Bundles | 18 July 2024

LNG: The complete Liquified Natural Gas picture

The LNG market is set for a significant shift. What's driving it? What will it mean for prices? And what about the environmental impact? We answer all that in this series of in-depth articles on the Liquified Natural Gas market

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Global LNG supply set to balloon

The ramifications of increased LNG supply

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LNG demand is expected to grow at a healthy pace for the remainder of the decade

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Why closer attention is now being paid to LNG emissions

Tackling emissions in the LNG value chain is increasingly important

By Coco Zhang and Warren Patterson

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Global LNG supply set to balloon

A wave of Liquified Natural Gas supply is set to hit the market over the second half of this decade, pushing the global LNG market into a large surplus and weighing on prices. This significant growth also brings up important questions about emissions along the LNG value chain

The LNG Tanker FSRU Toscana arrives at the French port of Marseille

Imminent surplus to hit the global LNG market

Global gas markets have had an extraordinarily eventful time since 2020. A combination of Covid-related lockdowns and a significant growth in LNG export capacity left the global LNG market in surplus at the start of the decade, pushing global gas prices to record lows. However, this was short-lived with Russia's invasion of Ukraine, which led to drastic shifts in gas flows and record-high prices for spot Asian LNG and European natural gas.

The market's set for a significant shift

A cut-off of almost all Russian gas into Europe saw the region lose its largest supplier of natural gas, forcing buyers to scramble to look for alternative supply. Pipeline constraints from other suppliers left LNG as the obvious alternative. LNG imports into the EU grew from 81bcm in 2021 to 139bcm in 2023, according to LSEG data, leaving LNG as the key source of gas supply for the EU,

making up more than 40% of total gas imports. This additional demand at a time of limited new supply tightened the global LNG market, leaving it finely balanced until now. However, the LNG market is set for yet another significant shift, with the market forecast to move into deep surplus as we move through the remainder of this decade.

A wall of LNG export capacity

A wall of LNG export capacity coming mainly from the US and Qatar will see export capacity growing by more than 45% by 2030, which will see global capacity standing at more than 950bcm. Other key supply additions will come from Russia, Mozambique, Canada and Mexico. However, there are very real risks hanging over some of these projects. Turning to global demand, we are assuming that it will grow by around 35% by the end of the decade, a move that will be largely driven by Asia, specifically China and South/Southeast Asia. Japan is likely to continue shifting away from LNG as nuclear capacity is brought back online and the government focuses on its renewables targets. This trend is clearly already underway.

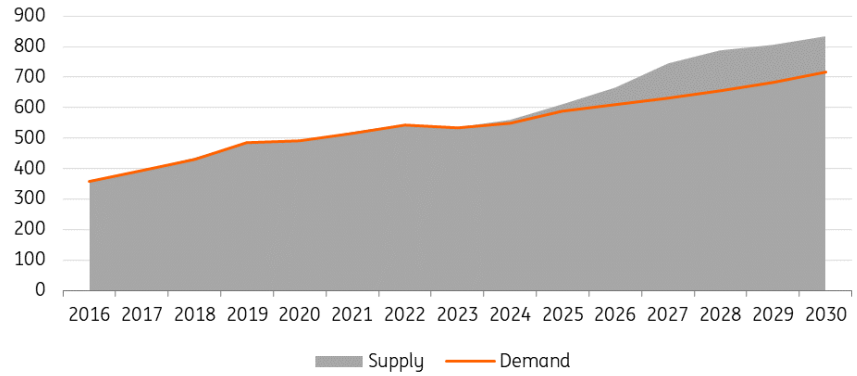
The LNG market could move into surplus next year

Similarly, in Europe, where gas demand is still well below pre-Russia/Ukraine war levels, there is further downside as we move towards the end of the decade. However, this is not necessarily bearish for LNG demand as Europe still plans to end its reliance on Russian fossil fuels by 2027, suggesting that the region will still need to see some further switching to LNG. We expect that the global LNG market will move into surplus as early as 2025 and is likely to remain in a surplus environment for the remainder of this decade, which should see global LNG prices move lower in the long term.

Admittedly, though, our balance shows only a marginal surplus in 2025, which could quickly disappear due to stronger demand or supply disruptions. We have more confidence in a meaningful surplus from 2026 and 2027, putting downward pressure on LNG prices.

