



ENTSOG SUMMER SUPPLY REVIEW

2022

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Executive Summary

ENTSO-G has completed the review of the European gas picture for the summer of 2022, April to September. ENTSO-G's seasonal Reviews aim at a deeper comprehension of the development of the demand and supply in the previous seasons and the identification of trends that cannot be captured at national or regional level.

Summer Supply Reviews help to build experience and a solid background for the assumptions considered in the Summer Supply Outlook. Such knowledge is also factored in the recurrent TYNDP process in order to ensure a consistent improvement over ENTSO-G reports, as well as in the ongoing R&D plan.

The key findings of this review are:

- Total gas demand values dropped in the EU by 15.5%. Small increases in the demand values for Ireland, UK and France – 8%, 4% and 3% respectively for the summer 2022 period, due to low nuclear and hydro power. Russia's invasion of Ukraine and record temperatures had the most significant impact on the supply mix, gas prices and gas demand in Europe.
- The European gas hubs reached the highest gas prices compared to all historical data registered at ENTSO-G, reaching 234 €/MWh on the TTF in August 2022.
- Price spreads between hubs thereby indicated infrastructure limitations (bottlenecks). While several Western European countries could have bought additional LNG at global market prices due to surplus LNG terminal capacities, they could not share such additional quantities with their Eastern neighbours due to bottlenecks.
- At the same time, there was a group of hubs with aligned but extremely elevated prices. The effected countries did not have the physical means to import additional gas quantities since all pipelines connecting supply sources and LNG terminals were maxed out.
- Pipeline gas supplied by Russia dropped by around 50% in comparison with the summer 2021. LNG and National Production experienced the most notable increase from all supply sources to Europe and accounted for 75% and 26% of increase, respectively. That means that the decreasing trend in the National Production observed in the past couple of summer seasons has been broken as a response to the drop in Russian supply.
- The storage level at the beginning of the summer 2022 (1 April) was 27%, the lowest storage level of the last 4 summers, mainly driven by high wholesale gas prices, triggered by Russia's invasion of Ukraine and the fact that GAZPROM had filled its booked storage capacity in the EU only to a very low level in the previous filling season. Due to the mild weather during shoulder and winter months in 2022 and political efforts, the storages were well-filled and reached a peak of 95% on the 13 November 2022.
- The sum of the import flows to Europe remained on the same level during summer 2022 as in summer 2021.

Detailed data for the cross-border flows is available on the ENTSOG Transparency Platform¹.

Stakeholders' comments on this seasonal analysis are welcome and would enable ENTSOG to improve its knowledge of seasonal and market dynamics influencing the use of infrastructure. Comments would serve as a basis for the R&D plan and be beneficial to the quality of further reports.

Disclaimer: the content of this Supply Review is subject to future changes, depending on the outcome of ENTSOG's assessment of the EU/UK Trade and Cooperation Agreement.

Disclaimer 2: the source of data if not indicated otherwise is ENTSOG members.

¹ Transparency Platform: <https://transparency.entsog.eu/>

Introduction

This review, as part of the ENTSOG Annual Work Programme 2022, is published on a voluntary basis and aims at providing an overview of the demand and supply balance during the summer 2022. The report brings transparency on the internal analysis carried out by ENTSOG for the purpose of developing the seasonal Supply Outlooks as well as the Union-wide TYNDP.

The report aims to provide an overview of European trends that cannot be captured at national or regional level and to build experience for future reports. This report should not be seen as a direct review of previous Seasonal Outlooks, as outlooks do not aim to provide a forecast, but to better explore infrastructure resilience in view of actual past trends.

Regarding European dynamics, the report highlights the wide heterogeneity of national demand profiles and supply sources. These differences are linked among others to physical rationales such as climate, demand breakdown or producing field flexibility for example.

Seasonal and Market Overview

Different events on the European gas market caused fluctuations in the supply and demand balance from April to September 2022. The major ones between April and September 2022 were:

- GAZPROM halted gas supplies to Poland and Bulgaria on the 27 April.
- Nord Stream supply cuts by 40% of capacity in June.
- The fall in Russian exports and uncertainty over future supplies.

