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LNG Briefing Note: Fall 2023

Linking North American LNG Supply
to Asia-Pacific Markets

Author: Tom Young



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About the Author



Tom Young covers global gas markets for Evaluate Energy. He has extensive experience writing and editing on all facets of oil and gas — notably hydrogen, LNG, emissions reduction technologies and ESG-related policy. Tom is based in the UK.

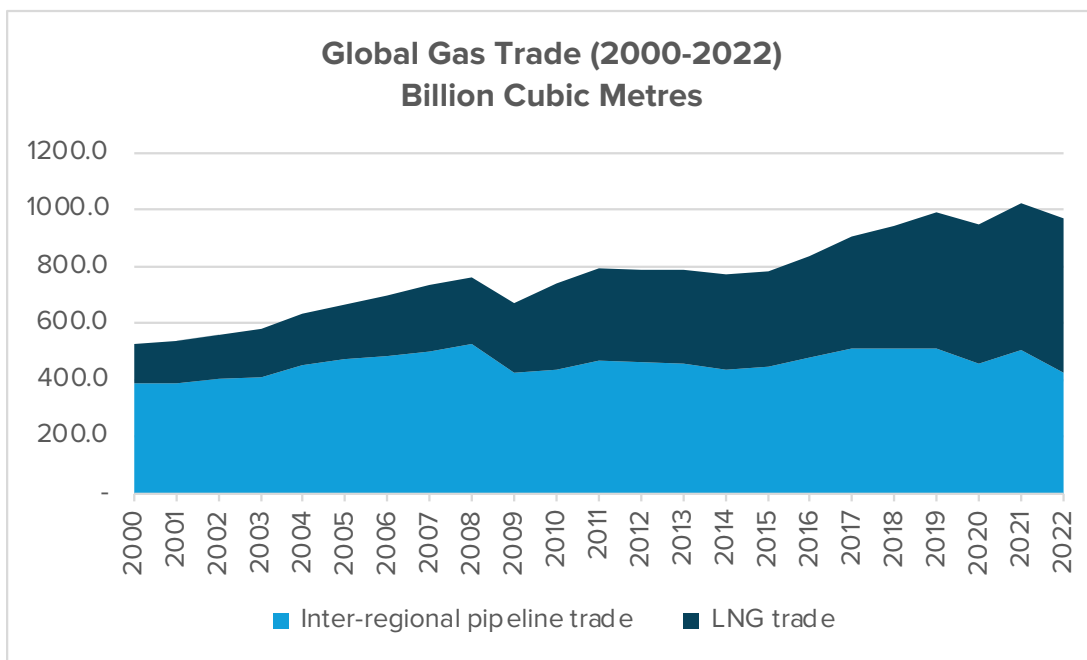
Introduction: Natural gas in a global context

Natural gas markets are expanding and becoming more globalized

Between 2000 and 2022, global gas consumption climbed 64 per cent from 232 bcf/d to reach 381 bcf/d.

Total international trade of natural gas nearly doubled to reach 1020 bcm (36 tcf) annually or around 99 bcf/d in the same period, according to the 2023 Energy Institute Statistical Review of World Energy.

Previously distinct markets have become connected due to increased inter-regional pipeline trade, which has grown by 10 per cent between 2000 and 2021, and by LNG trade which has nearly quadrupled over the same period.

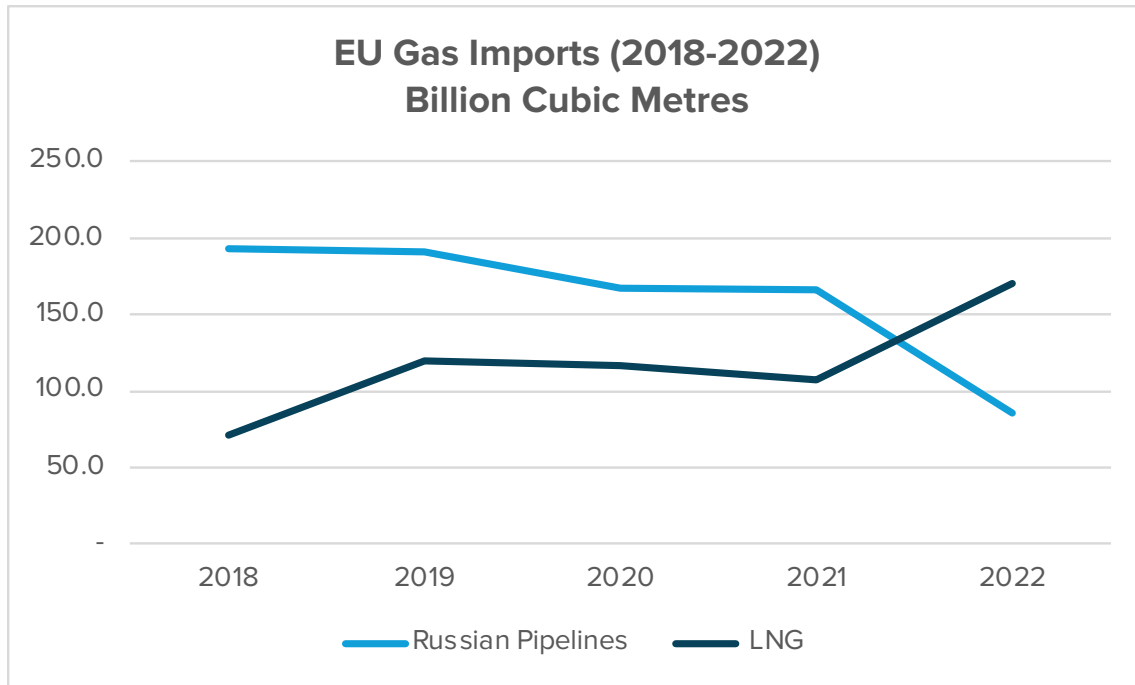


Source: 2023 Energy Institute Statistical Review of World Energy

Ukraine invasion accelerates LNG trade

Russia's invasion of Ukraine in early 2021 accelerated this shift to LNG. Pipeline trade fell by 15 per cent between 2021 and 2022 while LNG trade grew 5.3 per cent to reach a record 542.4 bcm (19 tcf) annually in 2022, accounting for 56 per cent of all traded gas.

