

Natural Gas in Europe

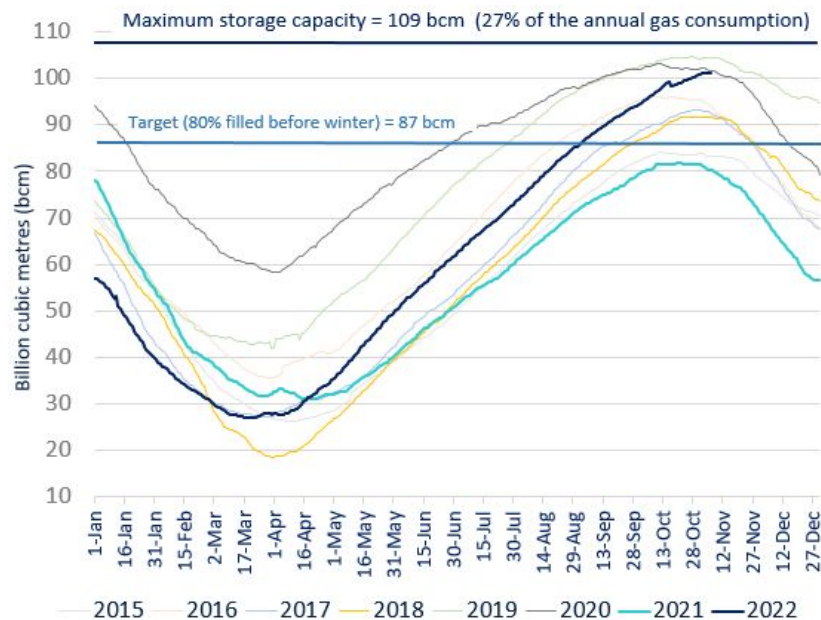
November, 2022

Key messages

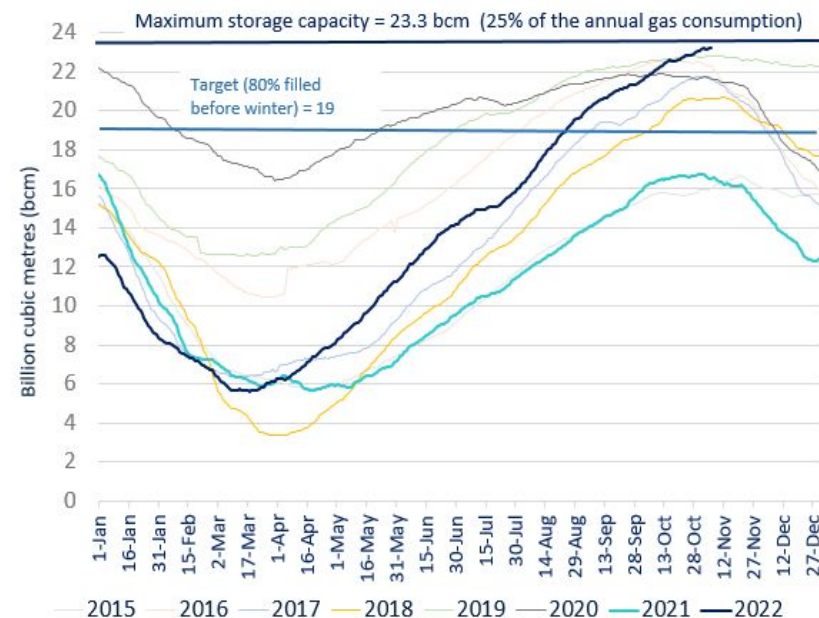
- European gas storage reached 100 bcm (94% of capacity) at the beginning of November. Europe is in good position to confront the rise in consumption during winter
- Gas consumption among the main European countries remains below four-year average up to November (Germany -9%, France -4%, Italy -2%). Higher prices so far have contributed to contain gas consumption
- High reserves, saving measures and flows from alternative sources will prevent shortages in 2023, and, likely, also in 2024. Only if Russia cuts all export to zero would be gas shortages in 2024
- The gas connection capacity between European countries allows to cover their consumption this winter if the aggregated figures add up and solidarity exists
- The European Commission postponed the formal approval of a package of emergency measures to tackle the gas crisis until mid-December, in order find a common ground on a gas price cap mechanism, as under the current EC proposal the conditions to trigger the price cap are very difficult to be met and it is subject of debate among the countries

Gas storage reached 100 bcm (94% of capacity) at the beginning of November. Europe is ready to confront the raise in consumption in the winter

EU GAS RESERVES AS OF 6TH OF NOVEMBER (BCM)

