

Natural Gas in Europe

Toward Winter 2024

February, 2023

Creating Opportunities

Key messages

- European natural gas storage remains at favorable levels (63% capacity, +26% YTD over the 2018-21 avg.) to face the end of winter, thanks to a gas demand that remained well contained (16% YTD below the same average) due to warmer-than-normal weather and high wind power generation
- On the supply side, the remaining gas flows from Russia continued: monthly pipeline transit of 0.8 bcm from Ukraine and Turkstream pipelines each, and monthly LNG imports from Russia of 2 bcm. Norwegian pipeline flows remained at their 5-year average, while Algerian flows weakened. Although LNG imports declined in January, the ones from the US and Norway continue at high levels. EU import LNG plants still have room for maneuver, despite tensions in the use of regasification in some Eastern European countries
- These contained demand and stable supply are driving down European gas prices, which are likely to
 remain relatively low as the current warm weather is expected to last until the end of the winter. However,
 prices could come under pressure again in the winter of 2024 if the recovery in LNG imports from China is
 very strong
- According to our (conservative) scenario, we continue to expect no gas shortages in either 2023 or 2024. In 2023, reserves would fall to 55 bcm at the end of the winter, as compared to the European Commission target of 50-60 bcm and IEA recommended limit of 36 bcm. But in the winter of 2024 gas storage would be below those targets and additional measures may be needed to maintain safe levels

Key messages

- The analysis of recent gas consumption savings in the main EU countries highlights the major impact of high gas prices on industry gas consumption in the second half of 2022. We can also observe some savings in household gas consumption in Italy and France but, in general in the EU, this drop is mainly driven by abnormally high temperatures
- Regarding the electricity generation mix in the EU in 2022, the share of wind power increased overall, while hydro and nuclear weakened (with France trying to repair some of its nuclear plants). Coal rebounded in the face of the energy crisis from a downward trend in recent years
- Our analysis of the LNG market suggests that global supply would be sufficient to cover the increase in global demand, based on a higher world export capacity in 2023. This would be enough to cover the long-term contracts signed by major Asian LNG importers and higher EU demand to meet the European Commission's optimal reserves target



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Update on the Gas Situation in the EU

Creating Opportunities

EU GAS INFLOWS AND OUTFLOWS FROM

Gas storage remains above previous years although recent lower temperatures have boosted outflows, with inflows in line with previous years

EU GAS RESERVES (BCM)



*European Commission Regulation (2022/2301); 45% target by end of winter and 55% target if the winter months do not have below-average temperatures; in order to reach 90% target before winter the filling trajectories should include feasible minimum intermediate targets to meet this aim by 1 November 2023. **International Energy Agency. Source: BBVA Research based on GIE (Gas Infrastructure Europe)

EU CONSUMPTION TREND (YoY %)

Consumption remains below previous years (-16% YTD), led by lower industrial and household gas demand due to warmer weather

EU CONSUMPTION PROXY* (bcm)



*Total sum of the 7-day moving average of Germany, France, Italy, Spain, Netherland, Belgium and Poland as of 10th of December. Source: BBVA Research based on Refinitiv data.

Gas flow through the still open Russian pipelines (Ukraine and Turkstream) continues at around 0.5 bcm per week, slightly below December's levels

4.0 Pipeline Imports from Russia to the EU per Week (bcm) 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0 7-Jan 28-Jan 18-Feb 31-Mar 4-Aug 6-Oct 8-Dec 29-Dec 10-Mar 21-Apr 2-May 2-Jun 14-Jul 25-Aug 5-Sep 27-Oct 7-Nov 23-Jun 2015-2020 avg 2022 2023 202

PIPELINE IMPORTS FROM RUSSIA TO THE EU PER

PIPELINE IMPORTS FROM RUSSIA TO THE EU BY TYPE OF ROUTE (BCM)



WEEK (BCM)

Pipeline flows from Norway remain at the historical average, while those from Algeria, which are more volatile, are currently below this average



PIPELINE IMPORTS FROM NORWAY TO THE EU PER WEEK (BCM)

PIPELINE IMPORTS FROM ALGERIA TO THE EU PER WEEK (BCM)



