Global Energy Monitor

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# Amid market turmoil, Asia's liquefied natural gas plans reach a fork in the road

Even as the European gas crisis upends the global liquefied natural gas (LNG) trade, Asia is still positioned to build the majority of new terminals to import LNG, according to a Global Energy Monitor (GEM) survey. In its annual survey of LNG terminals first analyzed in the Gas Bubble 2022 report, GEM finds that LNG projects totaling 442 million tonnes per annum (mtpa)[1] of new import capacity are at various stages of development in Asia, enough to theoretically absorb the entire global LNG trade of 2021. This US$119 billion investment could lock Asian economies into reliance on a volatile, insecure energy commodity and challenge global efforts to address the climate crisis. Asia's LNG plans form part of an estimated US$797 billion global buildout of LNG terminals, which is occurring even as the international community recently reaffirmed its commitment to limiting global warming to 1.5°C at the 2022 United Nations Climate Change Conference (COP 27).

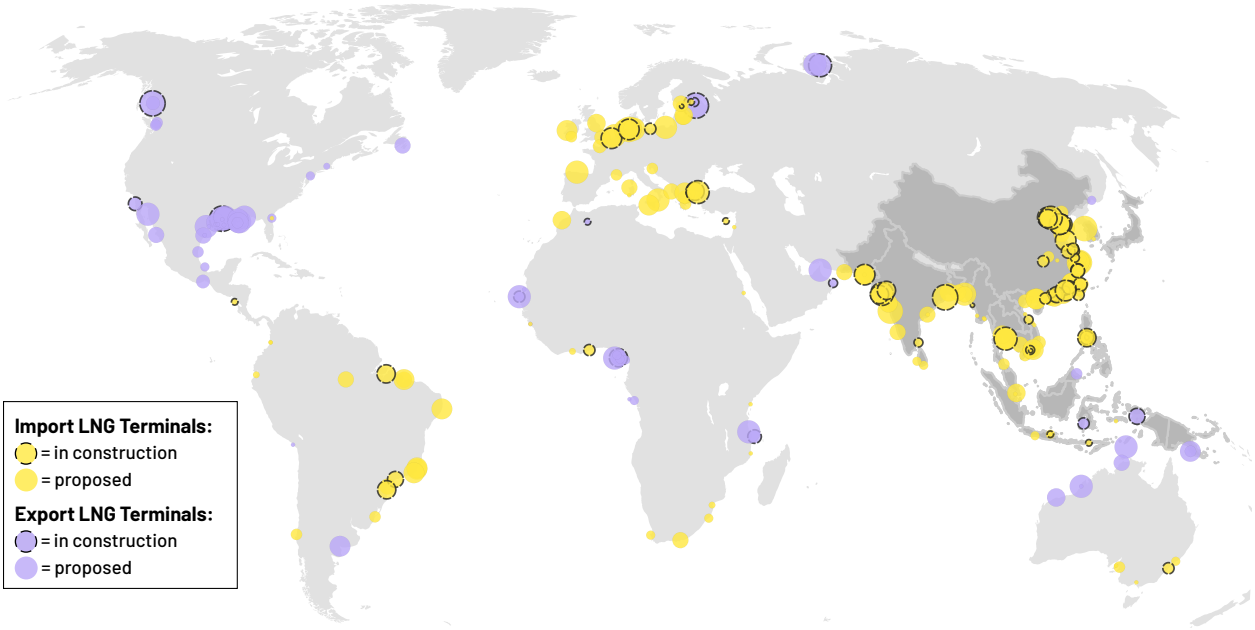
Over the past year, Asia's LNG market has been roiled by supply shortages, above all due to Europe's energy crisis. Asia's LNG plans have reached a fork in the road—pulled different directions by growing energy demand and painfully high costs—and how projects proceed will shape the region's energy trajectory for decades to come. On the basis of cost, energy security, and the climate, Asian economies would benefit from leapfrogging new gas developments directly to sustainable, clean energy.

