

# Exhibit L



**Institute for Energy Economics  
and Financial Analysis**

# **Global LNG Outlook 2023-27**

*High Prices Create New Risks to Demand Growth*

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## Key Findings

**Russia's invasion of Ukraine upended global LNG markets last year—spurring Europe to buy record amounts of LNG and pushing up prices to their highest level ever.**

**In Asia, LNG has now earned a reputation as an expensive and unreliable fuel source, clouding future demand.**

**The EU is taking aggressive steps to trim gas consumption, which could render new LNG import capacity unneeded.**

**Although LNG markets may remain tight for several years, a wave of new projects coming online in 2025-27 will likely encounter weaker-than-expected demand—elevating the risk of lower prices and profits for LNG suppliers and traders.**



## Executive Summary

Russia's invasion of Ukraine in February 2022 upended global liquefied natural gas (LNG) markets. As Russia slashed pipeline gas shipments to the European Union, EU buyers purchased record volumes of LNG to replace lost Russian supplies. Europe's red-hot demand drove global LNG spot prices to record levels, and squeezed the volumes available to developing economies.

High prices and supply disruptions have consequences. In many Asian nations, LNG has now acquired a reputation as a costly and unreliable fuel. Proposed LNG import projects in the region now face increased delay and cancellation risks, while governments in key LNG growth markets have announced new policies designed to limit dependence on global gas imports. This has clouded prospects for long-term demand in the regions that the global LNG industry had been counting on for robust growth:

- **Japan and South Korea**, which have historically anchored global LNG demand, plan to reduce LNG purchases while boosting nuclear, wind, and solar power generation to achieve energy security, economic growth, and decarbonization goals.
- **China** cut its purchases of LNG by 20% last year, due to a combination of high prices, COVID-19 shutdowns, and slower economic growth. Prolonged high LNG prices have encouraged the country to rely more heavily on lower-cost Russian pipeline imports and domestic gas production, putting downward pressure on the country's LNG demand growth.
- **South Asia**, including India, Pakistan, and Bangladesh, slashed LNG purchases by 16% last year. Many buyers in the region withdrew from spot markets altogether, and suppliers under long-term contracts often defaulted on cargo deliveries to obtain higher profits in other markets. Rising concerns over fuel supply security and affordability of LNG have downgraded the prospects for LNG demand growth in the region.
- **Southeast Asia's** demand growth faces challenges related to high prices, limited LNG contract availability and infrastructure constraints. Long-term contracts with deliveries

before 2026 are reportedly sold out globally, meaning price-sensitive Southeast Asian buyers risk high exposure to volatile, expensive spot markets.

For the next several years, global LNG markets will see modest supply additions, even as European nations continue to import significant LNG volumes to replace lost Russian pipeline gas. IEEFA anticipates that weak supply growth and robust demand will keep global LNG prices structurally elevated for several years. High prices will put sustained downward pressure on Asian demand growth, particularly among price-sensitive emerging markets that were widely expected to be the primary drivers of global LNG demand.

As high prices continue to alienate Asian buyers, European policymakers are moving aggressively to reduce gas consumption, driven by the triple imperative to cut energy costs, bolster energy security, and meet emissions reduction targets. Despite Europe's short-term LNG buying frenzy to replace lost pipeline imports from Russia, climate and energy initiatives are likely to cause LNG demand growth on the continent to stabilize and reverse later this decade.

**IEEFA expects that sustained high global LNG prices; weak LNG demand growth and elevated price sensitivity in Asia; declines in gas consumption in Europe; and a multi-year string of global capital investments in cost-competitive energy alternatives will undermine global LNG demand growth over the next several years.**

After several years of weak supply growth, IEEFA anticipates that the global LNG market will see a tidal wave of new projects come online starting in mid-2025. The wave will likely crest in 2026, with the addition of 64 million metric tons of annual liquefaction capacity—the most in the history of the global LNG industry. The supply additions will boost global liquefaction capacity by roughly 13% in a single year.

Liquefaction projects targeting in-service after 2026 may be entering a much smaller demand pool than bullish market forecasts anticipate. As new supply floods the market, today's tight markets may give way to a supply glut, with lower-than-anticipated prices, smaller netbacks, tighter margins, and lower profits for LNG exporters.

## Global LNG Supply

Global LNG supply growth has entered a two-year slump, with relatively little new liquefaction capacity being added through mid-2025. The current downturn will be followed by the largest supply additions in the history of the LNG industry, driven primarily by new projects in the U.S. and Qatar. In 2026 alone, new liquefaction capacity additions will exceed the preceding five years combined. Until significant new supply comes online later this decade, global LNG markets will likely remain tight, and markets may face periodic disruptions due to reliability and feedstock challenges at existing LNG facilities.

## IEEFA Outlook

The global LNG industry has entered a two-year lull in new supply additions. Five new export-scale LNG projects are expected to come online over the next two years, adding a scant 5.8 million metric tons per annum (mtpa) of liquefaction capacity in 2023 and 9.1 mtpa in 2024:

- Train 3 of BP's Tangguh LNG project in Indonesia is expected to be online in March 2023, adding 3.8 mtpa of liquefaction capacity.<sup>1</sup>
- Eni expects its 0.6 mtpa Tango LNG terminal to enter service in late 2023.<sup>2</sup>
- New Fortress Energy has told investors that its Altamira "Fast LNG" project in Mexico could begin operating in 2023, adding 1.4 mtpa of capacity.<sup>3</sup>
- The 2.5 mtpa Greater Tortue Ahmeyim (GTA) LNG project off the coast of Mauritania and Senegal was previously slated to enter service in 2023 but has been delayed until 2024.<sup>4</sup>

<sup>1</sup> Energy Voice. [BP's Tangguh LNG Train 3 to start-up in March](#). November 20, 2022.

<sup>2</sup> Eni. [Eni acquires the Tango FLNG to produce and export LNG from the Republic of Congo](#). August 5, 2022.

<sup>3</sup> New Fortress Energy. [NFE Finalizes Agreements with CFE in Mexico, Including Plans for Offshore FLNG Hub Near Altamira](#). October 28, 2022.

<sup>4</sup> Natural Gas Intelligence. [BP, Kosmos Expecting First LNG from Mauritania and Senegal Project by Early 2024](#). August 26, 2022.

- Russia's Arctic LNG 2 project may be able to bring one 6.6 mtpa train online over the next two years, but the fleet of specialized ice-class LNG carriers being built for the project will not be delivered until 2024 at the earliest.<sup>5</sup>

The five projects will boost global LNG production capacity by just 3% over two years, from roughly 456 mtpa to 471 mtpa—the slowest pace of global LNG supply growth since 2014.

The near-term slowdown in new LNG supply stems primarily from the worldwide LNG market downturn in 2019 and 2020. During 2019, rising global supplies collided with weak demand to create a global LNG glut, marked by falling LNG prices and tumbling profits for LNG traders.<sup>6</sup> In fall 2019, LNG market analysts predicted that the LNG glut could last as long as five years.<sup>7</sup> By summer 2020, after COVID-19 had battered the world economy, global LNG markets were in such severe oversupply that several U.S. LNG plants stopped operating due to lack of demand.<sup>8</sup>



**The near-term slowdown in new LNG supply additions stems from the worldwide LNG market downturn in 2019 and 2020.**

During this LNG glut, few new LNG export projects were sanctioned. And since it typically takes several years to bring new LNG projects online, the 2019-20 market dip means fewer projects will be coming online for the next several years. Speeding up construction causes costs to skyrocket, so even last year's record-high LNG prices did little to quicken the pace of project completion.

Following two years of slow supply growth, IEEFA forecasts that 2025 will mark the beginning of a three-year wave of new LNG export projects. Some of the plants coming online during the upcoming boom started construction before the 2019 downturn. Others are shorter-cycle

<sup>5</sup> The Barents Observer. [Arctic tanker trouble for Novatek's new flagship project](#). December 16, 2022.

<sup>6</sup> Bloomberg. [Natural Gas Prices Are Crashing Everywhere as Market Suffers 'Winter Hangover.'](#) March 29, 2019. Reuters. [Pavilion cancels U.S. LNG cargo loading as market faces oversupply](#). November 19, 2019.

<sup>7</sup> Natural Gas Intelligence. [Global Natural Gas Glut May Linger Five Years, Threatening U.S. Cargoes in 2020](#). September 17, 2019.

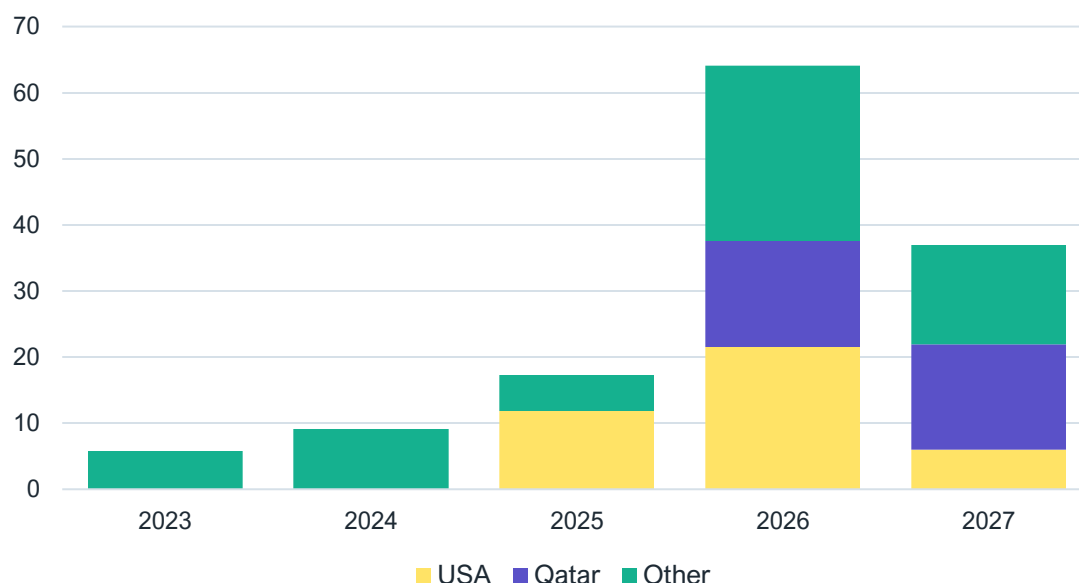
<sup>8</sup> U.S. Energy Information Administration. [U.S. liquefied natural gas exports remain at low levels this summer](#). August 11, 2020.



projects launched last year. The projects span the globe, including the U.S. Gulf Coast, Qatar, Australia, Canada, Nigeria, Mexico, Mozambique, and Russia.

IEEFA anticipates that roughly 17 mtpa of liquefaction projects are likely to come online around the world in 2025—more than in 2023 and 2024 combined. New capacity additions will crest in 2026, with an estimated 64 mtpa of capacity coming online in a single year, and continue into 2027, when 37 mtpa of new capacity is expected to begin operating (Figure 1).

**Figure 1: Forecasted Liquefaction Capacity Additions (mtpa) 2023-27**



*Source: IEEFA estimates from S&P Global Commodity Insights, International Gas Union, news reports and company announcements.*

These figures primarily represent projects that are already under construction. Many additional projects are on the drawing board, some of which have gathered commercial and contracting momentum. If any of the projects are sanctioned over the coming year, they will add to the tsunami of new global LNG capacity after mid-2025.

Amid this surge, several regions deserve special notice.