US and Norway boosted EU LNG imports. Russian LNG flows continue. Import plants have room for maneuver, despite some tensions in Eastern countries

EU LNG IMPORTS BY ORIGIN (BCM)



EU LNG CAPACITY (BCM) AND REGASIFICATION UTILISATION (%) IN THE LAST 4 WEEKS (2023)



Gas prices have fallen on high global reserves. Price tensions are expected to re-emerge in winter '24 on the risk of China's import recovery

NATURAL GAS 1M AHEAD FUTURE IN SELECTED MARKETS (First future EUR/MWH*)



NATURAL GAS FUTURES CURVE IN SELECTED MARKETS (EUR/MWH*)



Conversion 1 MWH equal to 34.09511 thn or 3,412 MMBtu

Full market names: Dutch TTF gas; Iberian market; UK Natural Gas; LNG Japan/Korea Marker; US Henry Hub natural gas. Source: BBVA Research based on Refinitv

March weather forecasts indicate above normal temperatures and higher precipitations in the East and the South of Europe

EUROPE: TEMPERATURE FORECAST FOR MARCH 23 (RELATIVE TO THE OBSERVED CLIMATE FOR 1993-2016) AS OF FEB 23



The graphs show the probability of the temperature being above/below the lower/upper tercile for the period 1993-2016

Source: ECMWF (European Centre for Medium-range Weather Forecasts)

EUROPE: PRECIPITATION FORECAST FOR MARCH 23(RELATIVE TO THE OBSERVED CLIMATE FOR 1993-2016) AS OF FEB 23



The graphs shows the probability of the precipitations being above/below the lower/upper tercile for the period 1993-2016



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Analysis of Gas Storage Scenarios in the EU

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The '22 EU gas balance ended with a 27 bcm surplus. In '23 and '24, under conservative assumptions, the deficits would be 48 and 20 bcm, respectively

EU GAS BALANCE, OBSERVED AND BBVA RESEARCH CONSERVATIVE SCENARIOS (BCM)



We define our baseline scenario, which we consider conservative, applying the following assumptions to the historical trend (2017-21) of main balance components:

- -7% consumption* (-12% observed in '22); higher solar and wind supply (+30 bcm); nuclear and hydro still underperforming (but better than '22)
- Russian pipelines cut, with only Turkstream (8 bcm), partially offset by non-Russian pipelines (+10 bcm) and higher LNG imports (+60 bcm), including 12 bcm from Russia LNG
- 2024 follows the same 2023 assumptions with additional solar and wind capacity (+13 bcm over 23') and higher LNG imports (+15 bcm over 23')

*7% gas consumption saving is below the recommended 15% saving by the council regulation (EU) 2022/1369: Member States shall use their best efforts to reduce their gas consumption from 1 August '22 to 31 March '23 at least by 15 % compared to their average gas consumption in the same period of the five previous consecutive years. Source: BBVA Research

No gas shortage expected in '23; but in a conservative scenario reserves would be low next winter, requiring additional measures to reach targets

EU GAS STORAGE, ACTUAL AND BBVA RESEARCH CONSERVATIVE AND TARGET SCENARIO (BCM)



- Under our conservative scenario, there would be no risk of gas shortages in the coming winter. However, a consumption saving of 14% (-7%, conservative sce.) and +75 bcm of LNG imports (+60 bcm, '23 conservative sce.) would be needed to reach the European Commission target* of 90% reserves before winter (target sce.)
- In order to have a sustainable balance in 2024 under our conservative scenario, even if we increase the level of solar and wind generation capacity in '24 (+13 bcm over '23), a higher level of LNG imports would be needed, while advancing in more structural energy efficiency measures

*European Commission Regulation (2022/2301); 45% target by end of winter and 55% target if the winter months do not have below-average temperatures; in order to reach 90% target before winter the filling trajectories should include feasible minimum intermediate targets to meet this aim by 1 November 2023. **International Energy Agency. Source: BBVA Research



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Analysis of gas consumption and energy mix in large EU countries

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Gas consumption in France and Germany declined as the industrial sector reacted to high gas prices and households benefited from warm weather



GERMANY GAS CONSUMPTION BY SECTORS AND AVERAGE TEMPERATURES (BCM)