However, new infrastructure could be commissioned that helped to mitigate the listed supply cuts:

Table 1 - Newly commissioned infrastructure 2022

Newly commissioned infrastructure in 2022			
Country	Project Name	Start date	Capacity
Netherlands	LNG EEMS Energy Terminal	September 2022	7 bcm/y
Germany	Wilhelmshaven LNG	December 2022	7.5 bcm/y
Finland	Hamind LNG	October 2022	150 Mcm/y
Lithuania/Latvia	Capacity increase	October 2022	7.9 bcm/y
Poland/Lithuania	New interconnector Poland/Lithuania	March 2022	PL to LT : 2.4 bcm/y LT to PL : 1.9 bcm/y
Poland/Slovakia	New interconnector Poland/Slovakia	End 2022	PL to SK : 4.7 bcm/y SK to PL : 5.7 bcm/y
Greece/Bulgaria	IGCB	October 2022	3 bcm/y
Romania/Hungary	Capacity increase	October 2022	2.4 bcm/y
Denmark/Poland	Baltic Pipe	October 2022	NO to DK/PL: 10 bcm/y PL to DK: 3 bcm/y
Poland	Upgrade of LNG terminal in Świnoujście	January 2022	6.2 bcm/y

In 2022 there were also some improvements done with the existing infrastructure between Spain and France and between France and Germany providing enhanced capacity under certain conditions of 40 GWh/d and 100 GWh/d respectively.

Gas Prices at European hubs

The following graphs show the evolution of gas prices in Europe during summer 2022.

Figure 1 displays the evolution of the day-ahead average prices for the different European gas hubs. The graph shows how the majority of the European hubs follow a similar trend by reacting in the same direction. However, few hubs show a different path, indicating infrastructure limitations.

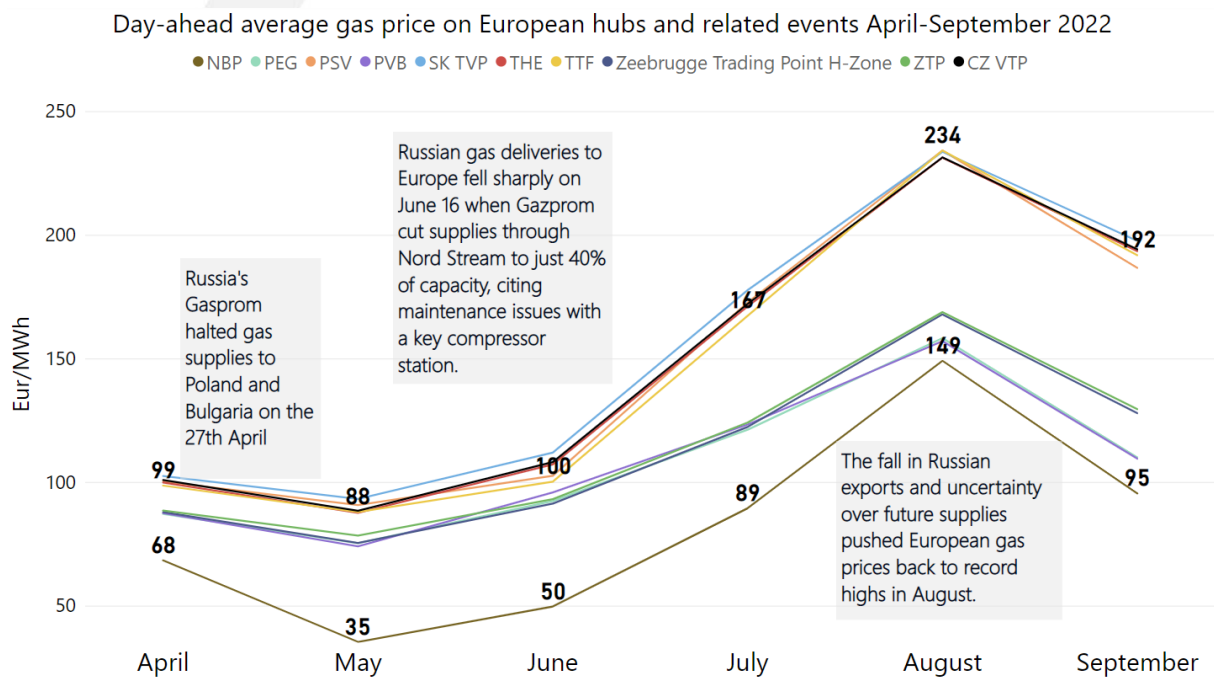


Figure 1 - Day-ahead average gas price at EU Hubs²

European wholesale gas prices fluctuated between 35 €/MWh and 234 €/MWh over the April – September 2022 period. The European gas hubs reached the highest gas prices ever based on latest historical data registered in ENTSOG.