The shift to LNG was largely a European Union phenomenon in 2022, as high prices resulted in other importers rerouting cargos. But as prices declined in early 2023, those importers, including China, have returned to the market.



Source: 2023 Energy Institute Statistical Review of World Energy

The global LNG trade network is expanding, and now connects 20 exporting markets with 48 importing markets, including, in 2022, first-time LNG importers Germany, the Philippines and Vietnam.

In the last decade regasification capacity has doubled, reaching 140 bcf/d, according to the U.S. Energy Information Administration (EIA). Global LNG import capacity is set to expand by 16 per cent, or 23 bcf/d, by the end of 2024 compared with 2022.

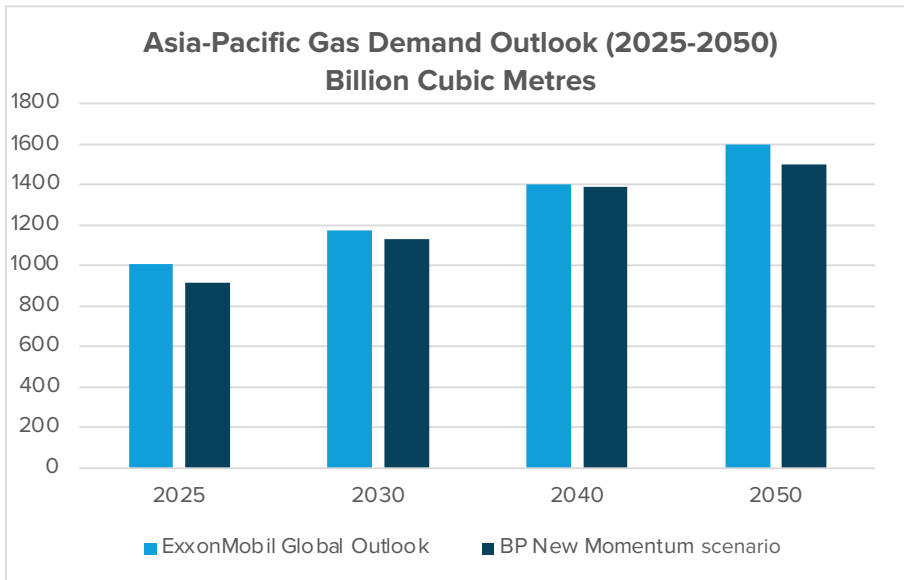
By the end of 2024, the EIA expects 55 countries to have LNG regasification terminals with a combined capacity of 163 bcf/d. Last year, global LNG trade used 37 per cent of available regasification capacity, or 51.7 bcf/d.

Market expansion will continue for the remainder of the decade. Cyprus is expected to start importing LNG in 2024, and Germany will have three more import terminals online by the end of 2023.

But by 2030, as European economies begin to decarbonize, gas demand growth will shift heavily to the Asia-Pacific region. What happens in Asia will decide the future course of the LNG industry for the next generation.

Gas demand forecasts show shift to emerging economies

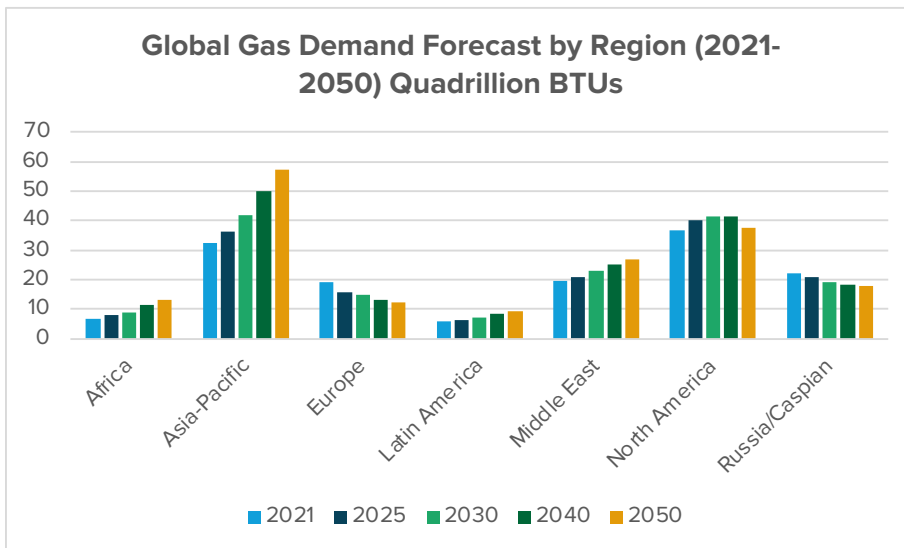
Asia-Pacific annual gas demand will rise from 858 bcm (30.3 tcf) in 2019 to 1392 bcm (52 tcf) in 2050 under BP’s New Momentum scenario published in its World Energy Outlook, going from 22 per cent of global gas demand to over 30 per cent during that period.



Source: Evaluate Energy

ExxonMobil’s 2023 Global Outlook sees a similar phenomenon, with Asia-Pacific gas demand rising by 21 tcf by 2050.

Outside the Middle East, Asia-Pacific is the only region forecast to see major increases in demand across most published scenarios. North American demand is expected to remain flat, while EU demand is expected to decline by 37 per cent by 2050.



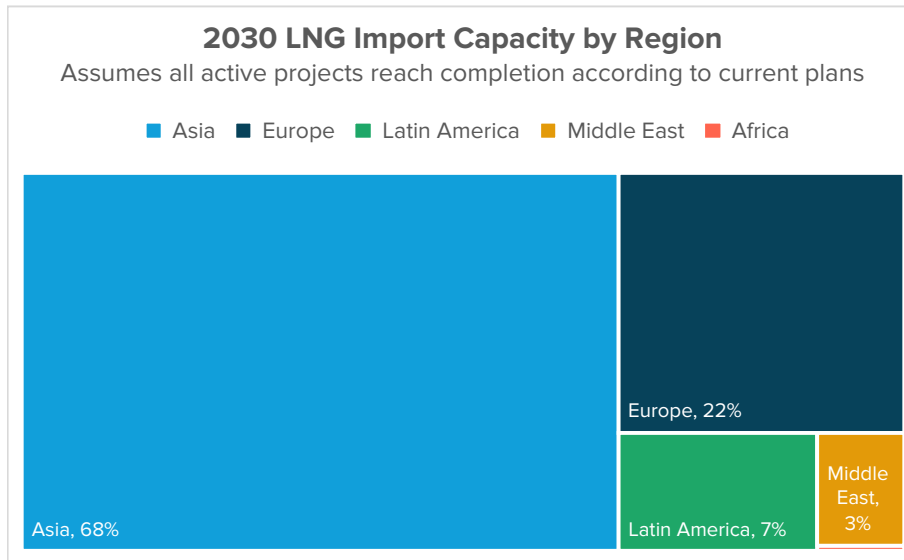
Source: ExxonMobil 2023 Global Outlook

Globally, demand increases are being driven by industrial usage and power generation. Industrial demand is forecast to increase 25 per cent by 2050, with power demand forecast to increase by almost 30 per cent.

