



Institute of Energy Economics
at the University of Cologne

Exploring energy markets –
enhancing decisions.



GAS SUPPLY OUTLOOK IN THE EU IN THE GAS YEAR 2022/2023

Analysis

Dr. Eren Çam, David Schlund

Institute of Energy Economics at the University of Cologne (EWI) gGmbH

06.09.2022

Natural gas supply has come under pressure in the current year

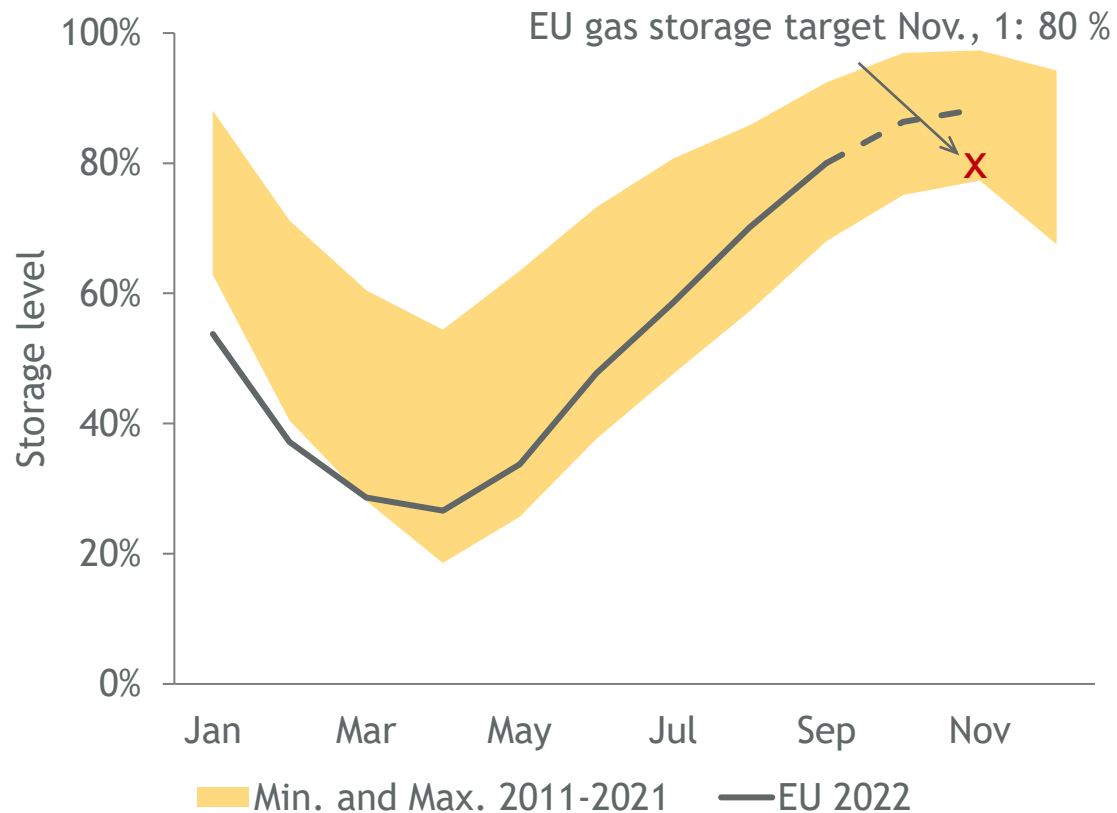
Price development of TTF spot market prices and current futures prices (as of September 06, 2022)



Source: [EEX](#).

Storage levels are currently around the multi-year average and are likely to reach the EU storage target