² Source: Bloomberg

Demand

Total gas demand values reduced by around 15.5% (1546 TWh vs. 1305 TWh) in the EU and 12.5% (1822 TWh vs. 1595 TWh) in Europe in general year-on-year. The reduction is mainly the consequence of the Russia invasion of Ukraine, that triggered record-high gas prices as well as the consequent demand decrease from the industrial sector amongst others. The top 3 countries with the highest demand decrease were Finland, Macedonia and Lithuania. The top 3 countries with the highest demand decrease were Finland, Macedonia and Lithuania. On the other hand, the Ireland, UK and France, due to increased consumption for power generation driven by historically low availability of nuclear and hydro power, gas demand has increased by 8%, 4% and 2% respectively. **Figure 2** below represents the total demand change in the summer 2022 for the EU countries and the UK. The accompanying **Table 2** shows the values of demand per country and the sum of total demand with and without considering the UK's demand values. **Figure 3** shows gas demand for power by country. **Figure 4** shows the comparison of historical gas demand values in Europe between summer 2017 and 2022.

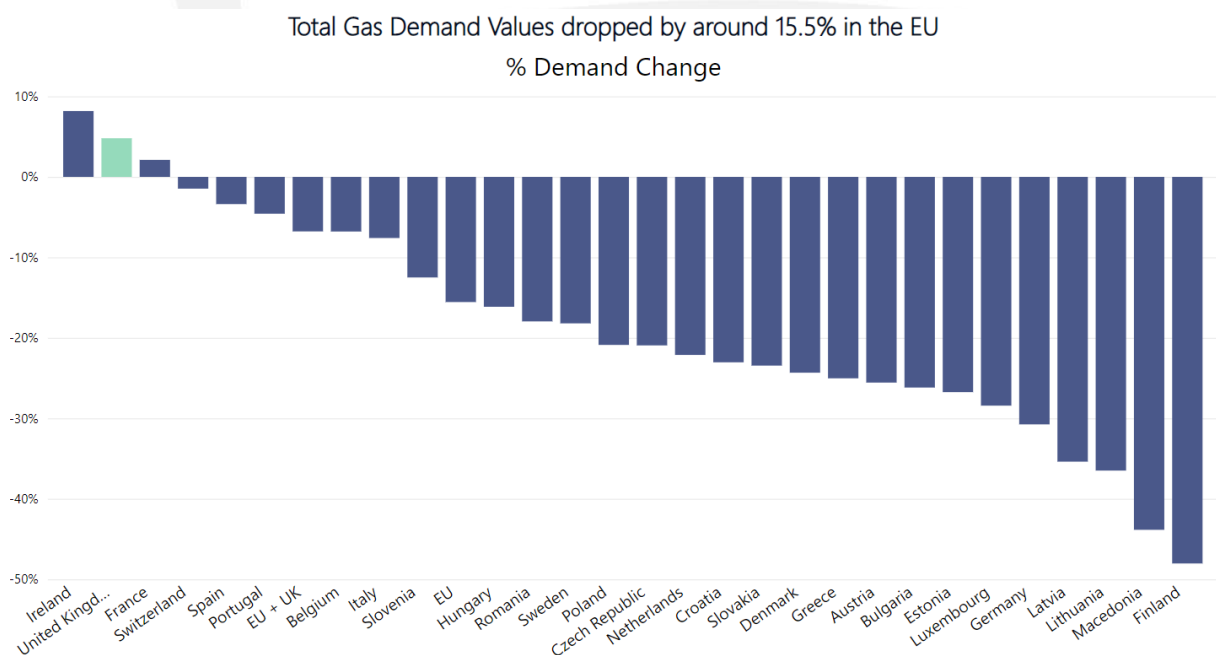


Figure 2 - Total gas demand by country for summer 2022 vs. summer 2021

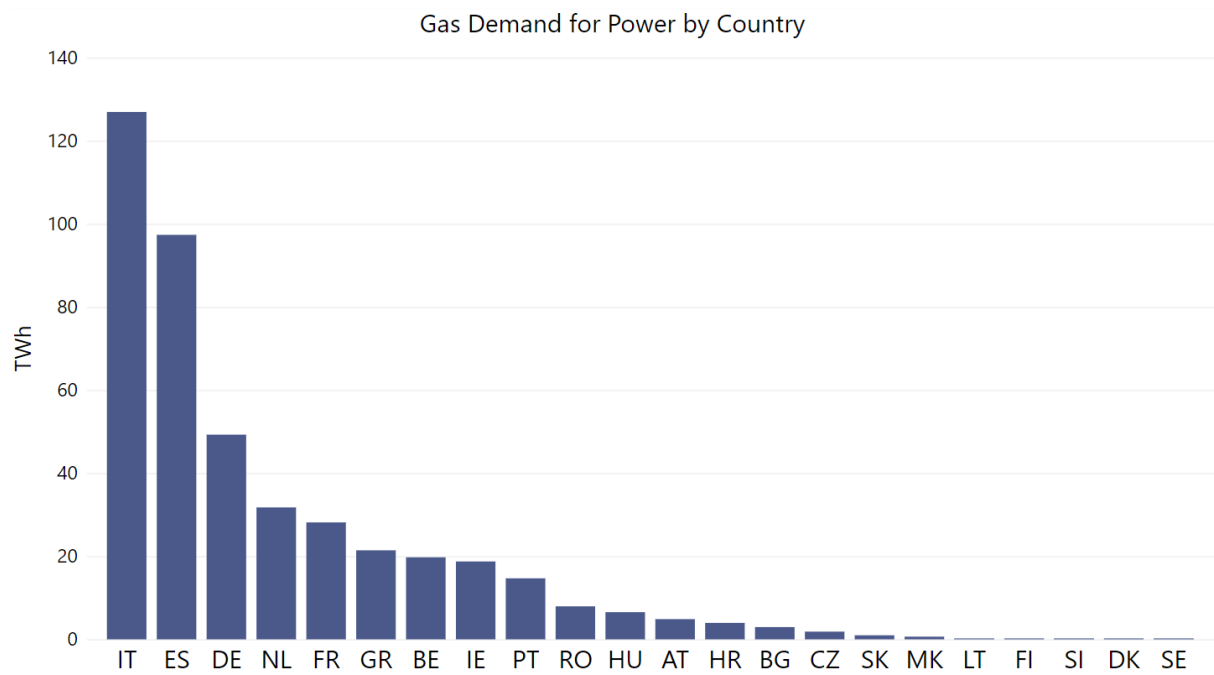


Figure 3 - Gas demand for power by country

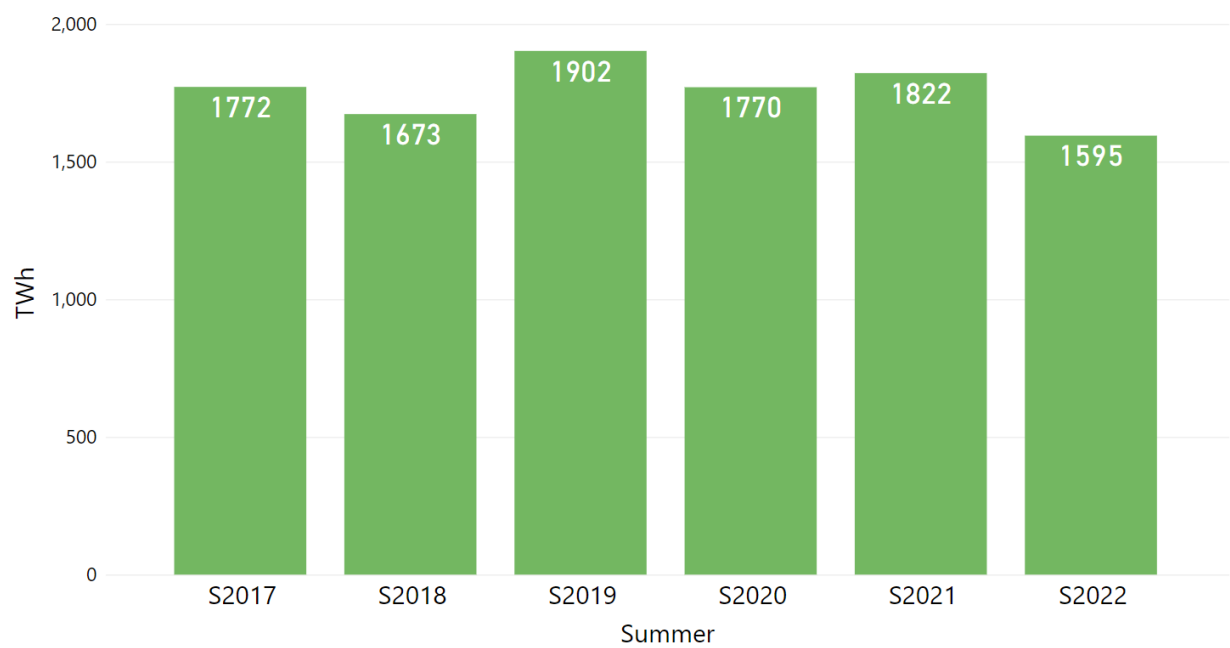


Figure 4 - Historical gas demand

Table 2 – Demand per country for summer 2022 and summer 2021

Country	Demand 2021 (TWh)	Demand 2022 (TWh)	Difference
Austria	30.8	22.9	-25.56%
Bulgaria	14.6	10.8	-26.17%
Switzerland	9.0	8.8	-1.46%
Czech Republic	32.4	25.6	-20.94%
Denmark	9.3	7.1	-24.33%
Estonia	1.5	1.1	-26.74%
Spain	170.6	164.8	-3.38%
Finland	8.8	4.6	-48.03%
Greece	35.0	26.2	-25.03%
Croatia	11.3	8.7	-23.04%
Hungary	35.0	29.4	-16.14%
Ireland	25.4	27.4	8.18%
Italy	294.2	271.9	-7.59%
Lithuania	9.8	6.3	-36.49%
Luxembourg	3.1	2.2	-28.42%
Latvia	3.4	2.2	-35.38%
