Global Energy Weekly

Winter weather melts global gas prices

Warm weather, high inventories weighed on gas prices

The end of winter is still more than a month away, but temperatures have been mild thus far in much of the Northern Hemisphere for the second consecutive year. In Japan and NWE, winter-to-date temperatures have been the third and fourth warmest in the past three decades, respectively, hurting heating demand. Furthermore, economic activity has been sluggish in Europe and China, denting industrial gas usage too. Meanwhile, supply has been ample, with global LNG utilization rates averaging 98.5% during Nov-Jan, up 3.5% YoY and the highest level since 2020, according to Platts. These factors kept inventories high and weighed on front month TTF and JKM gas prices, which fell 42% and 47% to €25.90/MWh and $9.40/mmbtu, respectively, since the end of October 2023.

More downside for prices likely into shoulder season…

Barring extreme weather, demand should soften seasonally from here as supply recovers from recent outages, keeping NWE storage near five-year highs and at comfortable levels elsewhere. As the risk of a winter shortfall fades further, gas prices should move lower into spring to stoke more demand and incentivize storage, testing 2023 lows. Fortunately, global LNG supply is set to grow just 8mn mt YoY in 2024 or 1.7% vs >5% on average since 2019, driven by 2H project starts. Even though economic growth should slow this year, the market won't have to contend with blowout supply growth, at least until late 2024-25. Potential LNG starts in 2024 include Plaquemines, Golden Pass, Corpus Christi stage 3, Arctic LNG, and LNG Canada, but most growth will hit in 2025, lifting global supply 25mn mt YoY.

…but restocking, LNG delays, weather may offer relief

The gas market is soft, but several factors could tighten balances as the year progresses. First, global manufacturing, which struggled since mid-2022, has likely troughed and inventory-to-sales ratios are falling in the US and elsewhere, which may herald a restocking cycle. A return to manufacturing growth would raise global industrial gas demand and Red Sea disruptions could give Europe a much-needed boost. Second, LNG terminals are complex and some require regulatory approval before startup. We see a high risk that some capacity planned for 2024 is delayed, cutting 2H24-2025 global supply growth. Third, weather was a headwind for natural gas demand recently, but normal or cold weather next fall/winter could overshadow supply growth. On the demand side, rising output and economic weakness create uncertainty for China.

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Commodities
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For a glossary of acronyms and other terms, see Exhibit 48.

Exhibit 1: BofA Commodity Research Themes and Outlook
Key takeaways

	View	Recent reports
Macro outlook	■ Our economists see world GDP rising 3% in 2023 and expanding by 2.8% in 2024.	
WTI and Brent crude oil	■ We project Brent and WTI to average \$80/bbl and \$75/bbl, respectively, in 2024. ■ The global oil balance should remain in a mild surplus during 2024, as OPEC+ withholds more supply from the market to counteract slowing demand growth ■ We forecast global demand growth of 2.3mn b/d YoY in 2023 and 1.2mn b/d in 2024. ■ Non-OPEC supply should grow roughly 2.24mn b/d YoY in 2023 and 1.35mn b/d in 2024. ■ We project total US crude and NGL supply to rise 1.5mn b/d in 2023 and 700k b/d in 2024. ■ OPEC crude oil supplies are set to fall 470k b/d in 2023 and 260k b/d in 2024 as OPEC+ actively manages balances	• Can (geo)politics Trump fundamentals? 04 January 2024 • The grind of the oil bulls 26 September 2023 • Money breaks oil's back 08 May 2023 • OPEC+'s whatever it takes moment 05 April 2023 • Global Energy Paper: Medium-term oil outlook 26 February 2023
Atlantic Basin oil products	■ Refined product markets face risks from OPEC+ cuts, a looming recession, and the pace of global refining capacity growth. ■ We forecast RBOB-Brent to average \$13/bbl in 2024, and we see ULSD-Brent cracks averaging \$26/bbl over the same period. ■ OPEC+ cuts, rising complex refining capacity, lower gasoline and diesel cracks create upside for 3.5% fuel oil cracks, which we see averaging -\$12/bbl in 2024.	• Waiting for Dangot(e) 31 October 2023 • Diesel weasels out of a cyclical downturn 29 August 2023 • In the fuel oil market, high sulfur is king 31 July 2023
US natural gas	■ US gas supply and demand growth should hit 1.6Bcf/d and 2.6Bcf/d YoY in 2024, pushing stocks to 3.95Tcf by October. ■ We forecast US Henry Hub natural gas prices will average \$3/mmbtu in 2024	• US nat gas rollercoaster nears the bottom 17 February 2023
LNG	■ LNG supply growth is manageable from historical view at 10MMT in 24 and 16MMT in 25, leaving demand to dictate future price path ■ JKM and TTF should average \$15/MMBtu and €50/MWh in 2024, but they could easily hit \$25/mmbtu or €100/MWh on cold weather	• Liquid gas can float and fly. So can oil 17 October 2023 • LNG is now a buyer's market 17 April 2023
Thermal coal	■ Seaborne coal prices pulled back on softer balances. Yet, China has come back in earnest, more than doubling thermal coal imports ■ We are constructive in 2024 on strong Asian demand and declining Russian supply	• China coal floors global gas 05 September 2023 • King coal loses its crown 31 March 2023

Source: BofA Global Research estimates

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Exhibit 2: BofA Global Research Commodity Price Forecasts
(period averages)

	units	1Q23F	2Q23F	3Q23F	4Q23F	2023F	1Q24F	2Q24F	3Q24F	4Q24F	2024F
WTI Crude Oil	(\$/bbl)	76	74	82	82	**78**	73	75	77	75	**75**
Brent Crude Oil	(\$/bbl)	82	78	86	86	**83**	78	80	82	80	**80**
US NY Harbor ULSD (HO) Cracks to Brent Crude Oil	(\$/bbl)	41	25	40	37	**36**	30	25	25	25	**26**
US RBOB Cracks to Brent Crude Oil	(\$/bbl)	23	31	29	7	**22**	11	21	14	7	**13**
NWE Low Sulphur Gasoil Cracks to Brent Crude Oil	(\$/bbl)	31	17	32	29	**27**	23	20	20	19	**21**
NWE Eurobob Cracks to Brent Crude Oil	(\$/bbl)	15	22	27	7	**18**	5	14	10	3	**8**
NWE 1% Residual Cracks to Brent Crude Oil	(\$/bbl)	-13	-8	-3	-7	**-8**	-6	-5	-5	-5	**-5**
NWE 0.5% Residual Cracks to Brent Crude Oil	(\$/bbl)	2	2	4	3	**3**	2	2	2	2	**2**
NWE 3.5% Residual Cracks to Brent Crude Oil	(\$/bbl)	-23	-11	-4	-14	**-13**	-13	-12	-12	-12	**-12**
US Natural Gas	(\$/MMBtu)	2.74	2.32	2.66	3.15	**2.72**	2.90	2.50	3.00	3.60	**3.00**
Thermal coal, Newcastle FOB	(\$/t)	253	160	147	145	**176**	148	148	151	153	**150**
Aluminium	\$/t	2,401	2,260	2,160	2,250	**2,268**	2,250	2,500	2,750	2,750	**2,563**
Copper	\$/t	8,941	8,461	8,367	8,000	**8,442**	8,000	8,500	8,750	9,250	**8,625**
Lead	\$/t	2,137	2,118	2,171	2,200	**2,156**	2,000	2,000	2,000	2,000	**2,000**
Nickel	\$/t	25,973	22,277	20,392	18,500	**21,786**	18,500	18,500	19,000	19,000	**18,750**
Zinc	\$/t	3,132	2,527	2,435	2,500	**2,648**	2,500	2,500	2,250	2,250	**2,375**
Gold	\$/oz	1892	1977	1927	1900	**1924**	1950	1950	2000	2000	**1975**
Silver	\$/oz	23	24	24	23	**23**	23	23	24	24	**23**
Platinum	\$/oz	995	1,027	932	950	**976**	1,000	1,000	1,100	1,100	**750**
Palladium	\$/oz	1,568	1,445	1,254	1,250	**1,379**	900	800	700	600	**750**

Source: BofA Global Research estimates

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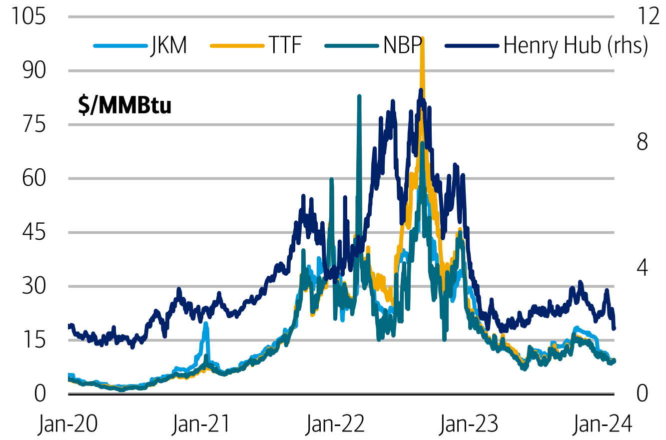
Winter weather melts global gas prices

Global gas prices continued to soften throughout December and January…

The energy markets have benefitted from a second consecutive winter season of relatively warm weather, which has greatly reduced heating demand (season to date). Global gas prices came under pressure as mild temperatures collided with a soft macro backdrop and strong LNG loadings. TTF and JKM front month prices have collapsed 42% and 47% to €25.90/MWh and $9.40/mmbtu, respectively, since the end of October 2023 (Exhibit 3). The imbalance has flattened winter premiums and forced the TTF forward curve into contango (Exhibit 4).