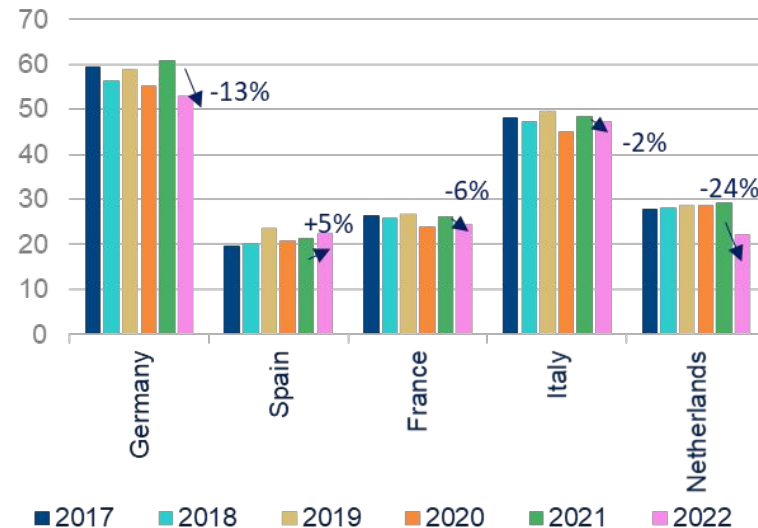
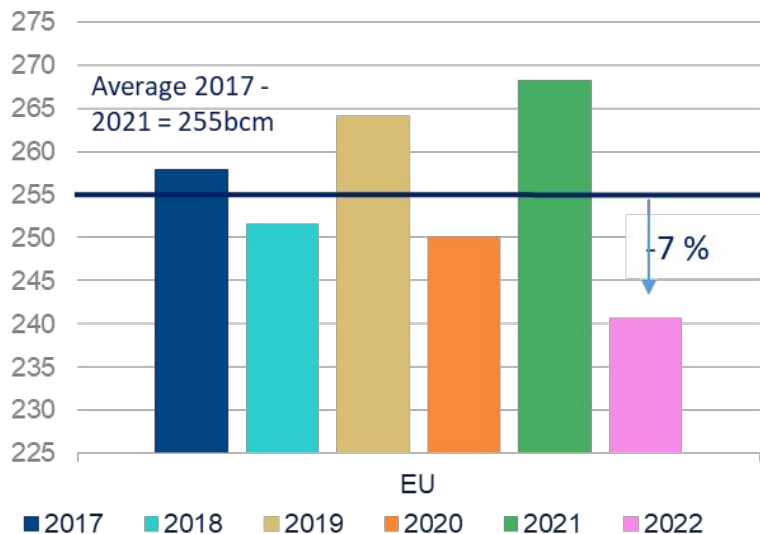


GERMANY GAS RESERVES AS OF 6TH OF NOVEMBER (BCM)



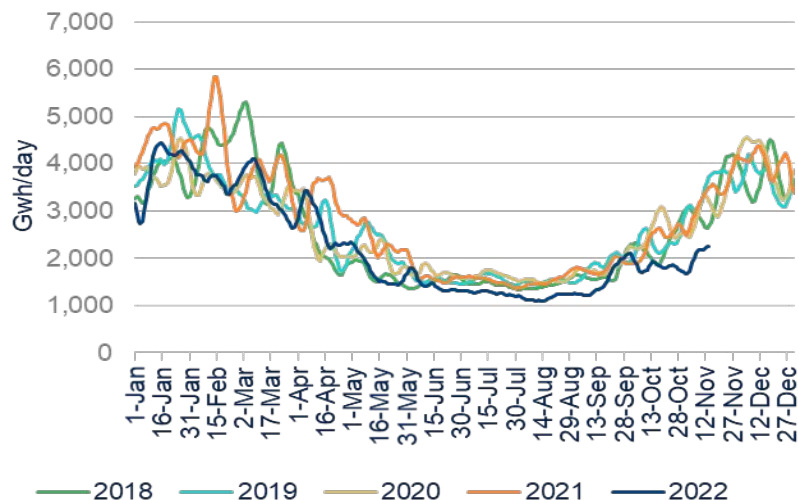
European gas consumption declined 7% (-15 bcm) below five year average up to August (latest consolidated data from Eurostat)

NATURAL GAS CONSUMPTION OBSERVED IN THE EU: JANUARY TO AUGUST (BCM, % CHANGE VS. 2017-2021 AVG.)



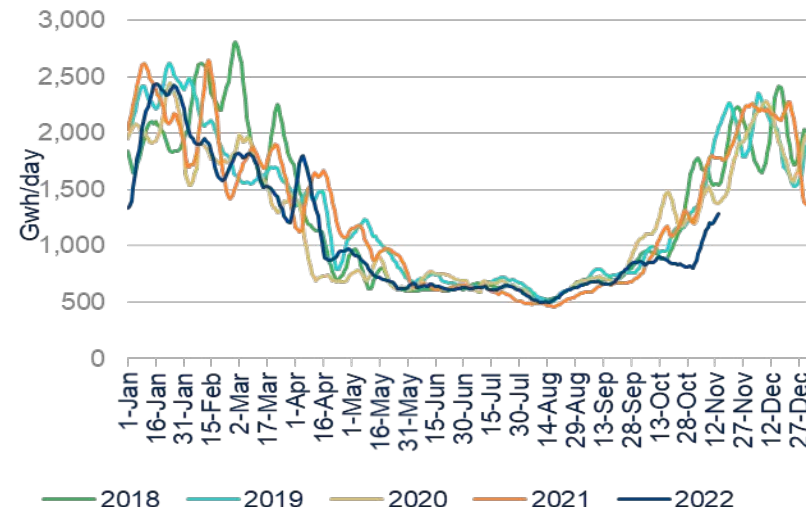
More recent data at country level indicate gas consumption in Germany and France grew around their average in September but moderated in October

GERMANY: GAS CONSUMPTION (GWh/day - MA7)



Germany	Last week	Last 4 weeks	YTD
2022 vs 2021	-35%	-32%	-16%
2022 vs average last 4 years	-31%	-31%	-9%

