LNG Market Developments and What They Mean for Japan

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Outlook for LNG markets in 2022





Outlook for global LNG trade in 2022

Global LNG demand



Global LNG supply

Source: BloombergNEF. Note: NWE is Northwest Europe, 'Other markets' includes Middle East, Americas and other Europe. MEA is Middle East and Africa (excluding West Africa). Difference between the supply and demand figures is due to operational losses, LNG on water and floating storage.

- BloombergNEF expects global liquefied natural gas (LNG) demand to reach 400 million metric tons in 2022, up 6.6% from 2021, driven by China and other Asian markets.
- Europe is expected to rely more on LNG this year. The curtailed gas supply, record high prices, unprecedented volatility and geopolitical tensions that made 2021 such a tumultuous year for the European gas market show few signs of abating in 2022. Europe could import more LNG than anticipated if gas storage falls to critically low levels after the end of winter; prompting the JKM-TTF price spread to shrink to a point where Europe outcompetes Asia for spot LNG cargoes.
- U.S. LNG accounts for more than 40% of the total year-on-year supply increase in 2022. Globally, four new projects could commence in 2022.

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Final investment decision watchlist



Source: BloombergNEF. Note: Map shows projects with announced FID targets between 2022-23. There are other projects proposed globally that are not shown on the map as they have not made recent announcements regarding project status. Potential FIDs include projects with target FID dates that may go beyond 2023.

LNG growth in China and emerging Asia

China LNG import capacity and contracts



Source: BloombergNEF. Note: Only terminals under construction are considered for future receiving capacity.

South and Southeast Asia LNG demand



- BNEF expects China to import 84.6 million tons of LNG in 2022, up 7.5% from 2021, fueled by continuous economic growth and coal-to-gas switching.
- More Chinese LNG buyers are emerging as they increase access to supply through their own new import terminals or third-party access (TPA) from PipeChina's LNG terminals. In 2022, new import capacity will reach 38.9 million tons a year, after nine new terminals and four expansion projects are commissioned. The gap between China's LNG contract supply and import terminal capacity is estimated to balloon from 45 million tons to 93.5 million tons in the next five years.
- South and Southeast Asia will likely see rapid growth in LNG imports, with Vietnam and the Philippines scheduled to start imports in the fourth quarter of 2022. This rise is driven by economic growth, as well as a move away from emission-heavy coal and the depletion of domestic gas resources.

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Massive LNG infrastructure expansion planned in emerging Asia



LNG import terminals in South and Southeast Asia

Regasification terminal status	Total capacity
Existing	95 million tons
Under construction	24 million tons
Planned	>71 million tons
<u>Total</u>	<u>> 190 million</u> tons/year

Note: Capacity of 27 proposed terminals is yet to be decided.

Source: BloombergNEF. Note: For Vietnam, terminals mentioned in the Gas Plan 2016 beyond 2030 (e.g. Cat Hai LNG) are not shown. For Indonesia, projects that are stalled (such as Cilacap FSRU) are not shown.

Japan's role in Southeast Asia's energy transition



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Japanese companies are active in Southeast Asian LNG infrastructure projects

Southeast Asia gas power project investments by Japanese players



Source: BloombergNEF, company reports. Note: JBIC stands for Japan Bank of International Cooperation.

LNG oversupply by utility (2020)



Source: BloombergNEF, company reports. Note: Analysis is based on company disclosures, 2021 figures not yet available.

- Many Japanese utilities that contracted LNG as a replacement fuel in the wake of nuclear shutdowns from 2011, such as Kyushu Electric, are now facing an
 oversupply of LNG. Developing the Southeast Asian LNG market, through investments into gas power plants for example, is one strategy to create an outlet for
 that excess LNG and to grow influence. Larger players, such as Jera and Kansai Electric, are also looking to sell their LNG to emerging Asian markets as they
 seek to become global portfolio LNG players.
- Japanese utilities and trading houses invest widely in Southeast Asian gas power plants. Gas power plants accounted for more than half of the total installed capacity in Southeast Asia acquired by Japanese players over 2011-19, such as Jera, Kyushu Electric or trading houses like Mitsubishi. A lot of those gas power plants are concentrated in Thailand, the region's biggest gas market.

Japan's role in Southeast Asia's energy transition plans beyond gas



Global pipeline of hydrogen-ready power projects by turbine supplier



Source: BloombergNEF.

- On top of gas power plant investments, Japanese entities are positioning themselves for the region's transition to zero-carbon technologies. To support Southeast
 Asia's decarbonization efforts, Japan unveiled a \$100 million funding pot at COP26 to develop hydrogen and ammonia power projects in Asia, on top of the \$10
 billion announced in May 2021.
- More ammonia and hydrogen power plants could fill Japanese manufacturers' order books, but they might not be the most efficient path to decarbonization.
 Japan's Mitsubishi Power is the world leader in planned deliveries of hydrogen-ready turbines. IHI Corp. also already has a partnership with Malaysian companies for co-firing projects. Yet renewable energy such as wind and solar is likely to be cheaper in Southeast Asian countries in most cases.

The future of gas in net zero-bound Japan







Role of LNG in Japan's decarbonization strategy

Japan's 2030 power mix target



Source: BloombergNEF, Ministry of Economy, Trade and Industry. Note: The government's 'Other renewables' target includes co-firing with ammonia at coal plants and hydrogen at gas plants. BAU refers to business-as-usual.