Of the 226 bcm (7.8 tcf) of demand growth in China, Northeast Asia and Southeast Asia between 2021 and 2030, 58 bcm (2 tcf) will come from industry, which is much less vulnerable to fuel switching than power.

Regasification facility construction taking off

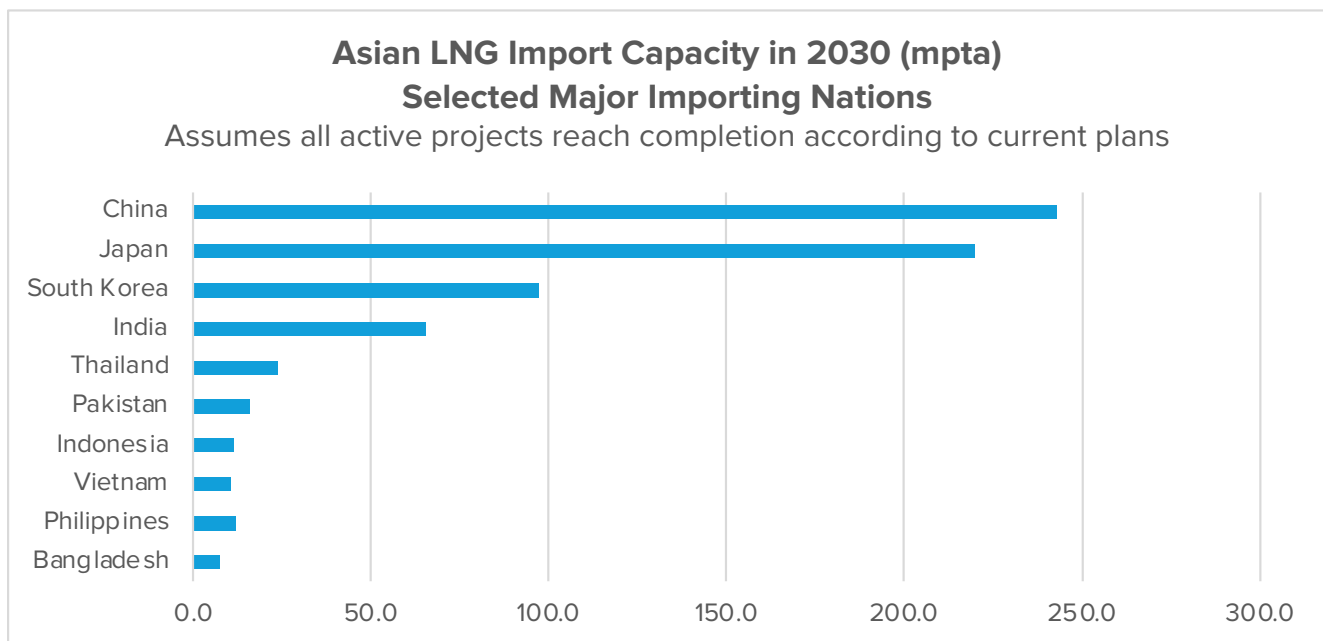
Construction of regasification facilities saw a major jump in Europe in 2022, with 20 mtpa added as Russian gas was removed from the market. EU import capacity is set to expand by one-third by the end of 2024 compared with 2022, according to the EIA. Germany expects to have six terminals operational by the end of 2023 capable of processing 3.7 bcf/d. Eleven other countries will each add between 0.1-0.7 bcf/d of new or expanded regasification capacity for a combined 4.9 bcf/d of additions.



Asia-Pacific is expected to add around 230 mtpa in regasification capacity by 2030, an increase of almost 42 per cent.

In the near term the EIA expects Asia to add 11.9 bcf/d of the total capacity additions in 2023 and 2024. In China, 8.5 bcf/d of new regasification capacity is being built. India expects 1.3 bcf/d of capacity to be online by the end of 2023 with two new terminals.

