2022

June

LNG Market Outlook in the Asia-Pacific Region

Energy Industry Report

The Al-Attiyah Foundation

01 OUR MEMBERS

The Al-Attiyah Foundation is proudly supported by:

Global LNG prices surged to never-before-witnessed heights in 2022, as market tightness and concern over supply gripped the market. The interconnectedness of gas markets in Europe and Asia-Pacific through LNG trade has resulted in the European benchmark, Dutch TTF, topping US$ 60 / MMBtu in 4Q 2021 while the spot Asian LNG benchmark, JKM, hit nearly US$ 60 / MMBtu in March 2022.

What is the short-term outlook for LNG markets across the Asia-Pacific region, and what are the key uncertainties?

ENERGY REPORT

This research paper is part of a 12-month series published by the Al-Attiyah Foundation every year. Each in-depth research paper focuses on a current energy topic that is of interest to the Foundation's members and partners. The 12 technical papers are distributed to members, partners, and universities, as well as made available on the Foundation's website.

- Europe is expected to continue as the premium market this winter season and will compete for LNG cargoes with Asian buyers, to compensate for a decline in Russian pipeline deliveries. Customers with long-term oil-linked contracts are much better-placed than those reliant on the spot market or on JKM (Asia) or NBP or TTF (Europe) indexation.
- Asian buyers are witnessing an incremental increase in demand for LNG spot cargoes as they enter the summer season. However, they face continued supply and price risks stemming from the Russia-Ukraine conflict, which is likely to keep LNG prices elevated in the coming months.
- Countries with winter peaks for gas demand for heating (China, Japan, South Korea) face a more challenging environment than those with a summer peak for air-conditioning (south-east Asia) as they will be competing directly with Europe.

China's LNG demand growth will continue to be supporits gas policy, as per its Five-Year Plan (FYP):

- In 2022, China's gas consumption is forecasted to increase by 9% Year-over-year (YOY) to 407 BCM, driven by its industrial sector, which will account for 48% of demand growth.
- China's LNG demand is expected to increase by 8% YOY to 85 MT in 2022, compared to last year's 16% YOY growth rate.

Growing nuclear and coal generation will reduce Japan and South Korea's demand for imported LNG:

- Japan's LNG imports are estimated to fall by 7% to 68 MT in 2022, due to an increase in nuclear availability during the winter months, and an increase in coal-based electricity generation in the summer months.
- South Korea's LNG imports are projected to decline by 11% YOY to 42 MT in 2022, despite a record increase of 16% YOY in 2021.

India, Pakistan, and Bangladesh will find it difficult to meet their gas requirements in 2022 due to declining domestic output and high exposure to expensive spot LNG markets:

- India's LNG demand is forecasted to increase by 8% YOY to 26 MT this year, mainly driven by new LNG import capacities, in addition to an anticipated economic recovery and better management of new COVID-19 outbreaks, which will bolster demand for the country's city gas distribution and fertiliser industry.
- Pakistan's LNG imports are estimated to increase by 11% YOY to 10 MT in 2022, driven by an anticipated steady economic growth, which will boost gas consumption in the power and industrial sector.
- In 2022, Bangladesh's total LNG imports are expected to increase by 20% to 7 MT, due to increasing consumption in the power and industrial sector amid declining domestic gas production, and a fall in contracted volumes from long-term suppliers Qatargas and Oman Trading International.

Thailand and Malaysia's gas-based electricity generation capacity, and new importers Vietnam and Philippines, will drive Southeast Asia's demand for LNG:

- Thailand's LNG demand is projected to increase by 14% YOY to 8 MT this year, given increasing demand from the electricity sector, which will be meet through the start-up of the Nong Fab terminal in 2Q 2022, amid declining domestic production and pipeline supplies from Myanmar.
- As of 2Q 2022, Myanmar has halted LNG imports as operations at the Thilawa and Thaketa power projects in Yangon have been suspended.
- In the three Sijori countries, Malaysia, Indonesia, and Singapore, demand for imported LNG is expected to grow by an average of 12% YOY this year, with the exception of Indonesia where LNG consumption will remain unchanged.
- Vietnam and the Philippines are expected to start importing LNG this year with the commissioning of new LNG import terminals

05 BACKGROUND

The Russian invasion of Ukraine has created an extraordinary energy crisis, which has negatively affected the post COVID-19 global economic recovery and led to rising global inflation through higher energy and non-energy commodity prices.

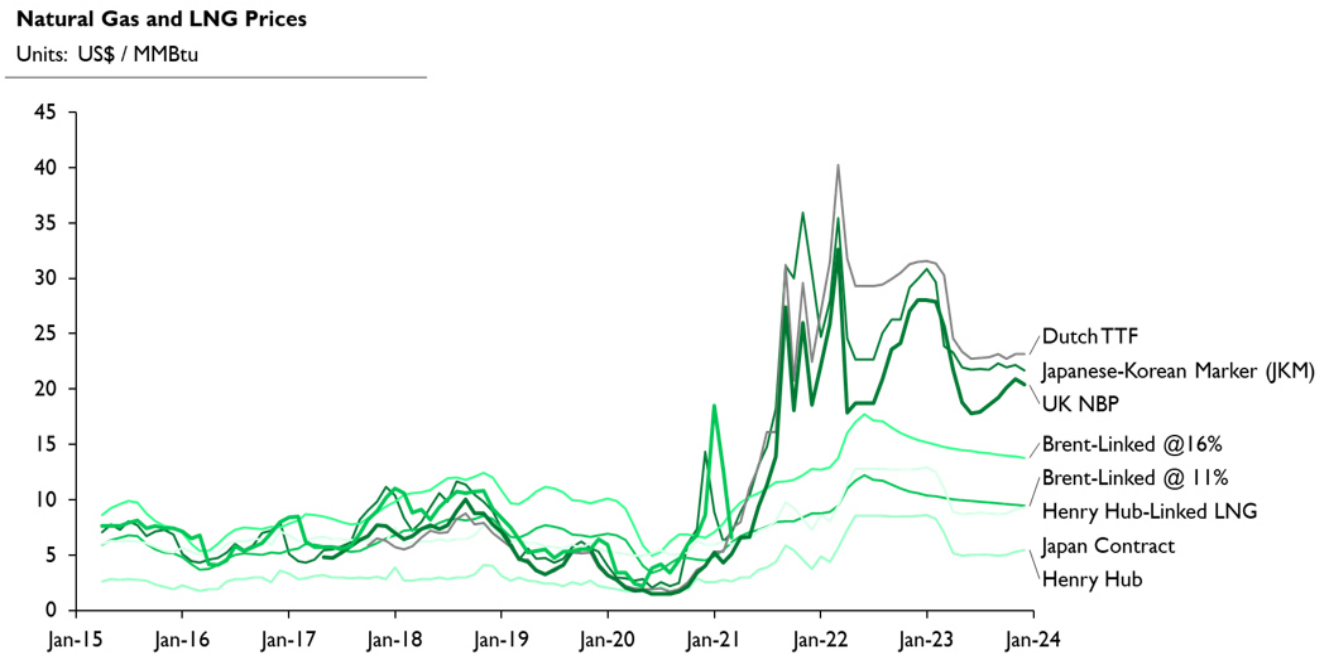
In particular, gas and LNG have experienced an unprecedented surge in price since 3Q 2021. Europe's gas supplies have been of major concern throughout 2H 2021, as storage inventories across the continent remained well below average levels, particularly at storage facilities directly or indirectly controlled by the Russian energy company, Gazprom.

The European winter season of 2021 / 2022 opened with storage levels 17% below their 5-year average, and 22% below the previous winter season[i]. These low inventory levels were mainly attributed to a 25% YOY decline in Russian pipeline deliveries[ii].

As a result of the reduction in deliveries, Dutch TTF prices reached a then record of US$ 15.8 / MMBtu in September 2021, and Henry Hub (US) prices almost doubled to an average of US$ 3.9 / MMBtu in 4Q 2021[iii]. Spot prices for deliveries to the Asia-Pacific region according to the Japan-Korea Marker (JKM) followed a similar pattern, rising more than four-fold to an all-time high of US$ 18 / MMBtu.

In the Asia-Pacific region, Japan and South Korea have the largest exposure to oil-indexed LNG import contracts, as both countries observed LNG import prices surge to an average of US$ 10.3 / MMBtu and US$ 10.6 / MMBtu, respectively in 4Q 2021, the highest levels since 2015, and in line with rising crude oil prices. The increase in gas prices also led to average Chinese LNG import prices reaching US$ 16 / MMBtu in the same period.

Figure 1. Global Gas and Liquified Natural Gas Prices and Benchmarks



Furthermore, European LNG import prices increased more sharply than the Asia-Pacific region. LNG import prices in the European Union increased by threefold on the 2020 average price to reach an average of US$ 10 / MMBtu between 1Q 2021 – 3Q 2021. In the United Kingdom, average LNG import prices quadrupled to US$ 10 / MMBtu with monthly prices soaring to an all-time high of US$ 27 / MMBtu in 4Q 2021.

After Russia's invasion of Ukraine in February 2022, Europe is expected to become a premium market this winter season and will compete for large LNG cargoes with Asian buyers in order to compensate for a decline in Russian pipeline deliveries. Currently, there are no legally binding import restrictions on Russian gas deliveries to the European Union, but there is a potential risk of Russia curtailing deliveries to Europe, in addition to a strong drive among European Union policymakers to reduce their exposure to Russian energy imports. Therefore, Europe's increased demand for LNG cargoes will put an additional pressure on Asian buyers to book winter LNG supplies early, amid a tight global LNG market.

Asian buyers are witnessing an incremental increase in demand for LNG spot cargoes as they enter the summer season, amid continued supply risks stemming from the Russia-Ukraine conflict, which is likely to keep LNG prices underpinned in the coming months. Most Asian buyers have begun purchasing their residual requirement for LNG cargoes from the spot market this spring and are likely to continue through the summer to avoid a repetition of the supply crunch they experienced in the previous winter season.