There are key upside risks to this view, centred on whether projects are potentially delayed or cancelled. We have already seen some delays in US projects currently under construction, while there has also been some political interference. For Russia, sanctions leave a large amount of uncertainty over whether some key projects will see their full potential or whether they will be scaled back. In Africa, security concerns continue to linger over an already delayed project in Mozambique.

Global LNG market set to move into deep surplus (bcm)



Source: ING Research

In the articles that follow, we will dive deeper into the supply and demand outlook for key markets. In addition, the continued growth in global LNG trade brings up the topic of emissions. A longer value chain as seen with LNG increases the risk of emission leakages as well as concerns over how these emissions compare to pipeline flows.

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The US and Qatar to drive LNG supply growth

Global LNG capacity is set to grow by more than 45% by the end of this decade with significant supply additions coming from both the US and Qatar. However, there are risks facing some capacity

Historically, Qatar has been the world's largest LNG supplier - but the ramping up of capacity from the US and Australia over the last decade has seen that position fall

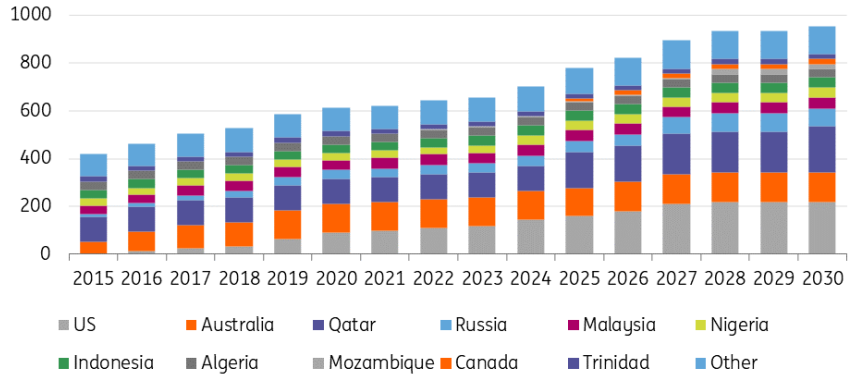
LNG supply ramps up

Unfortunately for gas markets, the developments in Russian pipeline flows to Europe coincided with a period of limited new LNG export capacity starting up. This has left less flexibility in the market and has caused extreme strength and volatility in prices.

Between 2021 and 2023, only 41bcm of LNG export capacity started up compared to 110bcm in the three years prior. However, there is a significant amount of LNG export capacity scheduled to start up from the second half of this year through to 2030. Between 2024 and the end of this decade, a total of 300bcm of new LNG export capacity is set to start up. This will take total LNG export capacity to more than 950bcm by the end of 2030, 45% higher than at the end of 2023.

The US and Qatar will make up the bulk of this new capacity. This should ease tightness concerns that have been looming over the market since 2022.

Significant growth in global LNG export capacity in the years ahead (bcm)



Source: IGU, EIA, press releases, ING Research

US LNG supply boost

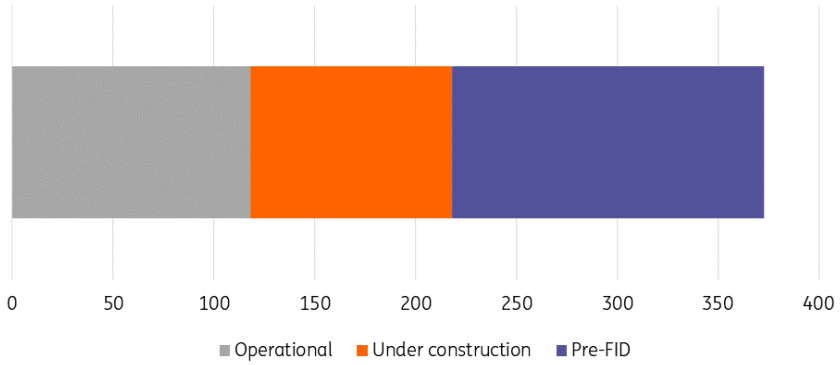
The US has been the key driver behind LNG export capacity in recent years. In 2016, the US had 12bcm of export capacity, made up of Trains 1 and 2 at Sabine Pass. However, the abundance of cheap natural gas led to significant investment in LNG projects, which saw the US going from a minimal player in the LNG market to the largest exporter in 2023 with 118bcm of capacity.