Exhibit 3: Global gas prices

Global gas prices came under pressure this winter as mild temperatures collided with a soft macro backdrop and strong LNG loadings



Source: Bloomberg

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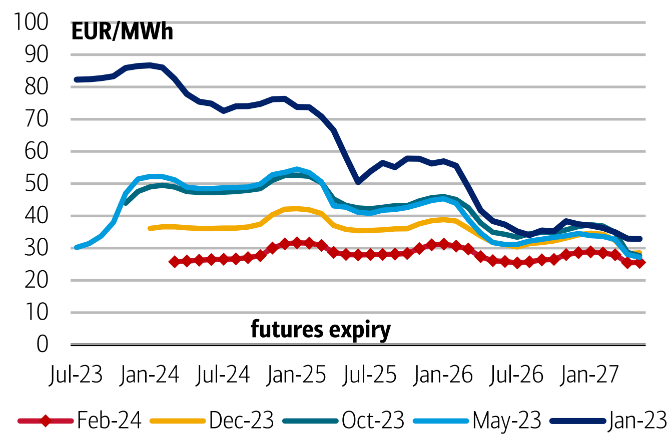
Exhibit 4: TTF forward curve

The imbalance has flattened winter premiums and forced the TTF forward curve into contango



Source: Bloomberg

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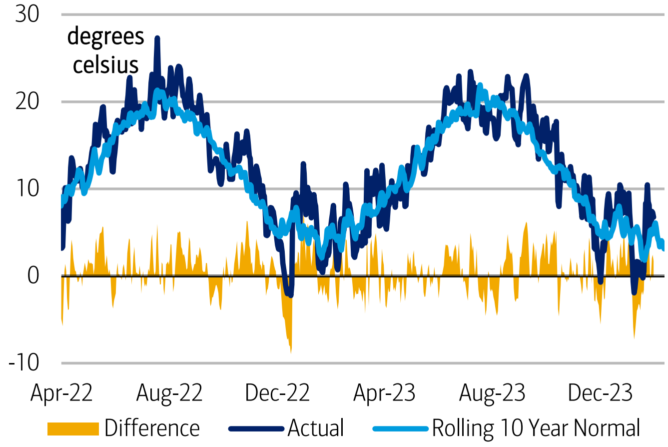
…as much of the Northern Hemisphere saw its 2nd consecutive warm winter…

Concerns over winter gas shortages have been assuaged for a second year in a row as warm weather tempered gas usage across the Northern Hemisphere. In France and Germany, winter-to-date temperatures are the third and fourth warmest in the past 34 years, respectively, and are higher YoY too (Exhibit 5). In Asia and the US, the story has been similar. Japan has also seen weather near the top quartile of the past thirty years (Exhibit 6), while other countries in Asia have seen more normal weather.

Exhibit 5: NWE temperatures vs rolling 10-year average

Weather in Europe has been mild so far this winter...



Source: Bloomberg

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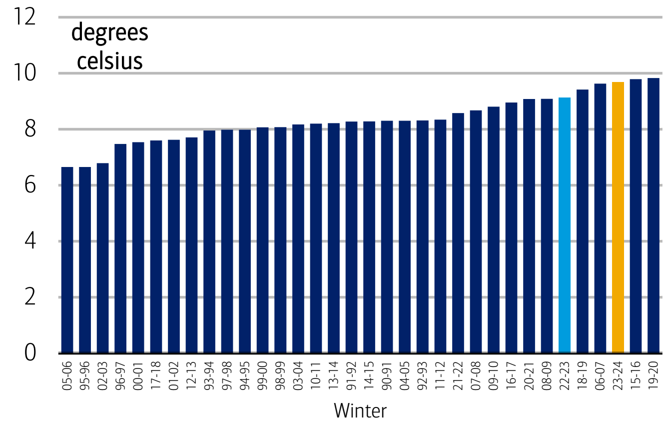
Exhibit 6: Winter to date average temperature in Japan since 1990

In Japan and the US, the story has been similar, resulting in lower gas demand for heating



Source: Bloomberg

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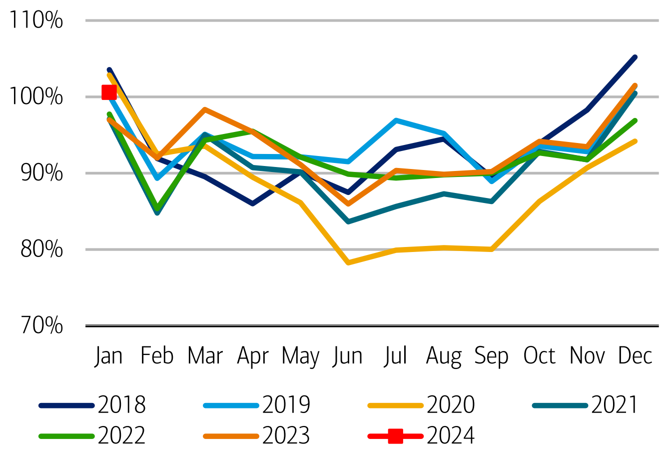
...and global LNG export facilities ran at very high utilization rates

LNG supply also ran well this winter, especially in the US. At the end of 2023, global LNG utilization rates exceeded 100% and reached the highest levels since 2018 (Exhibit 7). In the US, export facilities saw output reach about 115% of nameplate capacity, a feat likely only to be reached during winter when cooler temperatures allow liquefaction units to operate more efficiently (Exhibit 8). In late January and February, weather related outages caused US LNG exports to drop, driven in large part by a sustained outage at one of Freeport's 700mmcf/d trains. Elsewhere, Qatari exports dipped slightly into winter but stayed elevated versus nameplate capacity.

Exhibit 7: Global LNG capacity utilization

LNG capacity utilization has been very high so far this winter...



Source: Platts

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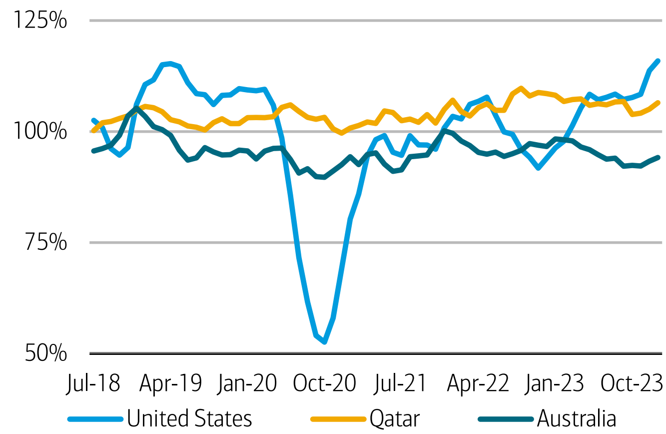
Exhibit 8: Country level LNG capacity utilization (3m avg)

...helped by high run rates in the US and Qatar



Source: Platts

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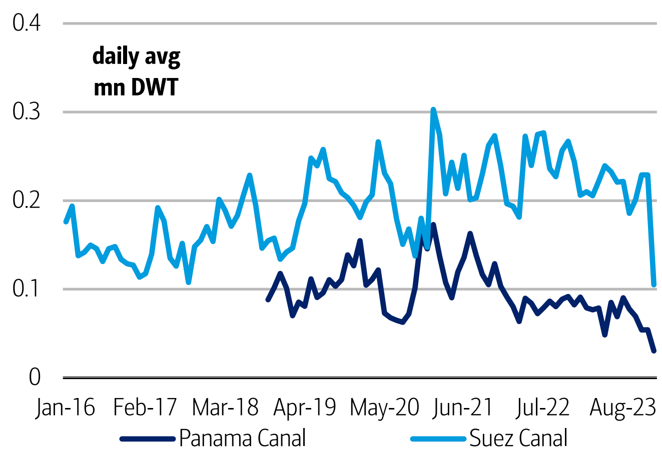
True, global gas balances benefitted from Panama and Red Sea constraints...

Escalation of tensions in the Middle East has culminated in direct attacks on commercial vessels transiting the Red Sea, and drought has curbed LNG vessel transits through the Panama Canal too. Safety concerns and rising costs of insurance are causing LNG vessels to be re-routed away from the Red Sea and the Suez Canal (Exhibit 9), with tonnage dropping by more than half since late 2023. Avoiding these chokepoints resulted in a shuffling of trade flows and longer trade routes. For example, LNG vessels that would typically access the Asian market via the Panama Canal have been incentivized to stay in the Atlantic basin, while Middle East LNG cargos that would typically access Europe through the Suez Canal have re-routed around the Cape of Good Hope or into the Pacific (Exhibit 10).

Exhibit 9: Daily Suez Canal and Panama Canal LNG vessel transits
Safety concerns and rising costs of insurance are causing LNG vessels to be re-routed away from the Red Sea and the Suez Canal, with tonnage dropping by more than half since late 2023



Source: Clarksons

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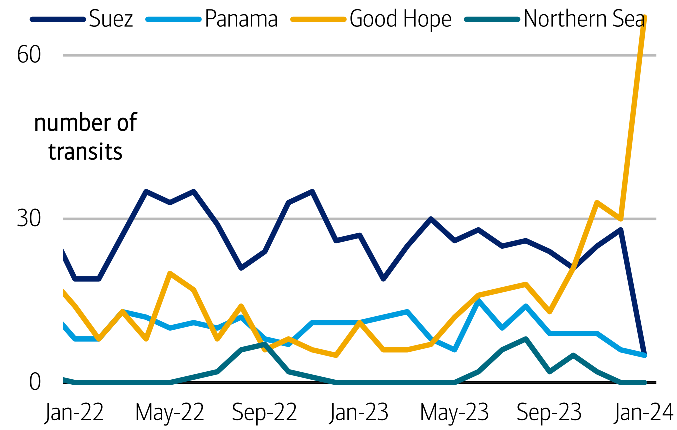
Exhibit 10: Annual LNG tanker crossings by key transit routes
The Cape of Good Hope has seen crossings increase substantially since 3Q23 as vessels reroute away from the Suez and Panama Canals



Source: Bloomberg

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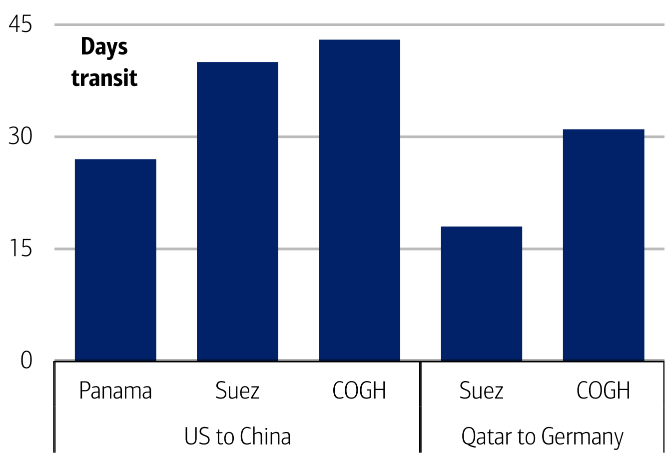
...which extended supply chains and tied up more LNG in transit...