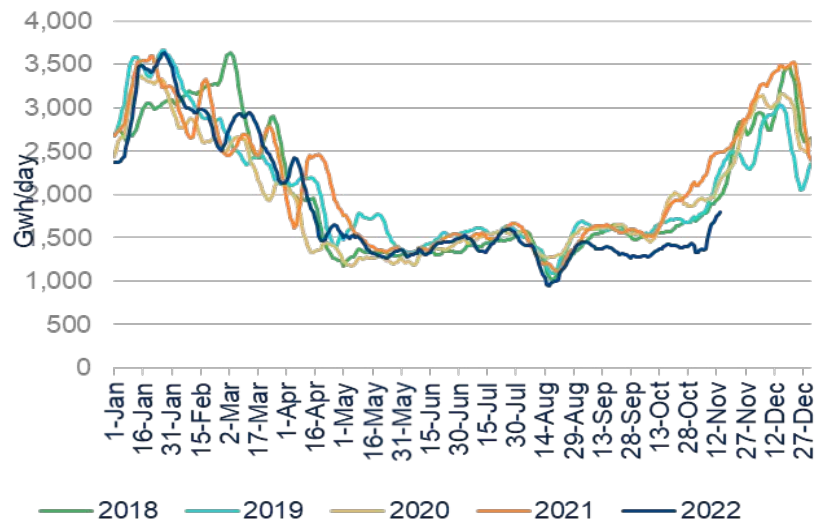
FRANCE: GAS CONSUMPTION (GWh/day - MA7)



France	Last week	Last 4 weeks	YTD
2022 vs 2021	-29%	-31%	-6%
2022 vs average last 4 years	-25%	-30%	-4%

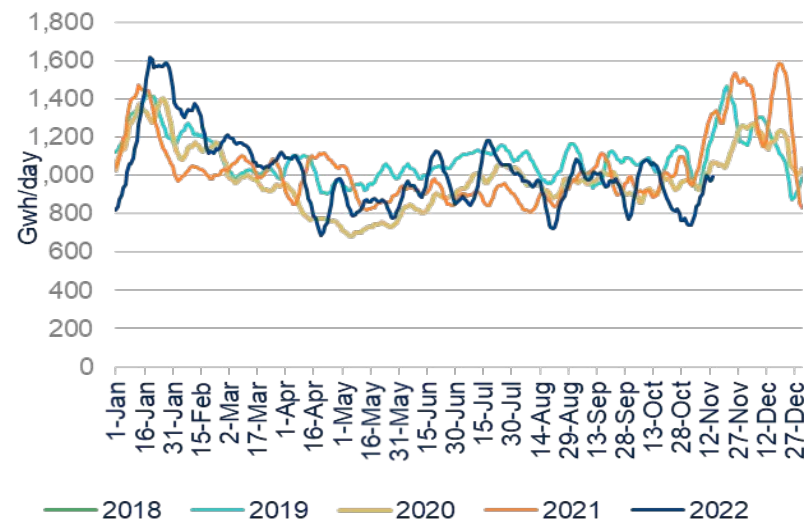
Italy's consumption was below its average during both September and October, while in Spain gas consumption fluctuated

ITALY: GAS CONSUMPTION (GWh/day - MA7)



Italy	Last week	Last 4 weeks	YTD
2022 vs 2021	-29%	-32%	-4%
2022 vs average last 4 years	-19%	-23%	-2%

SPAIN: GAS CONSUMPTION (GWh/day - MA7)



Spain	Last week	Last 4 weeks	YTD
2022 vs 2021	-26%	-22%	4%
2022 vs average last 4 years	-18%	-19%	2%

The gas connection capacity between European countries allows to cover their consumption if solidarity exists

EUROPE NATURAL GAS TRANSMISSION CAPACITY NOV22 (BCM PER YEAR)

Countries	Import Capacities from outside the	Cross-Border Capacities (between)	Total import capacity	Consumption (average 2017-2021)	Total import capacity - consumption	% Consumption / Total import capacity
Belgium	34	94	128	18	110	14%
Bulgaria	0	42	42	3	39	8%
Czechia	0	79	79	9	70	11%
Denmark	0	5	5	3	2	62%
Germany	43	152	195	91	105	46%
Estonia	5	3	8	0	7	6%
Ireland	0	13	13	5	8	39%
Greece	21	4	25	5	20	22%
Spain	94	9	102	33	70	32%
France	61	63	124	41	83	33%
Croatia	3	5	7	3	4	41%
Italy	73	80	153	74	79	48%
Latvia	0	2	2	1	1	54%
Lithuania	4	2	7	2	4	36%
Luxembourg	0	3	3	1	2	29%
Hungary	0	40	40	11	29	26%
Netherlands	47	38	85	44	41	51%
Austria	0	73	73	9	64	13%
Poland	15	9	25	22	3	88%
Portugal	7	5	12	6	6	50%
Romania	0	13	13	12	1	91%
Slovenia	0	5	5	1	4	17%
Slovakia	0	62	62	5	57	8%
Finland	5	3	8	2	6	31%
UK	108	45	153	59	94	39%

- The table tries to answer whether countries' gas interconnection would be sufficient to avoid outages if sufficient gas is imported at the aggregate level
- It is a conservative scenario, as it does not include neither the reduction of consumption nor own production
- The 6 FRSUs (29.5 BCM per year) expected to be operational in Germany in 2023 are not included

Source: BBVA Research, ENTSOG (European Network of Transmission System Operators for Gas). Updates to the ENTSOG 2021 report: France and Germany new connection of 100GWh/day, pipeline from Norway to Poland (10 BCM/yr), Finland FRSU and new LNG importing terminal 5 BCM/year, new connexion Greece and Romania.