1. For scale: 1 mtpa LNG is almost enough fuel to supply a 1-gigawatt (GW) gas-fired power plant (this is one-twelfth the generation capacity of Singapore). It is also enough fuel to produce the equivalent of 4 million tonnes of carbon dioxide, comparable to the annual emissions of 860,000 cars on the road. See Methodology for more information.

# Asia's LNG Plans

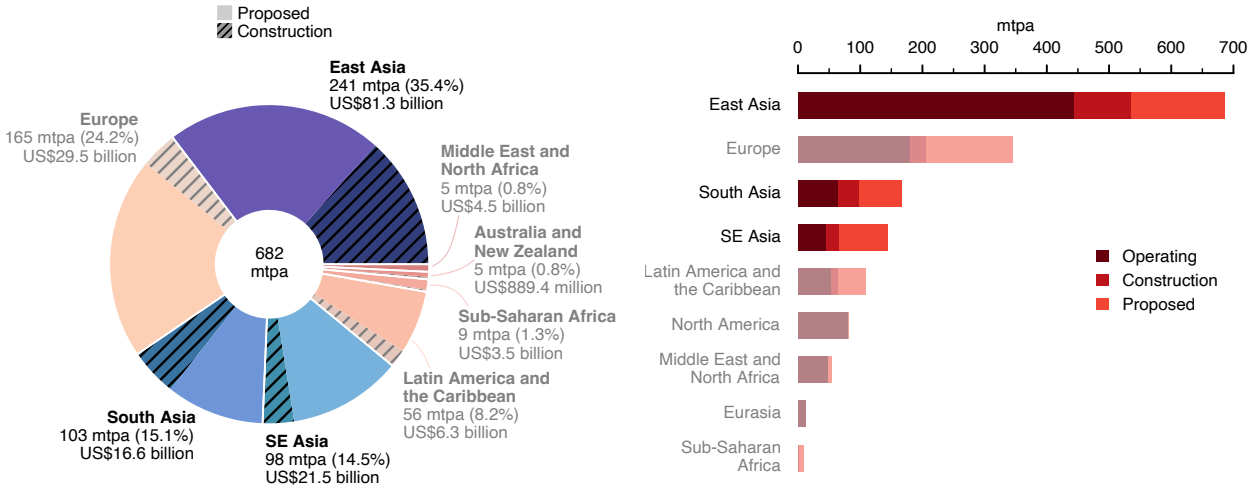
Already the largest LNG importing region in the world, Asia is home to 65% of the world's new LNG import terminals under development. Figure 1 shows the locations of individual LNG import and export projects in development in Asia and the rest of the world, with bubbles scaled according to projects' capacities. Figure 2 shows, by region, aggregate capacities and costs of all LNG import projects in development.