Figure 2. Selected Spot Tenders by Asian Buyers for the Winter Season of 2022 / 2023 (as of March 2022)[iv]

Selected Spot Tenders Issued by Asian Buyers for the Winter Season of 2022 / 2023 (as of March 2022)				
Company	Country	Delivery Period	Closing Date	Number of Cargoes
INPEX	Japan	27 – 31st March	02-22-22	1
PTT	Thailand	April		Unspecified
KOGAS	South Korea	March		
RPGCL	Bangladesh	12 – 13th March		1
Pakistan LNG	Pakistan	March		2
GSPC	India	1 – 15th March	02-18-2022	1
CPC	Taiwan	April	02-15-2022	2
PTT	Thailand	April	02-17-2022	Unspecified
KOGAS	South Korea	20th February – 10th March	02-16-2022	
GAIL	India	April - September		6

Japanese LNG offtakers have also sought to boost LNG supplies through time swaps instead of spot purchases, which if successful could result in having surplus summer supplies. However, the inflexibility of term contracts, with some including destination restriction clauses, combined with the uncertainty in determining the summer price spread amid the price volatility, has resulted in Japanese offtakers failing to secure such arrangements.

Conversely, Japanese buyers may need to secure more spot cargoes this summer if there is a ban on LNG supplies from the Sakhalin plant in Russia. Currently, eight Japanese firms have a total offtake agreement of 5 MT / year from the project[v].

South Korea's main LNG offtaker, Korean Gas Corporation (KOGAS), has issued several tenders in 1Q 2022 seeking spot cargoes for prompt delivery. This is a significant shift in the company's LNG purchasing strategy, with repeated tenders for small batches of LNG cargoes likely allowing KOGAS to mitigate risks. In June 2022, KOGAS entered into an agreement with TotalEnergies to enhance its LNG trading and optimisation capabilities, as it seeks to boost South Korea's energy security[vii]. Both companies have a strong record in procuring LNG and optimising KOGAS volumes from Cheniere Energy's Sabine Pass facility in the United States.

India's main LNG offtaker, the Gas Authority of India Limited (GAIL) has issued a swap tender offering six LNG cargoes for loading in the United States, and six additional cargoes for delivery to the ports of Dahej, Hazira, and Dahbol between 2Q 2022 – 3Q 2022[viii]. Currently, GAIL has a 20-year deal to buy 6 MT / year LNG from United States based Dominion Energy's Cove Point and Cheniere Energy's Sabine Pass facility[ix].

Figure 3. Japanese Offtake from the Sakhalin LNG Project in Russia[vi]

Japanese Term Offtakers from Sakhalin LNG			
Buyer	FOB / DES	Duration	Volume
JERA	FOB	2009 – 2029	1.5 MT
JERA	DES	2011 – 2026	0.5 MT
Hiroshima Gas	FOB	2008 – 2026	0.21 MT
Osaka Gas	FOB	2008 – 2031	0.2 MT
Saibu Gas	DES	2014 – 2027	0.07 MT
Toho Gas	DES	2009 – 2033	0.5 MT
Tokyo Gas	FOB	2009 – 2031	1.1 MT
Kyushu Gas	DES	2009 – 2031	0.5 MT
Tohoku Electric	FOB	2010 – 2030	0.4 MT

Pakistan LNG Limited (PLL) has picked up two cargoes of LNG from Qatargas for delivery in 2Q 2022, and another two cargoes from Total Energies for delivery in 2Q 2022[x]. Until now, PLL has picked up a total of four cargoes out of the seven it has been seeking.

Thailand's national energy company, PTT, has also been active in purchasing spot cargoes since late 2021, as falling domestic supplies from the offshore Erawan gas field have forced the company to seek spot cargoes to make up for the shortfall.

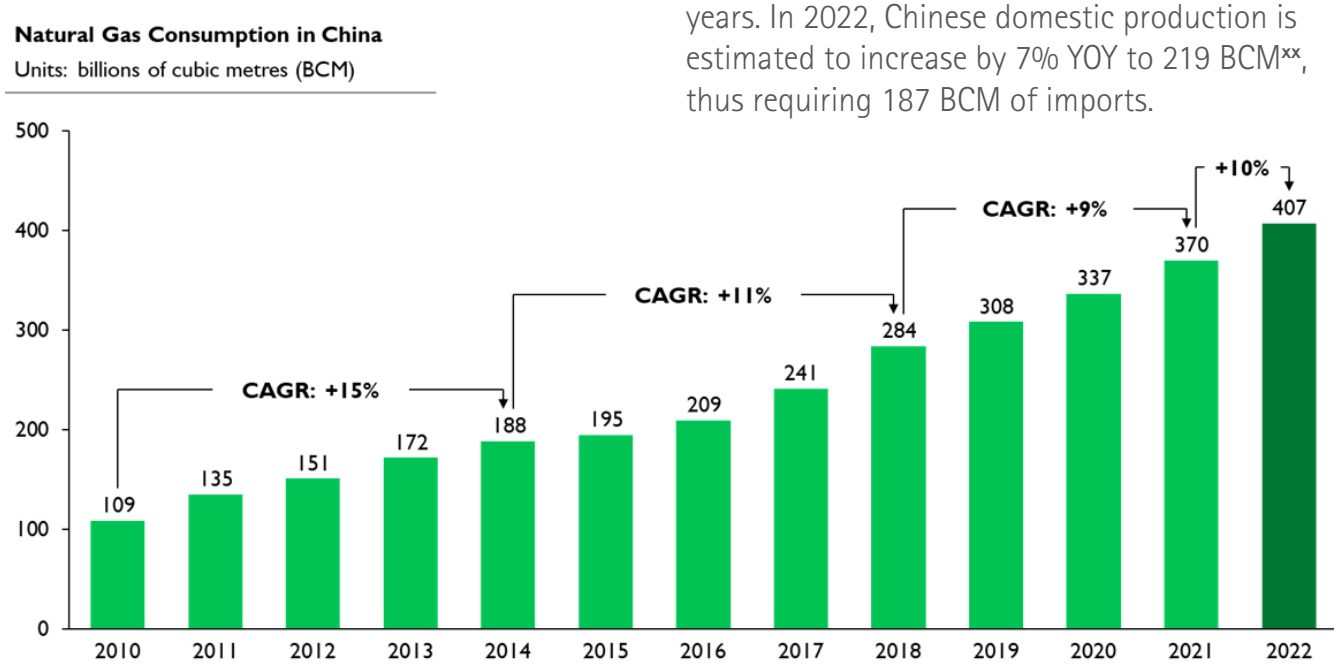
09 CHINA'S LNG GROWTH AND FIVE-YEAR PLAN

At the end of 4Q 2021, China's gas demand experienced a slowdown with total consumption increasing by 3% YOY[xi]. This was mainly due to slow economic growth under COVID-19 constraints, price-driven demand destruction particularly in the industrial sector, and relatively mild temperatures in the winter season of 2021 / 2022.

This trend continued in the following quarter, with demand growing at a modest rate of 4% YOY at the end of 1Q 2022, as the Beijing Winter Olympics prompted local authorities to shut down industrial and manufacturing facilities to reduce air pollution levels; in addition to various COVID-19 related mobility restrictions enforced across the country amid a surge in new cases[xii].

In 2022, China's gas consumption is forecasted to increase by 10% YOY to 407 BCM[xiii]. The industrial sector will continue to be a key driver, accounting for 48% of total demand growth[xiv].

Figure 4. Gas Consumption in China[xvii]



The power sector is projected to add another 17% of total demand growth, with an additional 5 GW of gas-based electricity generation capacity expected to be online at the end of this year, taking the country's total capacity to 114 GW[xv]. The residential, commercial, and transport sectors will collectively account for 27% of demand growth, led by new grid connections and a growing gas vehicle fleet[xvi].

The long-term outlook for gas and LNG in China is positive, as the Government of China intends to increase the share of gas in its primary energy mix to 15% by 2030 and expand the share of gas across urban areas to 65% – 70% by 2030[xviii].

The 13th Five-Year Plan (2016 – 2020) outlined the importance of protecting the environment, while also developing its gas resources. Under the plan, China intends to raise its domestic supply of unconventional gas, mainly shale gas and coalbed methane. The current production target is 30 BCM / year for shale gas and 10 BCM / year for coalbed methane[xix]. However, several government targets for domestic gas production have been missed or revised downward in recent years. In 2022, Chinese domestic production is estimated to increase by 7% YOY to 219 BCM[xx], thus requiring 187 BCM of imports.

Currently, the Chinese gas industry is undergoing a series of regulatory reforms. Typically, the National Development and Reform Commission (NDRC) has been authorised to set domestic gas tariffs, which it intentionally kept high for industrial users to help subsidise residential gas use. The initial goal has been to replace coal-based home and district heating with gas to reduce air pollution. But in recent years, a growing proportion of Chinese non-residential sales have been priced based on market values. These pricing reforms are intended to reduce the cost of gas for industrial users and encouraging coal-to-gas switching across the industrial sector.

Similarly, various structural changes are currently underway in to regulate Chinese gas infrastructure. China National Petroleum Corporation (CNPC) has controlled most of China's long-distance gas pipeline network. But several years ago, CNPC began transferring pipelines into a subsidiary called PipeChina, as part of a plan to establish a separate national pipeline company[xxii]. PipeChina was established in December 2019, and the three major Chinese national oil companies collectively hold 46.8% of its shares, but it offers third-party access to pipelines, LNG terminals and storage facilities. As part of its efforts to relieve gas supply shortages, several private companies are allowed to build and operate LNG receiving terminals.

Last year, China imported 79 MT of LNG, surpassing Japan to become the world's largest importer[xxiii]. In 2022, China's demand for imported LNG is expected to increase by 8% YOY to 85 MT, compared to last year's 16% YOY growth rate[xxiv]. These LNG supplies will not only provide flexibility in supply, but also balance unreliable supplies from domestic sources of production and a potential shortfall of pipeline deliveries from Kazakhstan and / or Uzbekistan.