Macedonia	1.6	0.9	-43.85%
Netherlands	145.0	112.9	-22.12%
Poland	79.3	62.7	-20.88%
Portugal	31.8	30.3	-4.58%
Romania	36.5	30.0	-17.95%
Sweden	3.2	2.6	-18.20%
Slovenia	3.8	3.3	-12.50%
Slovakia	19.4	14.9	-23.45%
United Kingdom	275.4	288.6	4.80%
France	135.6	138.4	2.11%
Germany	331.0	229.2	-30.75%
Belgium	65.0	60.6	-6.79%
EU + UK	1821.7	1594.5	-12.47%
EU	1546.3	1305.9	-15.55%

> Seasonal electricity power generation (TWh_e)³

Total electricity demand during summer 2022 was 1366 TWh_e, according to combined ENTSOE Transparency Platform (EU data) and National Grid ESO data (UK data).

Compared to summer 2021, power generation from natural gas has increased by 25 TWh_e due to low nuclear and hydro power. Generation from hard coal and lignite generation increased by 21 TWh_e and other fossil and oil usage for electricity production remained on the same level (for EU plus UK).⁴

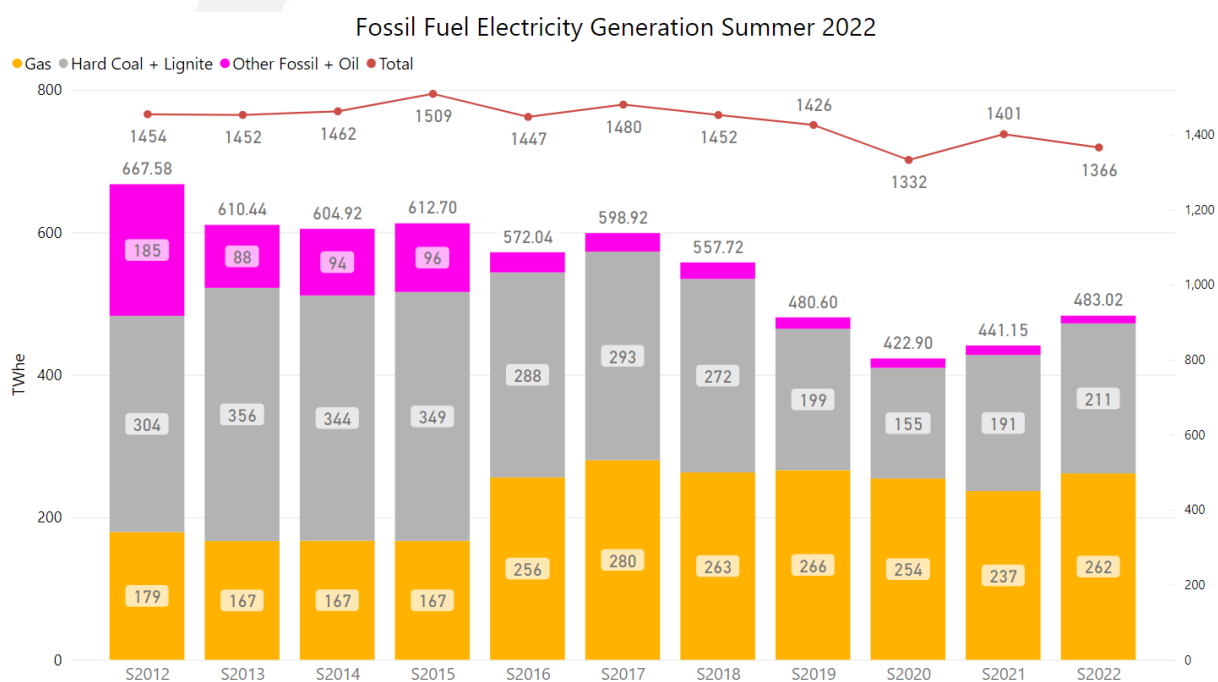


Figure 5 - Historical electricity power generation during summer in Europe.