**United States.** With seven industrial-scale LNG plants already operating and liquefaction capacity totaling more than 92 mtpa, the U.S. has emerged as one of the globe's top three LNG

exporters. The U.S. would likely have claimed the top spot among global exporters in 2022 if the 15 mtpa Freeport LNG project hadn't shut down after a massive June explosion.<sup>9</sup>

LNG developers in the U.S. and Mexico are currently building four projects that will rely on U.S. gas supplies, including the Plaquemines LNG and Golden Pass LNG projects on the U.S. Gulf Coast, an expansion of the Corpus Christi LNG terminal in Texas, and the Energía Costa Azul LNG project on Mexico's Baja Peninsula. Together, the projects will add roughly 42 mtpa of new liquefaction capacity, meaning that the U.S. gas is slated to outpace all other nations in LNG supply growth through 2027. Once the four projects are completed, total U.S. gas exports, including both pipeline exports and LNG, could equal 30% of today's domestically available gas supply.<sup>10</sup>

The LNG industry is pursuing more than a dozen additional major LNG projects sourced with U.S. gas, including at least five projects that have secured long-term contracts for the majority of their planned supply—a key precursor to securing financing for construction. If any of the projects move forward, U.S. gas exports will rise even further.

U.S. LNG projects draw from the same gas pipeline and supply network that supplies the majority of domestic gas buyers. As a result, U.S. consumers must compete directly with exporters for limited gas supplies. During 2022, the rapid growth of U.S. gas exports tightened domestic natural gas markets, pushing U.S. benchmark gas prices to their highest levels in more than a decade and creating financial hardships for household gas consumers and gas-dependent industries.<sup>11,12</sup> U.S. gas prices have eased in recent months, but could rise again as export volumes grow. Almost 70% of oil and gas executives surveyed by the Dallas Federal Reserve Bank last year warned that rising LNG exports would bring the era of low U.S. natural gas prices to a close by 2025.<sup>13</sup>

<sup>9</sup> Reuters. [Freeport LNG plant blast adds to strain on global supplies](#). June 9, 2022.

<sup>10</sup> IEEFA estimate based on U.S. Energy Information Administration. [Natural Gas](#). Accessed January 2023.

<sup>11</sup> U.S. Energy Information Administration. [U.S. natural gas bills will increase in all regions this winter](#). October 17, 2022.

<sup>12</sup> Industrial Energy Consumers of America. [LNG Exports Increase Natural Gas Prices by 290 Percent in Two Years](#). October 18, 2022.

<sup>13</sup> Federal Reserve Bank of Dallas. [Dallas Fed Energy Survey](#). September 28, 2022.

In theory, a tightening of U.S. gas markets could result in a cruel irony: U.S. natural gas prices that are high enough to pinch domestic consumers and slash LNG trading profits, but not quite high enough for contracted buyers stop buying U.S. LNG. However, if gas prices rise high enough, U.S. LNG could become globally uncompetitive and the country's LNG projects may be turned off entirely—as happened during the global LNG supply glut in the summer of 2020, when U.S. projects operated at roughly 30% capacity.<sup>14</sup>

**Australia.** In 2022, Australia led the world in LNG exports for the fourth consecutive year, with almost 84 million metric tons (mt) shipped from 10 projects. Due to geographical proximity, Australia's major export markets are in Asia, particularly Japan and China, which accounted for two-thirds of Australia's exports in 2022 and more than three-quarters in previous years. South Korea and Taiwan are rising in importance for Australia as well, and together imported one-quarter of Australia's LNG export shipments in 2022.

**Table 2: Australian LNG Exports by Destination Country**

	2018	2019	2020	2021	2022
<b>Japan</b>	31.0	31.5	30.6	28.3	32.1
<b>China (Mainland)</b>	25.1	30.6	31.4	33.8	23.3
<b>South Korea</b>	8.5	8.3	8.7	10.1	12.7
<b>Taiwan</b>	2.8	4.5	4.9	6.5	8.1
<b>Singapore</b>	2.1	1.9	2.4	2.4	2.7
<b>Malaysia</b>	0.9	1.6	2.0	1.6	2.2
<b>All Others</b>	1.9	2.0	1.8	1.2	2.7
<b>Total Exports</b>	<b>72.3</b>	<b>80.4</b>	<b>81.8</b>	<b>83.9</b>	<b>83.7</b>

*Source: IEEFA estimates based on S&P Global Commodity Insights data.*

Despite leading the world in LNG exports for the last several years, Australia will see muted supply growth for the next several years. Only one major Australian LNG supply project, the 5 mtpa expansion of Pluto LNG scheduled to come online in 2026, is under construction. According to the Office of the Chief Economist, the outlook for Australian LNG exports is flat through 2023-24:

<sup>14</sup> U.S. Energy Information Administration. [U.S. liquefied natural gas exports remain at low levels this summer](#). August 11, 2020.

“Australia’s LNG exports are forecast to ease ... as field depletion issues at Darwin LNG offset higher utilisation rates at other Australian LNG facilities. Volumes are forecast to stabilize ... in 2023–24, with no significant changes expected until the North West Shelf depletes (and a second train at Pluto LNG comes online) beyond the outlook period.”<sup>15</sup>

Australia’s LNG industry faces significant supply uncertainties starting in 2025. Woodside Energy faces feedstock declines from the field supplying its NW Shelf gas project, but questions remain about whether the company will be able to secure gas from third-party providers for the project. The company also faces questions about the timing of its planned Scarborough upstream gas project that is intended to feed the Pluto LNG expansion. Meanwhile, Darwin LNG faces feedstock declines unless it can secure additional supplies from the deeply troubled Barossa gas project.

**Qatar.** Qatar recently relinquished the top spot among global LNG exporters to Australia, but the country still exported 83 mt of LNG last year. Qatar’s Northfield East LNG project, consisting of four massive trains with a combined 32 mtpa of liquefaction capacity, is slated to enter service in 2026 and 2027. The project will have the lowest gas costs of any project expected to come online in the next five years. This means that Qatar will remain the globe’s lowest-cost LNG producer, with projects that can remain profitable even when competing suppliers are losing money. Qatar has proposed several additional North Field LNG projects that could come online after 2027, further adding to global supplies and potentially undercutting competitors for decades.

## Reliability and Feedstock Challenges

Predictable LNG supplies rely on existing projects operating predictably. Yet in recent years, the global LNG industry has had a checkered track record in keeping plants operating and LNG flowing. Even though the red-hot prices in 2022 made LNG production more lucrative than ever, global LNG capacity utilization—actual LNG output as a share of total production capacity—barely budged compared to prior years.

<sup>15</sup> Office of the Chief Economist. [Resources and Energy Quarterly December 2022](#). Page 80. December 19, 2020.

While some LNG plants met or even exceeded output targets last year, a number of high-profile LNG projects around the world saw production plummet. The 15 mtpa Freeport LNG project in the U.S. was one of the highest profile underperformers, after a June explosion spurred regulators to shut the plant until significant safety concerns could be addressed. Although the plant recently began receiving gas for early startup activities, the plant may not fully come back online until the second quarter of 2023.<sup>16</sup>



**The global LNG industry has had a checkered track record in keeping plants operating and LNG flowing.**

Shell's floating Prelude LNG plant off the Australian coast also underperformed. After the plant caught on fire in December 2021, Shell managed to restart the project last April—only to see it shut down again in August over a labor dispute. In late December, another fire took Prelude offline yet again.<sup>17</sup> Amid the turmoil, Prelude's 2022 LNG production totaled 1.3 mt, just 36% of its annual nameplate capacity of 3.6 mtpa.<sup>18</sup> Prelude's disappointing track record raises the possibility that the project may never produce as much LNG as designed.

Norway's 4.3 mtpa Hammerfest project was also offline through June 2022, after a fire took the plant out of service for 20 months starting in the fall of 2020.<sup>19,20</sup> An independent investigator blamed the fire on decisions by parent company Equinor to trim costs by curtailing routine maintenance of an air intake filter.<sup>21</sup>

These are not isolated cases. More than a dozen projects struggled in 2022, with LNG production falling far short of nameplate capacity (Table 2). Maintenance problems, performance issues, and declining yields from the gas fields feeding LNG plants have all played a role in keeping LNG production low at the plants.

<sup>16</sup> Reuters. [Gas starts to flow to Freeport LNG export plant in Texas - data shows](#). January 17, 2023.

<sup>17</sup> Natural Gas Intelligence. [Shell's Prelude FLNG in Australia Still Offline After December Fire](#). January 12, 2023.

<sup>18</sup> Journal of Petroleum Technology. [The Many Growing Pains of Shell's Prelude FLNG Continue](#). January 4, 2022.

<sup>19</sup> LNG Prime. [Equinor ready to load first Hammerfest LNG cargo since September 2020](#). June 2, 2022.

<sup>20</sup> The Barents Observer. [Fire breaks out at Hammerfest LNG plant](#). September 28, 2020.

<sup>21</sup> Bellona. [Equinor hides the truth in the new Melkøya report](#). May 12, 2021. Translated from Norwegian to English via Google Translate.

**Table 2: LNG Output as Share of Rated Capacity, Selected Projects**

	2020	2021	2022
<b>Prelude FLNG (Australia)</b>	6%	59%	36%
<b>Darwin LNG (Australia)</b>	84%	87%	39%
<b>Egyptian LNG</b>	22%	55%	42%
<b>Arzew-Skikda (Algeria)</b>	44%	49%	42%
<b>Freeport LNG (U.S.)</b>	69%	93%	43%
<b>Kribi FLNG (Cameroon)</b>	54%	50%	55%
<b>Stavanger LNG (Norway)</b>	93%	61%	66%
<b>Hammerfest LNG (Norway)</b>	71%	0%	67%
<b>Brunei LNG</b>	84%	77%	68%
<b>Angola LNG</b>	95%	77%	68%
<b>Nigeria LNG</b>	97%	80%	68%
<b>Atlantic LNG</b>	89%	56%	68%
<b>Gladstone LNG (Australia)</b>	70%	73%	71%
<b>Peru LNG</b>	90%	59%	79%
<b>Bontang LNG (Indonesia)</b>	80%	84%	82%
<b>Ichthys LNG (Australia)</b>	96%	91%	86%
<b>Malaysia LNG</b>	83%	81%	87%

*Source: IEEFA estimate from S&P Global Commodity Insights and company reports.*

An International Energy Agency (IEA) analysis underscores LNG's reliability challenges: In just the first eight months of 2022, global LNG plants were offline almost as much as they were in all of 2019, with unexpected disruptions rising faster than planned maintenance.<sup>22</sup> Similarly, analysts at Timera Energy reported that LNG plant outages increased over the summer months of 2022, as global demand was peaking.<sup>23</sup> Over the longer term, reliability remains a particularly severe challenge as the scale of projects grows. If even one of Qatar's massive liquefaction trains—each with roughly 8 mtpa of capacity—were to go offline, it would cause shockwaves throughout global LNG markets.

In addition to reliability challenges, many LNG projects are struggling with declining production from the gas projects that feed them. This problem is particularly acute in Australia:

<sup>22</sup> International Energy Agency. [Gas Market Report, Q4-2022](#). Page 50. October 2022.

<sup>23</sup> Timera Energy. [LNG supply response to European demand surge](#). November 14, 2022.