The bulk of this capacity started up between 2019 and 2020 and coincided with the demand hit we saw due to Covid restrictions. Over these two years, almost 61bcm of export capacity started up, equivalent to around 51% of total export capacity at the end of 2023. However, since 2022 there has been far less new capacity, with just 20bcm starting up. This is set to change as we move into the latter part of 2024. There is 101bcm of capacity currently under construction, which is set to start between the second half of 2024 and the end of this decade. This would take the total US LNG export capacity to 218bcm, an 85% increase from current levels. There are risks that some of the projects scheduled to start up this year and next will be delayed. There have already been reports that Golden Pass, which was set to start operations in the first half of 2025, could be pushed into the second half of the year.

Political interference is the other key risk, and more so for projects that have not been approved. The Biden administration temporarily paused any further export project approvals due to concerns over the economic and environmental impact. However, since then a federal judge in the US has blocked the government's pause on project approvals.

There is also a large number of projects in the US awaiting a final investment decision (FID), according to the EIA. Its data shows that almost 155bcm of capacity is awaiting an FID. If these projects go ahead, it is unlikely that much of this supply will come to market before 2030. In our supply numbers, we have only included projects that are currently under construction.

Status of US LNG export capacity (bcm)



Source: EIA, ING Research

Australian LNG supply to edge lower

Australia is the second largest global LNG exporter, exporting 111bcm in 2023. It has the largest capacity, however, standing at 120bcm. Given the upcoming capacity additions from the US and Qatar, this will not be the case for much longer. There is little in the way of significant export capacity set to start up in Australia in the coming years.

The Pluto LNG expansion project will see a second train added to the Western Australian facility with an additional 7bcm of capacity. This second train is expected to start up in 2026. While it will likely provide a short term boost to Australian LNG exports, this will probably be short-lived, with supply falling from other projects due to a combination of falling exploration expenditure and declining reserves. Woodside plans to shut one of its five trains at its North West Shelf project in 2024 due to falling feedstock supply. The Australian government estimates that LNG exports from Australia will total around 107bcm by 2028, down 3% from 2023 levels. Concerns over domestic gas shortages have plagued Australia, particularly on the east coast.

There are plans to build four LNG import terminals in Australia, with the first already near completion, suggesting that the country will play a less important role as a supplier for global markets in the longer term (post-2030).

Qatar goes big

Historically, Qatar has been the world's largest LNG supplier. The ramp-up of capacity from the US and Australia over the last decade has seen that position fall – although it still makes up a sizeable 20% of global LNG export supply.

Qatar is, however, currently in the process of increasing its export capacity from 105bcm to 193bcm by 2030. This will be done in phases, with 44bcm set to start up over 2025 or 2026, then a further 22bcm by 2027 and the final 22bcm by 2030. This would see Qatar becoming the second largest supplier with just the US in the lead, potentially making up around 23% of global supply by 2030.

Favouring Qatar is its position of being the lowest-cost LNG producer, which certainly would make it feel more comfortable given expectations of a surplus environment in the latter part of this decade. Qatari LNG is even more competitive when considering revenue from associated liquids

production.

Russian sanctions create supply uncertainty

Russia is the fourth largest LNG exporter, making up around 8% of global supply in 2023 – and it has ambitions to grow further. Current export capacity stands just shy of 41bcm, while by the end of this decade, capacity is estimated to increase to more than 75bcm. However, there is plenty of risk hanging over this additional capacity. The 27bcm Arctic 2 LNG project has faced several delays and issues due to Western sanctions. While the first train of the project is in the process of starting up, export volumes are only a fraction of capacity.

Furthermore, Russian LNG faces the risk of European sanctions. The European Commission banned the re-export of Russian LNG from EU ports, which would make it increasingly difficult for Russia to get LNG into Asia – particularly in the winter months, when the Northern route to Asia (through the Arctic) is frozen.

If the EU plans to target Russian LNG, the natural next step after banning the re-export of Russian LNG from EU ports would be a ban of Russian LNG into the EU. However, complicating this would be long-term contracts that some EU buyers will have with Russia. Regardless, the European Commission still has a target of fully phasing out Russian fossil fuels by 2027.

African LNG growth depends largely on Mozambique

By the end of this decade, Africa is set to see a little more than 37bcm of new LNG supply capacity. This includes 11bcm of new capacity from Nigeria, 4bcm from Congo, 3bcm from Mauritania, around 1bcm from Gabon and almost 18bcm from Mozambique. The biggest risk to this capacity comes from Mozambique's onshore LNG project. Not only is it the largest project under construction on the continent, it has also faced significant delays in recent years due to security concerns in the region. Further delays to the project cannot be ruled out.