Aggregated storage levels in the EU



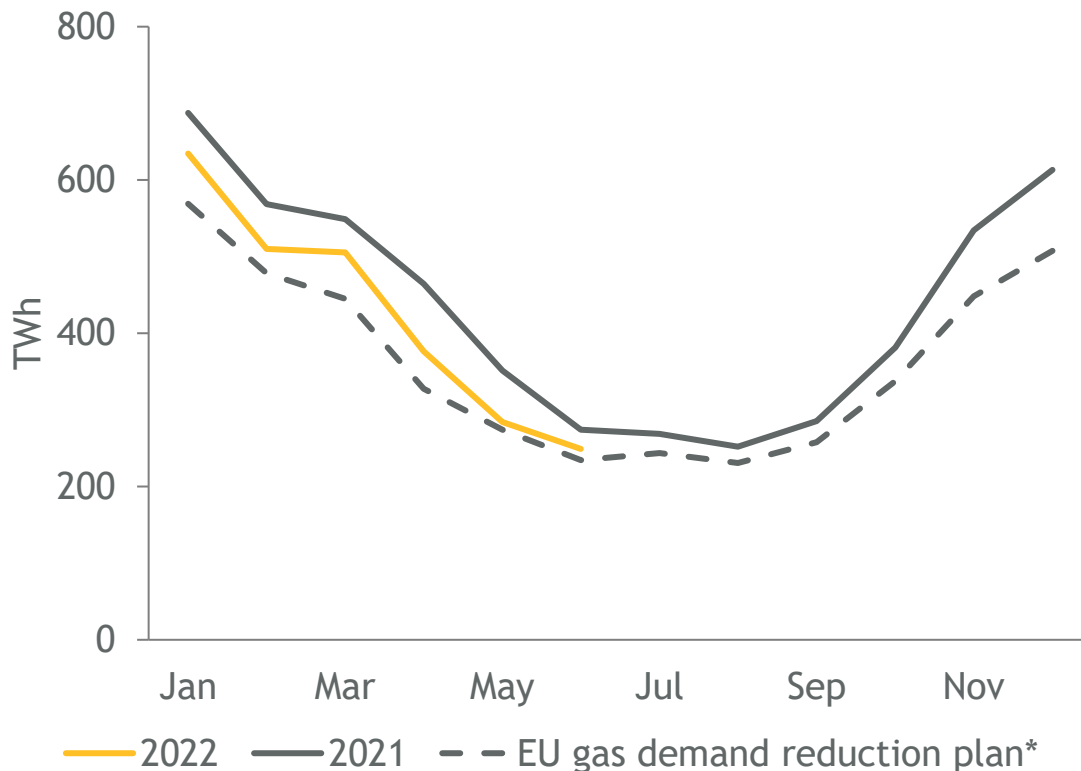
- At the end of August (Aug. 31, 2022), European gas storage levels were aggregated filled at 80% of their capacity, which is around the multi-year average during this time.
- Under a new EU regulation, all member states with gas storages must fill them to at least 80% of their capacity by November 1, 2022.
- Based on the historical trend of injections and withdrawals in September and October, a level of 90% is likely achievable by November 1, 2022.
- The storages are able to collectively hold about one-third of aggregate European gas demand for a normal winter, with the remaining demand met by LNG and pipeline imports.

Note: The level shown is the level on the first day of the month.

Source: [GIE](#).

Soaring wholesale prices for natural gas and mild weather have already led to a decline in natural gas demand in the current year

Aggregated monthly natural gas consumption in the EU & UK



- Monthly natural gas consumption in the EU (incl. the UK) in 2022 up to date is 13% lower on average than in the previous year.
- The reasons for this are a comparatively mild winter in 2022, but also demand reduction due to high gas prices, especially in the electricity and industry sector.
- The EU Commission is aiming for a 15% reduction in demand compared with the five-year average. Further demand reduction efforts are needed to achieve this level.

➔ The aim of the analysis is to investigate the balance of European natural gas consumption and supply in the event of a shortfall in Russian gas supplies in order to estimate the security of supply.