- The massive 16.9 mtpa NW Shelf project is in decline as the gas fields that supply it deplete.<sup>24,25</sup> It is currently looking to backfill the plant with gas from the onshore Waitsia project, but there is likely to be a shortfall in gas production, and one of the five trains may be shut-in from 2024.<sup>26</sup>
- On the east coast of Australia, Santos' Gladstone LNG (GLNG) plant has consistently operated below nameplate capacity amid gas supply challenges. GLNG's problems were apparent from the start, as Santos built the two-train facility knowing that it hadn't secured enough gas to fully supply the project.<sup>27</sup> Santos reported to investors that GLNG's production in 2022 totaled 6.1 mt, well below the plant's 8.6 mt capacity.<sup>28,29</sup>
- Darwin LNG in northern Australia is facing shut-in in early 2023 due to the expected closure of the Bayu Undan gas field that supplies the facility.<sup>30</sup> The Barossa gas project, which Santos had hoped to develop to backfill Darwin supplies, was halted in September 2022 after the Tiwi people (the Native title holders) successfully challenged the project license, forcing Santos to remove its drill rig.<sup>31,32</sup> Although Santos continues to seek approval to move the project forward, the drilling pause could postpone the project for several years.<sup>33</sup> The project encountered further delays after the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA), Australia's offshore petroleum regulator, directed Santos to stop building a pipeline to the project because of a potential violation of Native title.<sup>34</sup> Santos had hoped to have Barossa online by 2025, but it has likely been delayed until at least 2027 and possibly much later.

<sup>24</sup> Woodside Petroleum Limited. [Operations NW Shelf](#). Accessed January 2023.

<sup>25</sup> Woodside Petroleum Limited. [Form F-4 Registration Statement, Ex. 99.4](#). April 8, 2022.

<sup>26</sup> Australian Financial Review. [O'Neill lauds Woodside's LNG 'game-changer'](#). 23 November 23, 2021.

<sup>27</sup> The Australian. [How Santos's leap of faith became gas supply strife](#). April 3, 2017.

<sup>28</sup> Santos. [Fourth Quarter Report for period ending 31 December 2022](#). Page 7.

<sup>29</sup> Santos. [Half Year Financial Report](#). 30 June 2022. Page 3.

<sup>30</sup> Argus Media. [Australia's Nopsema delays Barossa gas pipeline](#). January 25, 2023.

<sup>31</sup> ABC. [What the Santos Federal Court loss means for the Barossa gas project off the Tiwi Islands, and future projects like it](#). December 3, 2022.

<sup>32</sup> Sydney Morning Herald. [Gas giant Santos loses appeal against Tiwi Islands traditional owners](#). December 2, 2022.

<sup>33</sup> Energy Voice. [Santos' Barossa could face two year delay leaving Darwin LNG empty](#). September 27, 2022.

<sup>34</sup> Reuters. [Santos faces new delay on Barossa gas pipeline due to heritage assessment](#). January 25, 2023.

## Demand: Europe

Europe's demand for LNG has risen dramatically during the Russia-Ukraine conflict—and could rise yet again in 2023, as Europe adjusts to another expected annual decline in Russian pipeline gas shipments. Yet overall gas demand on the continent peaked in 2010 and is now poised to shrink, driven by high prices, efforts to bolster energy security, and legally binding emissions cuts. As a result, LNG demand growth in Europe is likely to underwhelm more bullish forecasts, with planned regasification capacities far outweighing future import requirements.

### IEEFA Outlook

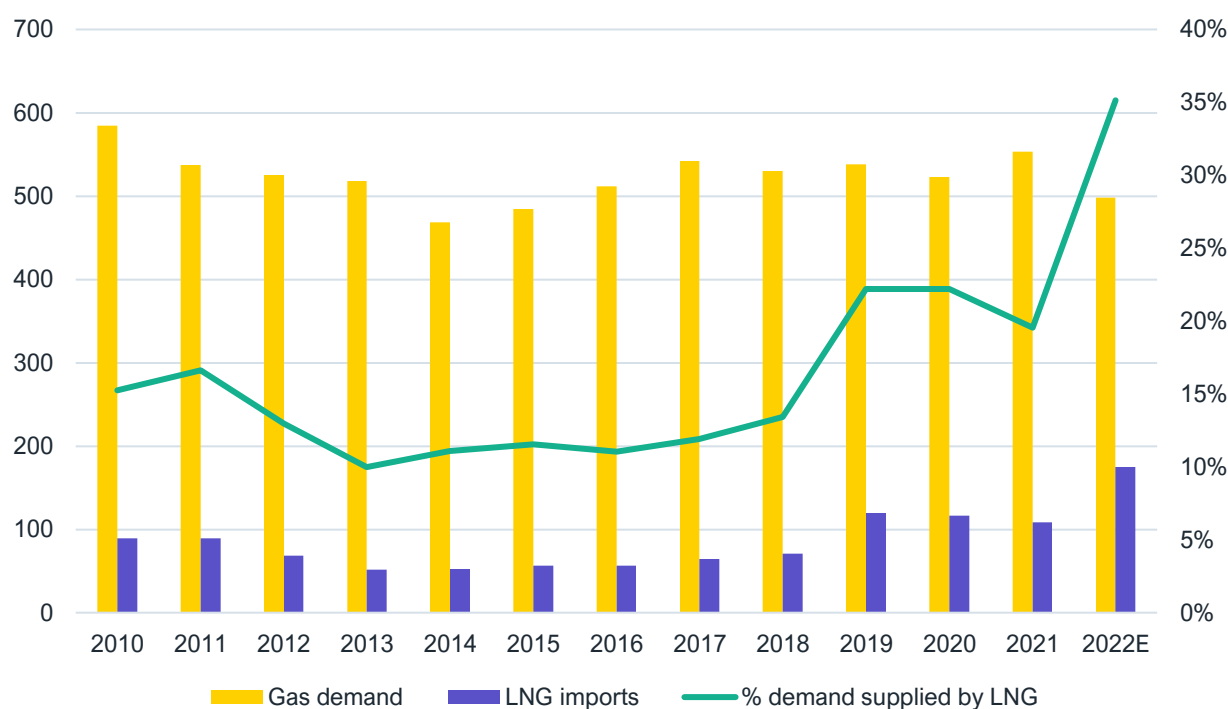
In the years leading up to Russia's invasion of Ukraine, Russia accounted for more than 40% of Europe's gas imports.<sup>35</sup> But pipeline gas exports from Russia to Europe had started to fall before the invasion of Ukraine, and the declines accelerated over the course of 2022. Two major pipelines have halted all westward flows of gas: Russia curtailed gas shipments via the Yamal pipeline in April 2022, and a September explosion halted all gas flows via the Nord Stream pipeline. From January through November of 2022, Russia reportedly shipped 69 billion cubic meters (bcm) less gas to the EU than it did the prior year, suggesting that gas shipments fell by almost half from the previous year.<sup>36</sup>

To make up for declining Russian gas supplies, Europe increased LNG imports by 60% in 2022, pushing the continent's LNG import volumes to an all-time high. From 2019 to 2021, Europe satisfied roughly 20% of its gas demand by importing LNG, but in 2022 the share of LNG in total gas demand rose to more than 35% (Figure 2).

<sup>35</sup> Institute for Energy Economics and Financial Analysis. [EU Gas: Diversity of Supply or Diversity of Routes?](#) February 1, 2022.

<sup>36</sup> European Commission. [New reports highlight 3<sup>rd</sup> quarter impact of gas supply cuts](#). January 13, 2023.



**Figure 2: European Gas Demand vs. LNG Imports (bcm)**

Sources: IEEFA estimates based on BP, DUKES, Eurostat, Statista, and S&P Global Commodity Insights.

Although some pundits seized on Europe's LNG import surge as evidence of the continent's inability to shake its gas addiction, the longer-term trends suggest otherwise. Gas consumption in the EU and UK peaked in 2010, and remained on a bumpy plateau from 2011 through 2021. In 2022, high gas prices, supply challenges, and policy shifts triggered a significant decline in European gas consumption.

In 2023, European gas demand may experience a rebound after last year's declines. But through 2030 EU gas demand could fall by 40% or more, driven by legally binding emissions reduction targets, policy measures to ensure energy security and demand destruction stemming from high prices.<sup>37,38</sup>

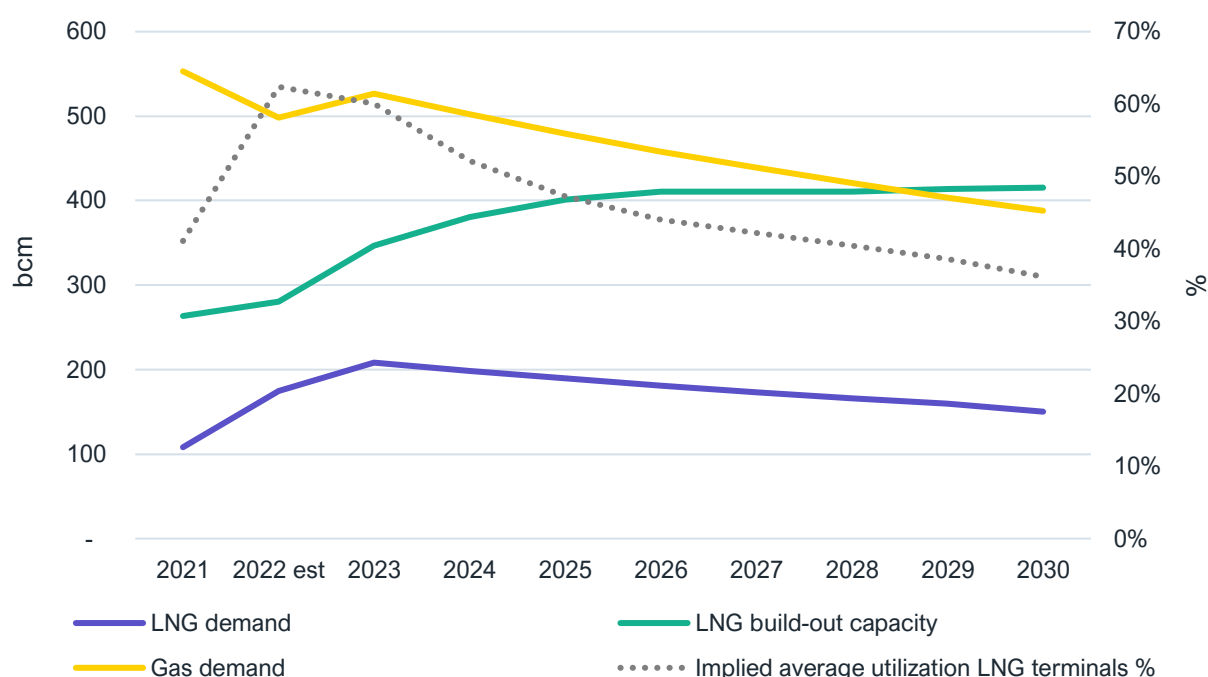
LNG imports into Europe may increase again this year, as European buyers continue to compensate for declines in Russian gas shipments. Yet, as overall gas demand on the continent

<sup>37</sup> European Commission. [REPowerEU: Joint European action for more affordable, secure and sustainable energy](#). March 8, 2022.

<sup>38</sup> Eurostat. [Supply, transformation and consumption of gas](#). January 31, 2023.

declines over time, IEEFA anticipates that Europe's appetite for LNG will fall as well, leading to declining utilization of the continent's LNG import capacity. Assuming the RePowerEU targets are achieved and that gas consumption in Turkey does not fall, then total European demand for LNG would only be approximately 150 bcm in 2030, down from roughly 175 bcm in 2022—implying that the utilization rate of Europe's LNG terminals would fall below 40% (Figure 3).