**Figure 1: Map of Global LNG Import and Export Development**




Source: Global Energy Monitor, Global Gas Infrastructure Tracker

**Figure 2: LNG Import Capacity in Development by Region**




Source: Global Energy Monitor, Global Gas Infrastructure Tracker

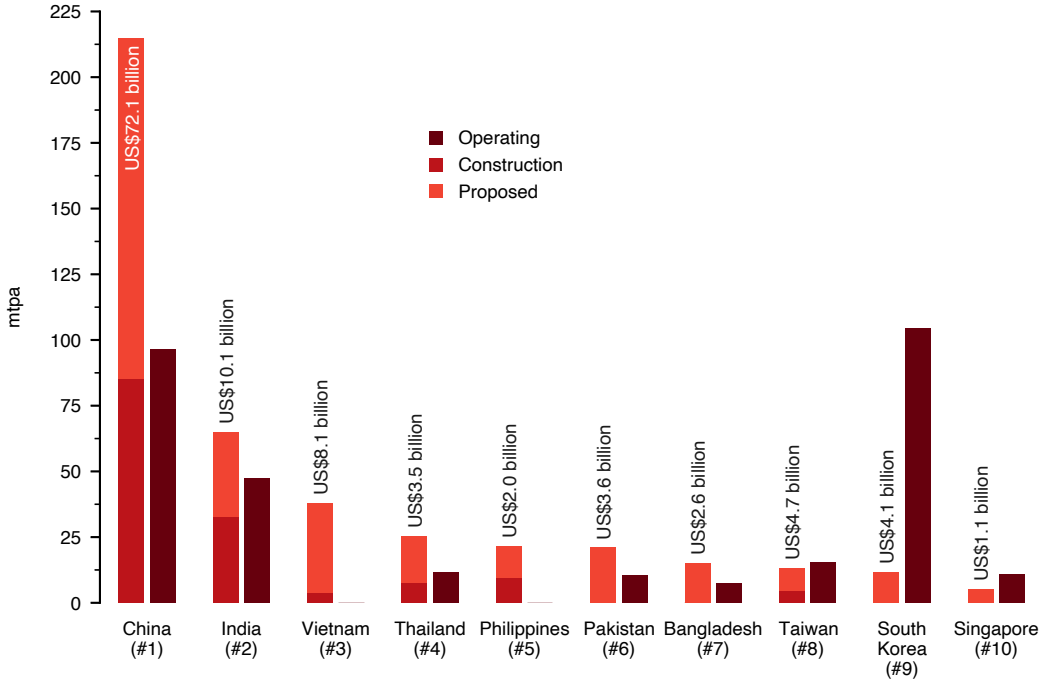
Where terminals are being planned and built illuminates Asia's and other regions' roles in the LNG market. The countries leading the development of new exporting facilities are in oil-and-gas-rich regions and seeking to cash in on growing demand: the United States (322.5 mtpa), Russia (133 mtpa), Canada (75.6 mtpa), Mexico (62.5 mtpa), and Qatar (49 mtpa). These countries comprise a mix of historical LNG exporters (i.e., the United States, Russia, and Qatar) along with relative newcomers to LNG exports (i.e., Canada and Mexico).

New LNG import projects are primarily concentrated in Asia (442 mtpa) and Europe (165 mtpa), which together account for almost 90% of all such projects in development globally. In Asia, plans for new LNG infrastructure are driven by growing energy demand, especially in the power and industrial sectors. In Europe, new import terminals are being built to ease its current shortfall of gas, above all for use in the building heating sector.

Figure 3 shows the top ten countries in Asia developing new LNG import capacity, along with estimated investment in these new facilities.

By far, the largest LNG buildout is planned in China, as the country seeks to expand its industrial sector, increase gas's role in building heating, and fuel a new fleet of gas-fired power plants. China's LNG import projects total 214.9 mtpa, estimated to cost US$72.1 billion, and amount to almost half of all such capacity in development in Asia. Other leading countries developing LNG import terminals include India, Vietnam, Thailand, the Philippines, and Pakistan. The world's largest historical LNG importer, Japan, is not shown in Figure 3 because it has no active projects in development, although it remains active, financing foreign LNG projects.

**Figure 3: Top Ten Asian Countries Developing LNG Import Terminals**




Source: Global Energy Monitor, Global Gas Infrastructure Tracker

## A Fork in the Road

It has been a turbulent year in the LNG market. Following Russia's invasion of Ukraine, European countries reliant on Russian gas imports strained an already tight market by struggling to secure alternative supplies, including LNG. Spot prices for LNG in Asia reached their highest levels ever in August. In recent months, countries like Japan have purchased LNG at extraordinary cost (e.g., US$130 million for one cargo); major LNG consumers like China and India have decreased imports by 20 and 18%, respectively;[2] and developing economies in Bangladesh and Pakistan have been priced out, failing to secure LNG shipments and resulting in rolling blackouts.

Asia's plans to build new LNG terminals have reached a fork in the road, pulled in different directions by market forces. Anticipating rising energy demand, Asia has enough LNG import projects in development to boost global LNG import capacity by nearly 50%, and a third of these projects (145 mtpa) are already in construction. LNG's adoption thus far has been motivated, in part, by its reputation as a "clean bridge fuel" from coal for Asia, despite the fact that its greenhouse gas emissions rival those of coal and that emissions from LNG-fired power contribute to poor air quality and premature deaths. And a report from the Intergovernmental Panel on Climate Change (IPCC) released in early 2022 states that new investments in fossil fuels, including LNG, will make it difficult, if not impossible, to avoid dangerous climate change.