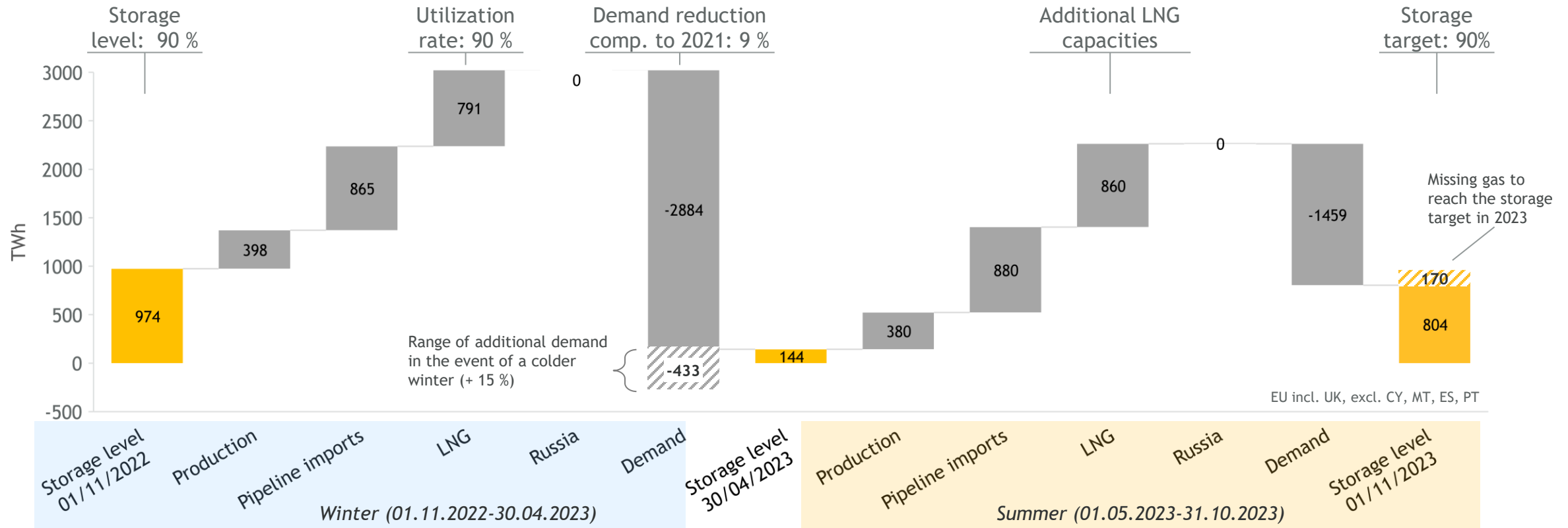
* Simplified without taking into account exemptions for individual countries and industries.
Source: [Eurostat](#), [UK Gov.](#)

The following analysis investigates the European gas balance and the most important developments in gas supply and demand

- The following analysis considers gas supply and consumption balances for the period from 01.09.2022 to 01.11.2023.
- A scenario is investigated in which Russian supplies are disrupted as of September 1, 2022, and would not be available via Nord Stream or alternative import corridors such as Ukraine, Turkey, or Belarus.
- The analysis covers the EU with the UK, but excluding Spain, Portugal, Malta and Cyprus, as these countries are not or only marginally connected to the European gas grid. Other infrastructure bottlenecks are not included.
- The demand estimate is based on the year 2021 with a 9% reduction according to International Energy Agency (IEA) forecasts.¹ In the event of a cold winter, winter demand increases by 15%.²
- Supply-side assumptions:
 - FSRU³ in Eemshaven (Netherlands) from October 2022 with a total capacity of 8 bcm/yr.
 - FSRU in Wilhelmshaven, Brunsbüttel, and Lubmin (Germany) from January 2023 with a total capacity of 15.5 billion m³/a
 - FSRU in northern Italy from May 2023 with a total capacity of 5 billion m³/a
 - FSRU in Alexandroupolis (Greece) from July 2023 with a total capacity of 5.5 bcm/a
 - Low production increases in Norway (+ 1.4 bcm)
 - No additional volumes from other producing countries as production or pipeline capacities are fully utilized ⁴
 - Average utilization of LNG regasification capacities 90% ⁵
 - Domestic production in Europe almost constant.⁶

¹ IEA and Eurostat; ² based on ENTSOG; ³ Floating Regasification and Storage Unit; ⁴ based on historical flows and ENTSOG; ⁵ own assumptions based on average and maximum historical utilization; ⁶ based on ENTSOG

In the event of a permanent shut-down of gas supplies from Russia, an additional reduction in demand will be necessary