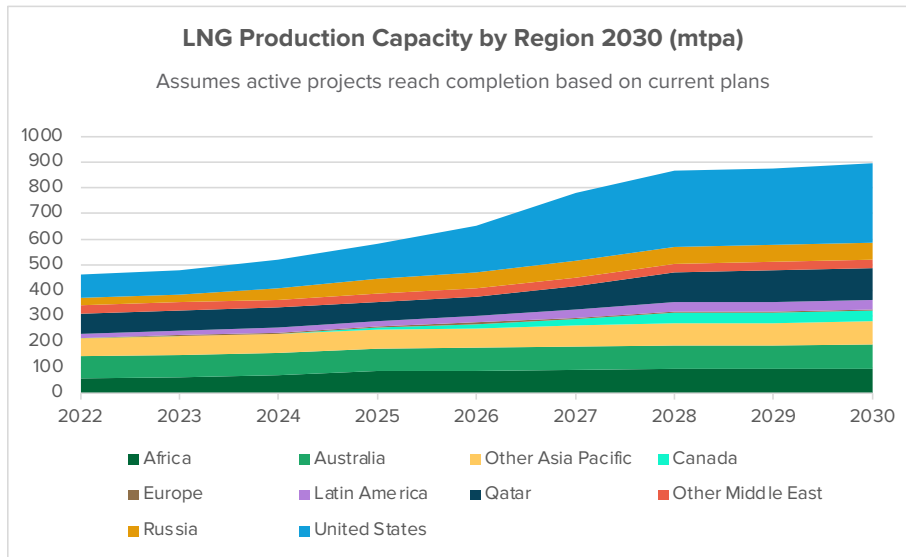
Source: Evaluate Energy



Source: Evaluate Energy

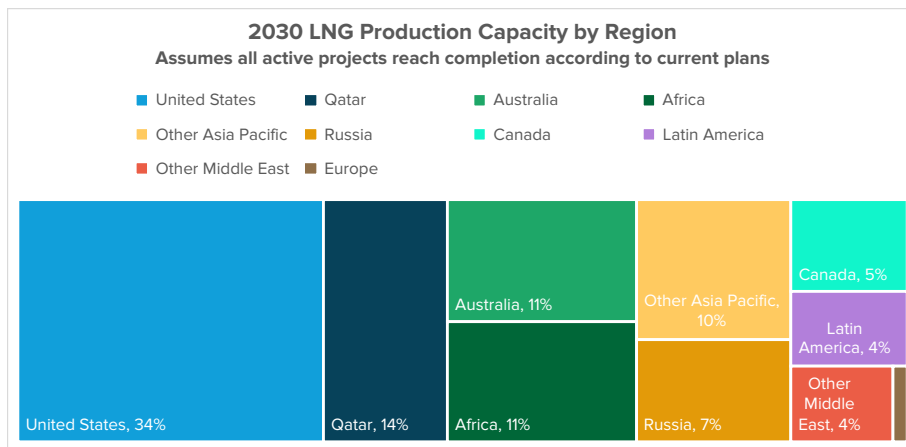
U.S. poised for majority of near-term supply

About 80 per cent of new LNG supply between now and 2030 will be from Qatar and the U.S., with Qatar adding 48 mtpa of liquefaction and the US adding nearly 96 mtpa, according to Evaluate Energy data. Other countries adding liquefaction capacity include Mozambique (20 mtpa), Canada (16 mtpa) and Australia (12 mtpa), assuming all active projects reach completion according to current plans.



By 2030 North America will have almost 40 per cent of global LNG production capacity, positioning it to be the major supplier of gas to Asia.

This new supply will reshape global trade flows. Portfolio players and trading houses will look to optimize their portfolios by taking a multi-basin approach — meaning that they will use sources of supply from various contracted volumes around the world to meet both short and medium-term demand, minimizing the number of long journeys taken by vessels without cargoes, rather than the more traditional approach of point-to-point contracts.



Source: Evaluate Energy

Because the bulk of US volumes are sold on a FOB basis and can be sent anywhere — unlike Qatari volumes which are contracted — the US will be a key supplier in this more flexible global market.

Longer term, successfully competing to supply the Asia-Pacific market will depend on price, reliability, and, ultimately, ESG performance.

Canada entering global LNG markets

After decades of political and regulatory challenges, Canada is set to enter the global LNG market with one project.

LNG Canada is expected to be on stream mid-decade with its Kitimat export facility on Canada’s West Coast. The LNG supply will be taken up by the project’s partners — Shell, Petronas, PetroChina, Mitsubishi, and KOGAS.

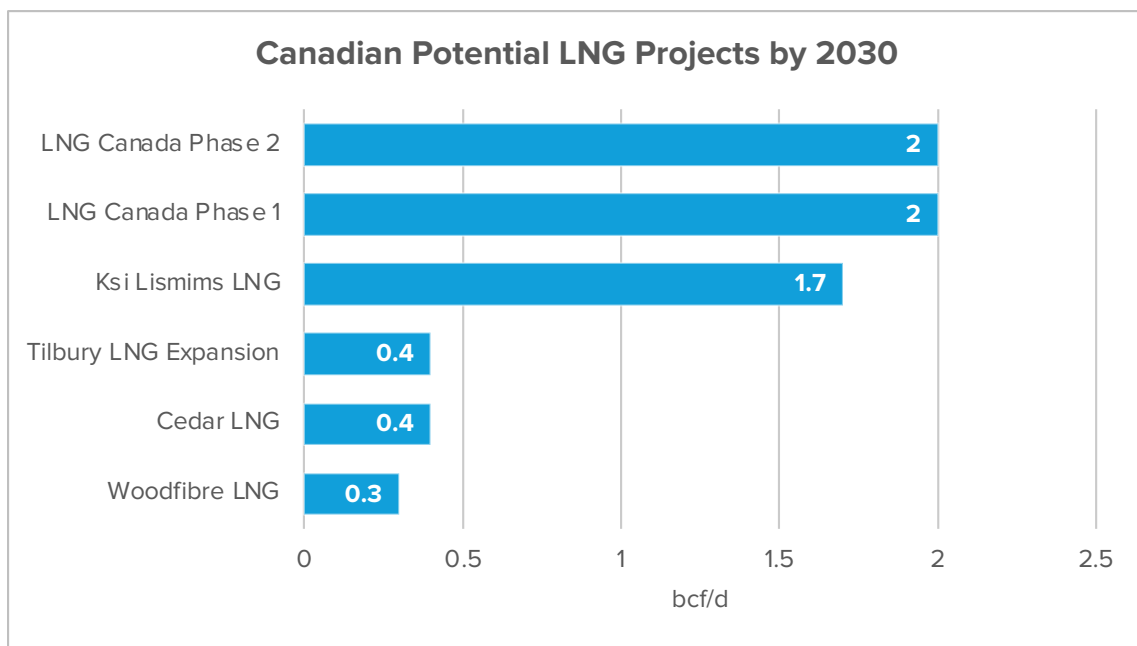
Still to come is a potential second phase of the project, which would bring total export capacity to 4 bcf/d.

A second large-scale project called Ksi Lisims LNG is also working towards FID. A partnership between the Nisga’a Nation, Rockies LNG, and Western LNG, it has a planned capacity of 1.7 bcf/d. Ksi Lisims LNG is a proposed floating LNG export facility, with the proponents working to sell its production into the Pacific Basin.

There are also several smaller projects in the works. Cedar LNG, a partnership between the Haisla First Nation and Pembina Pipelines, is expected to FID within the next year. Cedar is a floating LNG export terminal with a planned capacity of 400 mmcf/d.