**Figure 3: Forecasted European Demand for Gas and LNG vs. LNG Import Capacity**



Sources: IEEFA estimates based on BP, DUKES, Eurostat, Statista, and S&P Global Commodity Insights.

Bullish outlooks for Europe's LNG demand are largely based on planned increases in the continent's regasification capacity. European nations are set to boost LNG import capacity by about one-third by the end of 2024, with much of the new capacity coming from newly-chartered floating storage and regasification terminals.<sup>39</sup>

<sup>39</sup> U.S. Energy Information Administration. [Europe's LNG import capacity set to expand by one-third by end of 2024](#). November 28, 2022.

However, total import capacity is not an accurate proxy for LNG demand. As IEEFA research has repeatedly highlighted, gas transmission system operators (TSOs) in Europe are incentivized to overbuild infrastructure and expand their regulated asset base to increase shareholder returns, even if the assets are not used or required.<sup>40</sup> Existing regulations provide TSOs with guaranteed returns on investment, which are collected from consumers via tariffs. If built, some projects could join others that have been mothballed or underutilized in the past.

There are strong indications that Russia's invasion of Ukraine has increased the momentum of Europe's energy transition, dramatically increasing the penetration of technologies that displace gas and LNG, such as heat pumps, solar thermal, renewable power, battery storage, demand response, buildings insulation, and other energy efficiency upgrades. National and regional plans could bring cost reductions and economies of scale to alternative technologies faster than expected.

## Recent Developments

From August to November 2022, total gas demand from the EU and UK fell about 20%, compared to the average for the same period between 2017 and 2021, due to a combination of high prices, demand destruction, changing weather patterns, energy efficiency, increases in renewable power generation, and voluntary and mandatory demand reduction measures.<sup>41</sup>

Weather played an important role in Europe's energy supply in 2022. In the first six months of 2022, hydroelectric generation was down almost 30% in France, and down more than one-third in Italy and the Iberian Peninsula.<sup>42</sup> During the summer months, France was forced to reduce output of its nuclear power stations on the Rhône and Garonne rivers as hot weather raised temperatures in the river waters used to cool reactors.<sup>43</sup> These events may have increased Europe's reliance on gas-fired power. Yet particularly mild weather had also reduced gas demand for heating in buildings and homes in late 2022.

<sup>40</sup> IEEFA. Gas in Spain: [Still oversupplied and overcompensated](#). September 19, 2022.

<sup>41</sup> Eurostat. [EU gas consumption down by 20.1%](#). December 20, 2022.

<sup>42</sup> S&P Global Commodity Insights. [Droughts rattle Europe's hydropower market, intensifying energy crisis](#). August 5, 2022.

<sup>43</sup> The Guardian. [EDF cuts output at nuclear power plants as French rivers get too warm](#). August 3, 2022.

Other factors have affected gas consumption, as well. Along with water temperature concerns, France experienced extended nuclear outages due to maintenance issues, forcing the continent to rely more heavily on alternative power sources, including gas-fired generation.<sup>44</sup> Meanwhile, a price cap that applies exclusively to gas for power generation in Spain and Portugal—the so-called “Iberian exception”—contributed to increases in gas-to-power generation.<sup>45</sup>

Last year, European nations reached a deal to institute a controversial EU-wide gas price cap beginning in February 2023. The cap will limit the traded price of gas to EUR180 per megawatt-hour under certain conditions, although it is unclear exactly how this will affect LNG flows to Europe, especially in times of market stress.

The European Union’s RePowerEU plan, released in May 2022, encouraged EU member states to increase energy savings and clean energy with more aggressive targets, access to funding, streamlined permitting for renewables, and other new regulations. Since then, multiple announcements could lead to reduced demand for gas and LNG, including:

- **Bans of gas boilers:** At least 11 countries have already announced bans or restrictions for fossil heating that will take full effect before 2027.
- **Growth of heat pumps:** Preliminary figures suggest 3 million heat pumps were sold in Europe in 2022, double the number sold in 2019.
- **Growth of solar power:** In the EU, 41.4 gigawatts (GW) of new solar PV capacity was connected to electricity grids in 2022, a 47% increase from 2021. The industry expects the growth to continue, breaking 50 GW this year and reaching 85 GW in 2026.<sup>46</sup>
- **Growth of demand response:** In the UK, the National Grid successfully activated its demand flexibility service, which pays residential customers to cut electricity consumption during peak hours.

<sup>44</sup> S&P Global Commodity Insights. [French nuclear output to start 2023 at record low amid long-term outages, fuel savings stops](#). December 29, 2022.

<sup>45</sup> International Monetary Fund. [Beating the European Energy Crisis](#). December 2022.

<sup>46</sup> PV Magazine. [Europe added 41.4 GW of new solar in 2022](#). December 19, 2022.

## Demand: Japan, South Korea, and Taiwan

Although East Asian countries have long been among the top LNG consumers globally, demand in the region shows signs of medium-term decline. In both Japan and South Korea, high LNG prices have rekindled interest in restarting nuclear plants, trimming long-term LNG contract exposure, and shifting power targets away from LNG. Taiwan remains a wild card: Government policy generally supports LNG imports, but state-owned utilities have absorbed huge losses due to high global LNG prices and import terminal projects have experienced repeated delays.

### IEEFA Outlook

The East Asian markets of Japan, South Korea, and Taiwan have historically been among the largest LNG importers globally, with demand typically underpinned by long-term, oil-indexed contracts. All three countries have scarce domestic gas resources and together accounted for over 40% of global LNG traded from 2015 to 2022.<sup>47</sup> Taiwan's plans to increase LNG imports face capacity and pricing challenges, while demand in Japan and South Korea is widely expected to decline in the coming years due to various factors, including:

**Increasing nuclear power generation.** The high price LNG environment in 2022 has spurred a renewed focus on nuclear power in Japan and South Korea. A gradual restart of Japan's nuclear fleet and a reversal of anti-nuclear policies in South Korea are likely to significantly reduce power sector LNG demand.

**National energy mix targets.** Japan aims to reduce the share of LNG in the national electricity mix by 17% by 2030, turning instead to greater shares of nuclear and renewables. Similarly, South Korea has announced plans to reduce LNG's share in the power mix to just 9.3% by 2036, down from almost 30% in 2021. Uncertainty in future LNG demand from power and non-power sectors has previously caused buyers to refrain from securing new long-term contracts.

**Expiring long-term contracts.** Japan and South Korea have a combined 25.6 mt of long-term contracts expiring by 2026. Long-term contracts have typically been the primary driver of

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<sup>47</sup> BP, [Statistical Review of World Energy 2022](#).

demand in Northeast Asian markets, and the region's increased exposure to volatile spot markets may cause LNG buyers to cut imports faster to avoid costly spot trades.

## Recent Developments

**Japan's** LNG imports have fallen from a peak in 2014 at an average rate of 3% per year—a trend that continued in 2022—due largely to declining energy demand and a larger share of coal and nuclear in the power mix. Despite the drop, Japan reclaimed its spot as the largest LNG importer worldwide in 2022, due to a steep drop in China's LNG imports.

Most of Japan's declining gas demand is in the power sector, which accounts for more than half of the country's total gas consumption, while annual demand in residential, commercial, and industrial sectors has remained relatively flat. Power sector gas demand is influenced largely by nuclear power generation. After the 2011 earthquake and tsunami that caused the Fukushima Daiichi nuclear disaster, new safety measures effectively shut down all of Japan's 58 nuclear reactors by 2014, when the country's LNG demand peaked.



**Volatile commodity prices have caused the Japanese government to redouble its efforts to restart nuclear plants.**

However, volatile fossil fuel prices have spurred the Japanese government to redouble its efforts to restart nuclear plants.<sup>48</sup> The country now aims to have 10 nuclear reactors operating by the first quarter of 2023—up from five active reactors in July 2022—with two more units expected to restart in June and July. This would bring the total online nuclear capacity to almost 12 GW, more than double the available capacity through most of 2022.

The country's Sixth Strategic Energy Plan introduced in 2021 calls for a 50% reduction in LNG-fired power generation through 2030, which would reduce LNG's share in the power mix to 20% from 37% in 2019.<sup>49</sup> This is a more dramatic cut to LNG consumption than previous plans and

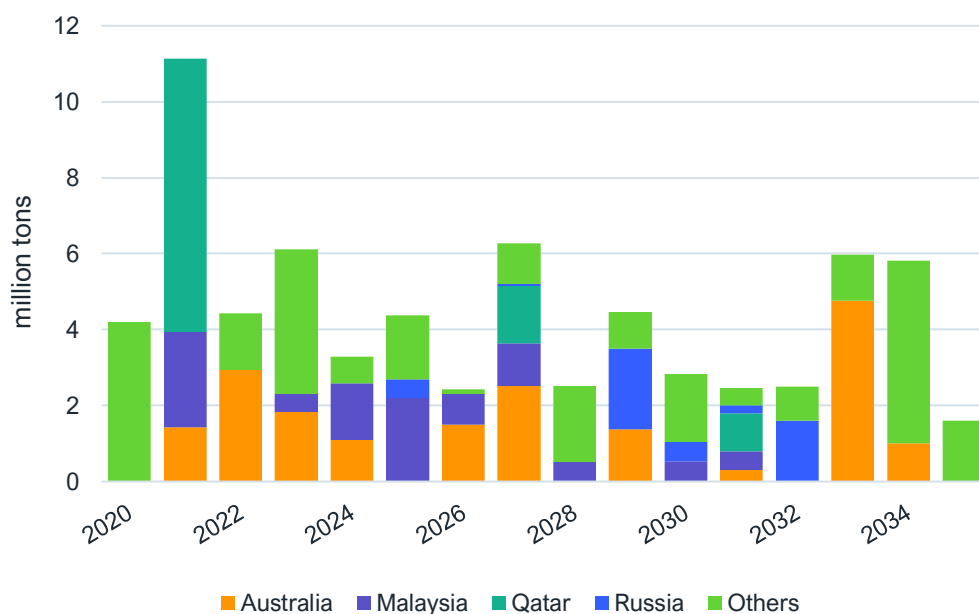
<sup>48</sup> Reuters. [Japan turns back to nuclear power to tackle energy crisis](#). December 16, 2022.

<sup>49</sup> Bloomberg. [Global LNG Market Faces Shakeup From Japan's Green Shift](#). July 27, 2021.

could result in a reduction of LNG demand in Japan by 25 mtpa—one-third of the country's current LNG demand—according to Bloomberg New Energy Finance estimates.<sup>50</sup>

The potential for steep drops in Japan's LNG demand has caused buyers in the past to refrain from signing new long-term contracts beyond 2030.<sup>51</sup> In 2021, Japanese buyers did not renew 7.2 mtpa of long-term contracts with Qatar, due partly to the fact that Japanese importers were pushing for deals of less than 10 years.<sup>52</sup> In 2023, 6.1 mt of long-term contracts are set to expire, increasing buyers' exposure to spot markets (Figure 4).

**Figure 4: Japanese LNG Contract Expiry by Supply Country**



Source: IHS Markit.

<sup>50</sup> The Fuse. [Japan's Decision To Cut LNG Demand Clouds Gas Outlook](#). July 28, 2021.

<sup>51</sup> Bloomberg. [Global LNG Market Faces Shakeup From Japan's Green Shift](#). July 27, 2021.

