021 when Brazil approved the New Gas Law, a regulatory framework for natural gas that broke apart Petrobras's monopoly (Lenton 2020). The bill guaranteed open access to transmission pipelines, a market-based tariff plan, and other elements based on a liberalized competitive open-market paradigm (Molnar 2021).

Brazil is home to one of the world's biggest offshore oil developments, which gas developers consider an underdeveloped resource for oil-associated natural gas (Lenton 2020). As a result, third-party developers have been motivated to open Brazil's natural gas market. Brazil's domestic offshore natural gas production is expected to increase significantly by 2030, with LNG imports becoming increasingly unnecessary over that period (Rystad Energy 2020). Current projections suggest that imported LNG will act merely as a transition fuel while offshore natural gas resources are further developed, making FSRUs attractive to developers investing in Brazil's gas infrastructure. FSRUs are leased on contract and moved from one location to the next based upon demand. This saves developers the substantial investment required for building stationary onshore regasification terminals, which may only be needed temporarily.

As seen in Table 11, a total of 13 regasification projects are currently under development in Brazil, including eight FSRUs. These FSRUs comprise 37.8 MTPA of the 41.6 MTPA (91%) in construction or pre-construction.

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Table 11. LNG Import Terminals Under Development in Brazil, mid-2021

Project	Operational Status	Type	Estimated Start Year	Capacity (MTPA)
Celba LNG Terminal	Proposed	FSRU	2022	4.03
Cosan LNG Terminal	Proposed	FSRU	2022	3.76
Geramar LNG Terminal	Proposed	Onshore	2026	
Hidrovias do Brasil LNG Terminal	Proposed	FSRU		3.76
Imetame LNG Terminal	Proposed	Onshore	2025	
Itacoatiara LNG Terminal	Proposed	Onshore		
Paraná LNG Terminal	Proposed	Onshore		3.76
Porto Norte Fluminense LNG Terminal	Proposed	FSRU		5.64
Presidente Kennedy LNG Terminal	Proposed	FSRU		5.37
São Marcos Bay LNG Terminal	Proposed	FSRU		5.64
Suape and Petrolina Regasification Terminal Complex	Proposed	Onshore	2021	0.01
Tepor Macaé LNG Terminal	Proposed	FSRU		5.64
Terminal Gás Sul LNG Terminal	Proposed	FSRU	2022	4.03

Source: Global Fossil Infrastructure Tracker, May 2021

Ownership

Ownership of LNG import capacity in construction or pre-construction is dispersed among at least 190 companies. State-owned Sinopec is the largest developer, with 12.93 MTPA in construction and 16 MTPA in pre-construction.

Table 12 lists the top 20 owners, ranked by amount of capacity in construction or pre-construction. The top 20 companies account for 42% of the global import capacity under development. China-based companies dominate the list, with 7 of the 20 companies listed, or 35% of the global total.

The most notable change to the list since mid-2020 is the increased proportion of import capacity being advanced by Asia-based or Asia-focused companies outside of China, including companies headquartered in Thailand, South Korea, India, and Bangladesh. Together, these non-China Asian companies account for 30.3% of under-development import capacity in the top 20 list. Overall, Asia-based or Asia-focused companies are responsible for advancing 65.3% of under-development import capacity among the top 20 owners.

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Table 12. Top 20 Owners of LNG Import Capacity (Million Tonnes per Annum), mid-2021, by in Development Capacity