If we take into account the electrical connection capacity between the European countries, the potential gas transfer improves slightly

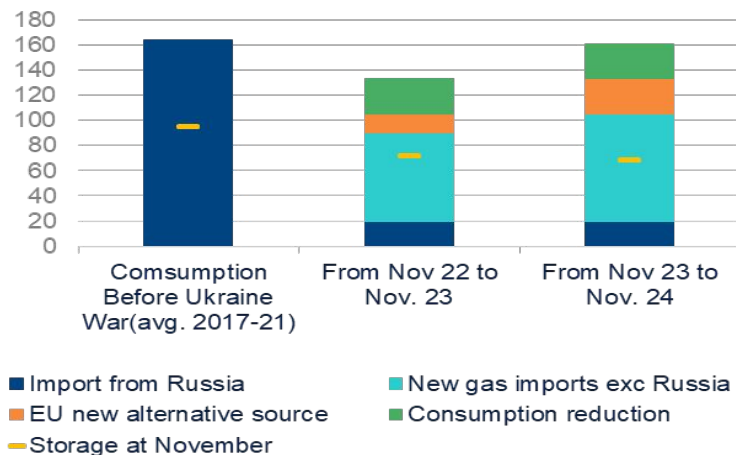
EUROPE MAXIMUM NATURAL GAS TRANSMISSION CAPACITY NOV22 (BCM PER YEAR)

Countries	Total GAS import capacity	Total Electricity import capacity (equivalent of gas that would be required to generate it)	Maximum gas import capacity (taking into account the import of electricity generated by gas)
Belgium	128	10	138
Bulgaria	42	2	44
Czechia	79	7	85
Denmark	5	10	15
Germany	195	43	238
Estonia	8	3	11
Ireland	13	1	15
Greece	25	4	29
Spain	102	10	112
France	124	19	143
Croatia	7	7	14
Italy	153	17	169
Latvia	2	3	6
Lithuania	7	4	11
Luxembourg	3	5	8
Hungary	40	12	52
Netherlands	85	14	99
Austria	73	14	87
Poland	25	5	29
Portugal	12	6	18
Romania	13	3	16
Slovenia	5	7	12
Slovakia	62	7	70
Finland	8	5	13
UK	153	7	160

Source: BBVA Research, ENTSOG (European Network of Transmission System Operators for Gas), ENTSOE (European association for the cooperation of transmission system operators (TSOs) for electricity)

Gas markets: high reserves, saving measures and flows from alternative sources will prevent shortages in 2023, and, possibly, also in 2024

CHANGE IN EUROPEAN ENERGY CONSUMPTION BY TYPE OF SOURCE AND GAS STORAGE (BCM)



Assuming Russia's flows continues through Türkiye pipeline (8bcm) and a LNG reduction to 12bn from current 20bcm. **New gas imports:** Norway's, Algeria and Azerbaijan's pipelines (10bcm) and LNG (60bcm in 2023 and 75bcm in 2024). World LNG production capacity will increase 15bcm in 2023, mainly in US (12bcm); and 50bcm in 2024 (Europe will attract the 9% of new production). **EU new alternative energy sources:** Solar and wind will increase capacity by 30bcm and 43bcm above 2021 levels respectively in 2023 and 2024, offsetting the decline in nuclear (-9bcm due to reactors reparation) and hydro (-15bcm) **Reduction in EU gas consumption:** 7% below 17-21, in line with reduction observed from Jan to Sept 2022

Source: BBVA Research

• Baseline scenario:

- Russia cuts its exports to Europe to 20 bcm from 40 bcm currently. In this case, there will be **no gas shortage in the winter of 2024**
- Flows from other sources, inventories and current consumption savings likely to offset supply cuts

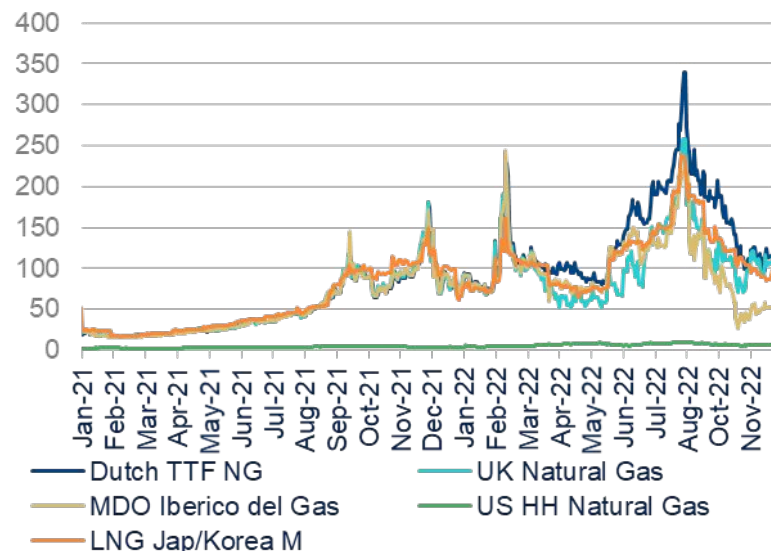
• Risk Scenario: Russia cut all export to zero. In this case, **reserves would be negative at the end of winter 2024.** However this scenario is less probable as