At the same time, growing evidence suggests today's high LNG costs are wearing on the region's LNG ambitions. Forecasting agencies such as the International Energy Agency (IEA) and Rystad Energy have downgraded their estimates for Asia's future gas demand; and reports in countries like the Philippines and Bangladesh suggest that new LNG projects are being dropped or delayed due to poor economics. According to the IEA's latest outlook report for the fourth quarter of 2022, "With Europe and a handful of projects [elsewhere] absorbing the entire fleet of FSRUs until 2025, the outlook for South and Southeast Asia's floating terminal projects—which were already beset by a host of project and country-specific challenges—has further deteriorated." Since the beginning of 2022, just two 1-mtpa LNG import projects in Asia have been commissioned, and only 17.1 mtpa of new import capacity came online the year before that. The global gas supply crunch is not expected to ease for years.

Meanwhile, the cost of renewable energy continues to fall, such that it is now cheaper than fossil fuel alternatives in countries including China, India, Thailand, and Vietnam. According to a report by Ember and two other organizations, the contribution of solar energy in seven Asian countries—China, India, Japan, South Korea, Vietnam, the Philippines, and Thailand—avoided potential fossil fuel costs of US$34 billion over the first half of 2022.

From unaffordable LNG prices to climate disasters, the events of 2022 have underscored the risks of LNG consumption. Asia's US$119 billion buildout of LNG import terminals would represent an enormous step toward doubling down on gas over the coming decades. As renewable energy continues to grow more affordable and secure, Asian economies would benefit from meeting new demand with clean energy, insulated from the volatility of global fossil markets, and ultimately more sustainable investments in the global energy transition.

2. High LNG prices are a major factor in China's declining imports, if not the only one, alongside an economic slowdown due to COVID-19 restrictions, policy support for coal, and a warmer-than-usual winter.

## Methodology

Data on LNG terminals are based on GEM's Global Gas Infrastructure Tracker (GGIT) as of July 2022, with minor updates as of September 2022. The July 2022 data are distributed under a Creative Commons CC BY-NC-SA 4.0 License and can be downloaded here. For more information see the GGIT Methodology page. Region definitions are derived from IEA's World Energy Outlook 2021 and provided in the Appendix tables. For information on GEM's estimates of investment in LNG terminals, see the LNG Update 2022 Cost Methodology page. The emissions calculation in Footnote 1 is based on the methodology from the GEM report Asia's Gas Lock-In.

## Acknowledgments

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## About Global Energy Monitor

Global Energy Monitor is a nonprofit research organization developing information on fossil fuel projects and alternatives worldwide. GEM data are used by the IEA, OECD Environment Directorate, UN Environment Programme, US Treasury Department, World Bank, Economist Intelligence Unit, and Bloomberg New Energy Finance. GEM data are also licensed by Bloomberg LP and UBS Evidence Lab.

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# Appendix

The following tables present capacity data and estimated capital expenditures for LNG projects in countries in Asia. Data in Tables 1 and 2 are for import terminals and data in Tables 3 and 4 are for export terminals. Global summary data are available in the GGIT Summary Tables and the Gas Bubble 2022: U.S. Edition report.