³ Source: ENTSG elaboration based on ENTSO-E Transparency Platform data and National Grid ESO data.

⁴ The natural gas demand to achieve this electricity production is higher in thermal terms due to the gas-fired power plants' efficiency factor.

Figure 6 below shows the electricity generation mix in the summer 2022 and summer 2021. From these values can be noted the high contribution of renewable sources in the total mix for electricity generation in 2022: Hydro, wind and solar energy contributed to the 2022 mix around 38.5% of the total generation in Europe. Despite the context, the share of natural gas increased from 2021 and constituted around 19% of the total generation in 2022.

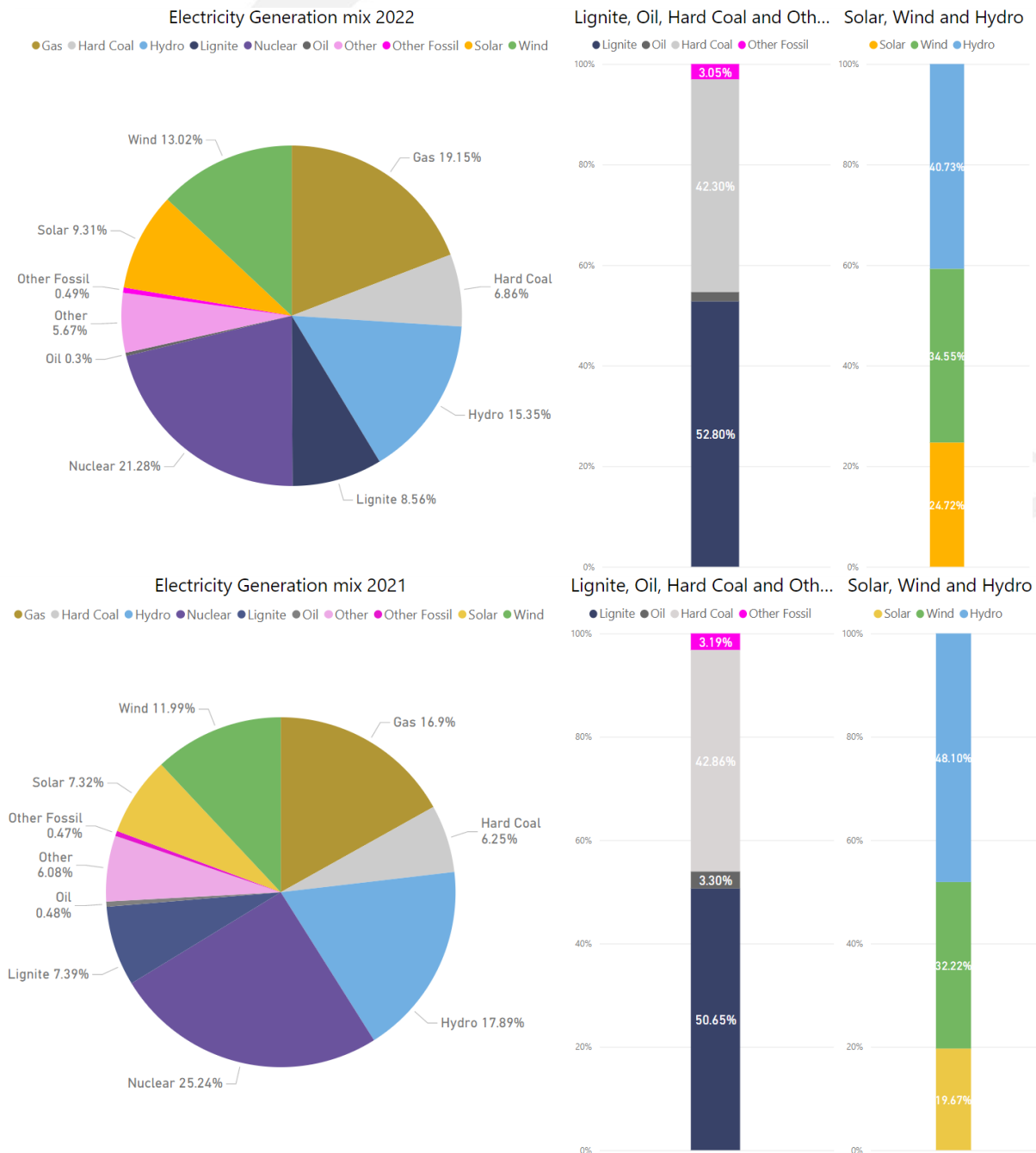


Figure 6 - Summer 2022 and Summer 2021 electricity power generation mix.³

Figure 7 below shows the historical Electricity Generation mix between 2016 and 2022 for the EU and the UK.