Canada and Mexico set to become LNG suppliers

In addition to a substantial amount of US LNG supply capacity, North America is also set to see new capacity from Canada and Mexico. In Canada, 22bcm of capacity is set to start up between 2025 and 2028. This includes Trains 1 and 2 from the LNG Canada project and 3bcm from Woodfibre in 2028. Meanwhile in Mexico, close to 10bcm of capacity is scheduled to start up between 2024 and 2026. This includes the Altamira project and the Energia Costa Azul project.

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LNG demand growth hinges on Asia

LNG demand is expected to grow at a healthy pace, by as much as 35% by the end of the decade, according to our calculations. Asia is set to dominate that growth, but the strong demand we've seen from Europe in recent years will ease

Construction is underway on the LNG storage and distribution station in China's Lianyungang City

Asia to dominate demand growth

The supply side of the equation is relatively easy to forecast, given the visible pipeline of projects. However, demand is a lot more difficult to forecast. This is particularly due to the current energy transition, and the differing paths that countries may take to finally reach their ambitious targets. Similar to the pipeline of LNG export projects, we could look at the pipeline of projects for regasification units at destination.

Clearly, this is not a guarantee of strong demand. For example, in Europe, there has been significant investment in regasification capacity, but given the European Commission's climate goals, a lot of this capacity is at risk of being severely underutilised in the longer term.

Globally, we assume that demand will grow by around 35% by the end of the decade. Asia will dominate this growth, while flat to modest growth is expected in other regions. China and India will see the largest absolute growth in LNG demand through until 2030, and China should hold onto its position as the largest importer.

While the demand growth expected over the next 6 years is assumed to be lower than what was

achieved in the previous 6, it is important to remember there were significant shifts in the LNG market in recent years with Europe becoming a significant LNG buyer. While we see some upside in European LNG demand in the short term as the region continues to wean itself off Russian fossil fuels, the growth rates will be much more modest.

Europe and the risk of regasification overcapacity

Since Russia's invasion of Ukraine and the spillover effect it had on Russian gas flows to Europe, the region's dependence on LNG has grown significantly. In 2021, the EU imported 81 bcm of LNG; these volumes grew to around 139bcm in 2023, according to LSEG data, making up more than 40% of total EU imports. And with EU gas demand still 17% below the 2017-21 average, there is room for further growth in LNG demand as new supply comes to market, particularly if the EU is serious about ending all Russian fossil fuel imports by 2027.

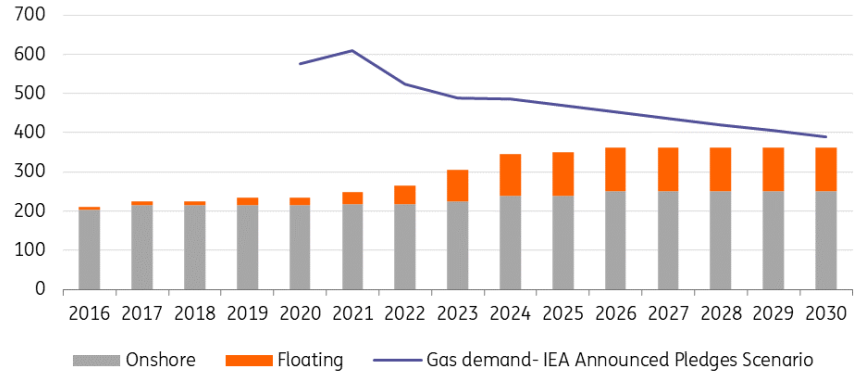
European gas demand has been in structural decline

However, European gas demand was in structural decline before the war. The war has only sped things up. While there is room for a recovery in industrial gas demand, the outlook is more negative from the power generation sector. The continued rollout of renewables will likely only weigh further on European gas demand. The investment in regasification capacity helped Europe manage the stoppage in Russian pipeline gas.

The increase in floating storage regasification unit (FSRU) capacity has particularly helped Europe. Since 2022, Europe has seen more than 113bcm of regasification either come online or set to come online. Interestingly, more than 70% of this regasification capacity is in the form of FSRU. The risk for Europe, where gas demand is in structural decline, is the potential for overcapacity on the regasification side. Therefore, it makes sense that we have seen Europe going largely down the FSRU route, where this capacity can be shifted to other markets if underutilised in Europe.