Company	HQ Country	Proposed	Construction	Operating
Sinopec	China	16.00	12.93	7.16
PTT Public Company Limited	Thailand	12.74	7.50	11.50
China National Petroleum Corporation	China	14.00	4.78	14.91
Gulf Energy Development	Thailand	18.06	0.00	0.00
Leif Höegh & Co	Norway	4.60	12.00	8.55
New Fortress Energy	USA	12.18	3.00	5.20
Caofeidian Xintian Liquefaction Natural Gas Company	China	7.00	7.00	0.00
Zhejiang Energy Group	China	12.00	1.53	1.74
KOGAS	South Korea	11.60	0.00	96.35
Kuwait National Petroleum Company	Kuwait	0.00	11.30	0.00
BP	United Kingdom	0.00	10.64	9.50
H-Energy	India	10.50	0.00	0.00
Energy Capital Vietnam	USA	0.75	9.00	0.00
China National Offshore Oil Corporation	China	3.00	5.89	16.73
Hanseatic Energy Hub	Germany	8.70	0.00	0.00
Fluxys	Belgium	8.55	0.00	9.52
GCL-Poly	China	3.00	5.00	0.00
China Huadian	China	6.90	1.00	0.00
Sharjah National Oil Corporation	United Arab Emirates	7.60	0.00	0.00
Petrobangla	Bangladesh	7.50	0.00	3.80

Source: Global Fossil Infrastructure Tracker, May 2021

Table 13. LNG Export and Import Capacity by Country and Developmental Status (MTPA), May 2021

	LNG Export Terminals			LNG Import Terminals		
Country	Proposed	Construction	Operating	Proposed	Construction	Operating
Algeria	0.0	0.0	29.3	0.0	0.0	0.0
Angola	0.0	0.0	5.2	0.0	0.0	0.0
Argentina	5.0	0.0	0.0	0.0	0.0	6.1
Australia	23.9	0.0	87.6	5.2	0.0	0.0
Azerbaijan	0.0	0.0	0.0	0.0	0.0	9.5
Bahrain	0.0	0.0	0.0	0.0	0.0	9.0
Bangladesh	0.0	0.0	0.0	7.5	0.0	7.3
Belgium	0.0	0.0	0.0	8.4	0.0	6.6
Benin	0.0	0.0	0.0	0.5	0.0	0.0
Brazil	0.0	0.0	0.0	41.6	0.0	22.6
Brunei	0.0	0.0	7.4	0.0	0.0	0.0
Cambodia	0.0	0.0	0.0	3.6	0.0	0.0
Cameroon	1.3	0.0	2.4	0.0	0.0	0.0
Canada	80.2	14.0	0.0	3.0	0.0	7.5
Chile	0.0	0.0	0.0	4.7	0.6	5.5
China	0.0	0.0	0.0	121.7	81.4	83.8
Colombia	0.0	0.0	0.0	0.0	0.0	3.8
Croatia	0.0	0.0	0.0	3.2	0.0	2.0
Cyprus	0.0	0.0	0.0	0.0	0.6	0.0
Denmark	0.0	0.0	0.0	0.1	0.0	0.0
Djibouti	7.0	3.0	0.0	0.0	0.0	0.0
Dominican Republic	0.0	0.0	0.0	0.0	0.0	1.9
Ecuador	0.0	0.0	0.0	0.4	0.0	0.0
Egypt	0.0	0.0	12.2	0.0	10.6	5.7
El Salvador	0.0	0.0	0.0	0.5	0.5	0.0
Equatorial Guinea	2.5	0.0	3.7	0.0	0.0	0.0
Estonia	0.0	0.0	0.0	1.8	0.0	0.0
Finland	0.0	0.0	0.0	0.0	0.1	0.5
France	0.0	0.0	0.0	7.8	0.0	26.6
Germany	0.0	0.0	0.0	14.1	0.0	0.0

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Table 13. LNG Export and Import Capacity by Country and Developmental Status (MTPA), May 2021 *– continued*