- Russian gas supply would likely enter global LNG market, with excess capacity elsewhere
- Russia is unlikely to stop export through Türkiye's pipeline (8bcm)

Gas prices have declined further on high reserves, warm weather but rebounded on doubts about EC's proposal to limit prices and several outages

NATURAL GAS PRICES IN DIFFERENT MARKETS

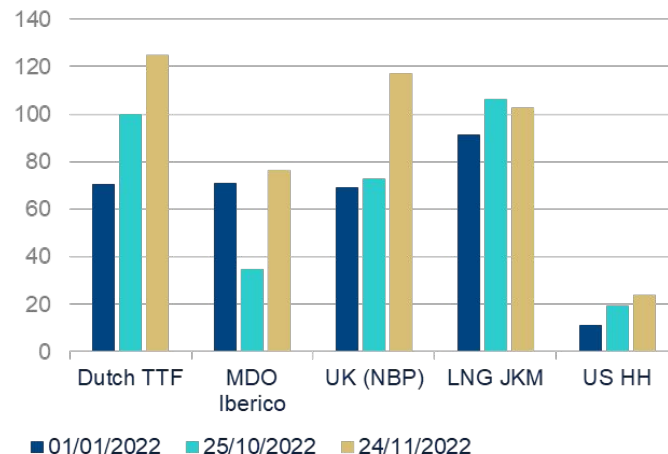
(First future prices EUR/MWH*)



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

NATURAL GAS PRICES IN SELECTED MARKETS

(EUR/MWH)



	Dutch TTF	MDO Iberico	UK (NBP)	LNG JKM	US HH
1M Change	25%	119%	61%	-4%	23%
YTD	77%	8%	69%	12%	112%

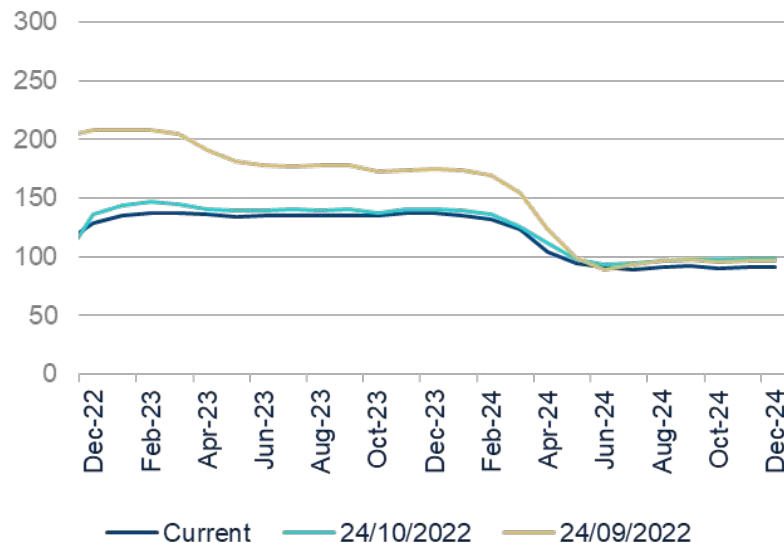
Update of recent news and figures

Recent events

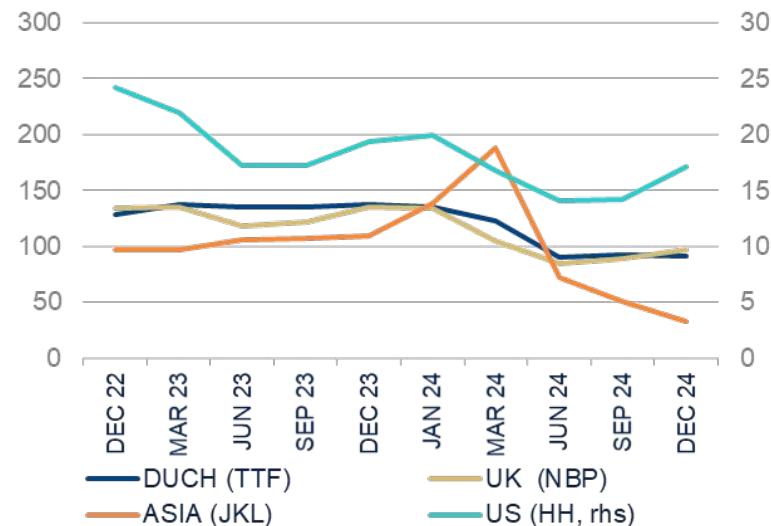
- The European Commission detailed its **gas price cap proposal**:
 - TTF first futures should be above €275 for two weeks
 - The spread between the TTF spot and LNG prices reference should not be wider than €58 Mwh during 10 days
- US Freeport delayed November and October's LNG flows to Europe
- European gas futures suggest **gas prices will remain at current levels** until spring 2024. However, Asian LNG prices suggest gas strains in winter 2024
- In the week up to 6 Nov the increased in **gas reserves were well above** previous years, but the pace slightly moderated. Storage topped 100 bcm
- Forecasts show a ~50% probability of **temperatures in Europe in December in the upper tercile** of the period 1993-2016
- There are indications that in Northern Europe it would **rain less** in December and in January