<sup>52</sup> Energy Intelligence. [Japan Walks Away From Qatar After Contracts Expire](#). February 8, 2022.

In **South Korea**, LNG imports have grown at an average annual rate of 3% since 2014, and the country imported 47.2 mt of LNG in 2022, a 2% increase from the previous year. However, growing reliance on imported fossil fuels has financially strained state-owned enterprises and put upward pressure on end-user gas and power prices.



**Growing reliance on imported fossil fuels has put upward pressure on end-user gas and power prices.**

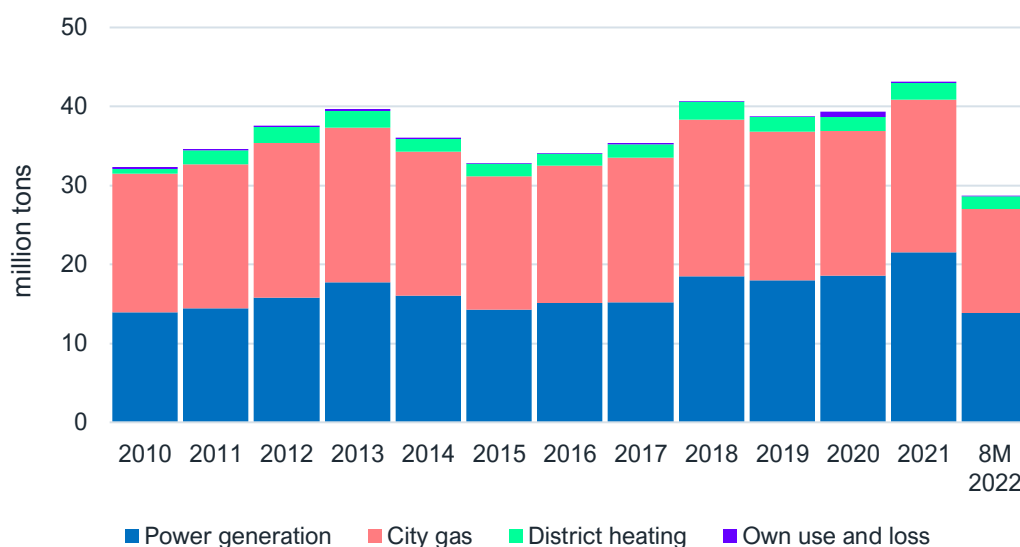
Last year, the government refrained from significantly increasing end-user power tariffs to quell inflationary impacts of higher energy prices. As a result, the state-owned Korea Electric Power Co. (KEPCO) is expected to report an annual operating loss of US\$24 billion. Escalating losses caused the government to raise electricity prices by 9.5% in the first quarter of 2023—the largest quarterly increase in 40 years.<sup>53</sup>

The government also capped increases in the wholesale power price to ease KEPCO's payments to private power generators.<sup>54</sup> Given that gas-fired power plants typically set wholesale prices, power producers that import LNG could see tighter margins as a result, and may opt to cut spot LNG purchases if global prices remain high.

<sup>53</sup> Bloomberg. [Korea Plans Record Power Price Hike in Hit to Consumers](#). December 30, 2022.

<sup>54</sup> Korea JoongAng Daily. [Korea caps wholesale electricity prices to support Keppo](#). December 5, 2022.



**Figure 5: South Korea Gas Demand by Sector**

Source: Korea Energy Statistical Information System (KESIS).

Higher nuclear and renewables generation could also squeeze LNG consumption in the power sector, which accounts for 48% of gas consumption (Figure 5). From January to August 2022, gas generation was down 3.5% year-over-year, while nuclear and renewables generation were up 15.7% and 21%, respectively.<sup>55</sup> In December 2022, the 1.4 GW Shin Hanul 1 reactor restarted, potentially replacing an estimated 1.4 mtpa of LNG imports.<sup>56</sup> The Shin Hanul 2 reactor is also expected online in 2023. The Yoon Suk-yeol administration intends to increase the targeted share of nuclear-fired power generation to 32.4% by 2030, up from 27.4% in 2021, while reducing the share of LNG in the power mix.<sup>57</sup>

**Taiwan**, unlike Japan and South Korea, aims to phase out nuclear power in generation mix by 2026, suggesting a larger role for LNG and renewables. In 2022, Taiwan imported 20.5 mtpa of LNG—an increase of 2.5%—after a December 2021 referendum decided against restarting the

<sup>55</sup> Korea Energy Economics Institute. [Korea Energy Statistical Information System: Power Generation by Source](#). Accessed February 2023.

<sup>56</sup> S&P Global Commodity Insights. [South Korea's natural gas demand likely to dip on nuclear startups, mild winter, power price cap](#). December 27, 2022.

<sup>57</sup> Bloomberg. [Korea Curbs Plans for Renewables in Push For More Nuclear](#). January 12, 2023.

2.7 GW Lungmen Nuclear Power Plant. The power sector is responsible for almost 80% of Taiwan's natural gas consumption.

Taiwan has two LNG terminals with a combined 16 mtpa of import capacity that operate at utilization rates well above 100%. The state-owned gas and power utilities, CPC and Taipower, intend to expand existing regasification capacity, although new terminals have faced environmental and legal delays. The Ministry of Economic Affairs has announced plans to increase LNG imports to 23 mtpa by 2025, but new terminals are not expected online until 2026, suggesting limits on new terminal capacity could inhibit such rapid LNG demand growth.

The government has typically restrained itself from raising end-user gas and power tariffs despite higher commodity prices. Taiwan's electricity prices, for example, have remained unchanged since 2018 and CPC is not authorized to raise gas prices by more than 6% per quarter. This means that state-owned utilities often absorb significant losses when fuel prices rise. CPC posted net income losses of NT\$43.4 billion (US\$1.4 billion) in 2021, and losses for the first six months of 2022 totaled NT\$65 billion (US\$2.1 billion). According to the company chairman Lee Shun-chin, losses are "mostly due to LNG."<sup>58</sup> If high fuel prices continue, Taiwan will face persistent pressure to limit LNG demand growth or raise prices for end users.

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<sup>58</sup> Reuters. [Taiwan's CPC loses almost \\$2 billion this year due to high energy prices](#). July 5, 2022.

## Demand: China

China's LNG demand fell 20% in 2022 due to high global prices, COVID-19-related lockdowns, and slow economic growth. While a potential economic rebound could boost gas demand in 2023, the bulk of incremental gas demand will likely be met by relatively inexpensive domestic production and piped imports, rather than costlier LNG. In the power sector, increases in coal production, a resumption of coal imports from Australia, and rapid growth in low-cost renewables will leave little room for LNG growth. Although new long-term contracts may support additional term deliveries, China's spot purchases are unlikely to recover until prices fall to more competitive levels.

## IEEFA Outlook

China is widely expected to be the largest growth market for LNG demand globally over the next two decades. Shell's 2022 LNG Outlook forecasted that China would import more than 60 mt of additional volumes through 2040, up from 81 mt in 2021.

Contrary to rapid demand growth forecasts, however, China's LNG imports fell 20% in 2022 to 65 mt, due to COVID-19-related lockdowns, weak economic growth, and expensive global commodity prices. Analysts at Rystad Energy, Wood Mackenzie, and Independent Commodity Intelligence Services (ICIS) now expect China's LNG demand to rebound by 9% to 14% in 2023.<sup>59</sup> However, rising domestic gas production, pipeline gas imports, and renewable power capacity could limit the potential for rapid LNG demand growth over the medium term.

**Piped Gas Imports:** China has a network of seven major gas pipelines, three of which are used for imported gas: Power of Siberia (Russia), Central Asia-China gas pipeline (Turkmenistan) and the Sino-Myanmar pipeline. The other four are supplied by regional China gas fields: Shaan Jing (Shaanxi), Sichuan-Shanghai, West-East (Tarim, Xinjiang) and Zhongxian-Wuhan (Sichuan).

In 2022, China increased pipeline gas imports, primarily from Russia, to reduce exposure to skyrocketing LNG prices in the global market. The country's total piped gas imports rose 7.8%

<sup>59</sup> Reuters. [In 2023, China's appetite for LNG set to rise amid tepid demand across Asia](#). January 4, 2023.

to 45.8 mt, according to China Customs Statistics, while volumes delivered to China via the Power of Siberia pipeline exceeded contractual obligations by 16% in December.<sup>60,61</sup> Piped gas accounted for a 42% share of China's total gas imports in 2022, up from 35% in 2021, while the share of LNG imports fell to 58%. This is due largely to the fact that LNG prices were significantly higher than piped gas imports through most of last year.<sup>62</sup>

Pipeline imports may continue to increase over the medium term for several reasons. First, production from Russia's Kovykta gas field, which feeds into the Power of Siberia pipeline, started up at the end of 2022. With recoverable reserves of 1.8 trillion cubic meters, it is the largest gas field in eastern Russia, and China has indicated plans to increase gas imports from Russia by 47% in 2023 as a result.<sup>63</sup> Second, the Power of Siberia pipeline, with 38 bcm per year of throughput capacity, has historically operated at less than 30% capacity, suggesting that pipeline imports could rise dramatically through existing infrastructure.

Additionally, China has plans to expand pipeline import capacity with Russia by 70 bcm per year (bcm/y), as well as plans to increase connections with Turkmenistan by 30 bcm/y. Negotiations surrounding new pipeline proposals are complex and politically sensitive, but acceleration of the plans could slow China's LNG demand growth.

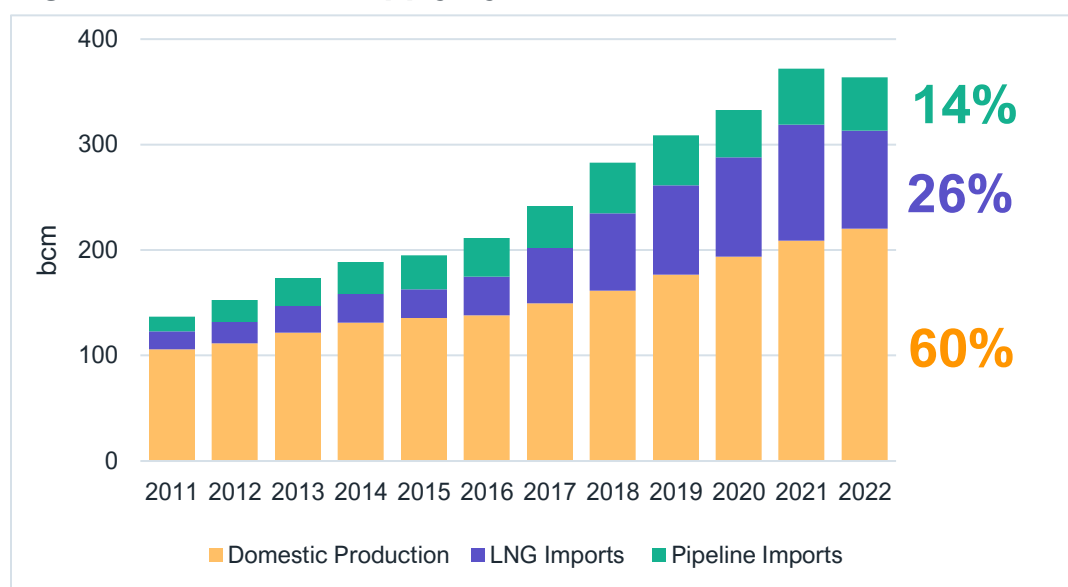
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<sup>60</sup> Natural Gas World. [Chinese LNG imports down 20% in 2022](#). January 19, 2023.