Re-routing vessels away from the Panama Canal and the Suez Canal can add nearly 59% and 72%, respectively to LNG trip times (Exhibit 11). Longer supply lines tie up more LNG vessels and result in more LNG in-transit (Exhibit 12) instead of gas delivered into consumer markets. This can be viewed as a temporary source of demand and likely supported global gas prices as warm weather and sluggish economic activity trimmed end-use demand. At the moment, we do not see a resolution to ongoing conflict in the Middle East and expect some of these additional volumes of LNG on the water to persist.

Exhibit 11: Transit times by route
Re-routing vessels away from the Panama Canal and the Suez Canal have added nearly 59% and 72%, respectively versus the most efficient rote



Source: Sea-Distances

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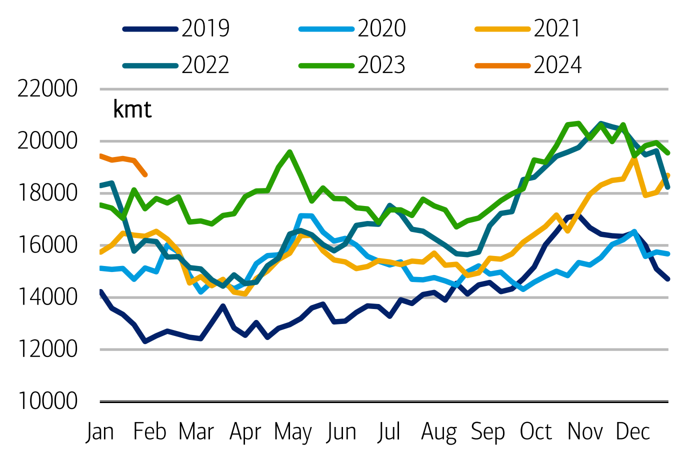
Exhibit 12: Global LNG on the water
Longer supply lines tie up more LNG vessels and result in more LNG in-transit, which can be viewed as a temporary source of demand



Source: Wood Mackenzie

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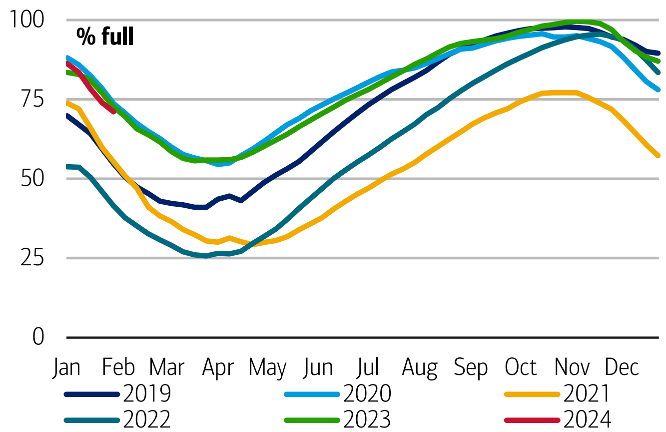
...but storage is still high across many consuming regions as spring nears

Warm weather left the market awash in gas inventories as winter's end approaches. In Europe, natural gas storage is tracking at new five-year seasonal highs (TWh), as gas as a % of storage capacity has also tracked substantially higher than most recent years, save for 2020 and 2023 (Exhibit 13). In Asia, storage in Japan and Korea ended 2023 at new five year high seasonal levels (Exhibit 14), and efforts to ramp nuclear output and warm weather likely mean that inventories remain at lofty levels for today.

Exhibit 13: Europe gas storage
In Europe, natural gas storage is tracking near 2020 and 2023 seasonal levels, which were substantially higher than recent history



Source: Bloomberg

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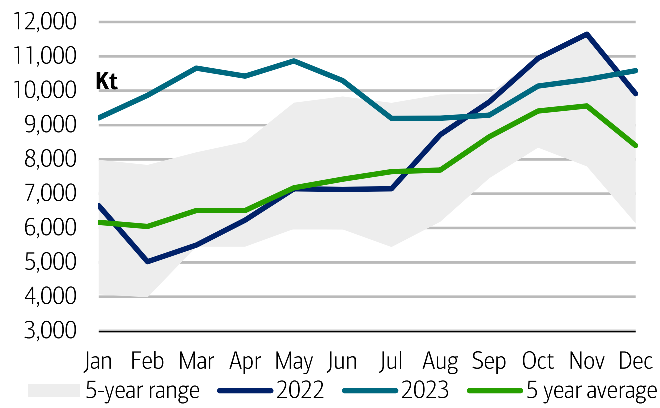
Exhibit 14: Japan and Korea LNG stocks
In Asia, storage in Japan and Korea ended 2023 at new five year high seasonal levels



Source: Wood Mackenzie

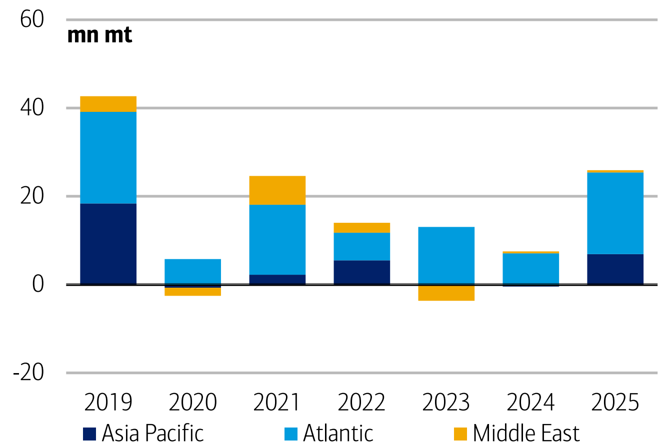
Global LNG supply growth is Atlantic basin centric in 2024-25…

Global LNG balances are set to grow more slowly in 2024, with supply rising just 8mn mt YoY, driven almost entirely by Atlantic basin projects (Exhibit 15). We assume 2H 2024 startups at Plaquemines and Golden Pass and an early 2025 commissioning at Corpus Christ Stage 3. Meanwhile, we assume a gradual ramp up at Arctic LNG 2 due to sanctions constraints. These facilities account for more than 60mn mt of supply and could weigh heavily on global LNG balances if they all start on time and ramp up quickly. We see two similarities between 2024 and 2020, when LNG supply was forced to shut in. First, inventories are tracking in a similar pattern, and second, demand growth appears weak. However, supply growth during 2019 was substantial and ultimately too much for the market to absorb in 2020. Fortunately, the supply backdrop today is more muted, but we still see a worst-case scenario where European gas prices trade down to Henry Hub prices to shut of US LNG exports, especially if global economic activity slows more than expected or LNG facilities ramp up quickly.

… while the Pacific leads demand growth, driven by China

While we assume slower supply growth in 2024, 25mn mt of growth in 2025 may be challenging for the market to absorb. This year, we expect Atlantic basin LNG demand to fall modestly YoY, while imports in the Pacific rise roughly 11mn mt, led by China (Exhibit 16). Next year, Asia is likely to play a significant role in absorbing incremental LNG supply. However, some tonnage is likely to be put back to Europe, which could weigh on prices. Atlantic basin supply growth and Pacific led demand growth should keep JKM trading above TTF for the foreseeable future, only compressing when Europe needs cargos or when the Asian market is oversupplied.

Exhibit 15: Global LNG supply growth
Global LNG supply growth is set to slow in 2024, rising just 8mn mt YoY, before climbing nearly 25mn mt YoY in 2025 on Atlantic basin projects



Source: BNEF, Woodmac, Platts, BofA Global Research estimates

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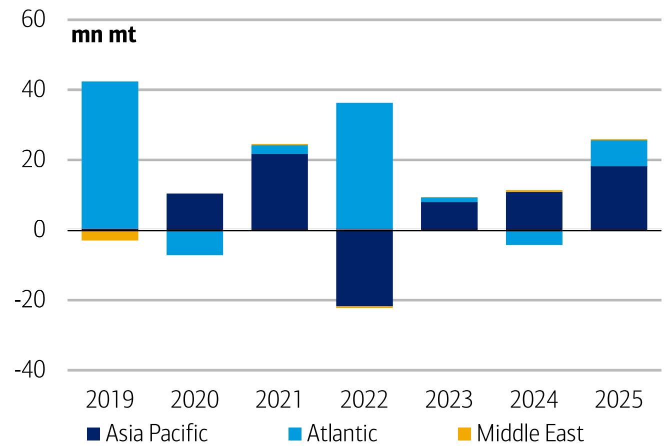
Exhibit 16: Global LNG demand growth
This year, we expect Atlantic basin LNG demand to fall modestly YoY, while imports in the Pacific rise roughly 11mn mt, led by China



Source: BNEF, Woodmac, Platts, BofA Global Research estimates

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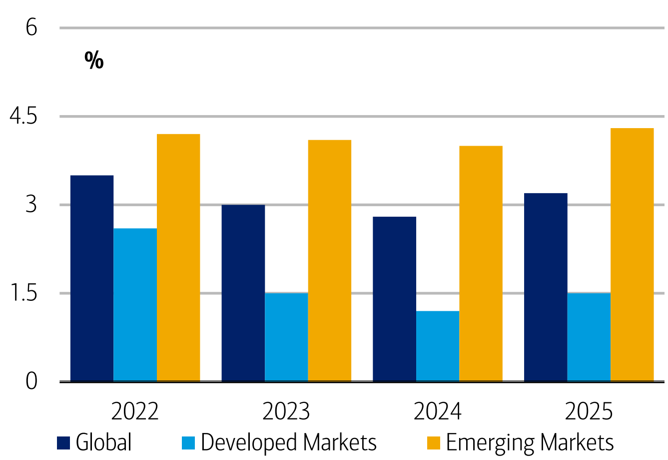
In the near term, gas faces downside on high storage, slower global growth…
As warm winter weather trimmed natural gas demand for heating, consumption was also hit by slower economic growth, particularly in the industrial sector. Economic forecasts for 2024 also call for less growth, with global GDP expanding by just 2.8% YoY, down from 3% in 2023 (Exhibit 17). Developed markets are expected to drive the slowdown, with US, EU, and Japanese growth dropping to 2.1%, 0.4%, and 0.8%, respectively. In the emerging economies, China's growth should decline further to 4.8%, while India's pace of expansion falls to 5.7% (Exhibit 18). The outlook for 2025 is more optimistic globally, with growth rising 0.4% to 3.2% YoY, which assumes a continued slowdown in US and Chinese growth, while economies elsewhere expand more quickly YoY.