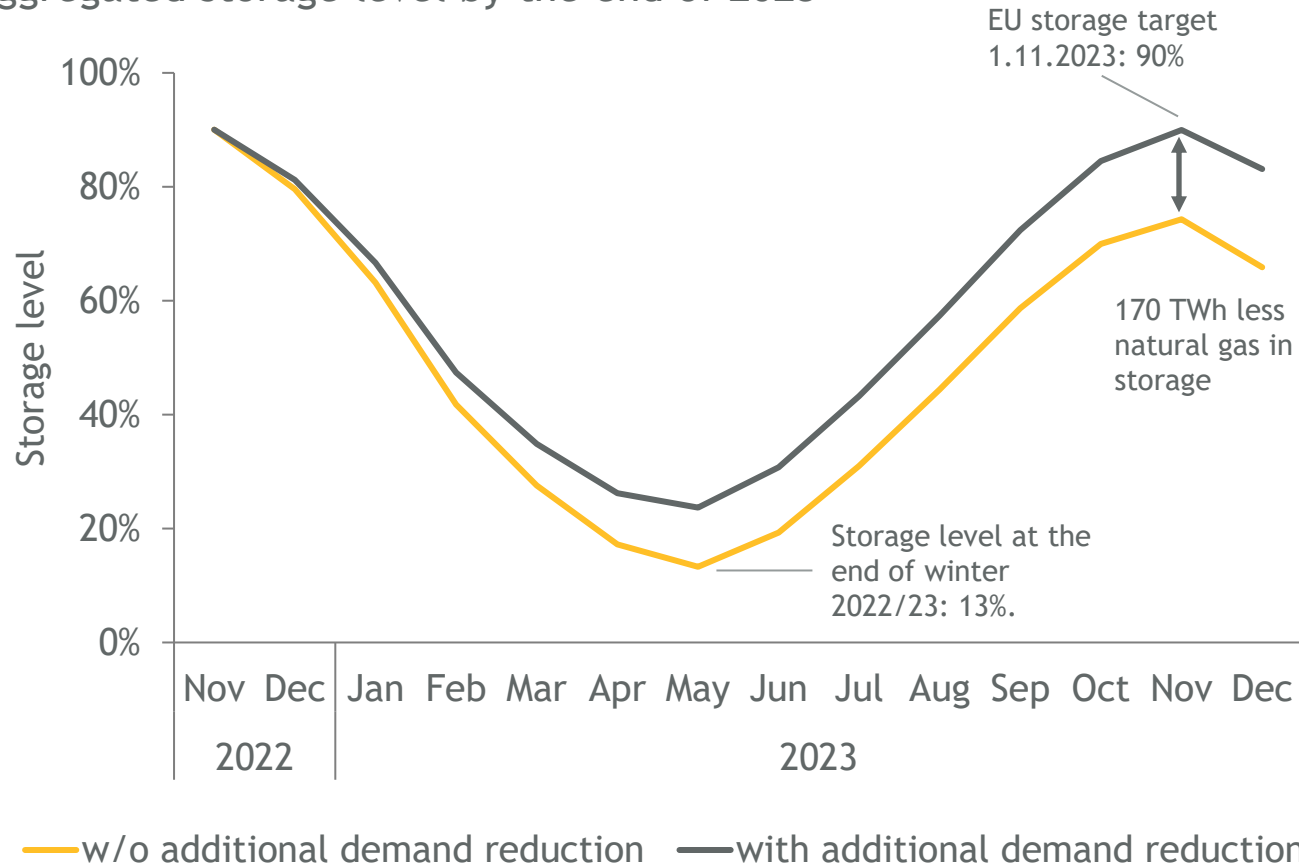


- In the event of a normal winter, aggregated gas volumes in Europe are sufficient to meet demand
- Storages would be depleted to a historical minimum of 13%
- In the event of a colder winter, imports and storage are not sufficient to meet demand

- With a low initial storage level (13%) at end of April, storages cannot be filled to 90% by Nov. 1 without additional measures
- Additional demand reduction this winter and next summer is required

Immediate demand reductions significantly improve the security of supply also beyond the coming winter

Aggregated storage level by the end of 2023



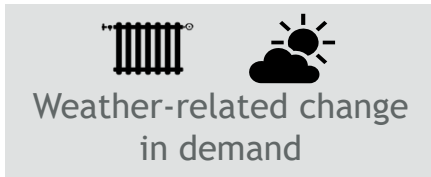
- The security of supply of natural gas will remain tight beyond the coming winter.
- A depletion of storages to around 13% at the end of winter 2022/23 will make refilling in the coming year much more difficult.
- Demand reductions today favor achieving the EU storage target of 90% by November 1, 2023.
- This will require additional savings of up to 170 TWh, which can be spread over the winter and summer months.

Note: The level shown is the level on the first day of the month.