European gas futures suggests gas prices will remain at current levels until spring 2024. However, Asian LNG prices point to gas strains in winter 2024

DUTCH TTF NATURAL GAS FUTURES (EUR/MWH*)



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



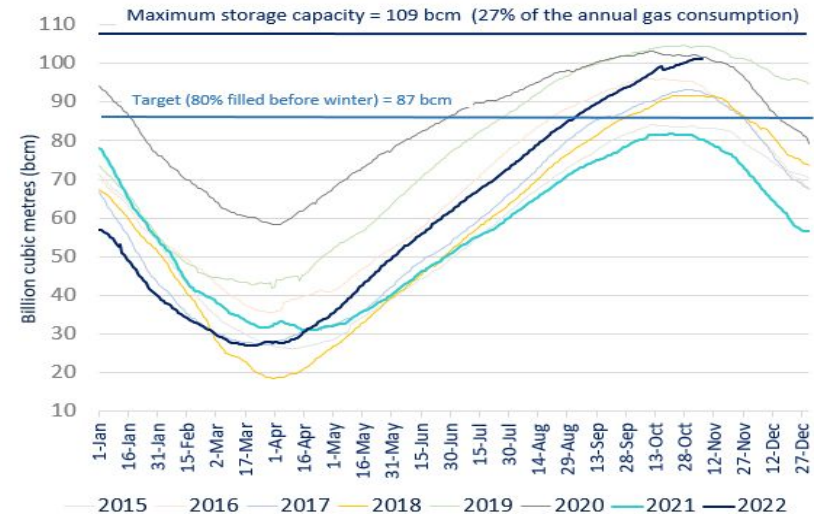
*Conversion 1 MWH equal to 34.09511 thn or 3,412 MMBtu

In the week up to 6 Nov the level of gas reserves was well above previous years, but the increase pace has slightly moderated. Storage topped 100 bcm

EU GAS RESERVES: EVOLUTION IN THE LAST FOUR WEEKS (BCM, WEEKLY FILLING OR USE OF RESERVES)



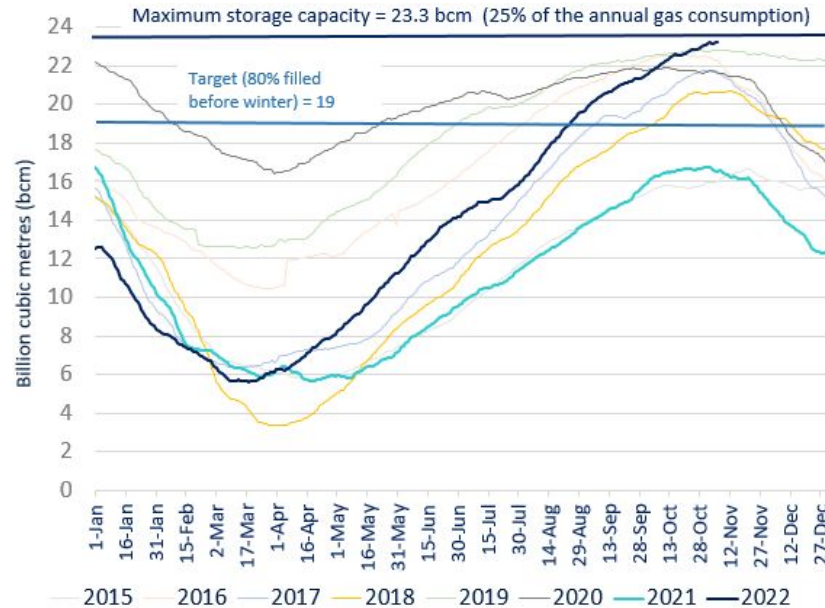
EU GAS RESERVES AS OF 6TH OF NOVEMBER (BCM)



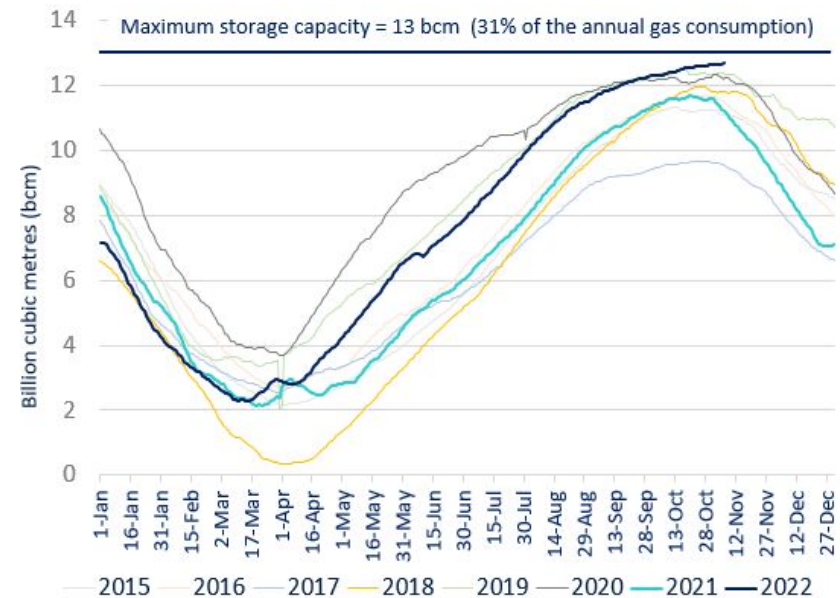
- As gas imports in the last weeks are lower than in previous years, **lower gas consumption than in previous years explains the better evolution of reserves**