Exhibit 17: Global GDP growth estimates
Economic forecasts for 2024 also call for less growth, with global GDP expanding by just 2.8% YoY, down from 3% in 2023



Source: BofA Global Research estimates

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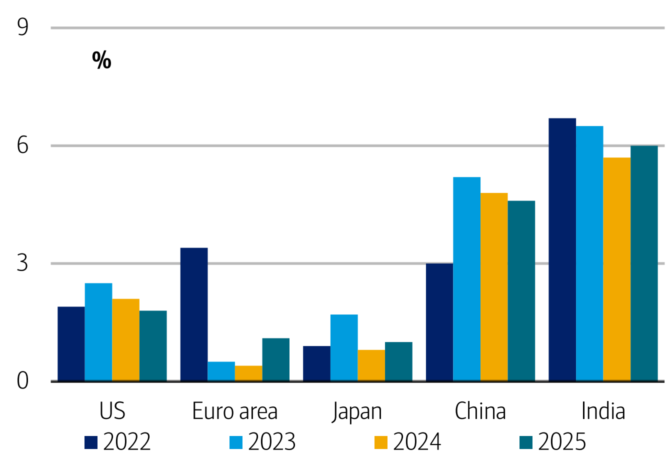
Exhibit 18: Regional and country-level GDP growth estimates
We see US, EU, and Japanese growth dropping to 2.1%, 0.4%, and 0.8%, respectively in 2024



Source: BofA Global Research estimates

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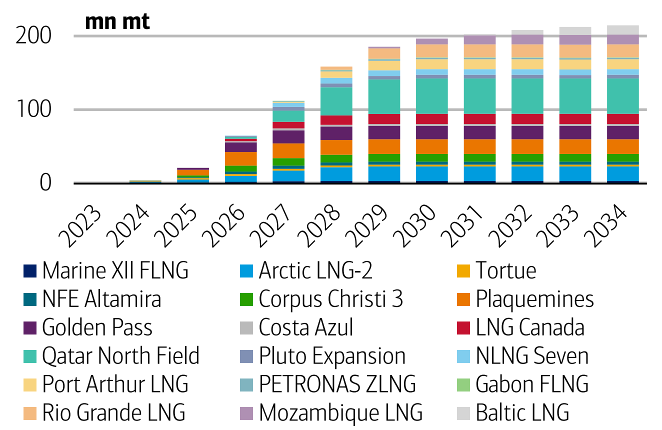
…but LNG supply growth likely to be historically low this year…
Fortunately, while natural gas demand growth is likely to remain soft this year, supply is also likely to grow at a slow rate. Major projects that could be commissioned in 2024 include Golden Pass (18mn mt), Plaquemines (13mn mt), LNG Canada (14mn mt), and possibly Corpus Christi Stage 3 (10mn mt) out of North America and also Arctic LNG 2 (20mn mt) out of Russia (Exhibit 19). Nearly all new capacity slated for startup in 2024

is back-half weighted and the risk of delays into 2025 appear high. In total, we forecast global LNG supply growth of just 8mn mt YoY in 2024, driven primarily by the US (Exhibit 20). Arctic LNG 2 is the first export facility to start on paper, but sanctions are making it difficult for Novatek to acquire the icebreaker LNG vessels and equipment needed for operation. As a result, the ramp up to 20mn mt nameplate capacity is highly uncertain.

Exhibit 19: LNG facilities under construction

Major projects that could be commissioned in 2024 include Golden Pass, Plaquemines, LNG Canada, Corpus Christi Stage 3, and Arctic LNG 2



Source: Woodmac

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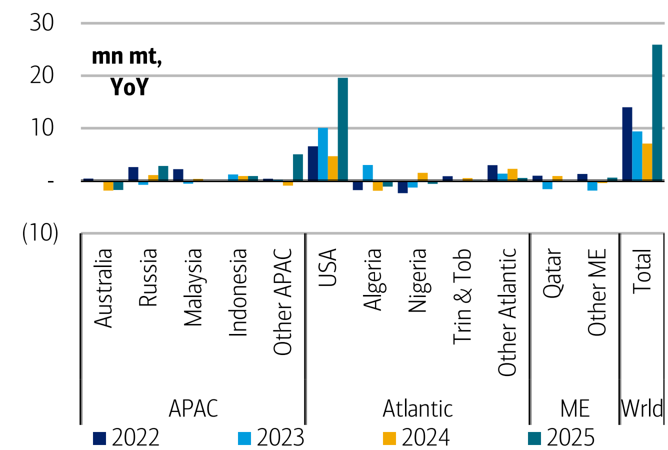
Exhibit 20: Global LNG supply growth

With LNG start up activity likely back-half weighted, we forecast global LNG supply growth of just 8mn mt YoY in 2024, driven primarily by the US



Source: BNEF, Woodmac, Platts, BofA Global Research estimates

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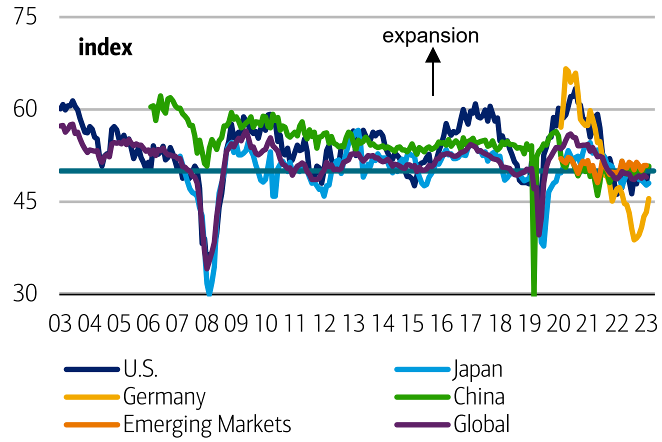
...and demand could benefit from a global inventory restocking cycle

Global natural gas demand has suffered since 2022 due to a slowdown in manufacturing activity, particularly in Europe (Exhibit 21). Manufacturing activity appears to have troughed in many countries and could begin to improve this year. One dynamic that could facilitate a manufacturing recovery is inventory restocking. Indeed, inventories in places like the US built quickly since 2021 (Exhibit 22), as supply outpaced consumption growth, but inventory-to-sales ratios appear to have peaked and begun to roll over. In a recession scenario, the inventory picture should deteriorate further, but our base case is for a soft landing, and this could drive an inventory restocking cycle, which could reignite industrial sector gas demand globally.

Exhibit 21: Manufacturing PMIs

Global natural gas demand has suffered since 2022 due to a dramatic slowdown in manufacturing activity, but the cycle appears to be turning



Source: Bloomberg

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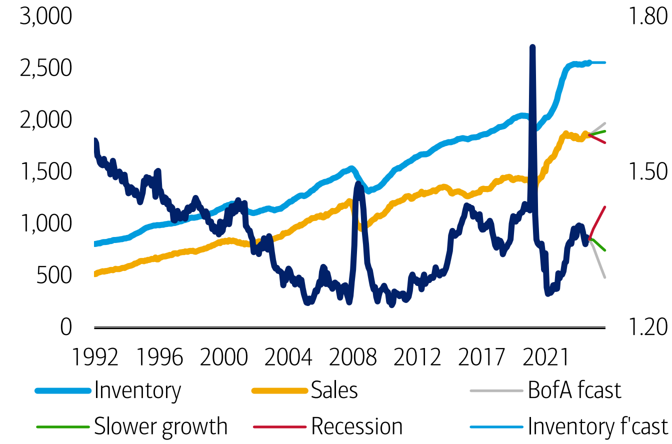
Exhibit 22: US aggregate inventories, sales, and inventory-sales growth and projections

A global restocking scenario would boost manufacturing activity and demand for natural gas too



Source: BEA, BofA Global Research. BofA fcast assumes 1.5% quarterly sales growth through 2024. Slower growth assumes 0.5% quarterly sales growth through 2024. Recession assumes -1% quarterly sales growth through 2024. Inventories are assumed to grow at the recent 1-year growth rate.

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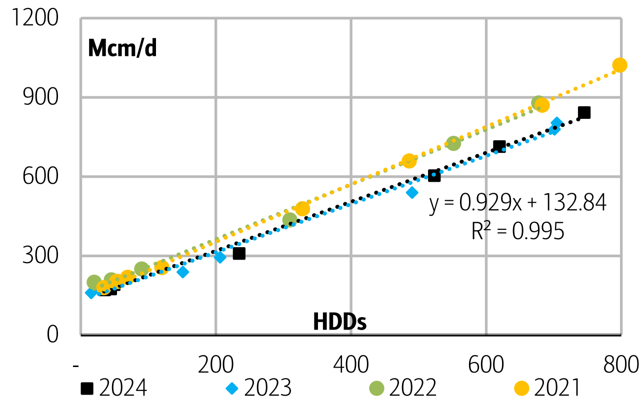
…or if weather turns favorable for summer burns, winter heating

The global natural gas market is very focused on the ongoing oversupply in the LNG market, and weather has played a significant role in perpetuating the imbalance. True, as gas prices spiked and European consumers saw their gas utility bills reset higher, the relationship between LDZ consumption and temperatures shifted lower (Exhibit 23). Yet, the trends for consumption in 2022-23 and 2023/24 are fairly consistent, suggesting demand sensitivity has likely stabilized in the past year. Assuming normal weather through winter's end, we estimate NWE LDZ demand would be ~2.5Bcm lower than demand during a 10-year average winter (Exhibit 24). A 1SD colder than normal winter would likely grow LDZ gas demand by 5.7Bcm versus expected 2023/24 levels. In essence, NWE would consume roughly 4.2mn mt more gas during the 2024/25 winter if weather was colder, or more than half of global LNG supply growth.