	LNG Export Terminals			LNG Import Terminals		
Country	Proposed	Construction	Operating	Proposed	Construction	Operating
Ghana	0.0	0.0	0.0	0.0	1.7	0.0
Gibraltar	0.0	0.0	0.0	0.0	0.0	0.1
Greece	0.0	0.0	0.0	4.5	0.0	3.7
India	0.0	0.0	0.0	27.5	40.0	47.5
Indonesia	11.0	4.3	19.5	6.9	3.0	16.3
Ireland	0.0	0.0	0.0	8.4	0.0	0.0
Israel	5.0	0.0	0.0	0.0	0.0	3.5
Italy	0.0	0.0	0.0	6.0	0.3	10.9
Ivory Coast	0.0	0.0	0.0	3.0	0.0	0.0
Jamaica	0.0	0.0	0.0	0.0	0.0	6.6
Japan	0.0	0.0	0.0	2.6	3.7	227.1
Jordan	0.0	0.0	0.0	0.0	0.0	3.8
Kuwait	0.0	22.0	0.0	0.0	11.3	5.8
Latvia	0.0	0.0	0.0	4.6	0.0	0.0
Lithuania	0.0	0.0	0.0	0.0	0.0	2.9
Malaysia	0.0	1.5	30.0	0.0	0.0	7.3
Malta	0.0	0.0	0.0	0.0	0.0	0.5
Mauritania	7.5	2.5	0.0	0.0	0.0	0.0
Mexico	33.5	7.0	0.0	0.0	3.0	17.1
Morocco	0.0	0.0	0.0	5.1	0.0	0.0
Mozambique	15.2	3.4	0.0	0.5	0.0	0.0
Myanmar	0.0	0.0	0.0	7.8	9.0	0.4
Netherlands	0.0	0.0	0.0	1.5	0.0	8.8
Nicaragua	0.0	0.0	0.0	0.5	0.0	0.0
Nigeria	7.6	0.0	22.2	0.0	0.0	0.0
Norway	0.0	0.0	4.7	0.0	0.0	0.5
Oman	0.0	0.0	10.4	0.0	0.0	0.0
Pakistan	0.0	0.0	0.0	18.4	5.9	14.9
Panama	0.0	0.0	0.0	0.0	0.0	1.5
Papua New Guinea	8.0	0.0	8.3	0.0	0.0	0.0

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Table 13. LNG Export and Import Capacity by Country and Developmental Status (MTPA), May 2021 *– continued*

	LNG Export Terminals			LNG Import Terminals		
Country	Proposed	Construction	Operating	Proposed	Construction	Operating
Peru	0.0	0.0	4.5	0.0	0.0	0.0
Philippines	0.0	0.0	0.0	6.0	4.5	0.0
Poland	0.0	0.0	0.0	3.3	1.8	3.6
Portugal	0.0	0.0	0.0	0.0	0.0	5.8
Qatar	48.0	0.0	77.4	0.0	0.0	0.0
Republic of Congo	1.2	0.0	0.0	0.0	0.0	0.0
Romania	0.0	0.0	0.0	6.0	0.0	0.0
Russia	25.9	35.4	28.9	0.0	0.0	2.7
Singapore	0.0	0.0	0.0	5.3	0.0	11.0
South Africa	0.0	0.0	0.0	1.0	0.0	0.0
South Korea	0.0	0.0	0.0	11.6	0.0	102.5
Spain	0.0	0.0	0.0	3.6	0.0	44.3
Sri Lanka	0.0	0.0	0.0	3.7	0.0	0.0
Sweden	0.0	0.0	0.0	0.0	0.0	0.6
Taiwan	0.0	0.0	0.0	10.8	0.0	13.5
Tanzania	10.0	0.0	0.0	0.0	0.0	0.0
Thailand	0.0	0.0	0.0	37.8	7.5	11.5
Trinidad and Tobago	0.0	0.0	15.3	0.0	0.0	0.0
Turkey	0.0	0.0	0.0	0.0	5.4	25.1
Turkmenistan	0.0	0.0	0.2	0.0	0.0	0.0
United Arab Emirates	0.0	0.0	7.6	7.6	0.0	9.8
United Kingdom	0.0	0.0	0.0	6.0	0.0	35.5
USA	278.7	35.1	71.6	0.0	0.0	66.7
Vietnam	0.0	0.0	0.0	19.6	1.0	0.0
Total	**571.5**	**128.2**	**448.3**	**443.6**	**191.9**	**910.1**

Source: Global Fossil Infrastructure Tracker, May 2021

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