**Table 1: LNG Import Capacity by Status and Asian Country**

| Country | Region | Proposed (mtpa) | Construction (mtpa) | Proposed + Construction (mtpa) | Shelved (mtpa) | Cancelled (mtpa) | Operating (mtpa) |
|---|---|---|---|---|---|---|---|
| Bangladesh | South Asia | 15.1 | | 15.1 | | 26.3 | 7.3 |
| Bhutan | South Asia | | | | | | |
| Brunei | SE Asia | | | | | | |
| Cambodia | SE Asia | 3.6 | | 3.6 | | | |
| China | East Asia | 129.7 | 85.3 | 214.9 | 25.8 | 45.9 | 96.3 |
| Chinese Taipei | East Asia | | | | | | |
| Guam | SE Asia | | | | | | |
| Hong Kong | East Asia | | 1.2 | 1.2 | | | |
| India | South Asia | 32.0 | 33.0 | 65.0 | 5.0 | 46.7 | 47.5 |
| Indonesia | SE Asia | 4.3 | 0.4 | 4.7 | 1.4 | 15.2 | 14.9 |
| Japan | East Asia | | | | | 8.6 | 227.7 |
| Laos | SE Asia | | | | | | |
| Macao | East Asia | | | | | | |
| Malaysia | SE Asia | | | | | 0.8 | 7.3 |
| Mongolia | East Asia | | | | | | |
| Myanmar | SE Asia | | | | 4.0 | | 0.4 |
| Nepal | South Asia | | | | | | |
| North Korea | East Asia | | | | | | |
| Pakistan | South Asia | 21.0 | | 21.0 | 0.7 | 8.0 | 10.4 |
| Papua New Guinea | SE Asia | | | | | | |
| Philippines | SE Asia | 11.8 | 9.8 | 21.6 | 3.0 | 4.4 | |
| Singapore | SE Asia | 5.3 | | 5.3 | | | 11.0 |
| South Korea | East Asia | 11.6 | | 11.6 | | | 104.6 |
| Sri Lanka | South Asia | 1.7 | | 1.7 | 2.7 | | |
| Taiwan | East Asia | 8.5 | 4.8 | 13.3 | | | 15.5 |
| Thailand | SE Asia | 17.8 | 7.5 | 25.3 | | 8.0 | 11.5 |
| Timor-Leste | SE Asia | | | | | | |
| Vietnam | SE Asia | 34.0 | 4.0 | 38.0 | | | |
| **Total** | | **296.3** | **145.9** | **442.2** | **42.6** | **163.8** | **554.4** |

**Table 2: Cost Estimates for LNG Import Capacity in Development by Asian Country**

| Country | Region | Proposed (US$ billion) | Construction (US$ billion) | Proposed + Construction (US$ billion) | Shelved (US$ billion) | Cancelled (US$ billion) | Operating (US$ billion) |
|---|---|---|---|---|---|---|---|
| Bangladesh | South Asia | 2.6 | | 2.6 | | 4.1 | 0.7 |
| Bhutan | South Asia | | | | | | |
| Brunei | SE Asia | | | | | | |
| Cambodia | SE Asia | 0.7 | | 0.7 | | | |
| China | East Asia | 42.9 | 29.2 | 72.1 | 7.1 | 15.5 | 35.1 |
| Chinese Taipei | East Asia | | | | | | |
| Guam | SE Asia | | | | | | |
| Hong Kong | East Asia | | 0.4 | 0.4 | | | |
| India | South Asia | 4.4 | 5.7 | 10.1 | 0.8 | 8.2 | 10.2 |
| Indonesia | SE Asia | 1.6 | 0.1 | 1.7 | 0.2 | 2.9 | 2.3 |
| Japan | East Asia | | | | | 3.0 | 80.1 |
| Laos | SE Asia | | | | | | |
| Macao | East Asia | | | | | | |
| Malaysia | SE Asia | | | | | 0.2 | 1.1 |
| Mongolia | East Asia | | | | | | |
| Myanmar | SE Asia | 4.5 | | 4.5 | 2.1 | | 0.1 |
| Nepal | South Asia | | | | | | |
| North Korea | East Asia | | | | | | |
| Pakistan | South Asia | 3.6 | | 3.6 | 0.1 | 1.4 | 1.4 |
| Papua New Guinea | SE Asia | | | | | | |
| Philippines | SE Asia | 1.2 | 0.8 | 2.0 | 0.6 | 3.3 | |
| Singapore | SE Asia | 1.1 | | 1.1 | | | 1.7 |
| South Korea | East Asia | 4.1 | | 4.1 | | | 34.0 |
| Sri Lanka | South Asia | 0.2 | | 0.2 | 0.9 | | |
| Taiwan | East Asia | 3.0 | 1.7 | 4.7 | | | 5.4 |
| Thailand | SE Asia | 2.4 | 1.0 | 3.5 | | 1.1 | 2.1 |
| Timor-Leste | SE Asia | | | | | | |
| Vietnam | SE Asia | 7.2 | 0.9 | 8.1 | | | |
| **Total** | | **79.5** | **39.8** | **119.4** | **11.8** | **39.8** | **174.1** |