Exhibit 23: Relationship between NWE HDDs and LDZ demand on a monthly basis (Jun-Jan)

LDZ consumption trends have been fairly consistent across 2022-23 and 2023/24, suggesting demand sensitivity has stabilized in the past year



Source: Bloomberg, BofA Global Research

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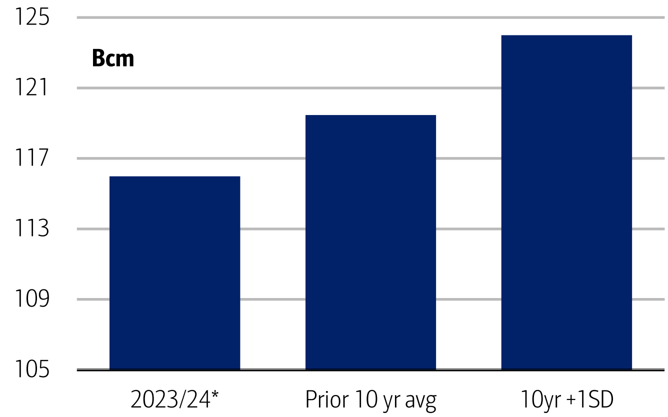
Exhibit 24: Winter season NWE LDZ demand scenarios assuming Jun-Jan 23/24 observed relationship

A 1SD colder winter in NWE would raise LDZ gas demand by more than 4mn mt, consuming more than half of global LNG supply growth, all else equal



Note: assumes 10 year normal weather for February and March of 2023-24. **Source:** Bloomberg, BofA Global Research estimates

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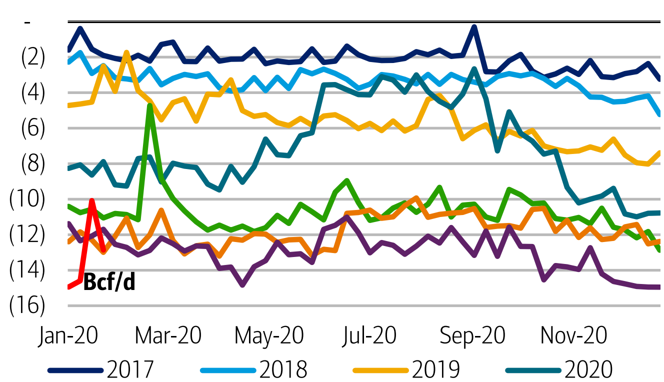
Furthermore, back-half weighted LNG growth could be delayed

US natural gas exports roared higher this winter before extreme weather-related mechanical issues took one of Freeport LNG's 5mn mt trains down for part of January and February (Exhibit 25). US LNG exports should recover into the end of the month but we expect maintenance at Sabine Pass to weigh on loadings again this summer. Later this year, Golden Pass, Plaquemines, and Corpus Christi stage 3 may be commissioned, barring technical or FERC approval delays. The recent increase in scrutiny over LNG projects by the White House and FERC could also trickle down to its decisions around final approvals nearly completed LNG terminals too (Exhibit 26).

Exhibit 25: US LNG feedgas volumes

US LNG exports roared higher this winter before extreme weather-related mechanical issues cause an outage at Freeport during January and February



Source: Bloomberg

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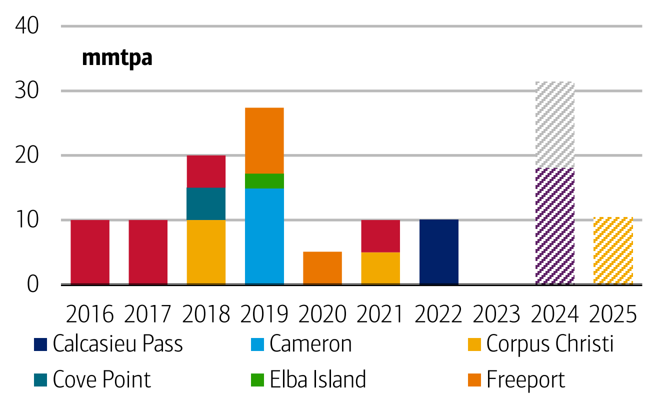
Exhibit 26: US LNG export capacity additions

It is possible that FERC is slow to give final approvals for US LNG facilities set to start operations during 2024-25



Source: Woodmac, BofA Global Research estimates

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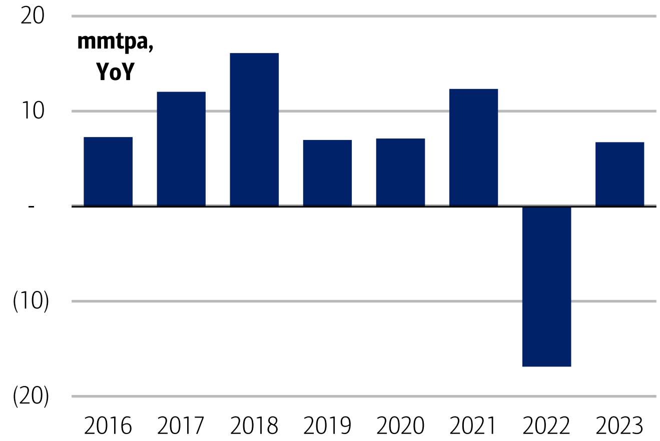
However, China remains a significant wildcard for LNG demand

China was a key contributor to global LNG demand growth during the 2010s but its imports receded in 2022 as prices became unattractive (Exhibit 27). Instead, China opted to ramp up domestic coal and gas production, pipeline natural gas imports (Exhibit 28) and renewables installations to meet its energy needs. In 2023, consumption expanded again as the country ramped up its use of long-term LNG contracts instead of purchasing cargos in the spot market. In 2024, with a questionable economic backdrop, we think consumption will rise again by just 6mn mt as slowing economic growth reduces the amount of incremental LNG imports needed to meet domestic gas demand.

Exhibit 27: China LNG imports

China cut LNG imports as gas prices became prohibitively expensive during 2022...



Source: Platts

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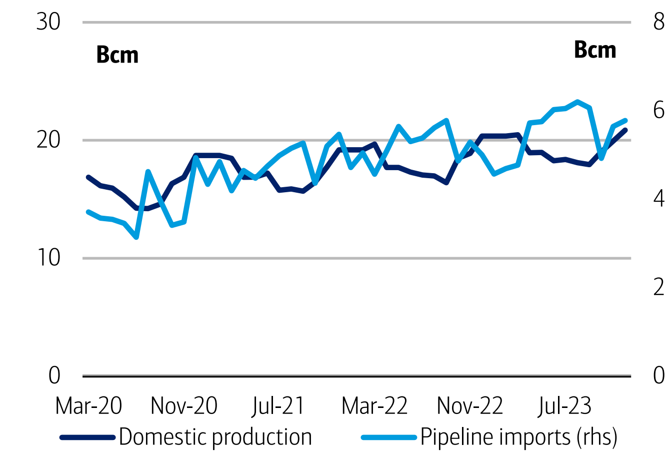
Exhibit 28: China domestic gas production and pipeline imports

...and instead opted to ramp up domestic gas production and pipeline gas imports, among other measures



Source: Bloomberg

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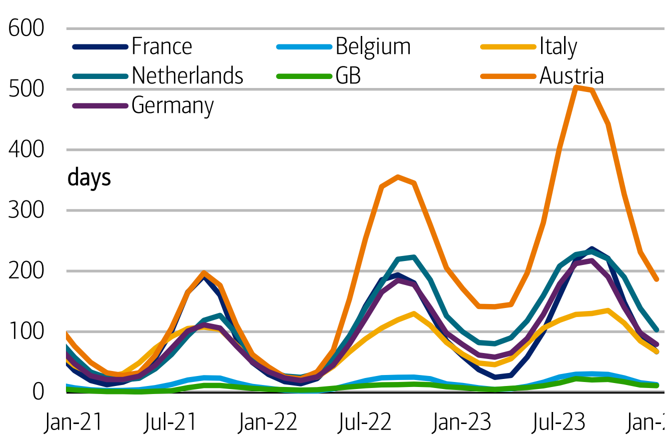
In Europe, gas inventories are high, especially on a days of demand basis...

Previously, we highlighted how Europe was more vulnerable due to its reliance on LNG. However, one frequently overlooked development in Europe's natural gas market has been the impact of declining demand on inventory on a days of supply basis. Indeed, gas inventories go much farther toward covering demand across many European countries (Exhibit 29) and so long as countries continue to top up storage ahead of winter, the risk of a shortage is more limited. In January, storage on a days of supply basis was the highest it's been in at least the past five years (Exhibit 30), which has weighed on prices.

Exhibit 29: Ratio of monthly inventory to rolling three month average demand by country

Declining demand has meant Europe's inventories on a days of supply basis have risen to new seasonal highs this winter...