<sup>61</sup> Natural Gas Intelligence. [Reshuffling the Deck: High Stakes for Natural Gas & The World is All-in](#). Page 15. January 2023.

<sup>62</sup> IEEFA. [The economic case for LNG in Asia is crumbling](#). August 15, 2022.

<sup>63</sup> Upstream Online. [China to increase pipeline imports of Russian gas by 47% in 2023](#). January 4, 2023.

**Figure 6: China Gas Supply by Source**

Source: BP Statistical Review of World Energy 2022; 2022 figures compiled from Natural Gas Intelligence, S&P Global Commodity Insights.

**Domestic gas production growth:** Domestic gas production in China grew from 161 bcm in 2018 to 209 bcm in 2021, a growth rate of roughly 9% per year (Figure 6). Domestic production is expected to continue growing more than 10 bcm per year.<sup>64</sup> In 2022, China National Petroleum Corporation (CNPC) produced 32.3 bcm of gas from the Tarim Basin, China's largest ultra-deep onshore field, a 7.7% increase from the previous year.<sup>65,66</sup> Production from the Fuling field, China's largest shale gas field, increased almost 17% to 7.2 bcm.<sup>67</sup> In 2020, the Ministry of Natural Resources began allowing foreign companies to explore and produce natural gas in the country in hopes of increasing domestic energy supplies.<sup>68</sup> The continued growth of domestic natural gas production—typically the cheapest source of gas in China—may help restrain LNG demand growth.

<sup>64</sup> Columbia Center on Global Energy Policy. [Q&A | Gas in China: A Snapshot Based on the Recently Published Natural Gas Development Report](#). September 7, 2022.

<sup>65</sup> Global Times. [Tarim Oilfield energy production hits 33.1 million tons in 2022](#). January 2, 2023.

<sup>66</sup> Xinhua Net. [China's Tarim oilfield produces over 30-mln-tonne oil, gas equivalent](#). December 12, 2021.

<sup>67</sup> Natural Gas Intelligence. [China Continuing to Boost Domestic Natural Gas Production From Top Fields](#). January 5, 2023.

<sup>68</sup> CNBC. [China opens up oil and gas exploration, production to foreign firms](#). January 8, 2020.

**Domestic coal output growth and renewables:** China's domestic raw coal output rose 9% to 4.5 billion metric tons in 2022, while coal imports declined 9.2% to 290 mt.<sup>69</sup> In January 2023, China lifted an unofficial ban on Australian coal imports, allowing three state-owned firms to import Australian thermal coal and one steel producer to import coking coal.<sup>70, 71</sup> IEEFA expects China coal imports to increase in 2023 as a result. According to media reports, China has approved 260 mt of new annual coal production capacity, bringing total capacity to 5.05 billion metric tons,<sup>72</sup> a 10% increase from 2022. The higher coal capacity could also limit the increase in LNG demand.

The rapid growth of low-cost renewables capacity may also limit China's natural gas demand growth in the power sector. In 2022, China's thermal generation capacity grew by 35 GW, or 2.7%; renewables capacity grew by 145 GW, or 14%.<sup>73</sup> Thermal power generation, meanwhile, rose less than 1% to 5,863 terawatt-hours (TWh), while solar, wind and power grew by 6% in 2022.<sup>74</sup> At the end of 2023, China is expected to have 490 GW of solar capacity and 430 GW of wind capacity.<sup>75</sup> This compares to 253 GW of solar capacity and 282 GW of wind capacity in 2020, and represents an increase of 94% and 52% over a three-year period.

**Long term contracts:** China has nine new LNG contracts starting in 2023, for an additional 4.59 mtpa. Total contracted LNG volumes in 2023 will be 67.15 mt, more than the total 65.49 mt LNG demand in 2022. Forecasts from Wood Mackenzie suggest that China's LNG imports may recover in 2023, due primarily to the increase in long-term contract volumes.<sup>76, 77</sup> In 2021 and 2022, Chinese buyers also signed significantly more long-term LNG supply contracts than in previous years (primarily from the U.S. and Qatar), indicating a desire to secure supply volume and costs (Figure 7).

<sup>69</sup> Xinhua Net. [China's coal output increases in December 2022](#). January 24, 2023.

<sup>70</sup> Reuters. [China boosts coal output, eases Australia ban to bolster energy security](#). January 9, 2023.

<sup>71</sup> Reuters. [China allows four firms to resume Aussie coal imports – sources](#). January 4, 2023.

<sup>72</sup> Reuters. [China coal output in Dec slips on COVID: rises to record in 2022](#). January 16, 2023.

<sup>73</sup> S&P Global Commodity Insights. [China to maintain renewables growth pace in 2023 despite uncertainty](#). February 1, 2023.

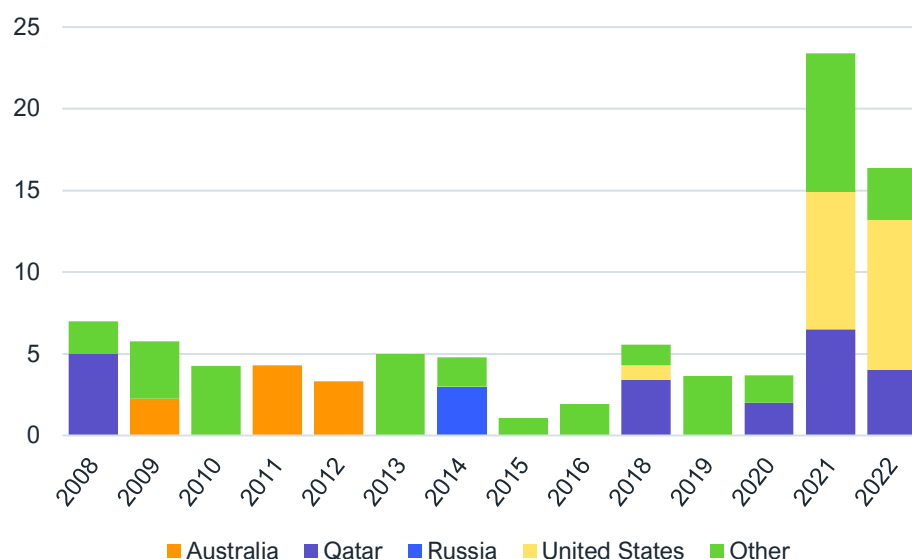
<sup>74</sup> Ibid.

<sup>75</sup> PV Magazine. [China aims to add 160 GW of wind, solar capacity in 2023](#). January 3, 2023.

<sup>76</sup> Natural Gas Intelligence. [Reshuffling the Deck: High Stakes for Natural Gas & The World is All-In](#). Page 14. January 2023.

<sup>77</sup> Nikkei Asia. [China tightens grip as dominant LNG buyer with long-term deals](#). January 24, 2023.

**Figure 7: China Supply and Purchase Agreement Signings by Supply Country**



Source: IHS Markit.

Although the rising share of long-term contract volumes in China's LNG supply portfolio suggests a shift in procurement strategy away from spot markets, it does not necessarily foreshadow rapid increases in LNG demand. Flexible destination terms in new contracts allow Chinese buyers to resell cargoes to other markets if demand grows more slowly than contracted supply. The IEA anticipates China's natural gas demand will grow just 2% annually between 2021 and 2030, and notes that volumes from existing long-term contracts, along with expected supply from pipelines and domestic production, will "more than cover China's demand requirements" through 2035.<sup>78</sup> The IEA adds that due to rising domestic production, some of China's flexible LNG volumes (around 45 bcm per year) may be diverted to other markets in the mid-2020s. Re-export of significant Chinese LNG volumes would exacerbate supply glut conditions that emerge as a result of significant new liquefaction capacity entering global LNG markets after mid-2025.

<sup>78</sup> International Energy Agency. [World Energy Outlook 2022](#). Page 366. October 2022.

## Demand: India, Pakistan, and Bangladesh

In 2022, high LNG prices and unreliable supplies contributed to a 16% decline in LNG imports into India, Pakistan, and Bangladesh. Falling imports contradict long-standing assumptions about rapid growth in South Asian LNG demand. Concerns over fuel security, coupled with demand management measures and a growing preference for long-term contracts over spot purchases, have downgraded the prospects for medium-term LNG demand growth in the region.

### IEEFA Outlook

Total LNG consumption in India, Pakistan, and Bangladesh declined by 16.2% in 2022, due primarily to unaffordable spot prices, contractual disputes, and rapidly depleting foreign currency reserves.<sup>79</sup> The region's LNG demand growth is likely to continue to face resistance over the medium term unless LNG prices settle to affordable and cost-competitive levels.

Before the Russian invasion of Ukraine in February 2022, emerging Asia was widely expected to be the largest driver of global LNG demand, along with India and China.<sup>80</sup> In 2019, analysts estimated that LNG demand in Pakistan and Bangladesh would grow by a combined 63 bcm through 2035, while India's demand would increase by 43 bcm.<sup>81</sup> However, such rapid demand growth now appears unlikely over the medium term due to the following reasons:

**Concerns about LNG reliability and energy security:** High LNG prices and inadequate supplies caused widespread load shedding and economic harm, casting doubt on the reliability of LNG as a fuel source. Bangladesh and Pakistan instituted load shedding during record peak demand in summer, while India grappled with a ballooning fertilizer subsidy burden. As a result, governments are examining plans to increase domestic renewable energy penetration in the long-term.

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<sup>79</sup> IHS Markit.

<sup>80</sup> IEA. [Gas 2020](#). June 2020.

<sup>81</sup> McKinsey. [Global gas & LNG outlook to 2035—H1 2019](#). September 8, 2019.



**Economics do not support LNG imports:** Pakistan and Bangladesh face mounting economic pressure in the form of falling foreign exchange reserves, depreciating currency, high fuel import bills, and rising inflation. High prices have eroded the competitive advantage of LNG over alternative fuels and are likely to continue to subdue LNG demand in South Asian countries.



High prices have eroded the competitive advantage of gas over alternative fuels and are likely to continue to subdue LNG demand in South Asian countries.

**Demand-side management instead of imports:** South Asian countries resorted to demand-side management and energy conservation measures, such as early store closures and increasing promotion of biofuels.<sup>82, 83, 84</sup> For 2023, India plans to run 2.5 GW of peaking gas units under a special scheme where state-owned gas company GAIL will procure gas supplies in advance.<sup>85</sup> Pakistan and Bangladesh may continue to undertake energy conservation measures such as scheduled load management and reduced commercial activity to avoid major disruptions.

**Preference for long-term LNG contracts:** Bangladesh, Pakistan, and India are actively seeking new long-term LNG supply contracts from diverse suppliers. However, long-term LNG supply contracts with shipments beginning before 2026 are limited globally. Until then, incremental growth in LNG demand may have to come from volatile spot markets, since existing contractors are unable to increase supplies in the short term.<sup>86</sup>

## Recent Developments

**India** was the world's fourth-largest LNG importer in 2021 even though gas provided just 6.1% of the country's energy mix.<sup>87, 88</sup> Imports have been declining due to high spot prices and a

<sup>82</sup> The Business Post. [Bangladesh's Energy Austerity Measures](#). August 6, 2022.

<sup>83</sup> Pakistan Today. [Islamabad imposes section 144 to shut markets by 9pm](#). June 19, 2022.