FRANCE GAS CONSUMPTION BY SECTORS AND AVERAGE TEMPERATURES (BCM)



In Italy, as in France, some household savings were be observed even in months with lower temperatures. Industry was also impacted by high prices



ITALY GAS CONSUMPTION BY SECTORS AND

AVERAGE TEMPERATURES (BCM)

SPAIN GAS CONSUMPTION BY SECTORS AND AVERAGE TEMPERATURES (BCM)



Higher gas prices and saving needs have had a moderate effect on aggregate industrial production, which has been felt in some gas-intensive sectors

EU27 INDUSTRIAL PRODUCTION AND NATURAL GAS CONSUMPTION BY SECTOR



- In aggregate, the European energy crisis has had a moderate impact on total industrial output. However, the most gas-intensive industries may have been more affected by the difficulty of finding valid alternative energy supplies
- No relevant impact in food, which might indicate a fuel switching process that, according to the IEA (2023)*, would account for half of the savings in industrial gas consumption in 2022
- An another saving alternative might be the substitution by importing gas-intensive primary items in the value chain, displacing local gas use and preserving higher value-added stages

Source: BBVA Research based on Eurostat. *International Energy Agency (2023) How to Avoid Gas Shortages in the European Union in 2023

Renewables are gaining weight in the power mix, while coal rebounded in Germany to alleviate the gas crisis; France struggles to revamp nuclear plants

GERMANY ELECTRICITY POWER GENERATION MIX (% ELECTRICITY GENERATION)



FRANCE ELECTRICITY POWER GENERATION MIX (% ELECTRICITY GENERATION)



Gas share in power mix increased in Italy and Spain in 2022 on weaker hydro. There was a surge in power exports from Spain to France and Portugal in 22'

ITALY ELECTRICITY POWER GENERATION MIX (% ELECTRICITY GENERATION)



SPAIN ELECTRICITY POWER GENERATION MIX (% ELECTRICITY GENERATION)







Analysis of the Global LNG Market

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The EU became the largest LNG importer in 22' (131 bcm), displacing traditional major importers such as China, Japan, South Korea and India

LNG exporters LNG importers China (87 bcm) Australia (110 bcm) Japan (97 bcm) Qatar (111 bcm) South Korea (63 bcm) Malaysia (36 bcm) India (26 bcm) Russia (44 bcm) EU (131 bcm) US (107 bcm) Rest World (145 bcm) Rest.World (141 bcm)

WORLD LNG TRADE IN 2022 (BCM)

- EU's LNG import increased to 131 bcm in '22 from 78 bcm in '21. The US and Norway helped to cover this excess demand, and Qatar and Russia continued the flows
- China's LNG imports slumped in '22 (-20 bcm), due to lower activity and high LNG prices. There were lower imports from Australia and the US, pivoting to more from Qatar and Russia
- Japan's LNG imports inched down in '22 (-2bcm to 97 bcm), giving more weight to Australia and less to Qatar; while South Korea LNG imports remained relatively stable, with increased trade with Australia

Source: BBVA Research based on Refinitiv

Major Asian LNG importers have already signed contracts for 2023 amounting to 290 bcm, around 48% of total expected LNG supply

LONG-TERM CONTRACT SIGNED BY MAJOR LNG IMPORTERS (BCM)



- China already signed LNG 100 bcm in long-term contracts for '23, pivoting more to Qatar and Russia. This amount is similar with our projections of China's LNG import in '23 (94 bcm)
- Japan's signed long-term contracts amount to 119 bcm for 2023. However, imports are systematically below this figure, which could indicate that re-export is taking place
- South Korea LNG long-term contracts signed amount to 41 bcm for 2023. However, unlike Japan, its they are consistently higher than its contracts
- India LNG long-term contracts signed amount to 30 bcm , similar with recent LNG imports

China is among the countries with the greatest import bottlenecks, trying to solve it with new plants. Export bottlenecks also in Qatar, USA and Russia

GLOBAL REGASIFICATION (IMPORT) CAPACITY AND UTILISATION IN 2021 (BCM)



GLOBAL LIQUEFACTION (EXPORT) CAPACITY AND UTILISATION IN 2021 (BCM)



Global LNG import capacity will grow sharply in China and rest Asia in '23. Export capacity will rise by 55 bcm in '23, but more significantly in '24