Source: BloombergNEF, BofA Global Research

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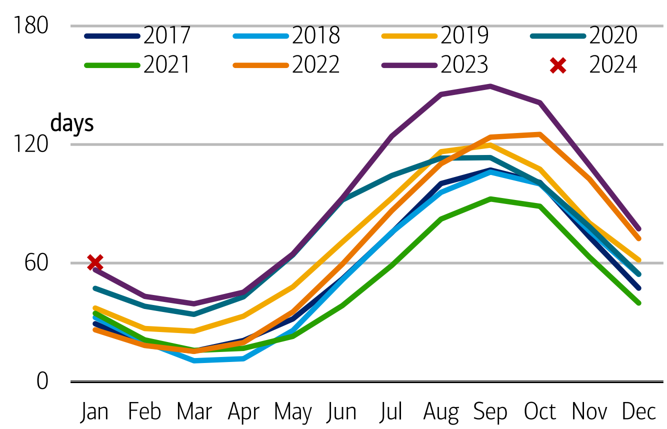
Exhibit 30: Ratio of monthly inventory to rolling three month average demand in NWE

...which has put pressure on European and Asian natural gas prices



Source: BloombergNEF, BofA Global Research

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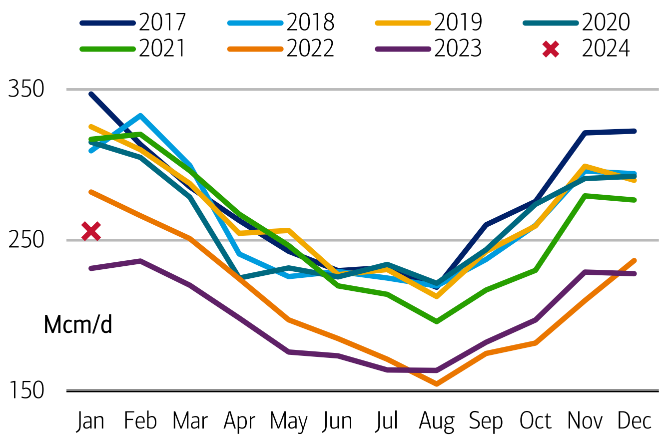
...but there are signs of resurgent industrial use and restocking could help...

The loss of cheap Russian pipeline gas removed a key subsidy for Europe's industrial base, which helped offset expensive labor and high regulatory costs. Natural gas usage in the industrial sector slumped steadily from mid-2021 through mid-2023 before demand finally registered growth on a YoY basis (Exhibit 31). In NWE, demand in 2023 was 24% or 60Mcm/d below 2020 levels. Demand in early 2024 suggests industrial activity may be rebounding YoY, but consumption remains far below 2021 and even 2022 seasonal levels. However, with global supply chains lengthening in the aftermath of Houthi attacks in the Red Sea, container freight costs are spiking again (Exhibit 32), which likely creates a tailwind for European industry that competes with imported product, such as the petrochemical sector.

Exhibit 31: NWE industrial gas demand
Natural gas usage in the industrial sector slumped steadily from mid-2021 through mid-2023 before demand finally registered growth on a YoY basis



Source: Bloomberg

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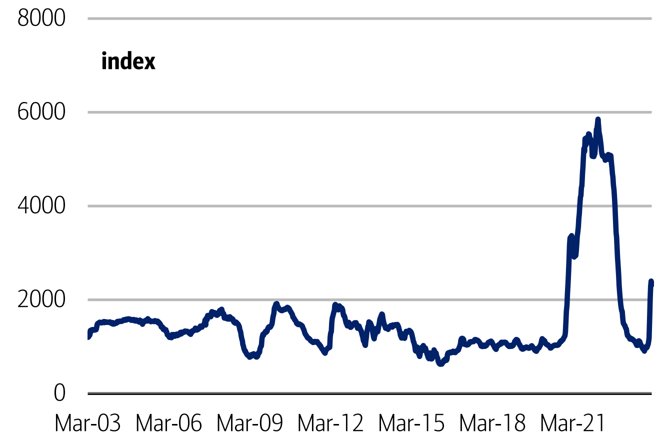
Exhibit 32: CCFI China-Europe Container Freight Rate Index
Rising shipping costs should create a tailwind for European industry that competes with imported product, like the petrochemical sector



Source: Clarksons

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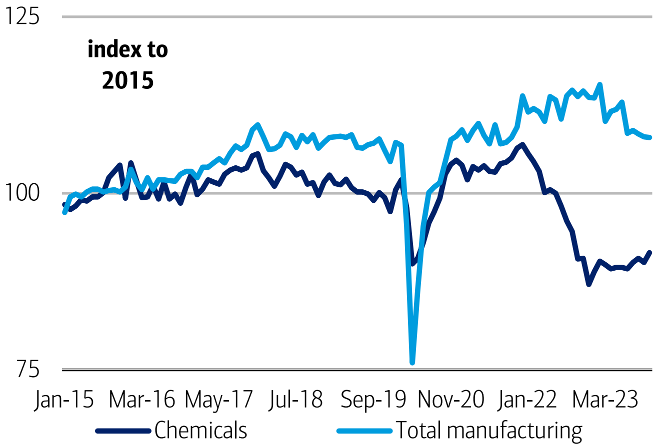
…especially if petrochemical margins start to improve

Europe's chemicals sector has significantly underperformed the rest of its manufacturing base since 2022 (Exhibit 33). This is due to several dynamics that moved against the sector, including the loss of Russian pipeline gas, the collapse in global freight costs, a sharp ramp up in Chinese petrochemical capacity, and the exhaustion of consumer goods demand. In our view, at least two of these factors could reverse this year, namely a global restocking cycle could reinvigorate petrochemical demand and freight rates could rise further, protecting Europe from imported products. These dynamics could help lift European petrochemical margins off the lower bound (Exhibit 34) and increase natural gas demand.

Exhibit 33: Europe industrial production indices
Europe's chemicals sector has significantly underperformed the rest of its manufacturing base since 2022



Source: Bloomberg

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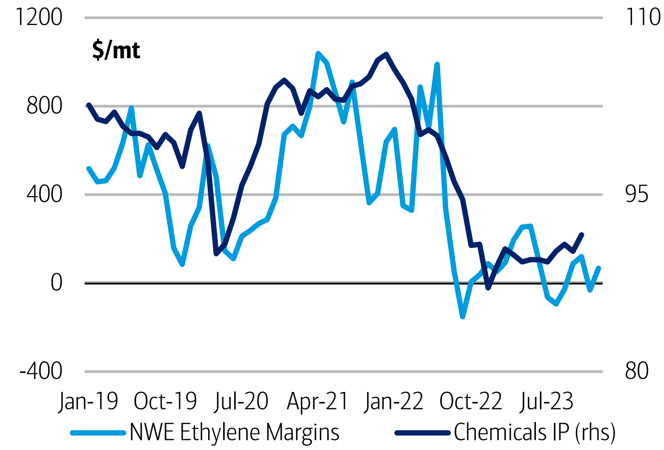
Exhibit 34: Europe chemical manufacturing IP and NWE ethylene margins
Supply chain constraints and a restocking cycle could lift NWE petchem margins off the lows and increase natural gas demand too



Source: Platts, Bloomberg

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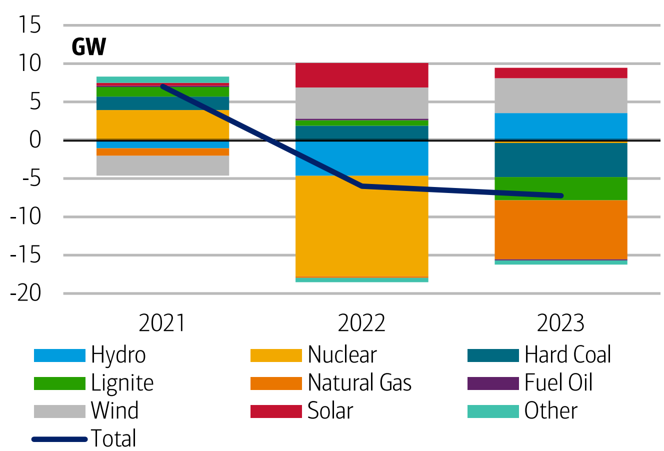
Meanwhile, NWE gas generation continues to struggle…

European natural gas generation contracted modestly in 2022 as high prices made natural gas less competitive than coal and lignite (Exhibit 35). In 2023, natural gas generation fell 7.7GW or roughly as much as coal and lignite, while hydro, wind, and solar grew. By the end of the year, NWE natural gas generation averaged just 37GW and its share of total generation fell to just 18% from 21% in 2022 (Exhibit 36). Gas generation has been off to a slow start in 2024 too, falling roughly 170MW YoY on average YoY through early February.

Exhibit 35: NWE power generation growth by source
In 2023, gas generation fell 7.7GW or roughly as much as coal and lignite, while hydro, wind and solar grew and ytd gas generation is lower YoY in 2024



Source: S&P Global Platts

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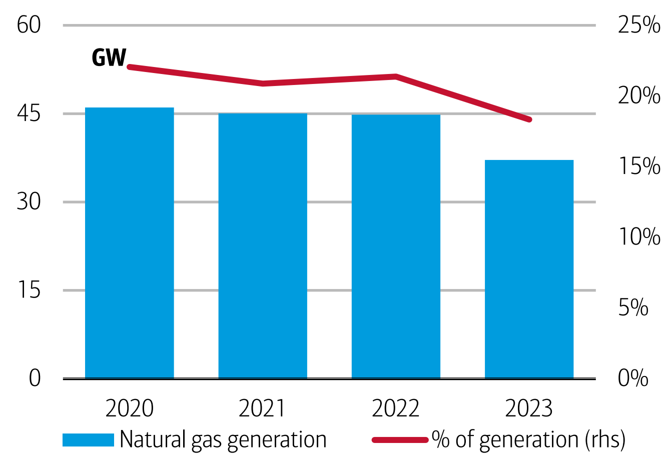
Exhibit 36: NWE natural gas power generation and % total generation
NWE natural gas generation averaged just 37GW in 2023 and its share of total generation fell to just 18% from 21% in 2022



Source: S&P Global Platts

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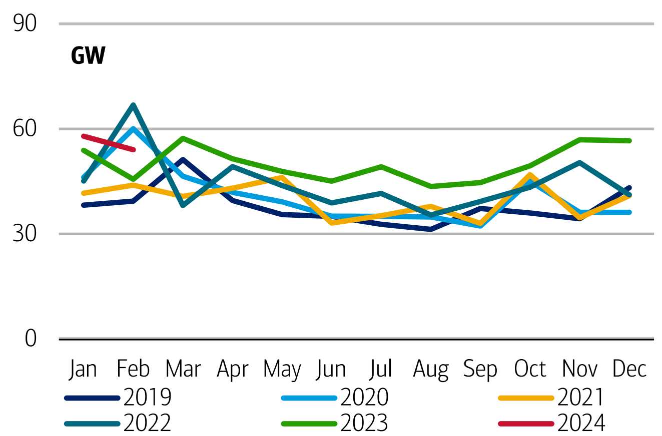
…due to improved renewables, hydro, nuclear generation…

One reason for the exceptional rally in global natural gas prices during 2021-22 was the failure of Europe's nuclear and renewable power generation. Indeed, 2021 and 2022 were mediocre years for Europe's renewable assets (Exhibit 37). However, wind and solar have had a better start in 2023 and hydro is performing near five-year seasonal highs. Nuclear power plants also faced significant downtime in 2021-22 in France

(Exhibit 38), but even here, generation performed better in 2H23 and appears to be off to a good start in 2024 too.