<sup>84</sup> PIB. [Import of Gas](#). December 8, 2022.

<sup>85</sup> Business Standard. [Peaking gas and power units to run under special scheme next summer](#). December 11, 2022.

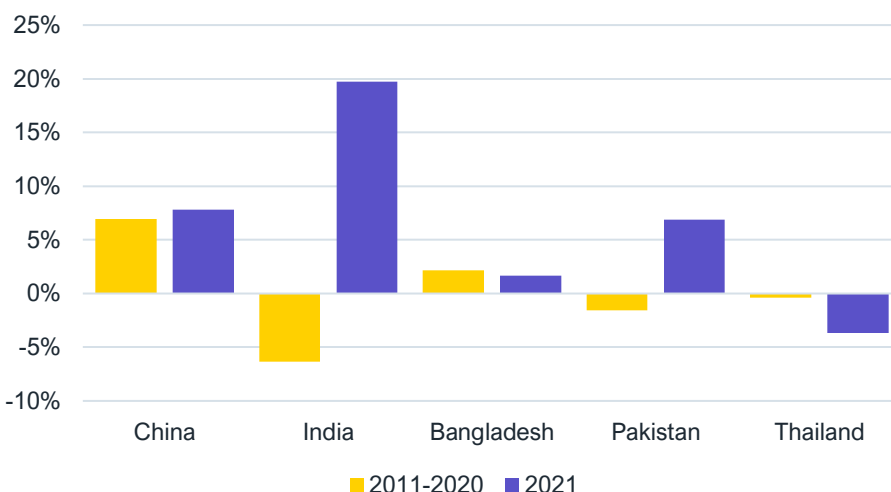
<sup>86</sup> The Daily Star. [Qatar won't increase LNG supply to Bangladesh before 2025: Petrobangla](#). September 28, 2022.

<sup>87</sup> BP. [Statistical Review of World Energy](#). 2022.

<sup>88</sup> Ministry of Power. [Power Sector at a Glance, All India](#). December 21, 2022.

shortfall in supplies from long-term contracts. While the volume of LNG imports fell by 15.2% in 2022, the total cost increased by 44.5% due to expensive LNG prices.<sup>89</sup> Meanwhile, domestic gas production increased 20% in 2021 and an additional 3% in 2022.

**Figure 8: Natural Gas Production Growth Rates in Asia**



Source: BP Statistical Review of World Energy 2022.

The fertilizer sector consumes the largest share of LNG in India and receives significant subsidies from the government. The sector's LNG consumption increased from 8.3 mtpa in January 2022 to almost 10.31 mtpa in November, raising the subsidy burden to potentially US\$31 billion for the ongoing fiscal year due to high imported LNG prices.<sup>90, 91</sup>

Exorbitant costs have pushed the government to encourage consumption of domestically produced gas instead of LNG. In December 2022, the government allowed fertilizer companies to procure 20% of their gas supplies from the domestic spot market to ease the public subsidy bill.<sup>92</sup> The government is also considering implementing a cap of US\$6.5 per metric million British thermal units (MMBtu) on domestically produced gas prices, which are typically linked to

<sup>89</sup> PPAC. [Oil and Gas Snapshot](#). December 2022.

<sup>90</sup> IHS Markit. [India LNG Datasheet](#). December 2022.

<sup>91</sup> The Hindu. [Fertilizer subsidy bill in FY23 seen at Rs 2.3-2.5 lakh cr.; may drop 25% in FY24: FAI](#). December 6, 2022.

<sup>92</sup> Reuters. [India revises gas procurement rules for fertiliser firms to cut costs – sources](#). December 22, 2022.

international prices.<sup>93</sup> Greater allocation of gas to the fertilizer sector and capped domestic gas prices could limit imported LNG demand in 2023.

In contrast to rising LNG consumption in the fertilizer sector, the share of LNG consumption in the city gas sector decreased from 3.8 mtpa to 1.1 mtpa, and petrochemicals from 1.9 mtpa to 0.52 mtpa between January and November 2022. Both sectors pass through fuel costs to price-sensitive consumers, creating a greater demand response to high prices. The government has allotted more domestic gas to the sectors, and LNG demand will likely remain limited until prices moderate to affordable levels.

India has also set ambitious green energy targets that could reduce overall gas demand. These include a goal of deploying 500 GW of renewable energy by 2030—up from 118 GW in 2022—as well as establishing a green hydrogen production hub, capable of developing 5 mt of green hydrogen per year.<sup>94, 95</sup> The country also aims to focus on natural farming and bio inputs announced in the budget FY2023-24.<sup>96</sup> The goals signal a potentially rapid shift to green technologies that could result in lower LNG demand over the medium term.

**Bangladesh** met 21% of its gas demand through imported LNG in FY2020-21.<sup>97</sup> Roughly 20% of the country's total LNG imports came from the spot market, at an average price of US\$7.98/MMBtu.<sup>98</sup> In July 2022, however, the government ceased spot market purchases due to high prices. Meanwhile, suppliers under Bangladesh's two long-term LNG contracts—Qatar Gas and Oman Trading International—exercised downward quantity tolerances to limit contracted volume deliveries.<sup>99</sup> As a result, the country's LNG imports contracted by 16% in 2022.<sup>100</sup>

<sup>93</sup> Natural Gas World. [Indian Panel Suggestions will help gas consumers: ICRA](#). December 19, 2022.

<sup>94</sup> Hindu. [Plan to install 500 GW of renewable energy capacity by 2030 to cost ₹2.44 trillion](#). December 8, 2022.

<sup>95</sup> IEEFA. [From Intent to Action: India well poised to become a global leader in green hydrogen](#). January 11, 2023.

<sup>96</sup> IndiaBudget. [Speech of Nirmala Sitharaman, Minister of Finance](#). February 1, 2023.

<sup>97</sup> Hydrocarbon Unit, Energy and Mineral Resources Division, Bangladesh. [Annual Report on Gas Production, Distribution and Consumption FY 2020-21](#). November 25, 2021.

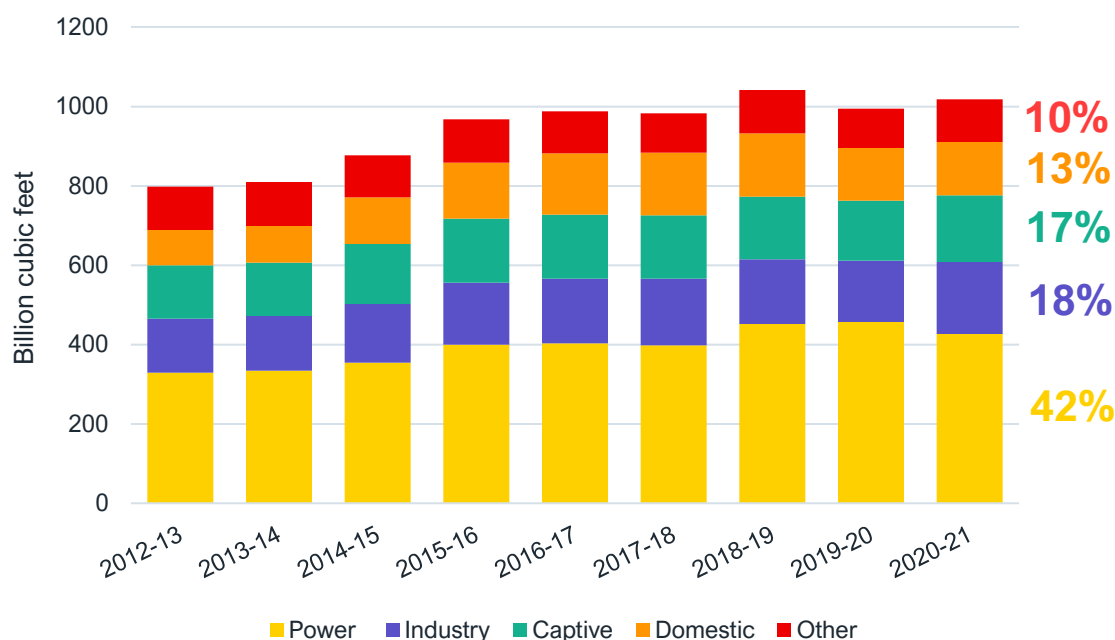
<sup>98</sup> Centre for Policy Dialogue. [Economic and Environmental Cost Estimation of LNG Import: Revisiting the Existing Strategy of Imported LNG](#). June 2022.

<sup>99</sup> S&P Global Commodity Insights. [Qatar, Oman to Reduce 2022 LNG Deliveries to Bangladesh](#). December 2, 2021.

<sup>100</sup> IHS Markit. LNG Market Briefing and Quarterly Outlook to 2026. November 2022.

Expensive fossil fuel imports have increased prices of liquid fuels and electricity tariffs in Bangladesh.<sup>101,102</sup> Recently, Bangladesh hiked gas prices for various sectors, excluding household, transport, and fertilizer, from 14% to 179% to reduce fiscal burdens.<sup>103</sup> After a dip in Asian spot market prices in January 2023, the government released a buy tender for an LNG cargo from the spot market for the first time in eight months, and now aims to purchase up to 12 spot cargoes in 2023.<sup>104</sup> Yet, long-term contractual arrangements remain a priority, and Bangladesh is currently negotiating a 1.5 mtpa supply contract with Brunei Darussalam, though any potential deal would not begin until 2025 at the earliest.<sup>105,106</sup>

**Figure 9: Bangladesh Gas Consumption by Sector**



Source: Hydrocarbon Unit, Energy and Mineral Resources Division, Bangladesh. Annual Report on Gas Production, Distribution and Consumption FY 2020-21. November 25, 2021.

<sup>101</sup> The Daily Star. [Record Hike in fuel prices](#). August 6, 2022.

<sup>102</sup> The Business Standard. [Power Division Hikes Retail Electricity Price by 5%](#). January 12, 2023.

<sup>103</sup> The Business Standard. [Gas Shocks for Industries](#). January 18, 2023.

<sup>104</sup> Energy & Power. [Govt Resumes Importing LNG from Int'l Market](#). February 1, 2023.

<sup>105</sup> The Business Standard. [Bangladesh Proposes Imports of 1.5m Tonnes LNG from Brunei](#). November 24, 2022.

<sup>106</sup> Reuters. [Bangladesh could buy 10-12 spot LNG cargoes in Feb-June](#). February 6, 2023.

Despite the recent decision to reenter LNG spot markets, the country's LNG demand over the next two to three years is unlikely to rise significantly beyond pre-Ukraine crisis levels due to depleting foreign currency reserves and the devaluation of the local currency. Instead, the government is expected to maintain coal-fired power generation to minimize power shortages. The government has also set an ambitious target of 40% renewable energy by 2041 as part of the draft Mujib Climate Prosperity Plan.<sup>107</sup> Given that power, industry, and captive generation sectors are responsible for more than 70% of the country's total annual gas consumption, the success of this plan could reduce the country's LNG demand growth.<sup>108</sup>

**Pakistan's** LNG consumption fell 18.9% in 2022 due to high prices and the unavailability of fuel. Defaults on long-term LNG contracts forced Pakistan to seek LNG from the volatile international spot market.<sup>109</sup> However, the country repeatedly failed to attract bids despite floating tenders to procure cargoes (Figure 9).<sup>110</sup> Similar to Bangladesh, Pakistan's foreign currency reserves are depleting rapidly due to the country's high dependence on imported fossil fuels and skyrocketing commodity prices.