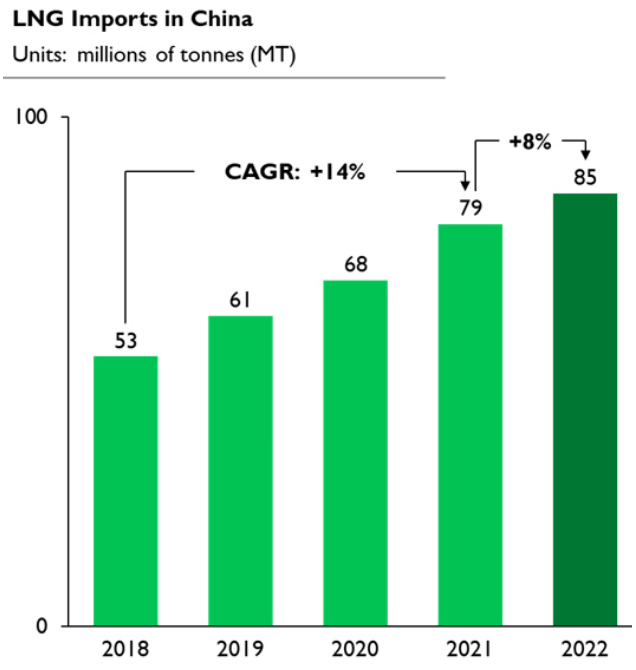
Figure 5. Chinese Term Contracts Starting in 2022

Chinese LNG Term Contracts Starting in 2022				
Buyer	Seller	Export Terminal	Expected Start Date	Volume
CNOOC	Venture Global	Calcasieu Pass	2022 (start date has not been confirmed)	1.5 MT
	QatarEnergy	Ras Laffan		3.5 MT
	Petronas	-		2.2 MT
Sinopec	QatarEnergy	Ras Laffan	01-01-2022	2 MT
CPC			01-01-2022	1.25 MT
Shell (for delivery to China)			01-01-2022	1 MT
Sinochem	Cheniere	Portfolio	07-01-2022	0.9 MT
ENN	Cheniere	Portfolio		0.9 MT
Total				13.25 MT

These countries are expected to reduce their gas exports to China due to increasing domestic consumption. Yet, pipeline deliveries are projected to increase by 12% YOY to 67 BCM in 2022, with the increase coming from the 38 BCM / year Power of Siberia Pipeline from Russia.

Moreover, in 2021, numerous long-term LNG contracts were signed by Chinese companies, driven by expectations of a healthy growth in gas demand, and a desire to avoid the volatility in spot prices. In 2021, China signed a record high 23 MT of LNG contracts, a 516% YOY increase[xxv]. A total of 13 MT of long-term LNG contracts are expected to begin in 2022[xxvi]. To accommodate this, the country's total LNG receiving capacity is forecasted to reach 91 MT by the end of 2022, with eight new import terminals expected to achieve commercial operations[xxvii].

Figure 6. Chinese LNG Imports

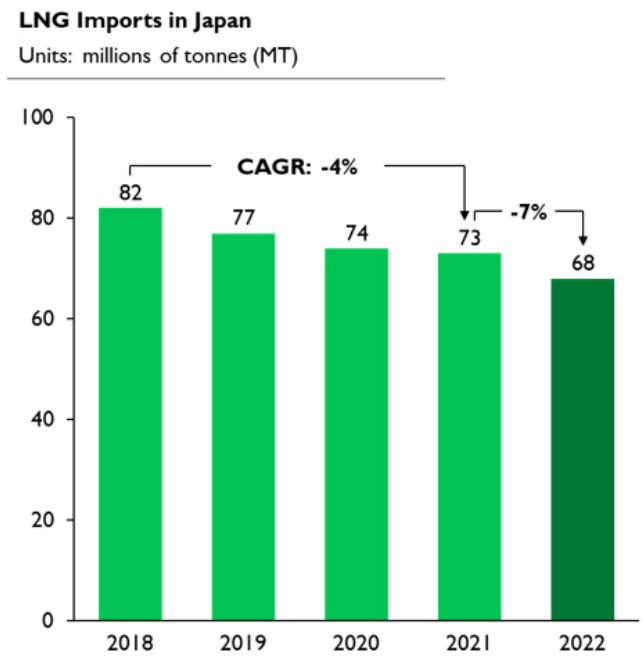


GROWING NUCLEAR AND COAL GENERATION IN JAPAN AND SOUTH KOREA

At the end of 4Q 2021, Japan's gas consumption decreased by 19% YOY mainly because of a series of nuclear restarts. This was in contrast to the previous winter season, when LNG imports increased due to cold winter temperatures, which also coincided with low nuclear and solar availability[xxviii]. The decline in demand continued in 1Q 2022, with LNG imports falling by 10% YOY at the end of the quarter.

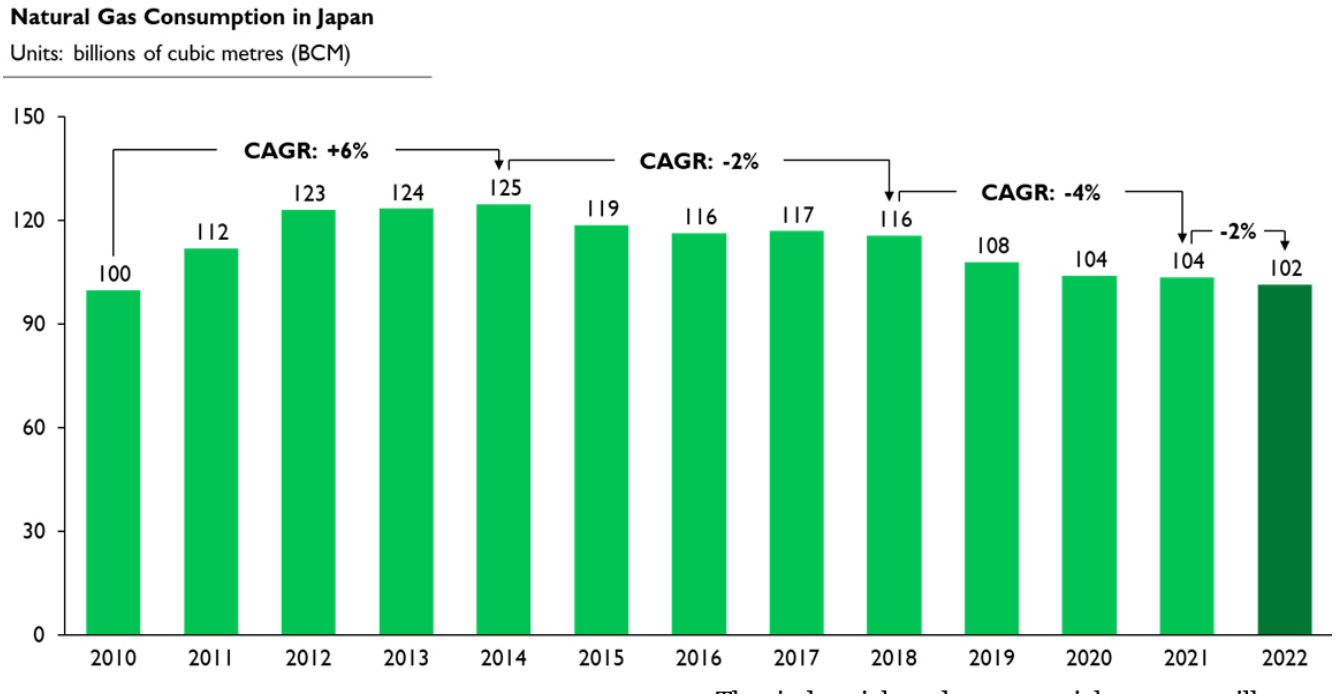
In 2022, Japan's gas consumption is projected to decrease by 2% YOY, mainly driven by growing nuclear, renewable, and coal-based electricity generation[xxx]. Yet, gas will continue to dominate the country's electricity mix, accounting for 35%, followed by coal with 30%, and renewables with 12%[xxxi]. After nuclear generation increased by 42% YOY in 2021, it is expected to remain mostly unchanged in 2022. However, with the introduction of several new coal-based plants this year, demand for gas could be further squeezed.

Figure 7. Japanese LNG Imports [xxxii]



The industrial and commercial sectors will continue to experience increasing gas demand in 2022, due to the ongoing economic recovery from the COVID-19 pandemic but it will not be sufficient to offset the decline in demand from the power sector. At the same time, slower than expected economic growth combined with rising inflation between 3Q 2022 – 4Q 2022, could present additional pressure to gas consumption for the rest of this year.
With declining gas consumption this year, Japan's LNG imports are estimated to fall by 7% to 68 MT in 2022, due to an increase in nuclear availability during the winter months, and an increase in coal-based electricity generation in the summer months [xxxiii].

Figure 8. Gas Consumption in Japan[xxix]



Nuclear generation is expected to decrease in the summer months this year, and will be offset by higher coal plant availability, despite delays in the start-up of new coal power projects. The 650 MW Kobe 3 Coal Project was scheduled to be online in December 2022, but instead achieved commercial operations late January 2022. Similarly, the 1,070 MW Taketoyo 5 project in Chubu was expected to come online at the end of March 2022 but has been delayed to early August 2022.

In 2022, overall nuclear generation is expected to decline by 4% YOY, despite being higher during peak demand period of 1Q 2022 and 4Q 2022, because of longer maintenance periods scheduled for the Ohi 4 and the Genkai 3-4 Project this year [xxxiv]. Four nuclear reactors are expected to complete security clearances in 2022, of which the 1,180 MW Ohi 3 Project is expected to miss its deadline.

The potential restructuring of the ownership interest of Mitsui and Mitsubishi, two Japanese firms, in the nearby Sakhalin LNG facility in Russia, is also concerning for Japan's security of supply.

South Korea's gas demand growth remained close to zero at the end of 4Q 2021, due to high prices and with new nuclear and coal-based electricity capacity coming online. This trend was contrary to the previous quarter, when gas demand increased by 14% YOY at the end of 3Q 2021[xxxvi].

South Korea's declining gas demand trend is expected to continue this year, with demand forecasted to decrease by 12% YOY to 55 BCM in 2022, as the country's power sector faces headwinds with the start-up of the delayed 1.4 GW of nuclear capacity at Shin-Hanul 1 in 2Q 2022 and 1 GW of coal capacity expected to achieve COD in 3Q 2022 [xxxvii].

Nuclear generation is estimated to average 22 GWh between 2Q 2022 – 3Q 2022, compared to actual output of 17 GWh a year earlier [xxxviii]. And if South Korea's nuclear capacity continues to operate at the current load factors, the increase in nuclear generation could offset South Korean LNG demand by 3 MT or seven cargoes / month between 2Q 2022 – 3Q 2022[xxxix].

South Korea's LNG imports are projected to decline by 11% YOY to 42 MT in 2022, despite a record increase of 16% YOY increase in 2021[xl].

In addition to increasing nuclear generation, the South Korean government's efforts to facilitate coal-to-gas switching efforts, which involved implementing an environmental dispatch system, has yielded minimal results so far, with carbon prices being too low to make coal uncompetitive against gas.

While South Korea has introduced a coal phase-out plan by 2050, coal-based generation will continue to dominate the country's electricity mix in 2022, accounting for 36% of overall generation[xlii].