Exhibit 37: NWE wind and solar power generation
Wind and solar performed much better YoY in 2023 and initial readings suggest that 2024 is off to a good start too



Source: Bloomberg

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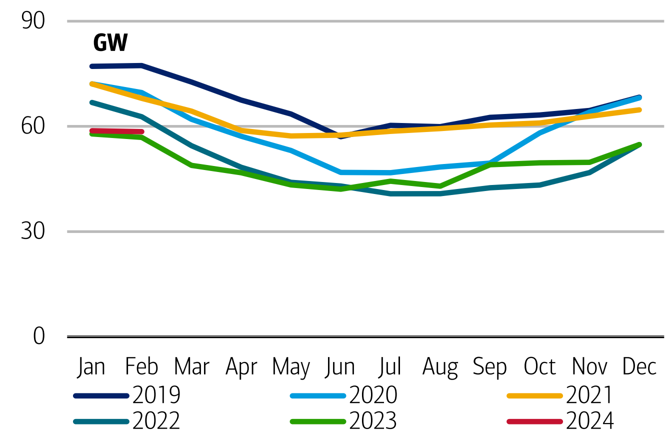
Exhibit 38: NWE nuclear power generation
Nuclear power is likely to perform better in 2024 than in 2023



Source: Bloomberg

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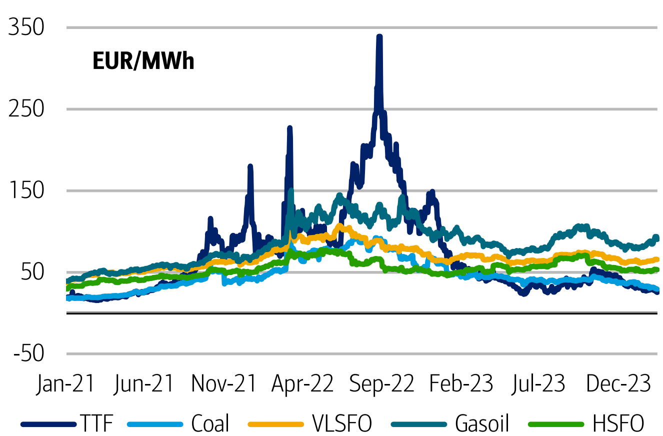
…but gas is priced competitively versus coal, which could help burns

Europe's call on thermal power declined sharply last year, marking a 21% drop versus 2022 levels. In 2024, strong renewables and nuclear generation likely points to more challenges for thermal power in 2024 too. However, a rebound in industrial activity could boost electricity demand. Furthermore, natural gas is pricing competitively versus coal, which could lead to a higher share of gas in total thermal generation (Exhibit 39). Thus far, gas generation has struggled (Exhibit 40), tracking 1.5% lower YoY in NWE.

Exhibit 39: Gas and gas equivalent prices for other fuels
Natural gas is pricing competitively versus coal in Europe…



Source: Bloomberg, BofA Global Research

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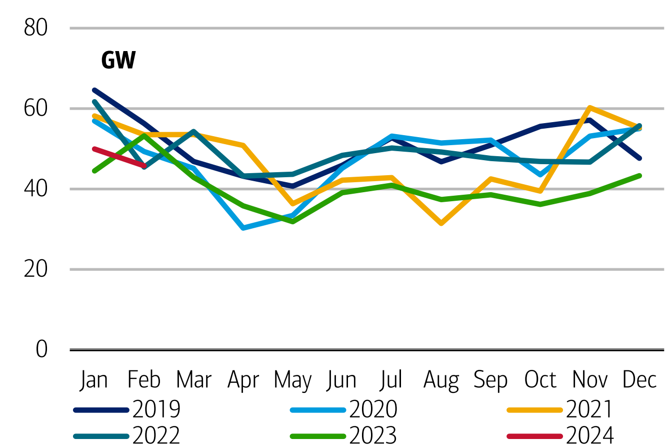
Exhibit 40: NWE gas power generation
…which could support natural gas usage in the power sector



Source: Bloomberg

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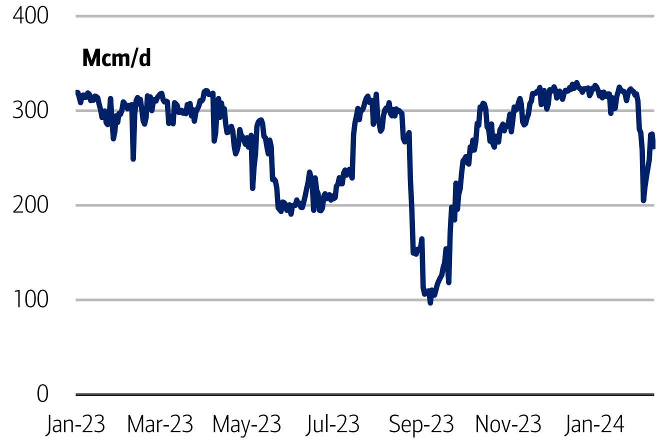
Meanwhile, NWE supply depends heavily on Norway and LNG flows

Natural gas supply into Europe has played a key role in keeping storage flush this winter, but volumes have turned lower in February. Norway saw another outage at the 80Mcm/d Nyhamna facility and at the Troll field this month and though output has rebounded from the lows, it is still 40-50Mcm/d below pre-outage levels (Exhibit 41). Thus far, the outage has removed more than 650Mcm from NWE. Meanwhile, unattractive arbs and rerouted tradeflows caused LNG imports into NWE to drop by about 36Mcm/d or 1.5Bcm ytd (Exhibit 42). We expect this dynamic to persist as Red Sea disruptions seem poised to persist and inventories in Europe have just reached new five-year seasonal highs.

Exhibit 41: Norway pipeline gas shipments to NWE

Outages at the Nyhamna gas processing facility and Troll field curbed Norwegian pipeline gas flows to Europe by ~650Mcm since February 1st



Source: Bloomberg

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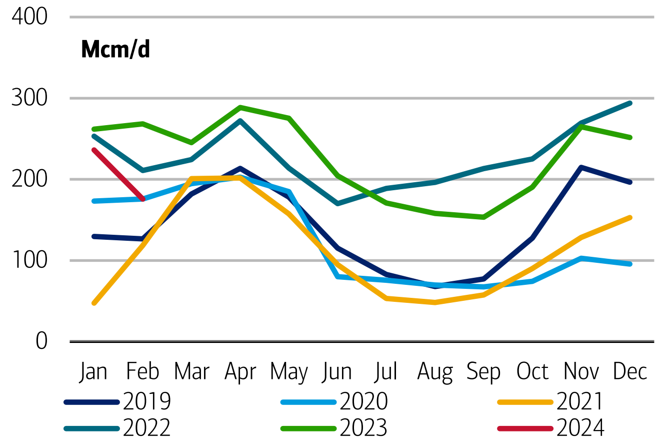
Exhibit 42: NWE LNG imports

Unattractive arbs and rerouted tradeflows caused LNG imports into NWE to drop by about 36Mcm/d or 1.5Bcm ytd



Source: Bloommberg

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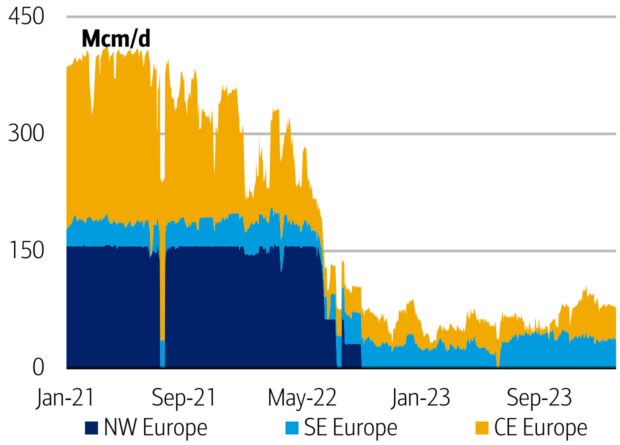
Key supply side risks include Russia (re-contracting) and Norg storage (closure)

In addition to any LNG start up delays, we also see risk to Europe's gas supply from the upcoming expiry of a contract that facilitates the flow of Russian gas to European countries like Austria and Slovakia through Ukraine. Russian pipeline flows into Southeast and Central East Europe averaged around 64Mcm/d since the start of 2023 (Exhibit 43), or an annual average volume of roughly 23Bcm. Failure to renew the deal or reach an alternative agreement would put Europe in a much more vulnerable position in the future. Elsewhere, the planned closure of the Norg gas storage facility in the Netherlands poses a near-term bearish risk for natural gas prices. The timing of the closure is still unclear. However, if closure occurs this year, the Netherlands will not pull the typical 3-4Bcm of gas into Norg storage facilities during April-October (Exhibit 44). Furthermore, a full closure implies the drawdown of an estimated 15Bcm of cushion gas. At the maximum withdrawal pace, the Norg facility would take over 240 days to completely empty. However, decreasing pressure as storage falls may slow withdrawal speeds. Thus, a full closure could take much longer.