Woodfibre LNG plans 2.1 mtpa (300 mmcf/d) of liquefaction capacity from 2027, with construction due to begin this fall/winter. The project has signed three sales and purchase agreements with off-takers. Woodfibre is a partnership between Enbridge and Pacific Energy, which has major upstream operations in northeast B.C.

The Tilbury LNG facility has been in operation since 1971. It is currently being expanded in two phases. The first phase will see the addition of 0.25 mtpa liquefaction capacity and a 46,000 cubic metre storage tank that will be constructed between 2024 and 2026. The second phase is currently under assessment and would see a new additional storage tank constructed and further liquefaction capacity of 2.5 mtpa added. Total capacity will be 400 mmcf/d.



Source: Evaluate Energy

Emerging gas markets and the ‘energy trilemma’

As global gas demand and the international gas trade have rapidly increased, a more sophisticated international market for natural gas is taking shape with the historic model of long-term contracts indexed to oil prices joined by new shorter-term contracts and spot market pricing.

At the same time, all nations are facing the ‘energy trilemma’ — the requirement to provide their citizens with secure, affordable energy, that is environmentally sustainable and socially beneficial.

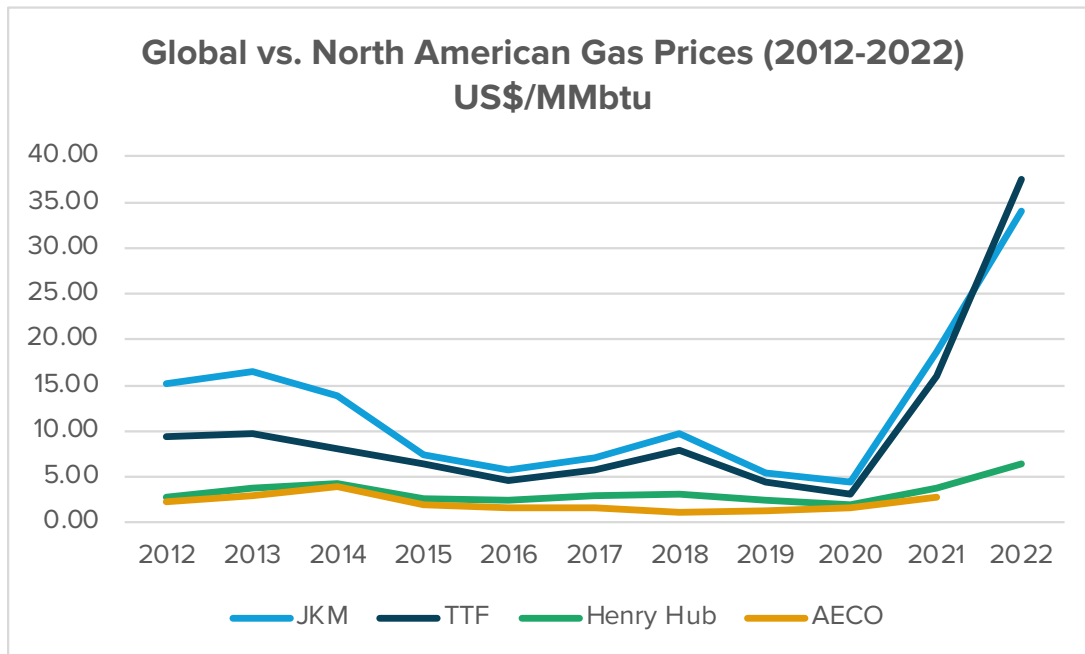
Russia’s invasion of Ukraine brought these two trends together. It showed energy security is not just about stable supply, but about diversity of supply. It showed energy security and affordability are closely linked. And it showed security and affordability come before sustainability when it comes to energy choices in much of the world.

Many Asia-Pacific nations turned to coal when LNG prices skyrocketed and supply was disrupted. Both China and India saw LNG demand decline 15 per cent from 2021 in 2022.

EU emissions trading scheme (ETS) prices and the mothballing of coal-fired power stations made European nations more reliant on gas, and in particular LNG. EU importers were left exposed to high spot market prices. JKM spot prices hit a record US\$70.50/MMbtu in August 2022, before falling back to US\$30.72/MMbtu in December.

Asian importers sold cargos on the spot market, capturing the margin between their long-term contracts and high spot prices.

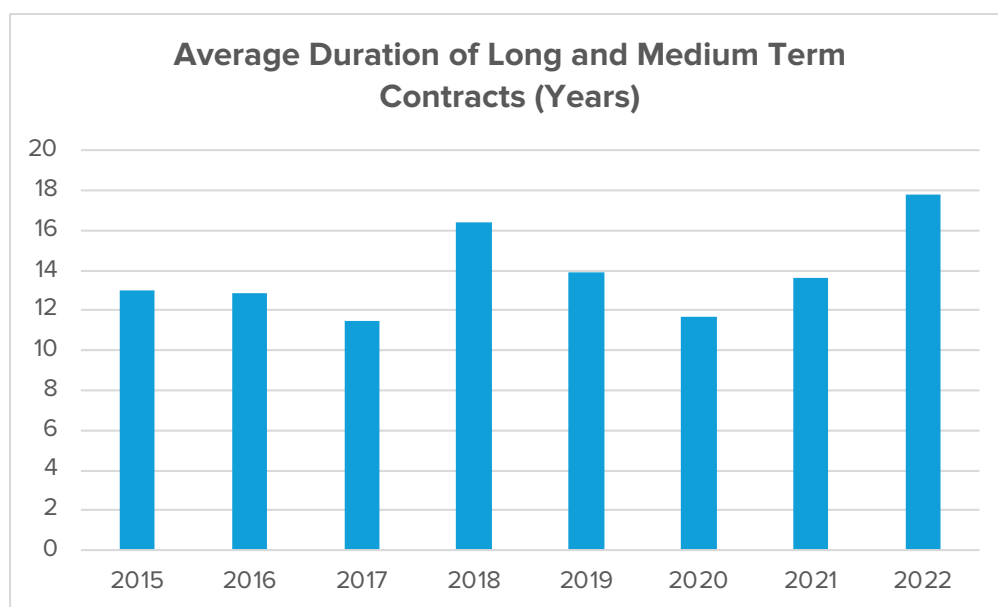
US exporters captured the large margin between Henry Hub pricing and LNG pricing in the spot market.