Figure 9. Gas Consumption in South Korea [xxxv]

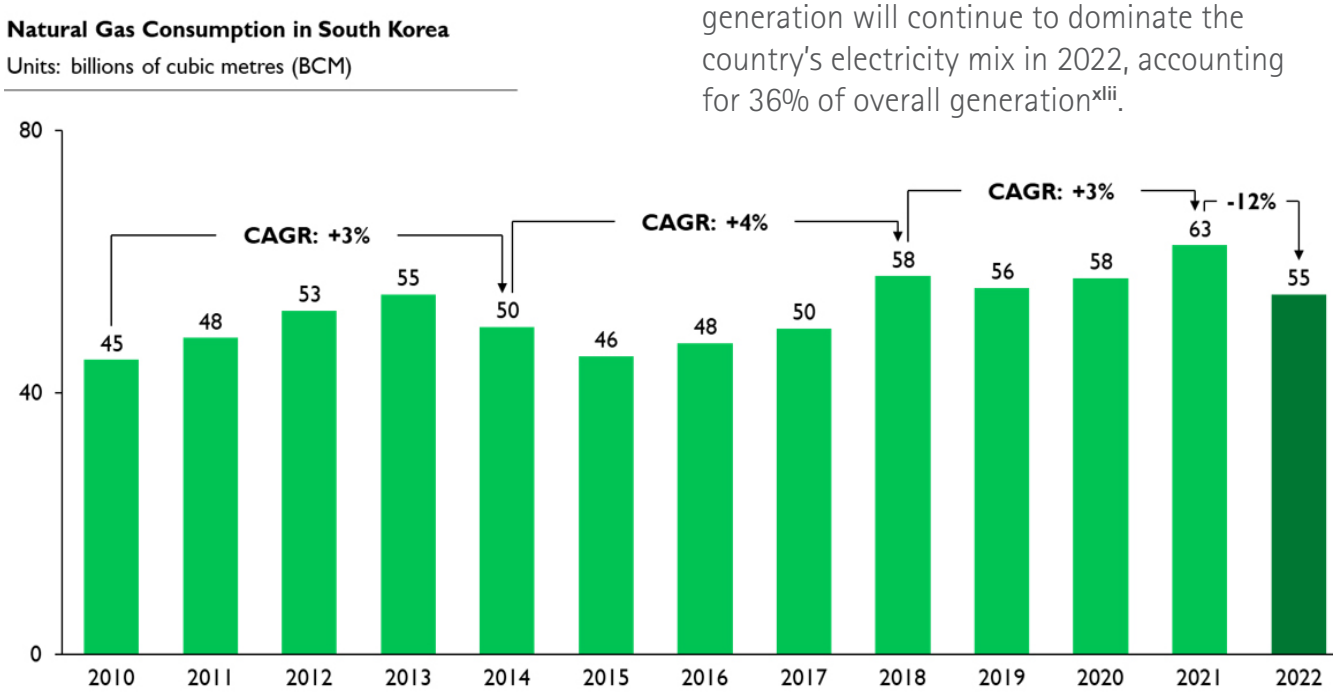
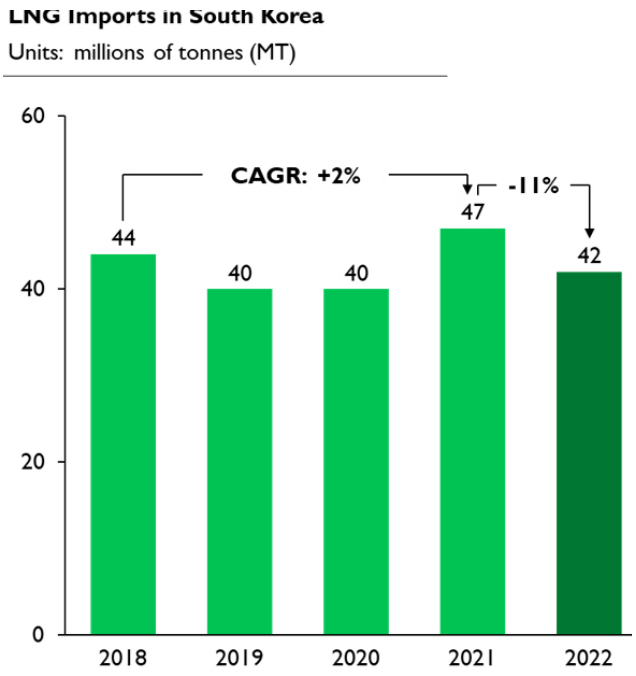


Figure 10. South Korean LNG Imports[xli]



The short to medium-term outlook for LNG in South Korea is mixed. The country's plan of permanently shutting down 24 coal power projects by 2034 could positively change the outlook for LNG. In March 2022, South Korea elected the conservative opposition People Power Party's presidential candidate, Yoon Seok-Yeol, who has promised to revive the South Korean nuclear industry and bring an end to the incumbent President Moon Jae-in's nuclear phase-out policy. During his election campaign, President Yoon Seok-Yeol criticised his predecessor for increasing South Korea's reliance on expensive LNG.

In contrast to Japan and South Korea, Taiwan's LNG imports are forecasted to increase by 6% YOY to 18 MT in 2022, with demand supported by a robust industrial activity and strong gas-based electricity capacity[xliii].

Last year, the 985 MW Unit 1 of the Kuosheng nuclear power plant was taken offline, as part of the Democratic Progressive Party's move to end the use of nuclear power by 2025. In addition to this, fluctuations in the renewable energy supply and a drought last autumn also contributed to a stronger dependence on gas for electricity generation.

In 2022, it is expected that gas-based electricity generation will continue to increase and supported by the government's target to increase the share of gas to 50% of the electricity mix by 2025.

GAS DEMAND STRUGGLES IN INDIA, PAKISTAN, AND BANGLADESH

After the sudden change in spot prices in 2021, the three large consumers of LNG in South Asia – India, Pakistan, and Bangladesh - are all expected to find it difficult to meet their requirements this year, with total demand across all three countries estimated to increase by a mere 4% YOY to 39 MT in 2022[xliv].

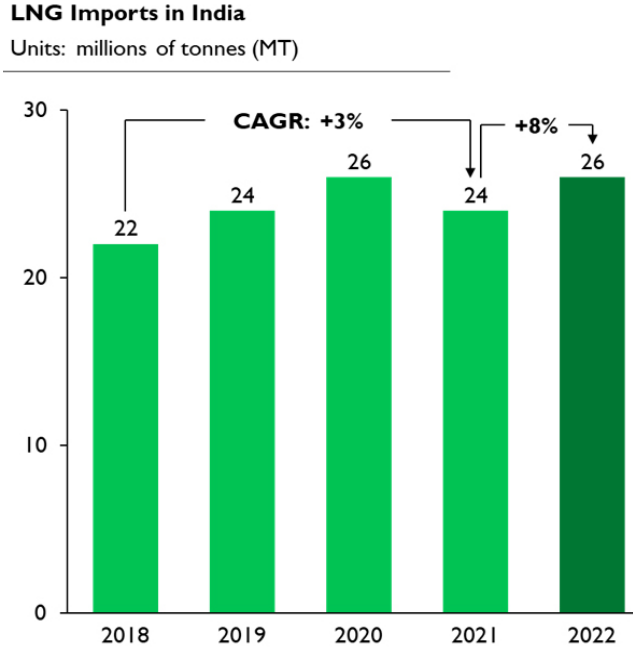
At the end of 4Q 2021, India's gas demand increased by 3% YOY, after a 6% YOY increase in consumption over the 1Q 2021 – 3Q 2021 period[xlv]. The decline in consumption in 4Q 2021, was mainly due to surging LNG prices, which suppressed gas use for electricity generation, and in the refining and petrochemical industry; while growth remained resilient across the country's city gas distribution and fertilisers industry, owing to new grid connections that boosted demand.

LNG imports also experienced a sharp decline of 20% YOY at the end of 4Q 2021, compared to a 7% YOY decline in consumption between 1Q 2021 – 3Q 2021, as rising domestic production and high import prices contracted demand for LNG[xlvi]. This trend continued in 1Q 2022, when total gas consumption in January and February 2022 increased by a mediocre 3% YOY, whereas LNG imports declined 23% YOY at the end of 1Q 2022[xlvii].

In 2022, India's gas demand is projected to increase by slower-than-normal 2% to 33 BCM, driven by expanding fertiliser production, and supported by increasing domestic supply that is cheaper to produce compared to current LNG import costs[xlviii]. India's total domestic gas production between April 2021 – February 2022, increased by 20% YOY to 31 BCM, with production expanding at the offshore Krishna Godavari basin operated by BP and Reliance Industries[xlix]. This also resulted in India's demand for LNG imports declining by 49% YOY over the same period, compared to a 55% YOY increase in the year before[l].

India's LNG demand is forecasted to increase by 8% YOY to 26 MT mainly driven by new LNG import capacities, in addition to an anticipated economic recovery and better management of new COVID-19 outbreaks, which will bolster demand for the country's city gas distribution and fertiliser industry[li].

Figure 11. Indian LNG Imports[lii]



In 2022, India is expected to increase its import capacity with the potential commissioning of four new import terminals. On the west coast, the Jaigarh and Jafrabad terminals are expected to start receiving LNG cargoes from 2Q 2022, whereas the Dhamra and Karaikal terminals on the east and south coast are likely to be operational at some point in 2H 2022. Despite the increase in India's regasification capacity, a lack of domestic pipeline infrastructure and project delays will likely continue to undermine capacity utilisation at some of its import terminals.

India's fertilisers industry, and to smaller extent the city gas distributors, are shielded from global LNG prices. Fertiliser producers are able to pass on higher production costs to consumers because the government subsidises urea production. Similarly, city gas distributors receive supplies at a cheaper rate than imported LNG but are not able to entirely pass on the price increases to their customers. Together these industries accounted for 49% of India's LNG consumption between 2Q 2021 – 1Q 2022[liii].

India's gas demand for fertilisers production will increase over the coming months, as ammonia and urea production across five new production facilities – Sindri, Barauni, Gorakhpur, Talcher, and Ramagundam - is estimated to require about 5 – 6 MCM / d of feedstock[liv].

However, India will continue to be exposed to high and volatile LNG prices, which presents a significant downside risk to its short-term gas demand forecasts. Its LNG imports are heavily exposed to the spot market, accounting for ~50% of the country's total LNG imports between 2015 – 2020[lv].