**LNG consumption fell 18.9% y/y in 2022 compared to the previous year due to high prices and the unavailability of fuel.**

The dual energy and foreign exchange shortages have hit export-related industries, such as the textile industry, with several manufacturing facilities shutting down production.<sup>111</sup> Insufficient LNG procurement has also led to the shutting down of power plants, resulting in widespread load shedding. In June 2022, the country experienced power outages for as long as 10 hours per day.<sup>112</sup> In response, the government has initiated energy conservation measures such as reduced working hours, and is also actively seeking long-term contracts with Russia.<sup>113</sup> The

<sup>107</sup> IEEFA. [Bangladesh must revamp its power system model by keeping space for renewables](#). January 31, 2023.

<sup>108</sup> Hydrocarbon Unit, Energy and Mineral Resources Division, Bangladesh, [Annual Report on Gas Production, Distribution and Consumption FY 2020-21](#). November 25, 2021.

<sup>109</sup> S&P Global Commodity Insights. [Gunvor backs out of LNG deliveries to Pakistan for April-June deliveries: officials](#). March 28, 2022.

<sup>110</sup> Dawn. [LNG tenders fail to fetch bidders](#). October 4, 2022.

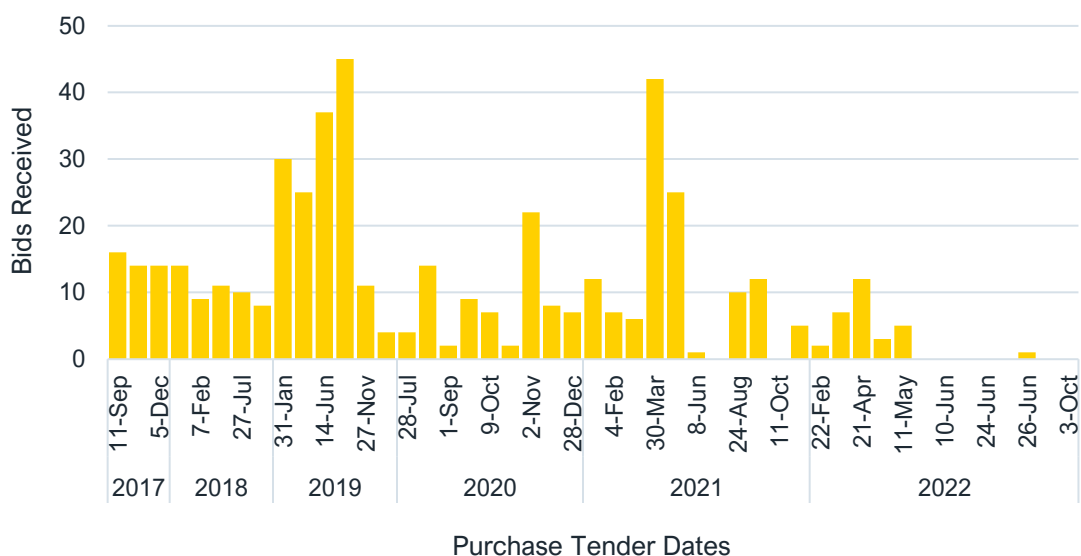
<sup>111</sup> Business Recorder. [Nishat Chunian to partially shut down operations after one month](#). December 28, 2022.

<sup>112</sup> The Conversation. [Pakistan: how an economic crisis has sent prices rocketing](#). July 4, 2022.

<sup>113</sup> The Express Tribune. [Breakthrough in energy talks with Russia unlikely](#). January 18, 2023.

country will likely continue to face an LNG supply crunch for several years until more liquefaction capacity enters the market and pricing becomes more favorable for emerging Asian markets. In the meantime, the country may look to domestic coal as an alternative energy source.<sup>114</sup>

**Figure 10: Pakistan LNG Purchase Tenders and Bids Received**



Source: Bloomberg, Pakistan LNG, PakESDA.

<sup>114</sup> Reuters. [Exclusive: Pakistan plans to quadruple domestic coal-fired power, move away from gas](#). February 14, 2023.

## Demand: Southeast Asia

Southeast Asia's LNG industry, once forecasted to be a hot spot for global demand growth, will face financial challenges due to high prices and difficulty in procuring supplies, as well as currency and inflationary pressures. These headwinds will slow the development of LNG value chains that would support long-term demand growth. Key Association of Southeast Asian Nations (ASEAN) economies have pivoted away from LNG to other sources of energy, including coal, domestic gas reserves, liquid fuels, nuclear, and renewables.

### IEEFA Outlook

In 2022, Southeast Asia's LNG demand growth encountered stiff headwinds due to high prices and unreliable supplies. If global market conditions persist, key challenges related to pricing, procurement, and infrastructure development will continue to curb the region's LNG demand growth.

Prior to the pandemic, McKinsey projected that regional LNG demand would reach 106 mtpa in 2035, a seven-fold increase from 2019 levels.<sup>115</sup> The forecast reflected the view that rapid economic development, coupled with declining domestic gas production, would turn Southeast Asia into one of the world's fastest-growing LNG markets. But developments over the past two years undermine bullish views, for several reasons:

**Limited LNG contracts available through 2026.** Long-term LNG supply contracts with shipments beginning before 2026 are reportedly sold out globally.<sup>116</sup> As a result, incremental demand growth in Southeast Asia is likely to come primarily from spot markets, which are plagued by unaffordable prices and unreliable deliveries.

**Economic and currency pressures for SOEs.** State-owned enterprises (SOEs) that develop new LNG projects could be forced to bear higher fuel and power costs, or else pass those costs

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<sup>115</sup> McKinsey. [Global gas & LNG outlook to 2035—H1 2019](#). September 8, 2019.

<sup>116</sup> Markets Insider. [Leading gas importer Japan says LNG is sold out until 2026, as energy-squeezed countries battle over dwindling supplies](#). November 21, 2022.

along to end users. Either way, LNG imports boost inflationary and currency pressures and undermine fiscal and financial stability.<sup>117</sup>

**Financing challenges for private projects.** With limited government guarantees, private LNG-to-power developers must bear greater risks of volatile fuel and power prices, exacerbating project financing challenges—especially for import projects that compete, directly or indirectly, with domestically supplied, lower-cost power projects.

**Infrastructure constraints.** With Europe now absorbing the entire global fleet of floating import terminals through 2025, Southeast Asian governments face constraints and extended delays in developing new LNG import infrastructure.<sup>118</sup>

In response to these challenges, key ASEAN economies have pivoted away from LNG-oriented energy sector growth strategies to other sources of energy, including coal, domestic gas reserves, liquid fuels, nuclear, and renewables.

## Recent Developments

**Thailand** is the largest LNG importer in Southeast Asia and has increased purchases quickly to compensate for declining domestic gas production and reduced pipeline inflows from Myanmar.<sup>119</sup> LNG imports increased 28% year-over-year through November 2022, causing domestic gas prices to double in 2022 and power prices to hit record levels.<sup>120</sup>

Due to cost pressures, LNG imports declined every month from August to November as buyers reduced spot market exposure. In November, buyers did not import any volumes from the spot market, which typically accounts for roughly 30% of the country's LNG supply.

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<sup>117</sup> IEEFA. [Emerging Asia's unrealistic LNG-to-power project pipeline threatens macroeconomic and financial stability](#). December 15, 2021.

<sup>118</sup> IEA. [Gas Market Report Q4 2022](#), page 28. October 2022.

<sup>119</sup> Natural gas accounts for 30% of Thailand's primary energy demand and 60% of power generation.

<sup>120</sup> Consequently, power prices hit a record high of THB4.00/kWh (US\$0.12/kWh) for the May-August period, before increasing another 18%. Prices are set to increase again for non-household consumers in 2023. Bangkok Post. [ERC clarifies disparity in power tariff rates](#). December 21, 2022.



Instead, the government has increased purchases of other liquid fuels, delayed decommissioning of coal plants, and obtained more renewable energy from small power producers. The government has also resumed negotiations with Cambodia over upstream developments in the Overlapping Claims Area, which is expected to contain large oil and gas reserves.<sup>121</sup> In September 2021, the state-run electrical utility was required to cap power prices, incurring a financial burden of THB60 billion (US\$1.73 billion) through April 2022 and THB110 billion (US\$3.17 billion) from May to August.<sup>122</sup>

Consensus forecasts anticipate Thailand's LNG demand will grow 17% to 20% annually. Thailand's LNG imports spiked in the first half of 2022, but growth slowed to just 9% year-over-year in the second half. If global fuel prices remain high over the coming years, the country may undergo more concerted shifts away from LNG consumption through the mid-2020s.

**Vietnam and the Philippines** do not currently import LNG, although LNG-related projects in both countries have experienced repeated delays. The Philippines is now aiming to bring two terminals online in early 2023, while the Hai Linh LNG terminal in Vietnam is also expected online next year.

However, neither Vietnam nor the Philippines had secured a long-term LNG supply contract as of November 2021. A recent survey of LNG buyers in Japan suggests that there are no long-term contracts available for shipments until 2026.<sup>123</sup> As a result, Vietnam and the Philippines may be forced to rely solely on volatile spot markets for several years.

Policy responses to the global energy crisis may limit the role for LNG. In the Philippines, for example, the government held the first centralized auction for 2 GW of renewable energy and increased mandatory renewable procurement levels.<sup>124, 125</sup> The government has also removed foreign ownership restrictions on new renewable energy projects, established preferential

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<sup>121</sup> Khmer Times. [New talks to end Overlapping Claims Area petroleum riches by Thailand and Cambodia](#). September 18, 2022.

<sup>122</sup> Bangkok Post. [Egat sags under subsidies](#). July 19, 2022.

<sup>123</sup> Oil Price. [Global Long-Term LNG Contracts Are Sold Out Until 2026](#). November 21, 2022.

<sup>124</sup> PV Magazine. [Philippines allocates 1.57 GW of solar in 2 GW renewables auction](#). June 27, 2022.

<sup>125</sup> Eco-Business. [Philippines raises minimum renewable energy capacity to 2.5% in power mix](#). October 3, 2022.

dispatch for renewables in the wholesale electricity spot market, and increased net metering size limits from 100 kilowatts to 1 megawatt.<sup>126,127,128</sup> In June, Vietnam's prime minister publicly expressed concerns about dependence on imported LNG.<sup>129</sup>

Before the Russia-Ukraine crisis, both countries were widely expected to increase LNG demand at a rapid rate of more than 40% annually, with combined imports reaching 10 mtpa by 2030. Now, however, such rapid growth appears unlikely at unaffordable spot prices, without a stable procurement strategy underpinned by long-term contracts and with growing competition from lower-cost energy alternatives.

<sup>126</sup> ASEAN Briefing. [Philippines Opens Renewable Energy to Full Foreign Ownership](#). January 11, 2023.

<sup>127</sup> PV Magazine. [Philippines introduces priority dispatch for renewables, opens market to 100% foreign investments](#). October 10, 2022.

<sup>128</sup> PV Magazine. [Philippines increases net-metering size limit for renewables to 1 MW](#). November 29, 2022.

<sup>129</sup> Dautu Online. [Chưa chốt xong Quy hoạch điện VIII](#). June 18, 2022.

## About IEEFA

The Institute for Energy Economics and Financial Analysis (IEEFA) examines issues related to energy markets, trends and policies. The Institute's mission is to accelerate the transition to a diverse, sustainable and profitable energy economy. [www.ieefa.org](http://www.ieefa.org)

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