Regasification capacity in Europe is set to total at least 368bcm by the end of this decade, while the International Energy forecasts under its Announced Pledges scenario for European gas demand to total 390bcm by 2030. If realised, this would leave Europe in a situation of regasification overcapacity, given that the region still receives a large portion of pipeline gas from other sources.

European regasification capacity vs. natural gas demand projections (bcm)



Source: IGU, GIE, IEA, ING Research

Japan & South Korea demand set to fall

Historically, Japan has been the largest LNG importer. However, in recent years it has competed with China for the top spot. Japanese LNG imports are in structural decline. Imports hit a high of 122bcm in 2014 and have fallen every year since, falling to 90bcm in 2023. A key driver behind this has been the return of nuclear capacity following the Fukushima disaster in 2011. Japanese nuclear power generation has grown 166% since 2017 to 77.5TWh in 2023.

Over the same period, wind and solar power generation has grown 78% to 107TWh. Japan aims to lower thermal power output as outlined in its 6th Strategic Energy Plan. The government wants to reduce greenhouse gas emissions by 46% in 2030 from 2013 levels. To achieve this, Japan aims to increase renewables in the power mix to 36-38% from 18% in FY19. Nuclear is expected to rise to 20-22% from 6%, while the target is for gas to fall to 20% from 37%.

South Korea is another key LNG importer, importing 61bcm in 2023, making it the third largest. However, South Korea also aims to reduce emissions with a target to cut them by 44% by 2030 from 2018 levels. As part of South Korea's 10th Basic Plan for long-term electricity supply and demand, the target is to reduce the share of LNG in the power mix from 27.5% in 2022 to 22.9% by 2030 and to 9.3% by 2036. It is envisaged that nuclear's share in the mix will increase from 29.6% in 2022 to 32.4% in 2030 and 34.6% in 2036. However, unsurprisingly, renewables are set to see the bulk of growth, increasing from 8.9% in 2022 to 21.6% in 2030 and 30.6% in 2036.

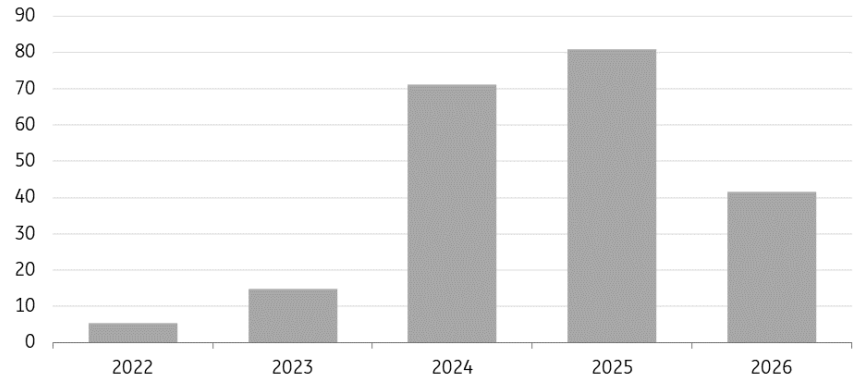
China regasification capacity continues to grow at strong pace

China is a key swing factor in the global LNG market. China can make all the difference between the global LNG market being tight or more manageable as we saw in 2022. In 2023, China regained its spot as the top LNG importer, with flows totalling 98 bcm, up 12% YoY, but still below the record 110bcm imported in 2021.

The compounded annual growth rate in LNG demand over the last 10 years comes in at almost 15%. And with many local players not expecting domestic gas demand to peak before 2040, demand is still expected to grow. This is also aligned with the large number of long-term contracts Chinese buyers have locked into over the last several years and the build-up in regasification

capacity. China has more than 190bcm of regasification capacity which is set to be built between 2024 and 2026.