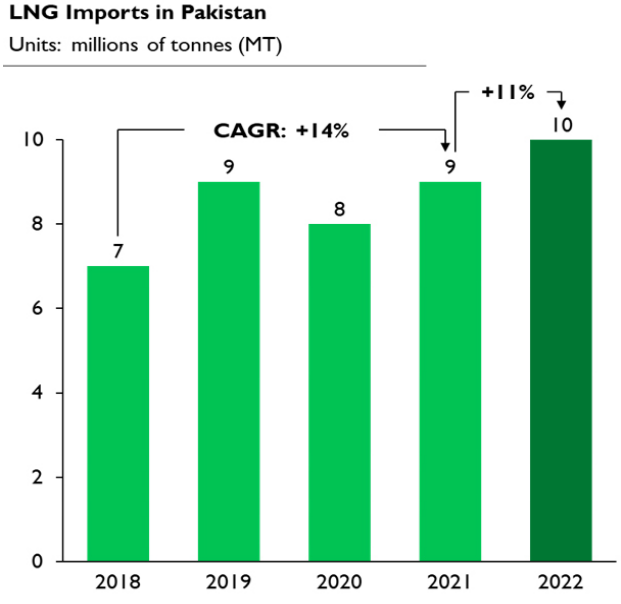
Indian state LNG importer, GAIL, has largely stayed clear of the spot market in recent months, as prices reached unsustainable levels, in addition to larger-than-normal domestic production. However, GAIL will continue to use its contractual offtake from the United States to supply the domestic city gas and fertilisers industry, whereas supply for the power and industrial sector is likely to remain constrained.

India's regional peers, Pakistan and Bangladesh, have experienced widespread fuel switching away from gas to coal and fuel oil, especially in the power sector, which has continued into early 2022. In December 2021, Pakistan's textile industry was forced to shut down for weeks due to the lack of affordable gas, while Bangladesh restricted supplies to CNG stations and other end users in order to cope with an extended outage at the Summit FSRU terminal.

Bangladesh has the largest share of gas relative to its overall primary energy mix in the entire Asia-Pacific region at 69%, followed by Pakistan at 43%, compared to India's 7%[lvi].

Last year, Pakistan's LNG imports increased by 14% YOY to 9 MT as the country's economy recovered from the nCOVID-19 related demand disruptions[lvii]. In 2022, Pakistan's LNG imports are estimated to increase by 11% YOY to 10 MT mainly because of an anticipated steady economic growth, which will boost gas consumption for the power and industrial sector[lviii]. The additional LNG supplies this year will also offset declining domestic gas production, with depleting reserves across its largest fields, Sui and Qadirpur. Despite declining production, the country's plans for a new LNG terminal are unlikely to materialise this year.

Figure 12. LNG Imports to Pakistan[lix]



In 2021, Pakistan and Qatar entered into another 10-year supply agreement, through which Qatargas will supply an additional 5 MCM / d of LNG at a 31% lower price than the original 14 MCM / d contract agreed in 2015, under which Qatar would supply 3 MCM / d eventually expanding to 4 MCM / d at a Brent slope of 10.2%[lx].

However, PLL continues to remain exposed with its mid-term contracts with global commodities trading firm Gunvor and Italian IOC Eni, which is set to expire in 3Q 2022. Eni has failed to supply five LNG cargoes, while Gunvor has failed to supply seven LNG cargoes to the country[lxi]. It may have been cheaper for the companies to default and pay a contractual penalty rather than supplying very high-cost LNG. Pakistan is likely to approach the London Court of International Arbitration (LCIA) for the collection of US$ 230M worth of damages from Gunvor and Eni over their failure to meet contractual obligations[lxii].

In July 2022, PLL announced that it was seeking ten shipments of LNG for delivery in July – September, which is estimated to cost the country US$ 1 billion to purchase at the current spot market rates[lxiii].

Furthermore, in 2022, Bangladesh's total LNG imports are expected to increase by 20% to 7 MT, due to increasing consumption in the power and industrial sector amid declining domestic gas production, and a drop in contracted volumes from long-term suppliers Qatargas and Oman Trading International[lxiv]. This will force the country's main LNG offtaker Rupantarita Prakritik Gas Company Limited (RPGCL) to increase its spot buying after scaling back its procurement plans in 2021 amid high prices. It will also put pressure on the government's commitment to subsidise LNG imports and may result in gas supply shortages this year.

However, Bangladesh's LNG demand is forecasted to reach 18 MT in 2030, 30 MT in 2040, and more than 36 MT by 2050, which will put pressure on the country to expand its import capacity[lxv]. Qatargas has dominated LNG supplies to Bangladesh over the past few years by combining long-term contracts with import infrastructure investments. Bangladesh also imports some LNG from Nigeria and the United States; however, the other leading global exporter Australia is yet to sell to the country.

RPGCL, which is a subsidiary of state gas firm PetroBangla, tends to prefer sourcing LNG supplies through government-to-government arrangements, which is an approach it has taken with Qatargas and Oman Trading International in the past. Malaysia is geographically the second-closest LNG supplier to Bangladesh after Qatar, and both countries have signed a memorandum of understanding on cooperation for LNG supply in 2021[lxvii].

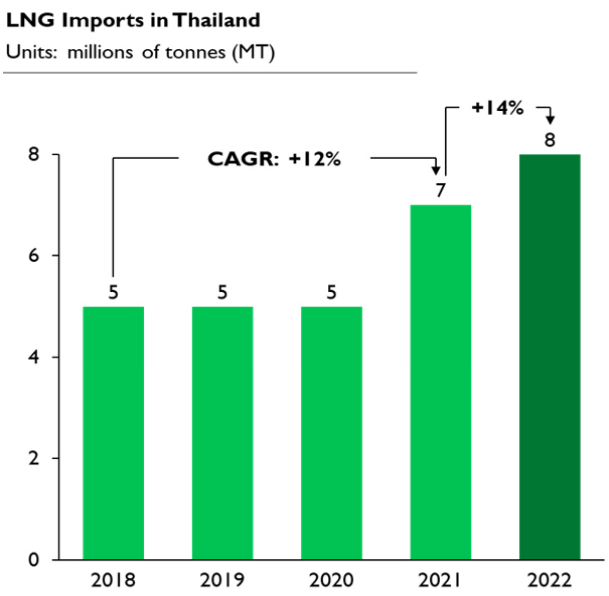
SOUTHEAST ASIA'S DEMAND FOR LNG SET TO GROW

Thailand is the largest gas consumer in Southeast Asia, with gas accounting for 33% of overall primary energy[lxvii]. In 4Q 2021, Thailand observed a 5% YOY decline in gas demand, as high LNG prices reduced domestic consumption[lxviii]. Whereas, in Indonesia, demand increased by a robust 34% YOY in 4Q 2021, as a stronger-than-expected economic recovery and coal shortages boosted gas consumption[lxix].

In 2021, Thailand's demand for imported LNG increased by 21% YOY to 7 MT. In 2022, Thailand's LNG demand is projected to increase by 14% YOY to 8 MT, driven by increasing demand from the electricity sector, which will be meet through the start-up of the Nong Fab terminal in 2Q 2022, amid declining domestic production and pipeline supplies from Myanmar[lxx]. Thailand's significant gas resources are mainly located across offshore basins in the Gulf of Siam and the Andaman Sea, but they are depleting, with proven reserves of 143 BCM (significantly down from 238 BCM as of 2014) and a production capacity of 31.5 BCM / year (also down from 42 BCM / year)[lxxi].

Thailand's Ministry of Energy has granted LNG import licenses to several private sector companies such as Thai EGCO and Gulf Energy Development in a bid to further privatise the domestic LNG market and keep electricity generation costs competitive.

Figure 13. LNG Imports to Thailand[lxxii]



Moreover, as of 2Q 2022, Myanmar has halted LNG imports as operations at the Thilawa and Thaketa power projects in Yangon have been suspended, mainly due to high LNG costs and financial constraints incurred by the military junta's government. It is unlikely that Myanmar will resume its imports this year.

Similarly to Vietnam, the Philippines is looking begin operation at three projects this year. The Philippines import terminal is expected to begin operations in 2Q 2022, whereas the Pagbilao and Batangas terminals are expected to begin operation in 2H 2022.

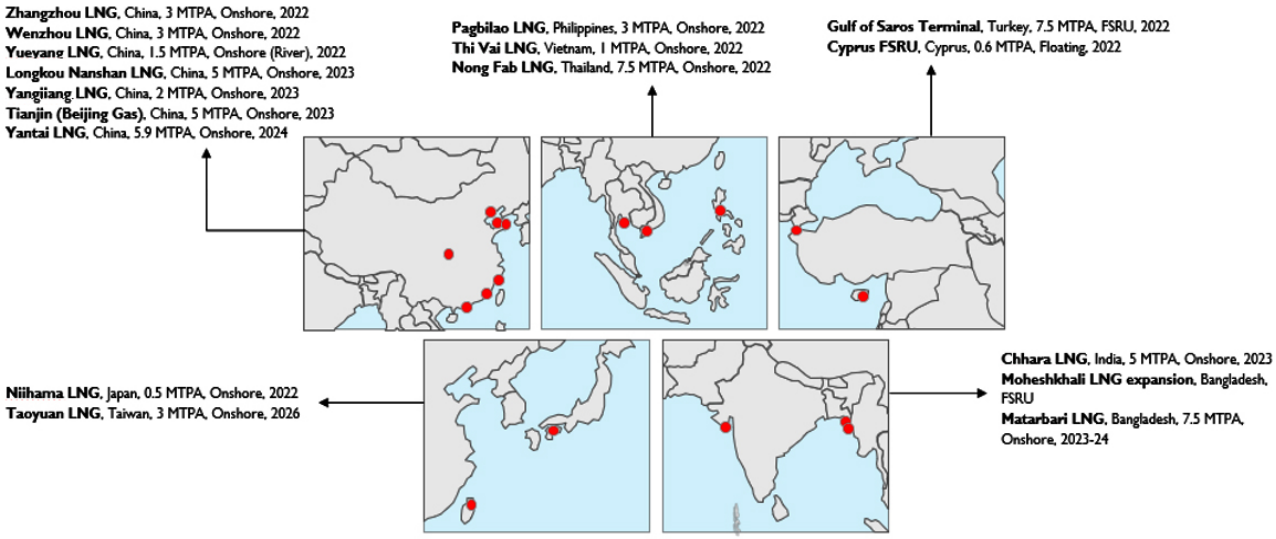
In the three Sijori countries, Malaysia, Indonesia, and Singapore, demand for LNG is expected to grow by an average of 12% YOY this year, with the exception of Indonesia where LNG consumption will remain unchanged[lxxiii]. In 2022, Malaysia's LNG demand is expected to increase by 13% YOY to 3 MT, whereas Singapore's demand is set to grow by 10% YOY to 4 MT, as both countries allow more third-party access to LNG import terminals and gas distribution networks[lxxiv].