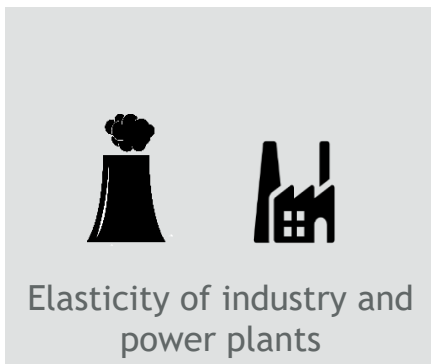
Conclusion: Without Russian gas supplies, further demand reductions are necessary

- With a complete shutdown of Russian gas imports, the European storage target of 80% can be met on Nov. 1, 2022, if the heating season does not start earlier than usual.
- Demand reduction of around 9% of monthly demand compared to 2021 could result in sufficient gas supply during the winter if the temperatures are moderate.
- However, due to the almost complete depletion of gas storages and possible bottlenecks in the gas network, it is likely that supply shortages will occur in some regions during the coming winter in the event of a shortfall in Russian gas supplies.
- In the event of a colder winter, the risk of supply shortages increases significantly as the stored volume and alternative imports are insufficient to meet higher demand.
- LNG imports pose another risk, as the availability of LNG in Europe could be lower than assumed in the analysis if gas demand in other import regions increases.
- An outlook for the coming year 2023 also illustrates that, with very low initial storage levels at the end of April 2023, storage refilling for the winter of 2023/24 will face major challenges.
- With all alternative supply sources running at full capacity, further demand reduction is required to ensure security of supply for natural gas across multiple scenarios.

Interpretation of the assumptions - drivers on the demand side



The demand variation in winter is significantly influenced by the heating demand. In the event of a very cold winter, the demand can be increased by up to 28% on individual days and up to 15% over the entire winter months (ENTSOG, 2021). When interpreting the results, it is essential to take into account the high level of uncertainty involved in the demand estimates.



Power generation from gas-fired power plants is currently subject to great uncertainty due to the limited availability of nuclear and coal-fired power plants. There are many reasons for this, ranging from unforeseen maintenances at French nuclear power plants and restricted availability of cooling water or a lack of fuel supplies due to congested infrastructures and low water levels in rivers. The availability of coal and nuclear power plants therefore also significantly affects the demand for natural gas for power generation and cannot be reliably forecast at present. In the industry sector, substitution of natural gas as a production factor by other fuels is limited in the short term. Therefore, a reduced industrial output must be considered for a reduction in industrial demand.



It is expected that elasticity will be comparatively low in the coming winter, because most households will not be able to switch heating systems in the short-term. Moreover, households do not have variable tariffs, so demand-reducing price signals reach them only with a delay (after tariff adjustments). Small measures could still generate demand-reducing effects. According to the IEA (2022), lowering the average heating temperature by one degree Celsius could reduce EU gas demand by about 100 TWh per year.

Interpretation of the assumptions - drivers on the supply side



Availability of LNG on the global market



The increase in LNG imports is limited by the existing infrastructure. Currently, the exporters' liquefaction capacity is almost fully utilized, which is why exports can only be increased to a limited extent in the short term. A large part of global LNG supplies is delivered through long-term contracts, which restricts the possibility of short-term deliveries to Europe. In the past, most volumes went to the East Asian market. Therefore, this analysis assumes that the European regasification terminals cannot be fully utilized continuously.



Potential of additional gas production



Currently, alternative gas suppliers that are connected to Europe via pipelines are already delivering close to their maximum production capacity and can only deliver small additional volumes on the market in the short term.



Infrastructure bottlenecks



The approximate calculation made here neglects intra-European network bottlenecks (with the exception of the bottleneck between Spain and France). In reality, it can be assumed that regional supply shortages will occur at very low storage levels, even with sufficient gas volumes available within Europe.

References

- EEX (2022): [Spot market data](#) (fee-based data access).
- ENTSOG (2022): [Yearly Outlook 2022-2023](#).
- ENTSOG (2021): [Winter Supply Outlook 2021/22](#).
- Eurostat (2022): [Energy statistics](#).
- Gas Infrastructure Europe (2022): [Storage Data](#).
- IEA (2022): [Gas Market Report, Q3-2022](#).
- IEA (2022): [A 10-Point Plan to Reduce the European Union's Reliance on Russian Natural Gas](#).
- UK-Government, Department for Business, Energy & Industrial Strategy (2022): [Natural Gas Supply and Consumption](#).