China has a significant amount of regasification capacity additions coming online (bcm)



Source: IGU, ING Research

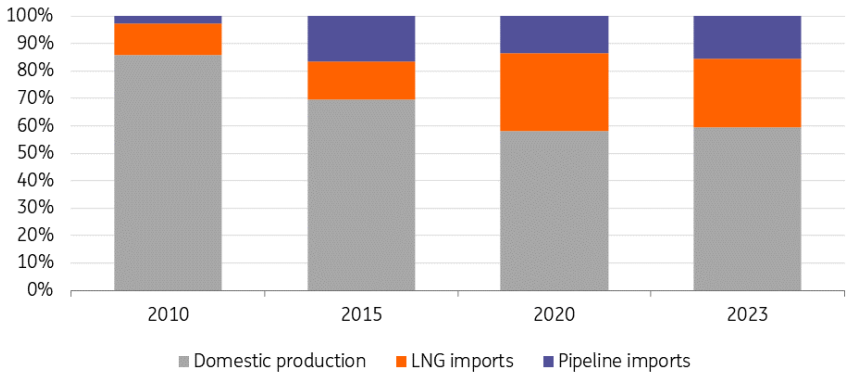
However, what makes it challenging to gauge how strong Chinese LNG demand will grow is, first, how much China will rely on natural gas as a transitory fuel in the power mix. The growth in natural gas's share of the electricity mix has been very modest over the last decade, growing from around 2% to 3.1%. This suggests that demand growth will likely continue to be driven by industry and the residential and commercial sectors.

The largest sector of natural gas consumption in China is industry, making up 34% of total demand. The power generation sector is only the third largest, holding a share of 23% and just behind residential and commercial demand. Secondly, China continues to grow domestic production in an attempt to limit its dependence on gas for imports. Domestic natural gas output has grown at a compounded annual growth rate of 6.8% over the last decade, reaching 234bcm in 2023, equivalent to 58% of total domestic consumption. The government will likely continue to target growing domestic supply. The deteriorating geopolitical environment and longer-term ambitions to transition away from coal support this trend.

Finally, pipeline gas flows are playing an increasingly important role for China. Pipeline imports have grown at a CAGR of 8.8% over the last 10 years. There are three sources of pipeline gas supplies for China: Central Asia, Russia, and Myanmar. There is a clear push from Russia to sign pipeline deals with China, given the loss of its key market, Europe. Russian flows from the Far East Sakhalin project are expected to start in 2026, providing 10bcm of additional pipeline supply. Russia is also pushing heavily for the Power of Siberia 2 pipeline, with a capacity of 50bcm.

However, if this project were to advance, flows would not start in the current decade. In addition, there are also intentions for the construction of the Central Asia Gas Pipeline Line D to resume, which will run from Turkmenistan to China and have a capacity of 30bcm. Therefore, the potential for further pipeline capacity into China also weighs on the growth potential for LNG in the longer term.

China natural gas supply mix (%)

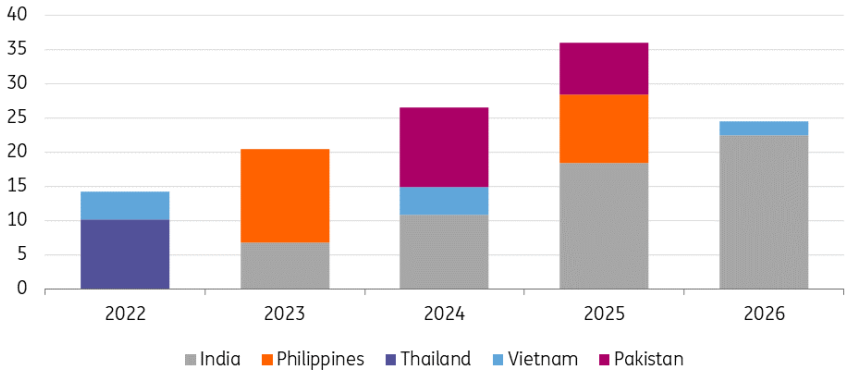


Source: Energy Institute, ING Research

Strong demand from South and Southeast Asia

South and Southeast Asia are key growth markets for LNG. However, buyers in these regions are also mostly price-sensitive. This was highlighted in 2022 during the European energy crisis, where buyers from the region took a step back from the market. Since then, imports have recovered as LNG prices have trended lower.

India dominates regasification capacity additions in South/Southeast Asia (bcm)



Source: IGU, ING Research

However, we are also seeing new buyers entering the market. In recent years, new regasification capacity in the Philippines and Vietnam have seen them starting to import LNG. There is also a large amount of regasification capacity in the region which is set to start over the next couple of years. This is largely driven by India, where the government has set a goal to increase the share of natural gas in its energy mix from around 6% to 15% by 2030.