The Philippines and Vietnam are expected to start importing LNG this year with the commission of new terminals. Vietnam's private oil company Hai Linh has completed the construction of the Hai Linh LNG import terminal last year and is currently undergoing routine testing before beginning operations. PetroVietnam Gas is expected to start operations at its Thi Vai LNG terminal in 2Q 2022.

Similarly to Vietnam, the Philippines is looking start three projects this year. The Philippines import terminal is expected to begin operations in 2Q 2022 and the Pagbilao and Batangas terminals in 2H 2022.

Cambodia imports very small quantities of LNG by container but may build a 3 MT / year permanent terminal[lxxv]. Sri Lanka is planning an LNG import facility to supply two gas-fired power plants[lxxvi], though the island's economic crisis could delay it. With these projects, every coastal nation in Asia[lxxvii] would be either an importer or exporter (or both) of LNG, other than North Korea.

Figure 14. Selected new Asia-Pacific LNG import projects between 2022-26



As gas markets tighten because of lost supplies from Russia after its invasion of Ukraine, the GCC producers have stepped in with their long history of providing stable energy supplies, which will continue to play a vital role in averting global shortages. Relatively little new LNG is expected on the world market during the 2022-24 period due to a dearth of previous Final Investment Decisions (FID). This will change from 2025 onwards.

In 2022, LNG supplies from the GCC will compete with the United States, primarily due to the start-up of Sabine Pass Train Six and the Calcasieu Pass project. As new projects in the United States commence, its exports will surpass volumes from Australia, and the US could take the throne as the world's largest LNG exporter over the next two years. Projects in Western Canada such as LNG Canada (19 BCM/y) have gained momentum given high prices, and would have the East Asian markets as their main target.

Australia's only large new LNG liquefaction project, Scarborough (10.9 BCM/y) is expected to begin operations in 2026. The Papua New Guinea LNG project (7.3 BCM/y) should also begin in that year. These plants will be important in supplying Asian markets given their geographic proximity.

Mozambique's Coral South FLNG is expected to start exporting in 2H 2022. At the same time, Norway's Hammerfest facility has also been back in operation since March 2022, which will supply 4.5 BCM / year of LNG. Other East African projects are larger, including Mozambique LNG, Rovuma LNG (also in Mozambique) and Tanzania LNG, but have faced repeated delays and will likely not start production until 2026 or later. They would be well-placed to supply South Asia in particular. In West Africa, the Cameroon LNG facility intends to increase output, and a fast-track Congo floating LNG plant (4.5 BCM/y) is intended to start in 2023. Nigeria LNG's Train 7 (10.9 BCM/y) may start up around 2027, and several phases are possible at Greater Tortue (Senegal-Mauritania) and Birallah (Mauritania). But these projects are targeted more at the European market.

In addition to this, LNG supplies from the GCC will also be competing with indigenous supplies across the Asia-Pacific region, particularly from Indonesia and Malaysia. In Indonesia, BP is planning a third 3.8 MT / year train at its Tangguh project, which is expected to come online at the end of 2022. In Malaysia, the 30 MT / year Bintulu LNG projects, which faced disruptions last year due to the discovery of mercury contaminants at the Pegaga gas field, operated by Mubadala Petroleum, has been operational again since the start of this year, after the installation of a temporary mercury remover unit. Petronas has deployed a number of floating LNG plants, with its third (2.7 BCM/y) intending to take FID shortly.

However, supplies from the GCC are particularly important for Asian buyers because of their geographic proximity and long-standing commercial relationships. Qatar is, of course, by far the most important LNG exporter to Asia, and is expanding its capacity. It recently announced a choice of international partners – Shell, ExxonMobil, TotalEnergies, ENI and ConocoPhillips – for its ongoing North Field East expansion, set to add 33 MT/year (45 BCM/y) by 2026, and the North Field South project will add another 16 Mtpa ((22 BCM/y) by 2027.In 2021, 72% or 77 BCM of Qatar's gas exports were directed to the Asia-Pacific region[lxxviii].

The UAE plans to build a new LNG export terminal at Fujairah on the Gulf of Oman in the Indian Ocean. The terminal is being built by Abu Dhabi National Oil Company (ADNOC) and will be able to produce 9.6 MT / year[lxxix]. The UAE currently has three liquification trains with a combined capacity of 5.8 MT / year at Das Island inside the Gulf[lxxx]. Oman is also debottlenecking its facilities from an annual average of about 12 BCM to an estimated 14 BCM[lxxxi].

In the short-term, an increase in demand for non-Russian gas supplies is in contrast with the need for a longer-term structural decline in fossil fuel consumption, as the energy sector transitions towards cleaner sources and technologies such as renewables, hydrogen, and carbon capture and storage.

The shortage of Russian gas in Europe will likely lead to very high prices in the short term, particularly over the 2022/3 and 2023/4 winters. MENA gas exporters will come under political pressure to supply Europe. However, they value their long-term contracts with Asian customers and are unlikely to break them. In the longer term, these high prices incentivise greater LNG supply and the approval of new export projects, notably from North America, Africa, the GCC and Australasia. But they will also be negative for demand growth, particularly in price-sensitive Asian importers (basically, all Asian exporters other than Japan, South Korea, Taiwan and Singapore).

MENA energy producers have various options to increase their gas exports. As Qatar and the UAE are doing, they have to expand liquefaction capacity in order to reach Asian markets. This requires feedstock. Some major MENA producers, notably Saudi Arabia and Iraq, are unlikely to export LNG; increased gas output is more about freeing up domestic oil

use. Iran could export LNG if US sanctions were lifted, but this would likely only be in small quantities. However, new or expanded pipeline supplies to Turkey, Iraq, Oman and Pakistan are feasible.

To provide the additional gas for exports, MENA countries have four main options:

- increase domestic gas production
- reduce the flaring and leakage of associated gas
- improve the efficiency of their current gas-based electricity generating capacity and electricity end-use
- deploy additional non-gas (renewables) capacity.

Investing in additional upstream capacity and output, which will yield new gas supplies in the medium-term. Prioritising efforts to eliminate gas flaring and methane leaks from upstream operations will lead to additional gas supplies.

By rationalising their gas consumption, particularly in the power sector, MENA countries can free up domestic gas consumption for additional exports. Currently, gas accounts for ~90% of the electricity mix across the MENA region[lxxxii]. Thermal power projects across the region consumes 33% of domestic production, 290 BCM / year.

Improving the average efficiency of gas-based power plants could free up 50 BCM / year of gas[lxxxiii]. Approximately, 20% of the MENA region's gas is used by power projects with an average efficiency rate of 30% - 35%[lxxxiv].

Replacing these low efficiency capacities with Combined-Cycle Gas Turbines (CCGTs) could boost average efficiency to 50%, allowing MENA producers to produce the same amount of electricity, whilst saving 50 BCM / year[lxxxv].

Replacing low efficiency capacities with low-cost renewables, which would also lower the region's carbon footprint. Currently, renewables account for less than 3% of MENA electricity generation, although this is rising rapidly with new solar and wind capacity in countries such as the UAE, Saudi Arabia, Qatar, Oman and Egypt.

Replacing the entire low-efficiency gas capacity would require ~250 GW of new solar capacity and cost ~US$ 220 billion[lxxxvi]. This would not only free up 150 BCM / year, but also generate US$ 150 billion / year, with a short payback period if gas prices remain elevated, which further underscores the potential of low cost solar in the MENA region.

MENA energy producers could boost their gas production by 150 BCM / year, which would require a smaller capital deployment of US$ 120 billion. Although this far less than investing in new solar capacities, the investment could be exposed to volatile energy markets, with risk levels increasing if the pace of the energy transition increases and long-term demand for gas declines.

Nonetheless, the most feasible option is the deployment of solar farms, which have shorter development periods and can be deployed much faster than developing new upstream projects or expanding current projects.

There are numerous risks to the short-term demand outlook for LNG across the Asia-Pacific region, which could alter the market balance. These risks include China's slowing economic growth, the increase in nuclear and coal-based electricity generation across Japan and South Korea, the growth in renewables in general (particularly in countries such as India and Vietnam), the decrease in LNG imports across price-sensitive importers across South Asia and Southeast Asia, and the potential of a snap increase in winter temperatures across the Northeast Asian countries, which could drive up short-term demand and spot prices.

Last winter, we have seen some remarkably strong dynamics across the global gas markets, with a tug-of-war between Asian and European buyers, with Europe being the premium market for LNG purchases.

Based on the current forward and futures prices, Dutch TTF prices are trading at a premium to Asian futures prices for consecutive quarters this year, which is a phenomenon that has never been observed before. This indicates a continued tight market-balance across Europe for the upcoming winter months.

The current forward and futures spread also highlights a close correlation between the Dutch TTF and the Asian spot prices, and the integrated nature of today's global gas markets, which will continue throughout this upcoming winter. Therefore, it is very likely that the price developments in Europe will be a key driver in setting the spot prices across the Asia-Pacific region. European price developments will continue to be exposed to the risk of an escalation in the Russia – Ukraine conflict, its geopolitical implications, and the potential impact of Russian gas supplies to Europe being further curtailed. Though remote, this war is therefore having a profound impact on the evolution of Asia's gas industry and its overall energy system.