Source: Evaluate Energy

Energy security and cost concerns mark return to long-term contracting

This volatility has led to a return to long-term contracts as importers looked to avoid being exposed to a repeat situation in the future. In 2022, over 70 mtpa of LNG contracts were concluded, more than double the average over the last five years. Of these, 90 per cent of contracts concluded had a duration over 15 years in length, with 65 per cent over 20 years in length.



Source: GIGNL 2023 annual report

But alternatives are now available. Shorter term contracts (5-10 years) can be signed with portfolio players that are happy to absorb the risk of securing long-term supply to profit from short-term volatility. One example of this is German utility Uniper, which last year signed a nine-year deal with Woodside for 0.8 mtpa to be delivered into Germany.

Another option is to buy spot cargoes or do strip deals with portfolio players and trading houses. The big portfolio players are long LNG to the tune of 54.2 mtpa as of 2023, 43 mtpa by 2025 and 26 mtpa by 2030.

Many of these volumes could likely end up heading to Europe in the near-term. While that region bought 33 per cent of the world's LNG in 2022, end users in the region accounted for only nine per cent of long-term contracts.

QatarEnergy recently signed two long-term SPAs with European importers. One is with TotalEnergies for up to 3.5 mtpa to France between 2026 and 2053. The other is with Shell for up to 3.5 mtpa to the Netherlands between 2026 and 2053. Volumes will be sourced from joint ventures between QatarEnergy and the two firms that hold interests in Qatar's North Field East (NFE) and North Field South (NFS) expansion projects.

But the EU's demand, and how it will be met, is just a short-term piece of the puzzle. If the EU is successful in its decarbonization goals, demand will fall off. EU policies will reduce the bloc's gas demand by 40 per cent, or 180 bcm, between 2021 and 2030, according to the IEA.

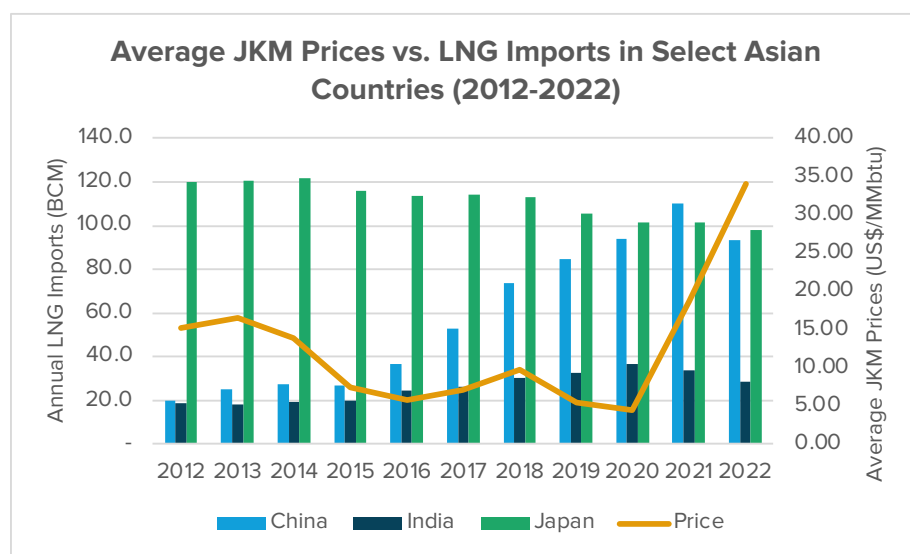
Asia: Price sensitive buyers dominate new demand

The future growth market for LNG is Asia. As Europe looks to cut its gas demand, Asia-Pacific gas demand will grow by at least 50 per cent by 2040.

Because many of these countries are going to have sustained demand, they are looking to enter or renew long-term contracts to ensure cheaper supply, rather than taking the European approach of shorter-term contracts or relying on spot cargoes from portfolio players.

As of 2023, roughly 146 long-term contracts, covering 195 mtpa of volume, exist in Asia. These totals will drop to 96 contracts and 146 mtpa by 2030.

This will create an interesting moment for pricing as Qatari, US, Australian and Canadian capacity comes on-line during this period. Qatari and Australian sellers seem committed to oil indexation, despite the increasing disconnection between oil and gas markets. Asian buyers will want the cheapest prices possible, and to avoid getting caught in a repeat of the scramble for expensive spot cargoes that took place in 2022.



Source: Evaluate Energy

One recent bellwether is the deal signed between QatarEnergy and Sinopec. The 27-year deal is for 4 mtpa, one of the longest contract durations in the sector. This kind of investment signals a strong long-term interest on the part of the importer.

There are several other price-sensitive buyers in Asia that are likely to become increasingly significant sources of demand, including India, Vietnam and Bangladesh.

India, the fourth-largest buyer of LNG globally, has recently signed deals with ADNOC for 1.2 mtpa and TotalEnergies for 0.8 mtpa, both starting in 2026, though pricing levels are unknown. Traditionally India has been an opportunistic buyer, only willing to enter the market at US\$10/MMBtu or below.

Bangladesh has signed a new sales and purchase agreement with Oman to start importing an additional 0.25mn - 1.5mn mtpa for ten years from 2026 and has an existing oil-linked deal for 1.25 mtpa with Vitol.

Vietnam has announced construction of five LNG importing terminals and more than 10 LNG-fueled power plants. It has not signed any long-term LNG contracts yet and therefore will be competing with other opportunistic buyers for spot supplies or strip deals until it does.

India and Bangladesh are also likely to be in the market for spot cargoes at times of low spot prices.

Affordability key driver for export growth

While industrial demand provides a base for LNG imports in Asia, the power market will provide most growth going forward. LNG exports must be competitive with other energy sources including coal and renewables.

The analyst consensus is LNG is competitive in emerging markets at under US\$10/MMbtu.