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Why closer attention is now being paid to LNG emissions

The issue of emissions along the LNG value chain is now weighing more heavily on companies' strategic decision-making processes. While challenges persist, there have been improvements in methane leakage management, carbon capture and storage, carbon offsetting, and fuel switching in the LNG industry

Methane leakage and emissions from parts of the LNG value chain are a topic of concern

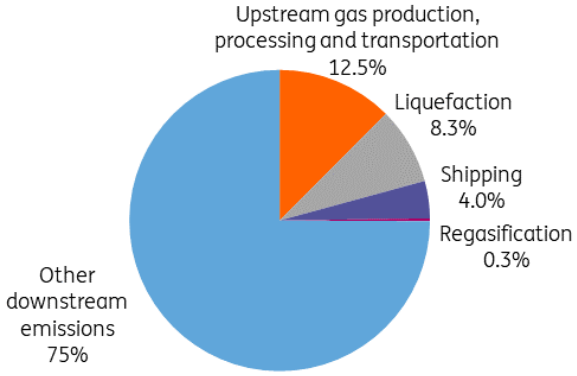
The increasing role of LNG in meeting global energy demand since the Russia-Ukraine war, combined with rapidly growing pressures to decarbonise energy-intensive economic activities, has led to heightened attention on greenhouse gas (GHG) emissions from the LNG value chain.

Emissions from the LNG value chain mainly come from three parts:

- **Upstream**, where natural gas is extracted, produced, transported, and liquified into LNG
- **Midstream**, which includes shipping LNG from the production location to the destination
- **Downstream**, where LNG is regasified into natural gas and combusted

Here's a breakdown of emissions along the value chain...

Share of life-cycle LNG emissions



Source: Center on Global Energy Policy at Columbia University

Methane leakages pose great challenge to LNG emissions measurement

While these are general estimates, it remains difficult to calculate the actual emissions volumes. And even today, there has not been a widely established formula. **The main reason behind the difficulty is the challenges in calculating methane's contribution to LNG life-cycle emissions**. In producing and transporting LNG, gaseous methane can be leaked into the atmosphere. Methane is a much more potent greenhouse gas than carbon dioxide (CO_2), as it can trap as much as **80 times** the amount of heat as CO_2 does during the first 20 years of its existence. But methane is also more short living (i.e., it dies out after 10 years), so under a 100-year timeframe, it becomes **28 times** more powerful as CO_2. Today, the norm is to calculate the global warming impact of methane over 100 years, but still, it remains challenging to precisely compare methane with CO_2.

Moreover, there is not yet a consensus on the average rate of methane leakages from LNG production. Studies from NGOs (e.g., the Environment Defense Fund), universities (e.g., Cornell and Carnegie Mellon), and governmental agencies (e.g., the Department of Energy, or the DOE) show the average methane leakage rates ranging from 0.7% to 3.3% – and that number can become a lot larger depending on production location and well productivity. Given the powerful nature of methane in causing global warming, even a small change in the leakage rate assumption can lead to substantially different results of emissions from LNG.

Organisations from both the public and the private sectors have been trying to compare the life-cycle emissions of methane from LNG imports in a region to the emissions from alternative options (such as coal or pipeline gas) that are available to that region.

While we think this is an important approach, we also acknowledge that the discrepancies in methane leakage assumptions can yield different conclusions. Mainstream research analysis (from the US DOE) shows that LNG exported from the US to Asia can result in a 54% to 2% emissions reduction compared to local coal combustion over a 20-year timeframe, and emissions from LNG exported from the US to Europe can be 56% less to 1% more than using coal. As for comparing US exported LNG to Russia pipeline natural gas to Europe, results indeed vary based on methane leakage assumptions, with some scholars concerned about mega leakages from Russia pipelines. It is also true that with the Russia-Ukraine war ongoing, imports of natural gas from Russia have dropped significantly regardless of emissions considerations.

As the awareness of and technologies for measuring methane emissions develop, the issue of methane leakage and emissions from the other parts of the LNG value chain have become a topic of concern from businesses, investors, and governments. And because LNG is still a fossil fuel, there has been increasing debate on how much more of LNG the world will realistically produce to achieve an increasingly noticeable balance between energy security, especially for Europe and Asia, economic development, notably in developing countries, and climate mitigation.