APPENDIX

i. Gas Market Report, Q2-2022, International Energy Agency (https://iea.blob.core.windows.net/assets/cfd2441e-cd24-413f-bc9f-eb5ab7d82076/GasMarketReport%2CQ2-2022.pdf)
ii. Gas Market Report, Q2-2022, International Energy Agency (https://iea.blob.core.windows.net/assets/cfd2441e-cd24-413f-bc9f-eb5ab7d82076/GasMarketReport%2CQ2-2022.pdf)
iii. Europe's energy crisis: Five charts to explain why your bills might go up this winter, 2022, DW (https://www.euronews.com/2022/02/11/europe-s-energy-crisis-five-charts-to-explain-why-your-bills-might-go-up-this-winter)
iv. Global LNG Summer Outlook, 2022, Argus Media, (https://www.argusmedia.com/-/media/Files/white-papers/2022/global-lng-summer-outlook-2022.ashx)
v. Global LNG Summer Outlook, 2022, Argus Media,
vi. Global LNG Summer Outlook, 2022, Argus Media, (https://www.argusmedia.com/-/media/Files/white-papers/2022/global-lng-summer-outlook-2022.ashx)
vii. South Korea's KOGAS signs MoU with France's TotalEnergies to enhance LNG trading, 2022, Reuters (https://www.reuters.com/business/energy/south-koreas-kogas-signs-mou-with-frances-totalenergies-enhance-lng-trading-2022-06-15)
viii. Gail India issues swap tender for 12 LNG cargoes for 2022-sources, 2022, Reuters (https://www.reuters.com/markets/asia/gail-india-issues-swap-tender-12-lng-cargoes-2022-sources-2022-02-15/)
ix. Gail India issues swap tender for 12 LNG cargoes for 2022-sources, 2022, Reuters (https://www.reuters.com/markets/asia/gail-india-issues-swap-tender-12-lng-cargoes-2022-sources-2022-02-15/)
x. Pakistan picks up four LNG spot cargoes for May-June -source, 2022, Reuters, (https://www.reuters.com/business/energy/paksitan-receives-bids-lng-cargoes-sought-may-june-source-says-2022-04-21/)
xi. Gas Market Report, Q2-2022, International Energy Agency (https://iea.blob.core.windows.net/assets/cfd2441e-cd24-413f-bc9f-eb5ab7d82076/GasMarketReport%2CQ2-2022.pdf)
xii. Gas Market Report, Q2-2022, International Energy Agency (https://iea.blob.core.windows.net/assets/cfd2441e-cd24-413f-bc9f-eb5ab7d82076/GasMarketReport%2CQ2-2022.pdf)
xiii. Global LNG Summer Outlook, 2022, Argus Media,

(https://www.argusmedia.com/-/media/Files/white-papers/2022/global-lng-summer-outlook-2022.ashx)
xiv. Gas Market Report, Q2-2022, International Energy Agency (https://iea.blob.core.windows.net/assets/cfd2441e-cd24-413f-bc9f-eb5ab7d82076/GasMarketReport%2CQ2-2022.pdf)
xv. LNG Outlook 2022: Any Relief in Sight?, Natural Gas and LNG, 2022, Refinitive Commodities Research (https://www.refinitiv.com/content/dam/marketing/en_us/documents/reports/refinitiv-natural-gas-and-lng-research-lng-outlook-2022-any-relief-in-sight.pdf); Gas Market Report, Q2-2022, International Energy Agency (https://iea.blob.core.windows.net/assets/cfd2441e-cd24-413f-bc9f-eb5ab7d82076/GasMarketReport%2CQ2-2022.pdf)
xvi. Gas Market Report, Q2-2022, International Energy Agency (https://iea.blob.core.windows.net/assets/cfd2441e-cd24-413f-bc9f-eb5ab7d82076/GasMarketReport%2CQ2-2022.pdf)
xvii. BP Statistical Review of World Energy, 2021, BP (https://www.bp.com/en/global/corporate/energy-economics/statistical-review-of-world-energy.html)
xviii. Guide to Chinese Climate Policy, SIPA Center on Global Energy Policy, (https://chineseclimatepolicy.energypolicy.columbia.edu/en/natural-gas#:~:text=The%20Chinese%20government%20has%20several,%E2%80%9370%25%20by%202030%3B%20and)
xix. Guide to Chinese Climate Policy, SIPA Center on Global Energy Policy, (https://chineseclimatepolicy.energypolicy.columbia.edu/en/natural-gas#:~:text=The%20Chinese%20government%20has%20several,%E2%80%9370%25%20by%202030%3B%20and)
xx. LNG Outlook 2022: Any Relief in Sight?, Natural Gas and LNG, 2022, Refinitive Commodities Research (https://www.refinitiv.com/content/dam/marketing/en_us/documents/reports/refinitiv-natural-gas-and-lng-research-lng-outlook-2022-any-relief-in-sight.pdf)
xxi. PetroChina to Sell Pipeline Assets Valued at US$6.3 Billion, 2014, Bloomberg (https://www.bloomberg.com/news/articles/2014-05-12/petrochina-to-sell-pipelines-worth-6-3-billion-as-controls-ease)
xxii. Global LNG Summer Outlook, 2022, Argus Media, (https://www.argusmedia.com/-/media/Files/white-papers/2022/global-lng-summer-outlook-2022.ashx)
xxiii. LNG Outlook 2022: Any Relief in Sight?, Natural Gas and LNG, 2022, Refinitive Commodities Research (https://www.refinitiv.com/content/dam/marketing/en_us/documents/reports/refinitiv-natural-gas-and-lng-research-lng-outlook-2022-any-relief-in-sight.pdf); Gas Market Report, Q2-2022, International Energy Agency (https://iea.blob.core.windows.net/assets/cfd2441e-cd24-413f-bc9f-eb5ab7d82076/GasMarketReport%2CQ2-2022.pdf)
xxiv. Gas Market Report, Q2-2022, International Energy Agency (https://iea.blob.core.windows.net/assets/cfd2441e-cd24-413f-bc9f-eb5ab7d82076/GasMarketReport%2CQ2-2022.pdf)
xxv. China signed record high 22.7 mil mt of LNG term contracts in 2021: CNPC ETRI, 2022, S&P Global Commodity Insights (https://www.spglobal.com/commodityinsights/en/market-insights/latest-news/lng/041522-china-signed-record-high-227-mil-mt-of-lng-term-contracts-in-2021-cnpc-etri)
xxvi. LNG Outlook 2022: Any Relief in Sight?, Natural Gas and LNG, 2022, Refinitive Commodities Research (https://www.refinitiv.com/content/dam/marketing/en_us/documents/reports/refinitiv-natural-gas-and-lng-research-lng-outlook-2022-any-relief-in-sight.pdf)
xxvii. LNG Outlook 2022: Any Relief in Sight?, Natural Gas and LNG, 2022, Refinitive Commodities Research (https://www.refinitiv.com/content/dam/marketing/en_us/documents/reports/refinitiv-natural-gas-and-lng-research-lng-outlook-2022-any-relief-in-sight.pdf)
xxviii. Gas Market Report, Q2-2022, International Energy Agency (https://iea.blob.core.windows.net/assets/cfd2441e-cd24-413f-bc9f-eb5ab7d82076/GasMarketReport%2CQ2-2022.pdf)
xxix. BP Statistical Review of World Energy, 2021, BP (https://www.bp.com/en/global/corporate/energy-economics/statistical-review-of-world-energy.html)
xxx. Gas Market Report, Q2-2022, International Energy Agency (https://iea.blob.core.windows.net/assets/cfd2441e-cd24-413f-bc9f-eb5ab7d82076/GasMarketReport%2CQ2-2022.pdf)
xxxi. BP Statistical Review of World Energy, 2021, BP (https://www.bp.com/en/global/corporate/energy-economics/statistical-review-of-world-energy.html)
xxxii. BP Statistical Review of World Energy, 2021, BP (https://www.bp.com/en/global/corporate/energy-economics/statistical-review-of-world-energy.html)
xxxiii. LNG Outlook 2022: Any Relief in Sight?, Natural Gas and LNG, 2022, Refinitive Commodities Research (https://www.refinitiv.com/content/dam/marketing/en_us/documents/reports/refinitiv-natural-gas-and-lng-research-lng-outlook-2022-any-relief-in-sight.pdf)
xxxiv. LNG Outlook 2022: Any Relief in Sight?, Natural Gas and LNG, 2022, Refinitive Commodities Research (https://www.refinitiv.com/content/dam/marketing/en_us/documents/reports/refinitiv-natural-gas-and-lng-research-lng-outlook-2022-any-relief-in-sight.pdf)
xxxv. BP Statistical Review of World Energy, 2021, BP (https://www.bp.com/en/global/corporate/energy-economics/statistical-review-of-world-energy.html)
xxxvi. Gas Market Report, Q2-2022, International Energy Agency (https://iea.blob.core.windows.net/assets/cfd2441e-cd24-413f-bc9f-eb5ab7d82076/GasMarketReport%2CQ2-2022.pdf)
xxxvii. LNG Outlook 2022: Any Relief in Sight?, Natural Gas and LNG, 2022, Refinitive Commodities Research (https://www.refinitiv.com/content/dam/marketing/en_us/documents/reports/refinitiv-natural-gas-and-lng-research-lng-outlook-2022-any-relief-in-sight.pdf)
xxxviii. Global LNG Summer Outlook, 2022, Argus Media, (https://www.argusmedia.com/-/media/Files/white-papers/2022/global-lng-summer-outlook-2022.ashx)