From these figures it can be noted for 2022 an increase in lignite, hard coal, gas, solar and wind but lower nuclear and hydro generation in comparison with 2021 data.

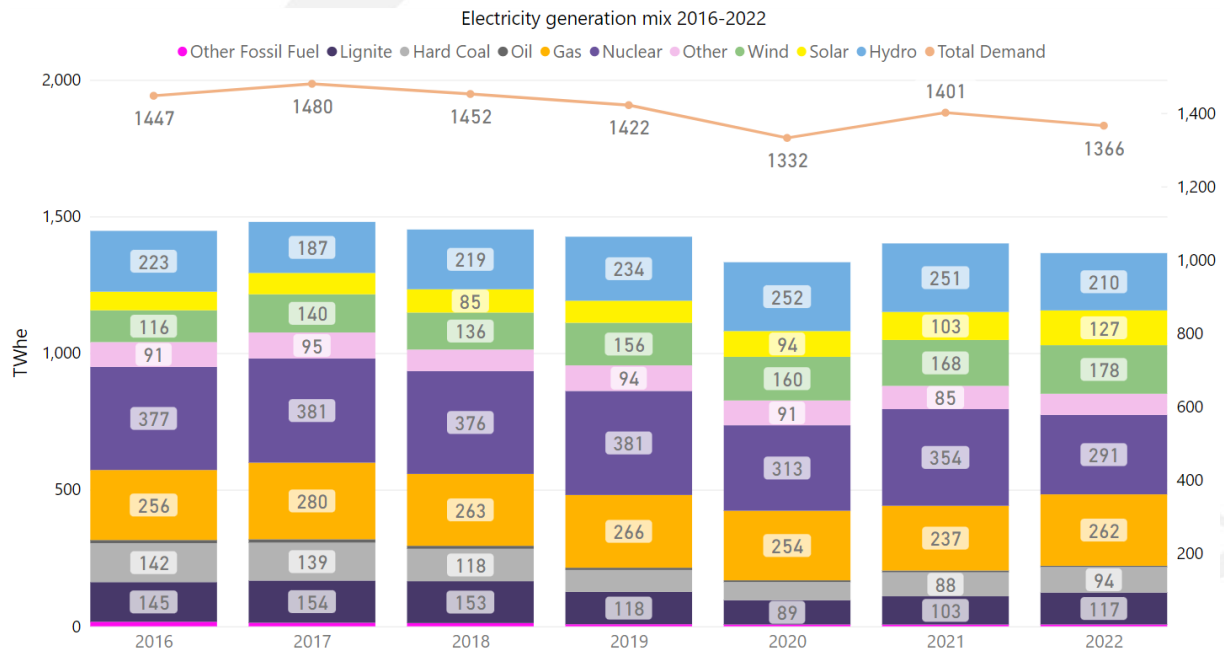


Figure 7 - Historical Electricity Generation mix 2022⁶

Supply

> European seasonal gas supply

Figure 8 is a representation of the aggregated gas supply in Europe during summer 2022, i.e., April to September. In the beginning of the year, overall withdrawal from the gas storages was followed by a long period till end of September where the storages were filled. The national production trend remained constant. Most importantly, Russian supply was disturbed by 4 major trends that are described in detail in the later part of this section.