Exhibit 43: Russian pipeline gas imports into Europe
Failure to renew the deal or reach an alternative agreement would put upwards of 23Bcm (annual) of European gas supply at risk



Source: Bloomberg

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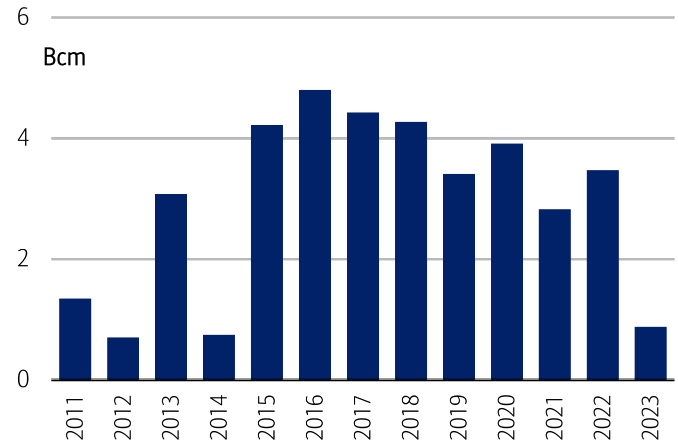
Exhibit 44: Inventory builds at Netherlands' Norg gas storage site (April-October)
Closing the Norg storage facility in 2024 could remove 3-4Bcm of storage demand and a full drawdown could put another 15Bcm into the market



Source: Platts

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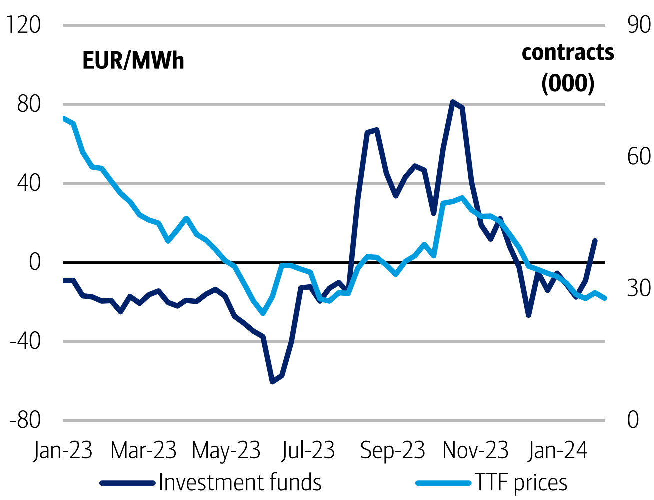
NT downside for TTF but several factors could tighten balances this year

Winter is not yet over, but Europe and the global gas market seem likely to exit winter with very ample inventories for a second consecutive year. We do see more downside than upside for TTF natural gas prices into spring, especially if the global economy continues to drag along at a sluggish pace, and prices should test the lows of summer 2023, if not move even lower. Investor positioning has risen recently, and if weather continues to warm, we could see a washout of long positioning that sends TTF prices lower (Exhibit 45). Furthermore, we think TTF must continue to price below JKM into summer to curb imports and temper high inventories (Exhibit 46).

Exhibit 45: TTF prices and investment fund net long positioning
Investor positioning has risen recently and if weather continues to warm, we could see a washout of long positioning that sends TTF prices lower



Source: Bloomberg

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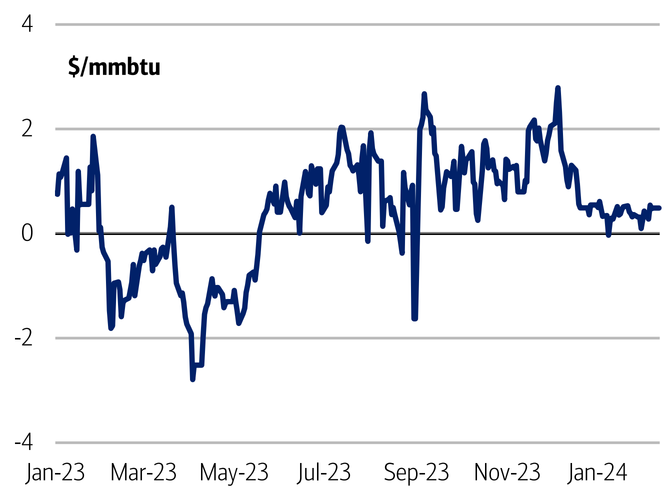
Exhibit 46: JKM-TTF spread
JKM-TTF spreads likely need to remain elevated to limit the amount of gas making its way to Europe this spring



Source: Bloomberg

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Exhibit 47: Global LNG balance

Quarterly and yearly totals

mn mt	2022	1Q23	2Q23	3Q23	4Q23	2023	1Q24	2Q24	3Q24	4Q24	2024	1Q25	2Q25	3Q25	4Q25	2025
LNG Supply	**402**	**105**	**101**	**100**	**106**	**411**	**107**	**102**	**100**	**109**	**419**	**109**	**107**	**109**	**119**	**444**
Asia Pacific	**171**	**44**	**41**	**40**	**45**	**171**	**44**	**41**	**41**	**45**	**170**	**44**	**43**	**43**	**48**	**177**
Australia	81	21	20	20	20	80	20	19	19	20	78	19	19	19	20	77
Russia	33	8	8	7	9	32	9	8	7	9	33	9	9	8	10	36
Malaysia	27	7	6	6	7	26	7	6	6	7	27	7	7	7	7	27
Indonesia	15	4	4	4	4	16	4	4	4	5	17	4	4	5	5	18
Other Asia Pacific	16	4	4	4	4	16	4	4	4	4	15	4	4	5	7	21
Atlantic	**126**	**33**	**34**	**34**	**37**	**139**	**37**	**35**	**35**	**39**	**146**	**39**	**39**	**41**	**45**	**164**
United States of America	81	22	23	22	25	91	25	23	22	26	96	27	27	29	33	115
Nigeria	15	3	3	3	3	13	4	4	4	3	15	4	4	3	3	14
Algeria	10	3	3	4	3	13	3	3	3	3	11	2	3	2	3	10
Trinidad & Tobago	9	2	2	2	2	8	2	2	2	2	9	2	2	2	2	9
Other Atlantic	11	3	3	3	3	13	3	4	4	4	15	4	4	4	4	15
Middle East	**106**	**27**	**25**	**25**	**25**	**102**	**26**	**25**	**25**	**26**	**102**	**26**	**25**	**25**	**26**	**103**
Qatar	81	20	20	20	19	80	20	20	20	20	80	20	20	20	20	80
Other Middle East	24	7	5	5	6	22	6	5	5	6	22	6	5	5	6	23
LNG Demand	**402**	**105**	**101**	**100**	**106**	**411**	**107**	**102**	**100**	**109**	**419**	**109**	**107**	**109**	**119**	**444**
Asia Pacific	**254**	**67**	**61**	**64**	**70**	**262**	**71**	**65**	**67**	**71**	**273**	**74**	**68**	**72**	**77**	**291**
Japan	71	18	14	16	17	65	18	14	16	17	65	18	13	16	17	64
China	63	16	17	17	20	71	19	18	18	21	77	20	20	22	25	87
South Korea	46	14	9	9	12	45	13	10	9	12	44	13	10	9	12	44
India	20	4	6	6	6	22	6	6	6	6	24	6	6	7	7	26
Taiwan	20	5	5	5	5	20	5	5	5	5	21	5	5	6	6	22
Pakistan	7	2	2	2	2	7	2	2	2	2	8	2	2	2	2	8
Thailand	8	2	3	3	3	11	3	3	3	3	12	3	4	4	3	14
Other Asia Pacific	19	5	6	6	5	22	5	7	6	5	23	6	7	7	6	27
Atlantic	**141**	**37**	**37**	**32**	**36**	**142**	**35**	**35**	**31**	**37**	**138**	**34**	**36**	**34**	**40**	**145**
Europe	131	35	34	29	33	131	33	32	28	35	128	32	34	31	38	135
Türkiye	11	5	2	1	3	10	4	2	2	3	11	4	2	1	3	10
North and South America	10	2	3	3	2	11	2	3	3	2	10	2	3	3	3	11
Middle East	**7**	**1**	**2**	**3**	**1**	**7**	**1**	**2**	**3**	**1**	**8**	**1**	**2**	**3**	**1**	**8**
Kuwait	6	1	2	3	1	6	1	2	3	1	7	1	2	3	1	7
Other Middle East	1	0	0	1	0	1	0	0	1	0	1	0	0	1	0	1
Balance	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

Source: BNEF, Woodmac, Platts, BofA Global Research estimates

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Exhibit 48: Glossary
List of acronyms in this report

Acronym	Definition
$/bbl	dollars per barrel
2H2023	Second half of 2023
avg	average
b/d	barrels per day
bbl	barrel
bn	billion
boe	barrel of oil equivalent
Btu	British thermal unit
CB	central bank
CPI	consumer price index
D&C	Drilling and completion
DM	developed market
E&P	Exploration and production
ECB	European Central Bank
EM	European market
EM	emerging market
EUAs	European Union Allowances
EUR	Euro
EV	electric vehicle
FID	Final Investment Decision
FPSO	Floating production storage and offloading
GoM	Gulf of Mexico
GWh	gigawatt hours
Hz	Horiztontal
IEA	International Energy Agency
IMO	International Maritime Organization
JKM	Japan Korea Marker
JPY	Japanese Yen
LNG	liquified natural gas
MA	moving average
mcm	million cubic meters
ME	Middle East
Mfg	manufacturing
MMBtu	million British thermal unit
mn	million
mt	metric ton
MWh	Megawatt hours
NBS	National Bureau of Statistics of China
NEV	New Electric Vehicle
ngl	natural gas liquids
NWE	North west Europe
OECD	Organisation for Economic Co-operation and Development
OPEC	Organization of the Petroleum Exporting Countries
OPEC+	OPEC countries plus ten additional countries
PMI	purchasing managers index
rhs	righthand side
SPR	Strategic Petroleum Reserve
TMX	Trans Mountain Expansion
TTF	Dutch TTF
TWh	terawatt hours
VLSFO	very low sulfur fuel
WCS	Western Canadian Select
WTI	West Texas Intermediate
YoY	year over year
yr	year

Source: BofA Global Research

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