xxxix. Global LNG Summer Outlook, 2022, Argus Media, (https://www.argusmedia.com/-/media/Files/white-papers/2022/global-lng-summer-outlook-2022.ashx)
xl. LNG Outlook 2022: Any Relief in Sight?, Natural Gas and LNG, 2022, Refinitive Commodities Research (https://www.refinitiv.com/content/dam/marketing/en_us/documents/reports/refinitiv-natural-gas-and-lng-research-lng-outlook-2022-any-relief-in-sight.pdf)
xli. BP Statistical Review of World Energy, 2021, BP (https://www.bp.com/en/global/corporate/energy-economics/statistical-review-of-world-energy.html)
xlii. BP Statistical Review of World Energy, 2021, BP (https://www.bp.com/en/global/corporate/energy-economics/statistical-review-of-world-energy.html)
xliii. Asia's LNG summer procurement demand set to heat up as supply risks continue, 2022, S&P Global Commodities Insight (https://www.spglobal.com/commodityinsights/pt/market-insights/latest-news/lng/060722-asias-lng-summer-procurement-demand-set-to-heat-up-as-supply-risks-continue)
xliv. LNG Outlook 2022: Any Relief in Sight?, Natural Gas and LNG, 2022, Refinitive Commodities Research (https://www.refinitiv.com/content/dam/marketing/en_us/documents/reports/refinitiv-natural-gas-and-lng-research-lng-outlook-2022-any-relief-in-sight.pdf)
xlv. Gas Market Report, Q2-2022, International Energy Agency (https://iea.blob.core.windows.net/assets/cfd2441e-cd24-413f-bc9f-eb5ab7d82076/GasMarketReport%2CQ2-2022.pdf)
xlvi. Gas Market Report, Q2-2022, International Energy Agency (https://iea.blob.core.windows.net/assets/cfd2441e-cd24-413f-bc9f-eb5ab7d82076/GasMarketReport%2CQ2-2022.pdf)
xlvii. Gas Market Report, Q2-2022, International Energy Agency (https://iea.blob.core.windows.net/assets/cfd2441e-cd24-413f-bc9f-eb5ab7d82076/GasMarketReport%2CQ2-2022.pdf)
xlviii. Gas Market Report, Q2-2022, International Energy Agency (https://iea.blob.core.windows.net/assets/cfd2441e-cd24-413f-bc9f-eb5ab7d82076/GasMarketReport%2CQ2-2022.pdf)
xlix. Global LNG Summer Outlook, 2022, Argus Media, (https://www.argusmedia.com/-/media/Files/white-papers/2022/global-lng-summer-outlook-2022.ashx)
l. Global LNG Summer Outlook, 2022, Argus Media, (https://www.argusmedia.com/-/media/Files/white-papers/2022/global-lng-summer-outlook-2022.ashx)
li. LNG Outlook 2022: Any Relief in Sight?, Natural Gas and LNG, 2022, Refinitive Commodities Research (https://www.refinitiv.com/content/dam/marketing/en_us/documents/reports/refinitiv-natural-gas-and-lng-research-lng-outlook-2022-any-relief-in-sight.pdf)
lii. BP Statistical Review of World Energy, 2021, BP (https://www.bp.com/en/global/corporate/energy-economics/statistical-review-of-world-energy.html)
liii. Global LNG Summer Outlook, 2022, Argus Media, (https://www.argusmedia.com/-/media/Files/white-papers/2022/global-lng-summer-outlook-2022.ashx)
liv. Global LNG Summer Outlook, 2022, Argus Media, (https://www.argusmedia.com/-/media/Files/white-papers/2022/global-lng-summer-outlook-2022.ashx)
lv. Gas Market Report, Q2-2022, International Energy Agency (https://iea.blob.core.windows.net/assets/cfd2441e-cd24-413f-bc9f-eb5ab7d82076/GasMarketReport%2CQ2-2022.pdf)
lvi. BP Statistical Review of World Energy, 2021, BP (https://www.bp.com/en/global/corporate/energy-economics/statistical-review-of-world-energy.html)
lvii. BP Statistical Review of World Energy, 2021, BP (https://www.bp.com/en/global/corporate/energy-economics/statistical-review-of-world-energy.html)
lviii. LNG Outlook 2022: Any Relief in Sight?, Natural Gas and LNG, 2022, Refinitive Commodities Research (https://www.refinitiv.com/content/dam/marketing/en_us/documents/reports/refinitiv-natural-gas-and-lng-research-lng-outlook-2022-any-relief-in-sight.pdf)
lix. BP Statistical Review of World Energy, 2021, BP (https://www.bp.com/en/global/corporate/energy-economics/statistical-review-of-world-energy.html)
lx. Pakistan, Qatar sign 10-year LNG supply contract, 2021, Dawn (https://www.dawn.com/news/1609619)
lxi. Pakistan to file for damages on default by Eni, Gunvor, 2022, Pakistan Today (https://profit.pakistantoday.com.pk/2022/04/19/pakistan-to-file-for-damages-on-default-by-eni-gunvor/)
lxii. Pakistan to file for damages on default by Eni, Gunvor, 2022, Pakistan Today (https://profit.pakistantoday.com.pk/2022/04/19/pakistan-to-file-for-damages-on-default-by-eni-gunvor/)
lxiii. LNG Emergency, 2022, Dawn (https://www.dawn.com/news/1698309/lng-emergency)
lxiv. LNG Outlook 2022: Any Relief in Sight?, Natural Gas and LNG, 2022, Refinitive Commodities Research (https://www.refinitiv.com/content/dam/marketing/en_us/documents/reports/refinitiv-natural-gas-and-lng-research-lng-outlook-2022-any-relief-in-sight.pdf)
lxv. Bangladesh, Australian Department of Industry, Science, Energy, and Resources (https://www.industry.gov.au/data-and-publications/global-resources-strategy-commodity-report-liquefied-natural-gas/emerging-lng-markets/bangladesh#)
lxvi. Bangladesh, Malaysia sign deal to cooperate on supply of Liquefied Natural Gas, 2021, the Daily Star (https://www.thedailystar.net/business/news/bangladesh-malaysia-sign-deal-cooperate-supply-liquefied-natural-gas-2129266)

lxvii. BP Statistical Review of World Energy, 2021, BP (https://www.bp.com/en/global/corporate/energy-economics/statistical-review-of-world-energy.html)
lxviii. Gas Market Report, Q2-2022, International Energy Agency (https://iea.blob.core.windows.net/assets/cfd2441e-cd24-413f-bc9f-eb5ab7d82076/GasMarketReport%2CQ2-2022.pdf)
lxix. Gas Market Report, Q2-2022, International Energy Agency (https://iea.blob.core.windows.net/assets/cfd2441e-cd24-413f-bc9f-eb5ab7d82076/GasMarketReport%2CQ2-2022.pdf)
lxx. LNG Outlook 2022: Any Relief in Sight?, Natural Gas and LNG, 2022, Refinitive Commodities Research (https://www.refinitiv.com/content/dam/marketing/en_us/documents/reports/refinitiv-natural-gas-and-lng-research-lng-outlook-2022-any-relief-in-sight.pdf)
lxxi. Nong Fab LNG Receiving Terminal, 2022, Hydrocarbons Technology (https://www.hydrocarbons-technology.com/projects/nong-fab-lng-receiving-terminal/)
lxxii. BP Statistical Review of World Energy, 2021, BP (https://www.bp.com/en/global/corporate/energy-economics/statistical-review-of-world-energy.html)
lxxiii. LNG Outlook 2022: Any Relief in Sight?, Natural Gas and LNG, 2022, Refinitive Commodities Research (https://www.refinitiv.com/content/dam/marketing/en_us/documents/reports/refinitiv-natural-gas-and-lng-research-lng-outlook-2022-any-relief-in-sight.pdf)
lxxiv. LNG Outlook 2022: Any Relief in Sight?, Natural Gas and LNG, 2022, Refinitive Commodities Research (https://www.refinitiv.com/content/dam/marketing/en_us/documents/reports/refinitiv-natural-gas-and-lng-research-lng-outlook-2022-any-relief-in-sight.pdf)
lxxv. https://www.khmertimeskh.com/50886168/cnooc-gas-power-sizing-up-entry-into-new-cambodia-lng-import-terminal/
lxxvi. https://www.upstreamonline.com/lng/sri-lankas-lng-dream-dawns/2-1-1071237
lxxvii. Excluding South-West Asia or the 'Middle East'
lxxviii. BP Statistical Review of World Energy, 2021, BP (https://www.bp.com/en/global/corporate/energy-economics/statistical-review-of-world-energy.html)
lxxix. UAE to More Than Double LNG Export Capacity With Fujairah Plant, 2022, Bloomberg (https://www.bloomberg.com/news/articles/2022-05-17/uae-to-more-than-double-lng-export-capacity-with-fujairah-plant)
lxxx. UAE to More Than Double LNG Export Capacity With Fujairah Plant, 2022, Bloomberg (https://www.bloomberg.com/news/articles/2022-05-17/uae-to-more-than-double-lng-export-capacity-with-fujairah-plant)
lxxxi. https://www.spglobal.com/commodityinsights/en/market-insights/latest-news/energy-transition/092221-oman-lngs-train-1-back-to-full-capacity-after-outages-debottlenecking-ongoing-ceo
lxxxii. BP Statistical Review of World Energy, 2021, BP (https://www.bp.com/en/global/corporate/energy-economics/statistical-review-of-world-energy.html)
lxxxiii. How producers in the Middle East and North Africa can free up more natural gas for exports, International Energy Agency, 2022 (https://www.iea.org/commentaries/how-producers-in-the-middle-east-and-north-africa-can-free-up-more-natural-gas-for-exports)
lxxxiv. How producers in the Middle East and North Africa can free up more natural gas for exports, International Energy Agency, 2022 (https://www.iea.org/commentaries/how-producers-in-the-middle-east-and-north-africa-can-free-up-more-natural-gas-for-exports)
lxxxv. How producers in the Middle East and North Africa can free up more natural gas for exports, International Energy Agency, 2022 (https://www.iea.org/commentaries/how-producers-in-the-middle-east-and-north-africa-can-free-up-more-natural-gas-for-exports)
lxxxvi. How producers in the Middle East and North Africa can free up more natural gas for exports, International Energy Agency, 2022 (https://www.iea.org/commentaries/how-producers-in-the-middle-east-and-north-africa-can-free-up-more-natural-gas-for-exports)

Have you missed a previous issue? All past issues of The Al-Attiyah Foundation's Research Series, both Energy and Sustainability Development, can be found on the Foundation's website at www.abhafoundation.org/publications

May – 2022

Advanced Batteries: Outlook & Impact

Advanced batteries are intended to reduce cost, weight and charging time, while increasing lifetime and safety. How do new technologies such as flow batteries, sodium ion and solid-state meet these criteria? Where are the key applications of different types? What are the main areas of future improvement and how would this advance the deployment of batteries?

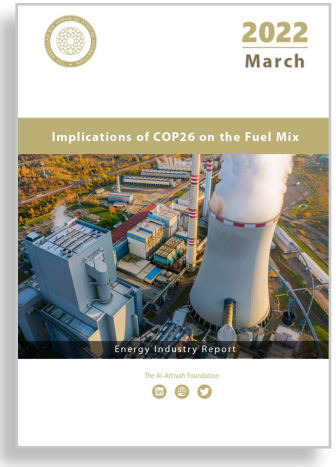
(QRCO.DE)

April – 2022

The World of Hydrogen

Hydrogen has emerged as an important fuel and energy carrier in the global race to tackle climate change and to reach net-zero emissions by mid-century. Global regulatory policies, technological developments, affordability, and scalability are converging to create an unprecedented drive for the expansion of the low carbon hydrogen economy.

(QRCO.DE)



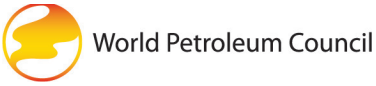
March – 2022

Implications of COP26 on the Fuel Mix

The outcomes from COP26 included major milestones such as the commitment to phase-down coal and fossil fuel financing, and the global pledge to reduce methane emissions by 30% by 2030. How will these pledges impact the sources of energy in the future?

(QRCO.DE)

Our partners collaborate with The Al-Attiyah Foundation on various projects and research within the themes of energy and sustainable development.



The Al-Attiyah Foundation

Tel: +(974) 4042 8000
Fax: +(974) 4042 8099
www.abhafoundation.org

Barzan Tower, 4th Floor,
West Bay.
PO Box 1916 Doha, Qatar

AlAttiyahFndn
The Al-Attiyah Foundation
Al-Attiyah Foundation