Japan's greenhouse gas emissions target



Source: Ministry of Environment.

- In April 2021, Japan increased its 2030 greenhouse gas emissions reduction target. The country's nationally determined contribution to the Paris Agreement was to lower emissions by 26% by 2030 relative to 2013. The new 2030 target to cut emissions by 46% is in line with a 2-degree global warming target but not a 1.5-degree one.
- Japan's Cabinet approved the Sixth Strategic Energy Plan on October 22, 2021, in line with the new emissions target. The plan, which outlines Japan's 2030 target power supply mix, calls for more renewables at the expense of fossil-fuel-generated electricity, while keeping the nuclear power target the same as previous plans. Gas' share in the mix would be cut by half, if renewable penetration rises while more nuclear reactors restart as per the target which is unlikely to happen.

The share of gas in Japan's power mix will depend on coal and nuclear

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Coal capacity outlook



Active nuclear capacity outlook



Source: BloombergNEF, METI. Note: "Inefficient" coal is capacity corresponding to a thermal efficiency that is lower than an ultra-super critical coal plant.

Source: BloombergNEF

- As a more expensive energy source, gas' future in power generation will depend on the amount of coal and nuclear stepping in to fill gaps in Japan's power mix.
- In 2020, the government considered mandating a phase-out of all sub-critical and supercritical coal power plants by 2030. Following pushback from utilities and industrials, the target was cut down to a new efficiency standard that would require the coal fleet owned by each power generator to meet a fleet-wide efficiency standard of 43%. That efficiency target will likely not lead to a mass retirement of inefficient units as it is less stringent.
- Despite maintaining a target of 20-22% of nuclear in the power mix, Japan has struggled to restart reactors after shutdowns in the wake of the Fukushima catastrophe, amid public opposition and a lengthy restart application process. Actual 2030 nuclear generation is set to fall short of 20%, despite Prime Minister Kishida's pro-nuclear stance. Beyond 2030, nuclear availability will depend on whether 20-year life extensions are granted to all nuclear plants beyond their standard 40-year operating limit.

Different pathways to decarbonize gas





Carbon-offset LNG and emissions transparency will be key initiatives now

Carbon-offset LNG trade in 2021



Source: BloombergNEF. Note: JKCT refers to Japan, Korea, China, and Taiwan, RoW refers to rest of world.

Emissions transparency offerings



Source: BloombergNEF. Image source: Bloomberg Mercury, company/organization websites. Note: Proportion of life-cycle emissions shown are BNEF assumptions for average LNG cargoes.

- Current strategies to decarbonize LNG include everything from carbon offsetting, statements of cargo emissions, carbon capture and storage, electrification of
 liquefaction processes and boil-off gas recovery. In the longer term, consumers might switch away from gas to zero-carbon fuels such as hydrogen and ammonia.
- In 2021, Japanese utilities were active in growing the trade of carbon-offset LNG cargoes. Tokyo Gas together with 15 other Japanese entities, mostly industrials, formed a 'Carbon Neutral LNG Buyers Alliance' last year. Tokyo Gas established the association in order to increase the distribution and penetration of carbon neutral LNG supply to Japanese end-users. The company could be looking to leverage deals with existing suppliers, such as Shell, or source it from plants like Woodside's Pluto and Santos' Darwin which have all come out to say they are looking into the supply of carbon-offset LNG cargoes for customers.

Japan's switch to zero-carbon fuels to rely on existing gas infrastructure



LCOE, new offshore wind vs. co-firing ammonia at existing coal plant, 2030



Source: BloombergNEF, Ministry of Economy, Trade and Industry.

Source: BloombergNEF. Note: LCOE stands for levelized cost of electricity, the electricity price needed in order to cover all the costs associated with building and operating a new power plant over its lifetime.

- Japan's domestic hydrogen policy has been focused on subsidizing residential heat and power co-generation fuel cells ("Enefarm"), as well as fuel cell passenger vehicles, primarily fueled by gray hydrogen produced from imported LNG. The government has also been supportive of Japanese utilities' plans to use hydrogen and ammonia co-firing to reduce emissions from existing gas and coal power plants, such as Jera's Hekinan coal power plant.
- While co-firing hydrogen or ammonia could extend the life of thermal power plants by reducing emissions, the costs will likely exceed those of renewables such as offshore wind. Overall, hydrogen is far better placed to decarbonize hard-to-abate industrial sectors, such as steel production and heavy-duty transport.
- Japan is also considering artificial methane produced from hydrogen to progressively replace city gas, which will allow Japanese utilities to utilize existing gas infrastructure.

Framework for how to look at decarbonizing gas



Source: BloombergNEF. Note: Visualization is for illustrative purposes.

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The **4th Japan Energy Summit will take place in-person from 2-4 August 2022 in Tokyo**, convening senior-level stakeholders from across the global value chain to discuss the evolving Japanese energy sector and its leading position in decarbonising global gas, LNG, and hydrogen markets.

The Summit will address the important topics around Japan's journey to a carbon-neutral society, the role hydrogen will play in Japan's future, and how nations can achieve net-zero by 2050.

The Japan Energy Summit has continued participation and support from the Ministry of Economy, Trade and Industry (METI), JERA Co. Inc., Tokyo Gas and the Institute of Energy Economics, Japan (IEEJ).

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