Gas reserves in Germany and France follow the same pattern

GERMANY GAS RESERVES AS OF 6TH OF NOVEMBER (BCM)

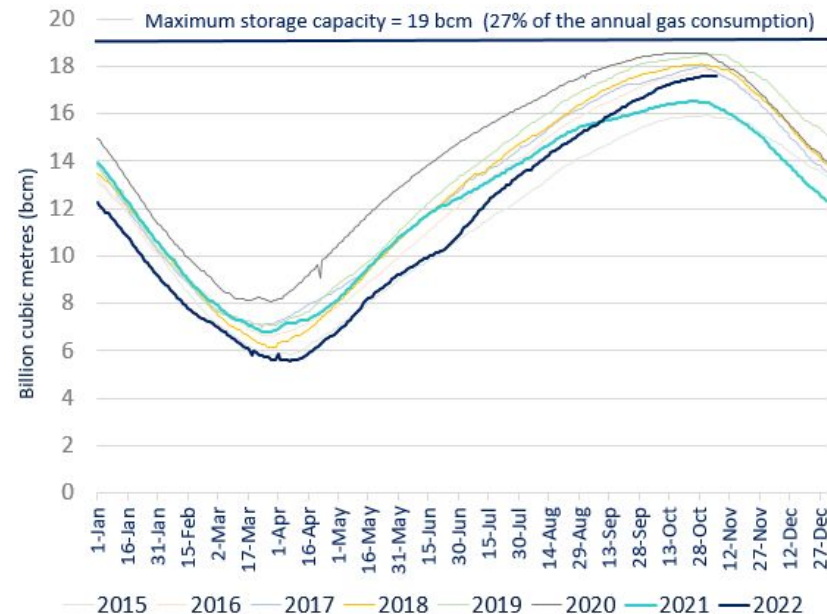


FRANCE GAS RESERVES AS OF 2ND OF OCTOBER (BCM)

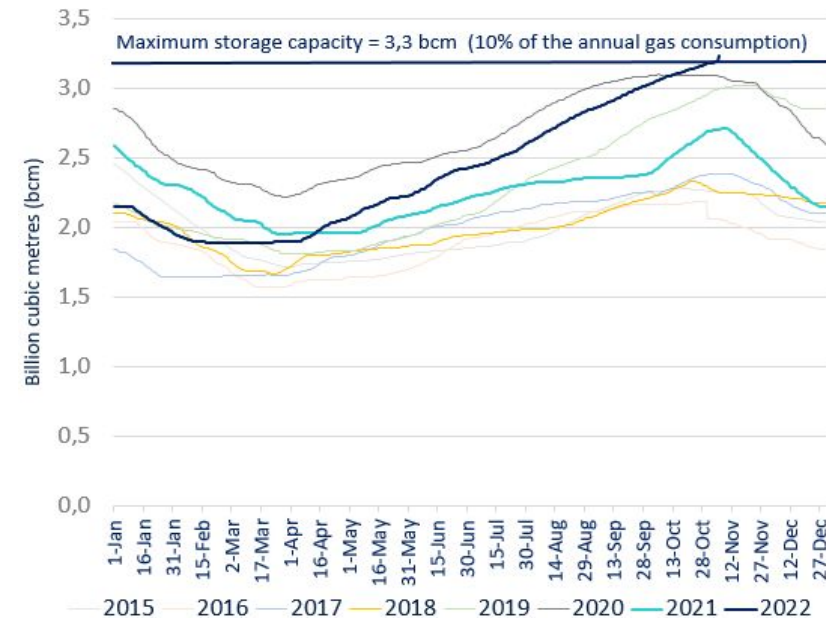


Italy's storage peaked, while Spain has reached its maximum storage capacity

ITALY GAS RESERVES AS OF 6TH OF NOVEMBER (BCM)

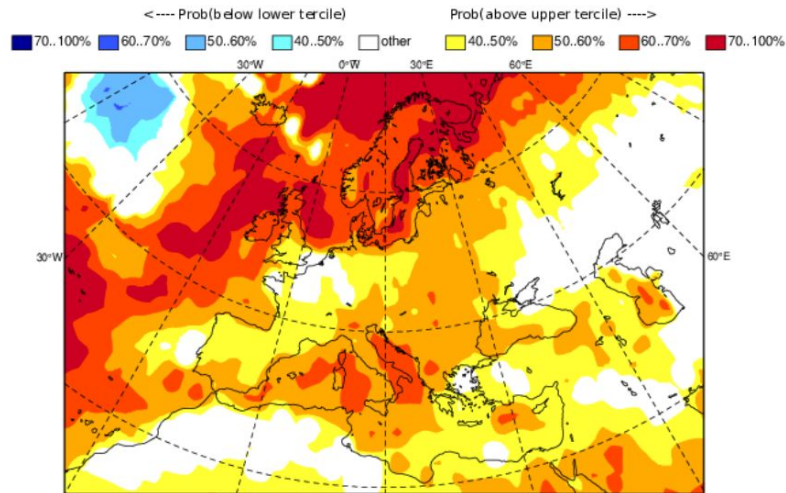


SPAIN GAS RESERVES AS OF 6TH OF NOVEMBER (BCM)