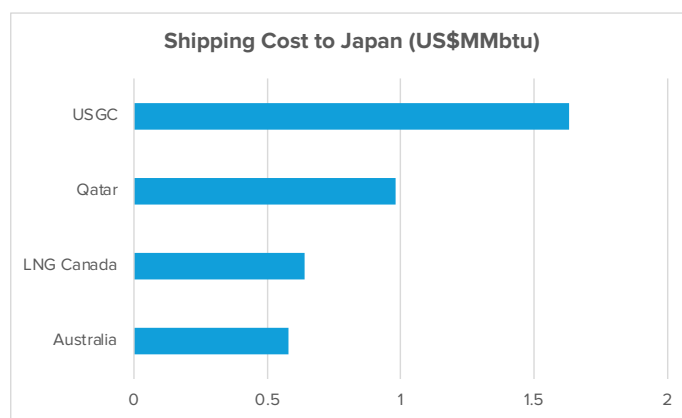
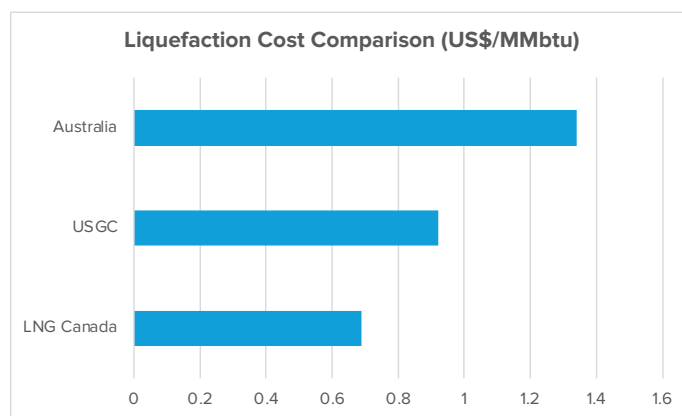
Countries and corporations will also compete to meet demand.

LNG supply costs depend on several factors, including facility capital costs, upstream gas supply costs, midstream liquefaction costs, and transportation costs. Most exporters are advantaged or disadvantaged in at least some of these areas.

For example, Canada has higher upfront costs than a comparable facility on the US Gulf Coast.

It also has significantly higher upstream transportation costs to pipe gas to liquefaction facilities.

However, Canada's liquefaction costs are lower due to its cold climate, and it also has a geographic advantage in reaching Asian markets.



Source: The Oxford Institute for Energy Studies

COMPARING UPSTREAM SUPPLY COSTS

A recent Canadian Energy Centre study shows Canada in the middle of the pack when it comes to upstream supply costs.

The Canadian natural gas sector had a weighted average breakeven gas price of US\$2.31/mcf in 2022, fifth lowest among major natural gas producing countries, behind Saudi Arabia (\$1.09/mcf), Iran (\$1.39/mcf), Qatar (\$1.93/mcf) and the

United States (\$2.22/mcf).

Canadian natural gas sector weighted average breakeven costs in 2022 were lower than Russia, Norway, Algeria, China and Australia.

However, the Montney play where most of LNG supply is expected to come had a breakeven price of \$1.49/mcf, lower than the largest LNG exporters in the world—Qatar and the U.S.

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Emissions could become factor in LNG markets

As ESG requirements on downstream firms in the Asia-Pacific region grow, the carbon intensity of gas imports could become increasingly important.

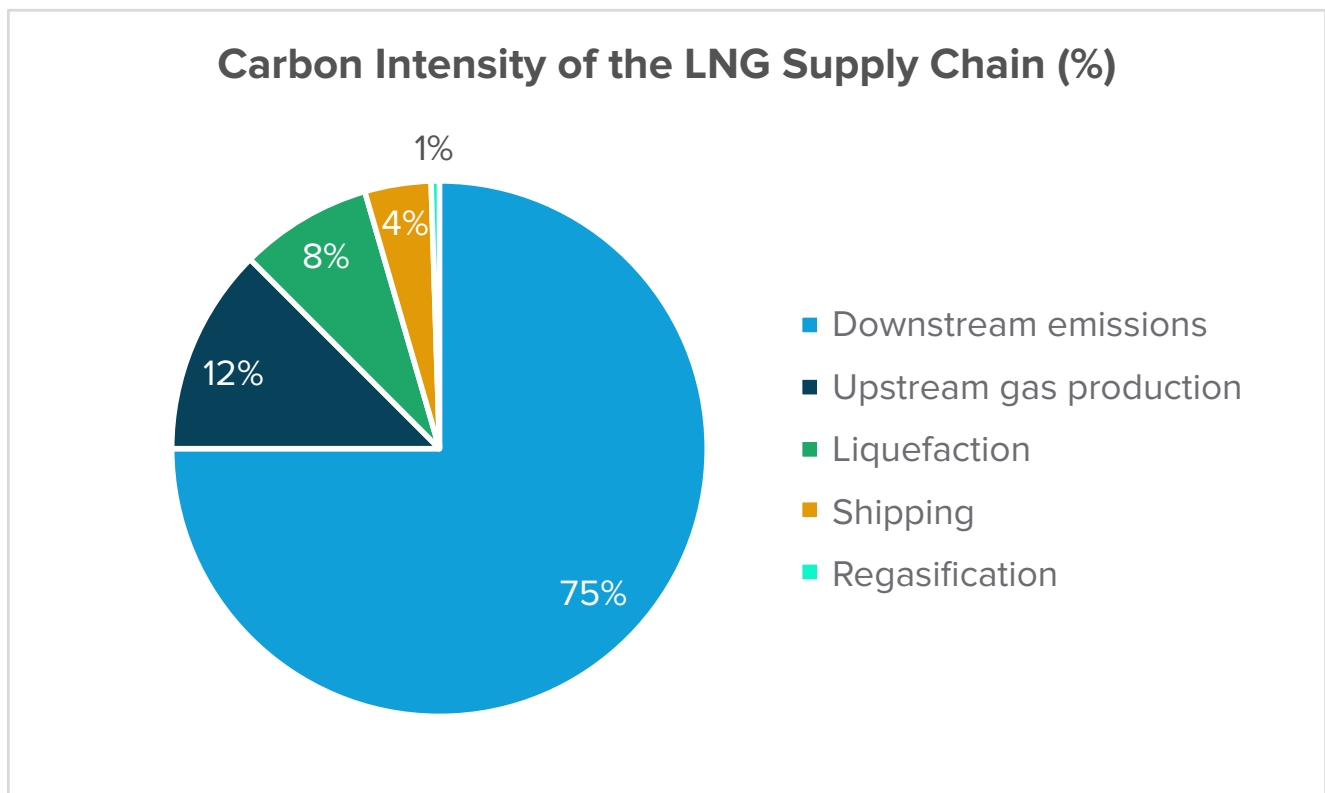
The rule of thumb estimate of life-cycle emissions for an average LNG cargo, including upstream production, liquefaction, shipping, regasification, and combustion, is 250,000 metric tonnes of CO₂ equivalent (t CO₂e).