**Table 3: LNG Export Capacity by Status and Asian Country**

| Country | Region | Proposed (mtpa) | Construction (mtpa) | Proposed + Construction (mtpa) | Shelved (mtpa) | Cancelled (mtpa) | Operating (mtpa) |
|---|---|---|---|---|---|---|---|
| Bangladesh | South Asia | | | | | | |
| Bhutan | South Asia | | | | | | |
| Brunei | SE Asia | | | | | | 7.4 |
| Cambodia | SE Asia | | | | | | |
| China | East Asia | | | | | | |
| Chinese Taipei | East Asia | | | | | | |
| Guam | SE Asia | | | | | | |
| Hong Kong | East Asia | | | | | | |
| India | South Asia | | | | | | |
| Indonesia | SE Asia | 9.5 | 5.8 | 15.3 | | 3.0 | 19.5 |
| Japan | East Asia | | | | | | |
| Laos | SE Asia | | | | | | |
| Macao | East Asia | | | | | | |
| Malaysia | SE Asia | 2.0 | | 2.0 | | | 31.5 |
| Mongolia | East Asia | | | | | | |
| Myanmar | SE Asia | | | | | | |
| Nepal | South Asia | | | | | | |
| North Korea | East Asia | | | | | | |
| Pakistan | South Asia | | | | | | |
| Papua New Guinea | SE Asia | 8.0 | | 8.0 | 1.5 | 6.0 | 8.3 |
| Philippines | SE Asia | | | | | | |
| Singapore | SE Asia | | | | | | |
| South Korea | East Asia | | | | | | |
| Sri Lanka | South Asia | | | | | | |
| Taiwan | East Asia | | | | | | |
| Thailand | SE Asia | | | | | | |
| Timor-Leste | SE Asia | | | | | 3.6 | |
| Vietnam | SE Asia | | | | | | |
| **Total** | | **19.5** | **5.8** | **25.3** | **1.5** | **12.6** | **66.7** |

**Table 4: Cost Estimates for LNG Export Capacity in Development by Asian Country**

| Country | Region | Proposed (US$ billion) | Construction (US$ billion) | Proposed + Construction (US$ billion) | Shelved (US$ billion) | Cancelled (US$ billion) | Operating (US$ billion) |
|---|---|---|---|---|---|---|---|
| Bangladesh | South Asia | | | | | | |
| Bhutan | South Asia | | | | | | |
| Brunei | SE Asia | | | | | | 4.4 |
| Cambodia | SE Asia | | | | | | |
| China | East Asia | | | | | | |
| Chinese Taipei | East Asia | | | | | | |
| Guam | SE Asia | | | | | | |
| Hong Kong | East Asia | | | | | | |
| India | South Asia | | | | | | |
| Indonesia | SE Asia | 20.0 | 2.4 | 22.4 | | 1.7 | 13.7 |
| Japan | East Asia | | | | | | |
| Laos | SE Asia | | | | | | |
| Macao | East Asia | | | | | | |
| Malaysia | SE Asia | 2.0 | | 2.0 | | | 18.5 |
| Mongolia | East Asia | | | | | | |
| Myanmar | SE Asia | | | | | | |
| Nepal | South Asia | | | | | | |
| North Korea | East Asia | | | | | | |
| Pakistan | South Asia | | | | | | |
| Papua New Guinea | SE Asia | 14.5 | | 14.5 | 0.9 | 8.3 | 19.0 |
| Philippines | SE Asia | | | | | | |
| Singapore | SE Asia | | | | | | |
| South Korea | East Asia | | | | | | |
| Sri Lanka | South Asia | | | | | | |
| Taiwan | East Asia | | | | | | |
| Thailand | SE Asia | | | | | | |
| Timor-Leste | SE Asia | | | | | 2.0 | |
| Vietnam | SE Asia | | | | | | |
| **Total** | | **36.6** | **2.4** | **38.9** | **0.9** | **12.0** | **55.6** |