How industry players are reducing emissions

One thing, at least, is clear: the current and any potential future LNG value chains need emissions reduction. Several pathways are being developed by the industry:

- **Methane monitoring and prevention of leakage**

Reducing methane emissions from LNG starts with monitoring the leakages. And this is already a challenge. Today, technologies such as optical gas imaging cameras, satellites, aircraft, drones, regional sensors, and point sensors are available to detect methane leakages from gas operations – but these technologies cannot yet track methane emissions systematically and accurately. Point sensors can track small leakages but it would require an army of those sensors to cover large natural gas projects or extended pipelines. Satellites can cover larger areas, but they are unable to detect small leakages. This means that current methane leakages are likely to be underestimated, and as technologies develop, we may see increases in those numbers.

The natural gas industry needs real innovation to improve methane monitoring. Luckily, there are efforts aimed at driving change. Smart sensors are being explored to better track pipeline methane emissions. Other sensor technologies for production sites are also becoming more advanced. LongPath Technologies in Colorado, for example, recently received funding from the US Department of Energy to develop its mobile dual-frequency comb laser spectrometer. Still, more policy support is needed to incentivise R&D from gas companies to innovate and deploy new technology. The industry would also benefit from having guided standards on how to best measure methane emissions.

As for methane emissions prevention, effective practices are already available. These include replacing components that emit methane during operations, installing emissions control equipment, and installing leak detection and repair (LDAR) devices. As methane that is prevented from leaking can be sold to the market, the additional revenue can in many cases exceed the cost of installation. In fact, analysis from the International Energy Agency shows that about half of all existing technology for methane emissions reduction can be implemented at no additional cost.

- **Carbon capture and storage (CCS)**

Besides using carbon offsets essentially paying for others to reduce emissions on one's behalf, companies are also exploring options to use CCS technology to reduce the actual emissions from LNG production. Qatargas' Qatar LNG CCS project is reported to have become operational since 2019, and the project is undergoing development to capture 4.3 million tonnes per annum (mmtpa) of CO_2 from Qatargas' 10 trains by 2024. In addition, Venture Global LNG in the US, BP Tangguh LNG in Indonesia, NextDecade Rio Grande LNG in the US, Hoegh LNG Stella Maris (location undecided), Novatek Yamal LNG in Russia, and Total Energies Papua LNG in Papua New Guinea are going through various stages of project development or early evaluation, with expected operation years ranging from 2024 to 2027. Despite a higher interest rate environment in many advanced

economies, policy support across jurisdictions such as tax credits and carbon pricing continue to fuel the deployment of CCS technology. We see CCS as a key mitigation method for the LNG industry in the future.

- **Carbon offsetting**

Purchasing voluntary carbon credits to offset emissions is becoming more and more common practice among LNG companies in the pursuit to reduce GHG emissions. And if the amount of purchased carbon credits is equal to the estimate of life-cycle LNG emissions, then an LNG cargo can be deemed 'emissions-neutral'. In fact, several dozens of LNG cargoes have claimed themselves as emissions neutral since 2021.

This is a viable mechanism, but there needs to be more transparency, standardisation and scrutiny to make the system more effective. First, a good portion of the purchased carbon offsets have no disclosure of where the credits come from. This makes it hard to verify the credibility of those carbon offsets. Second, carbon offsets should not be the main way for LNG companies to pay and 'write off' their emissions. Companies should still prioritise reducing emissions. Finally – and this is not limited to the LNG industry – voluntary carbon credit platforms such as Verra should take on a stricter approach when verifying offset generating projects before offering the credits to buyers.

Various frameworks have been established to address the first two challenges. One which is widely used is from the International Group of Liquefied Natural Gas Importers (GIIGNL). Companies adhering to this framework need to (among other things) report the origin of their purchased carbon offsets, emissions reduction plans, and the LNG emissions standards they have applied.

- **Shipping fuel switch**

Finally, as the shipping industry races to switch from using fossil fuels to biofuels or even LNG to power their cargoes, we can expect the emissions from transporting LNG to decrease over time.

Conclusion

All in all, the issue of emissions along the value chain is now holds more weight in LNG companies' strategic decision-making processes. There is still a long way to go toward methane detection improvement, measurement standardisation, and so on – but because of the nature of methane, even a small achievement can have a huge positive impact. While the exact future role of LNG in energy transition and energy security is still up for debate, there is no doubt that any existing or upcoming LNG projects need deep emissions reduction.

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