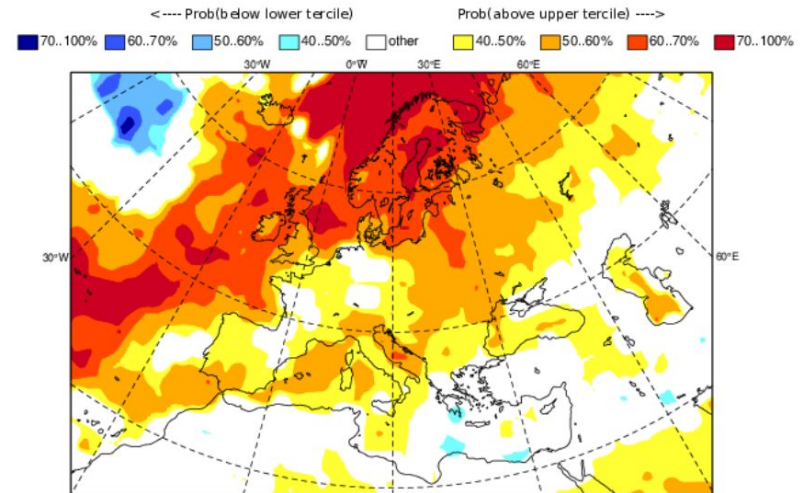


Weather: forecasts show a ~50% probability of temperatures in Europe in December in the upper tercile of the period 1993-2016

EUROPE: TEMPERATURE FORECAST FOR DEC 22 (RELATIVE TO THE OBSERVED CLIMATE FOR 1993-2016) AS OF NOV 22



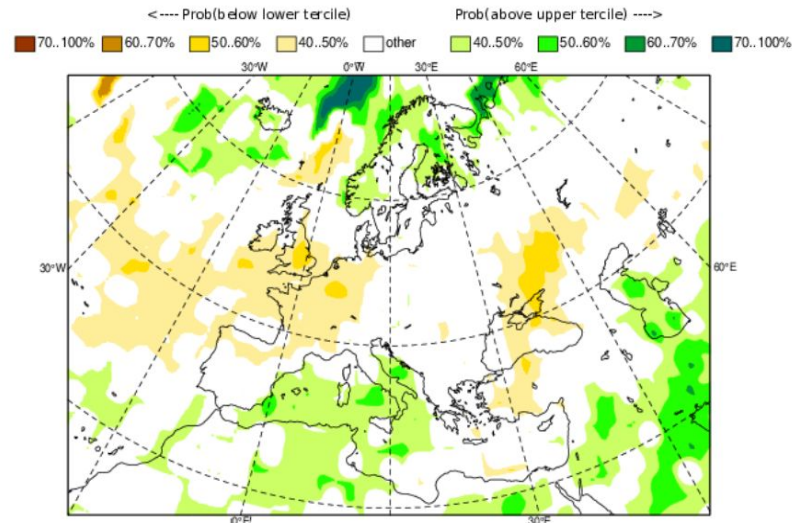
EUROPE: TEMPERATURE FORECAST FOR JAN 23 (RELATIVE TO THE OBSERVED CLIMATE FOR 1993-2016) AS OF NOV 22



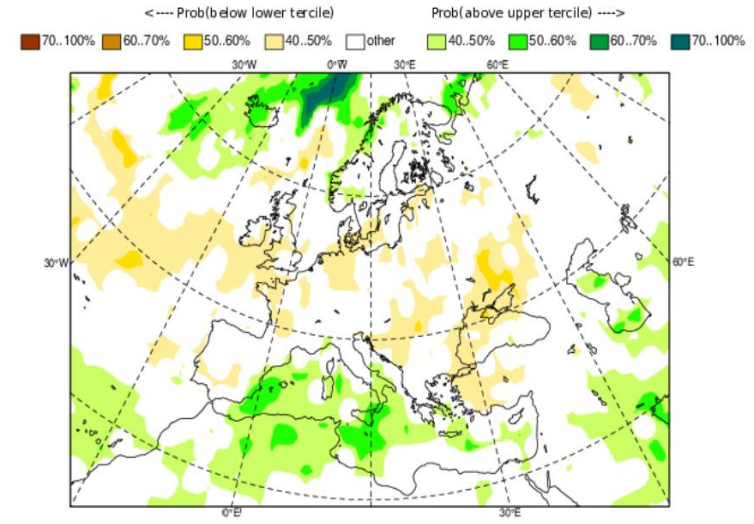
- The graphs shows the probability of the temperature being above/below the lower/upper tercile for the period 1993-2016

Weather: there are indications that in Northern Europe would rain less in December and probably in January

EUROPE: PRECIPITATION FORECAST FOR DEC 22 (RELATIVE TO THE OBSERVED CLIMATE FOR 1993-2016) AS OF NOV 22



EUROPE: PRECIPITATION FORECAST FOR JAN 23 (RELATIVE TO THE OBSERVED CLIMATE FOR 1993-2016) AS OF NOV 22



- The graphs shows the probability of the precipitation being above/below the lower/upper tercil for 1993-2016

Natural Gas in Europe

November, 2022