GLOBAL REGASIFICATION (IMPORT) TERMINAL CAPACITY UNDER CONSTRUCTION (BCM)



GLOBAL LIQUEFACTION (EXPORT) TERMINAL CAPACITY UNDER CONSTRUCTION (BCM)



Global gas demand is expected to increase in '23 compared to '22 by +40 bcm, which will be largely covered by the expected capacity increase of +55 bcm

GLOBAL LNG DEMAND AND SUPPLY BALANCE IN 2022 (OBSERVED) AND 2023 (SCENARIO) (BCM)



- Europe would again demand a larger amount of LNG in '23 to reach EC target** (151 bcm, +14 bcm over '22). This will continue to put pressure on gas prices, which will still above pre-war levels
- We consider that there would be sufficient LNG supply to meet the global demand rise, based on higher global export capacity in '23 (600 bcm*, +55 bcm over '22). This would be enough to cover long-term contracts signed by major Asian LNG importers (290 bcm, +15 bcm over '22). Moreover, these countries are price-sensitive, having other alternatives from Russia (new pipeline capacity to China), which may alleviate gas markets

*Assuming 85% historical utilization (85% of 706 bcm expected global capacity in 2023). ** EU target scenario: LNG imports needed, together with consumption savings, to reach the European Commission target of 90% reserves before winter. Source: BBVA Research based on Refinitiv



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Further updated figures



The French nuclear industry generated* 278 TWh in 2022, 81TWh below 2022 and 89 TWh below 2018-2021 average

FRANCE NUCLEAR GENERATION (TWh)



FRANCE NUCLEAR GENERATION OBSERVED AND FORECAST (TWh)



*278TWH are equal to 26.5 bcm. However, if those TWh of electricity from nuclear were to be generated with gas (in combined cycle power plants), it would be needed 53 bcm of gas. Source: BBVA Research based on RTE

Gas reserves in Germany and France remain at record highs in line with contained consumption and increased wind generation

GERMANY GAS RESERVES (BCM)





FRANCE GAS RESERVES (BCM)



In Italy and Spain, increased hydroelectric generation has also helped drive record levels of reserves

ITALY GAS RESERVES (BCM)



SPAIN GAS RESERVES AS OF 18TH OF DECEMBER (BCM)



China's LNG slumped in 22', lower from Australia and US, and pivots to higher long-term contracts with Qatar and Russia (25% of total in 23')

CHINA LNG BY ORIGIN AND TOTAL PIPELINE IMPORTS (BCM)



CHINA LONG-TERM LNG CONTRACTS VOLUMES (BCM)



Japan's LNG imports on a downward trend, giving more weight to Australia and less to Qatar. Long-term contracts systematically above actual imports

JAPAN LNG IMPORTS BY ORIGIN (BCM)



JAPAN LONG-TERM LNG CONTRACTS VOLUMES (BCM)



South Korea LNG imports remain relatively stable, with increased trade with Australia. Signed long-term contracts systematically below actual imports

SOUTH KOREA LNG IMPORTS BY ORIGIN (BCM)



SOUTH KOREA LONG-TERM LNG CONTRACTS VOLUMES (BCM)



India LNG imports declined to 26 bcm (-6 bcm vs 21') in 2022. LNG long-term contracts amount to 30 bcm and higher demand is expected in coming years



INDIA LNG IMPORTS BY ORIGIN (BCM)



INDIA LONG-TERM LNG CONTRACTS VOLUMES (BCM)

Global LNG import capacity has grown steadily, led by China, India and Southeast Asia; export capacity to 600 bcm in 21', led by US and Australia

GLOBAL REGASIFICATION (IMPORT) TERMINAL CAPACITY, 2000-2021 (BCM)



GLOBAL LIQUEFACTION (EXPORT) TERMINAL CAPACITY, 2000-2021 (BCM)



China's LNG imports are expected to pivot from Australia to Qatar and US, while assuring via pipeline more flows from Russia and Turkmenistan ('23-27)

WORLD LNG TRADE IN 2021 (BCM)



WORLD PIPELINE TRADE IN 2021 (BCM)



Source: BBVA Research based on 2022 bp Statistical Review of World Energy



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