As much as 75 per cent of this is accounted for by downstream combustion and cannot be mitigated without offsets. But there is much wider variation in emissions intensity for the wellhead-to-delivery segment.

Upstream and processing emissions are affected by several factors — the climate at the liquefaction terminal, pipeline transport distances and thus compressor energy demand, shipping distances, the relative decarbonization of power grids and upstream methane emissions.

A framework for assessing the carbon content of an LNG cargo has started to emerge thanks to work by the International Group of Liquefied Natural Gas Importers (GIIGNL). Shell Eastern LNG has already delivered a cargo from the Gorgon Project in Australia to the CPC Corporation in Taiwan that was certified as GHG neutral in line with the GIIGNL standards.

A handful of LNG players have already published a detailed methodology to provide greenhouse gas emissions statements for delivered cargoes, and one US LNG exporter published a life-cycle analysis of LNG cargoes specific to its supply chain.



Source: Columbia Global Center on Energy Policy

Comparing emissions intensity

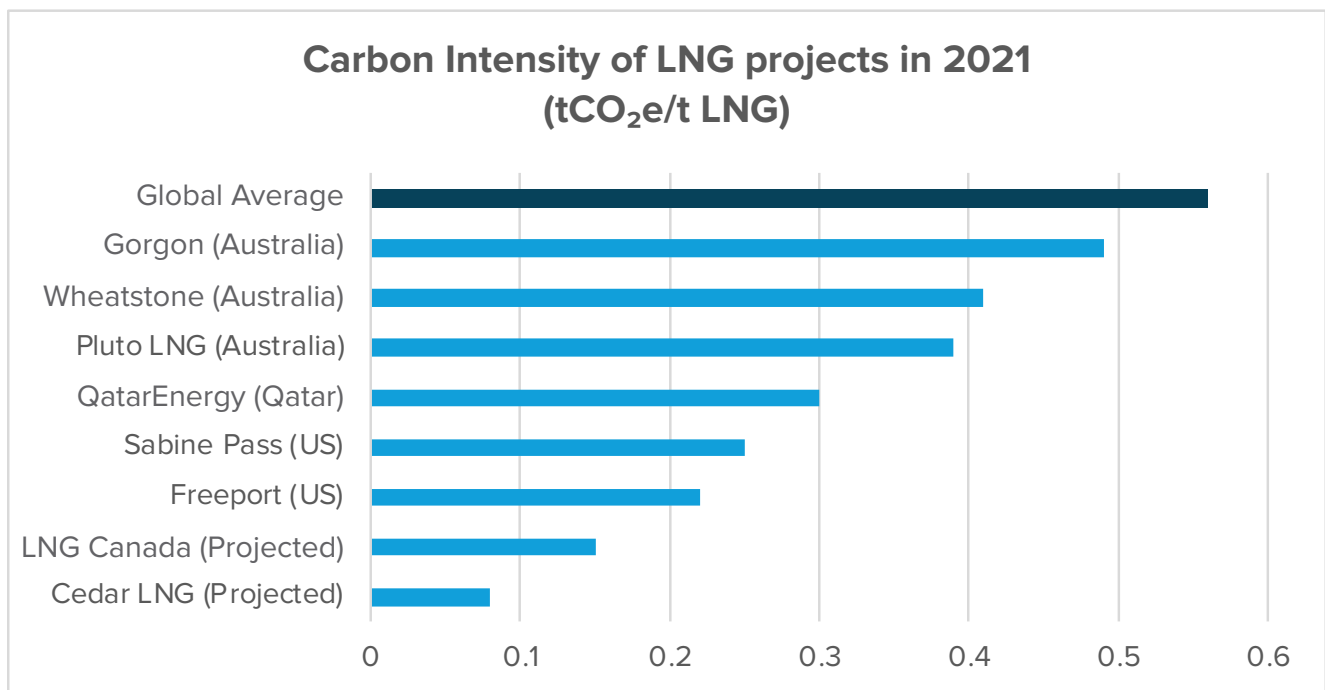
The average emissions intensity of LNG projects globally is 0.56 t CO₂e/t LNG (tonnes of carbon dioxide equivalent per tonne of LNG produced), according to a study by the Western Australia government.

Canadian projects — with their cooler climate, shorter shipping distances, hydro-based electricity grid and upstream methane emissions reductions — are very well placed to compete.

LNG Canada, currently under construction at Kitimat, B.C, is being designed to produce LNG at 0.15 t CO₂e/t LNG. It will achieve this through widespread electrification of upstream operations, the use of green power from the hydro-based electricity grid and the use of highly efficient gas turbines at the liquefaction plant.

The nearby Cedar LNG, looking to take FID next year, is targeting even lower emissions of 0.08 t CO₂e/t LNG, although this figure does not include emissions from the upstream development of natural gas.

Upstream methane emissions currently account for the biggest share of the well-to-tank emissions intensity of global gas production, according to data from the IEA, at levels of up to 50 per cent, depending on the region.



Source: Evaluate Energy (data from projects listed, Government of Western Australia, Climate Analytics)

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Key takeaways

- Natural gas demand and international trade driven by LNG exports increased rapidly in the first two decades of the 21st century, creating a much more sophisticated global market with diversified contracting options.
- The Ukraine war created a jump in LNG demand in the EU that will be sustained until 2030; longer term, the growth market for LNG exports is the Asia-Pacific.
- Affordability and security of supply are driving LNG import decisions in the developing world. Importers are signing long-term contracts at stable pricing to meet internal economic targets.
- Importers are also looking for supply diversity and are willing to use spot pricing and short-term contracts for some supply when beneficial.
- The US and Qatar will meet most LNG demand to 2030. Further out, there are opportunities for future supply growth.
- Decarbonizing gas supply is increasingly important in some markets, but price will continue to be the top priority for buyers in emerging markets.
- Like always, the lowest supply cost wins.

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