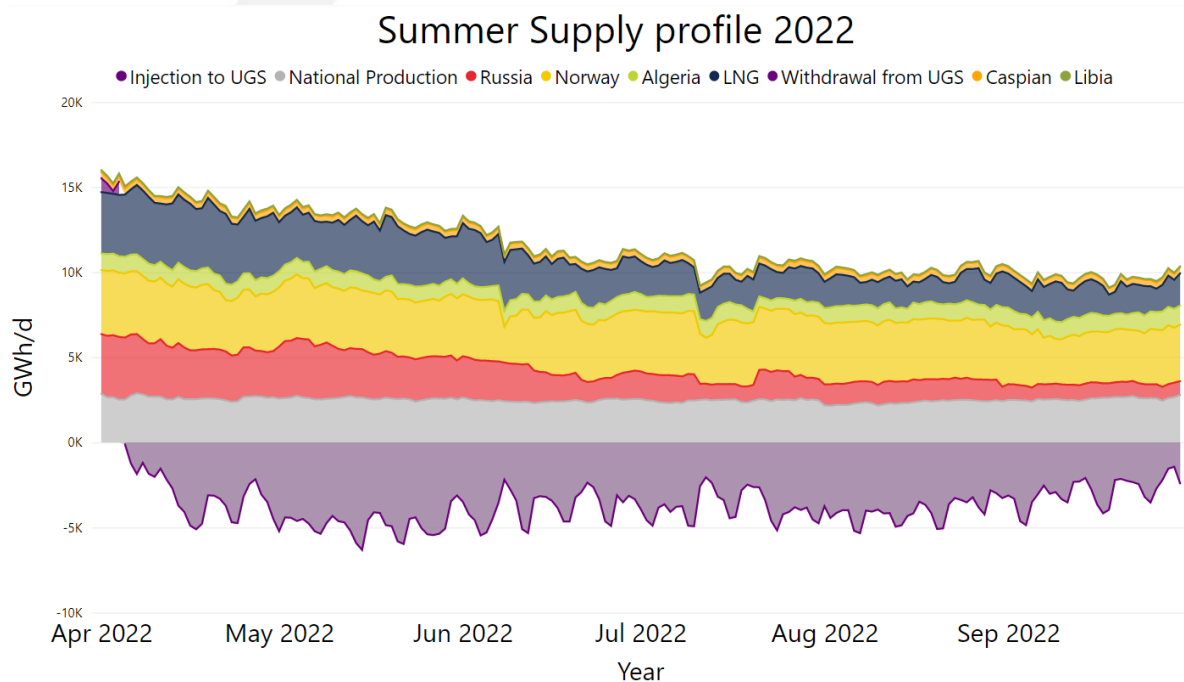


Figure 8 - Summer 2022 supply profile

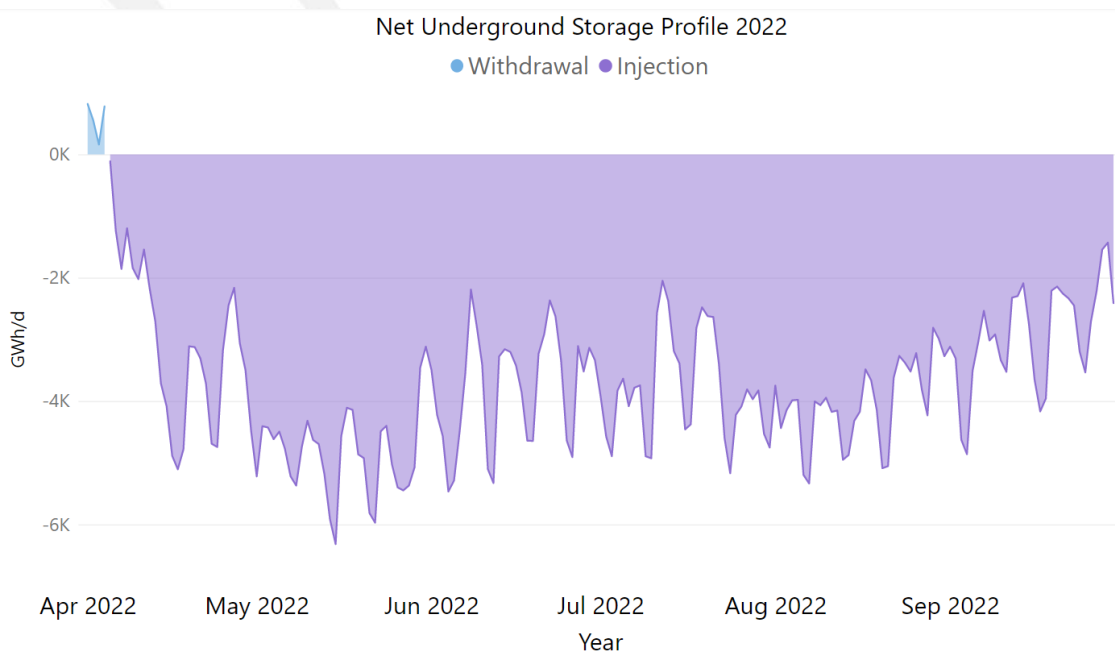
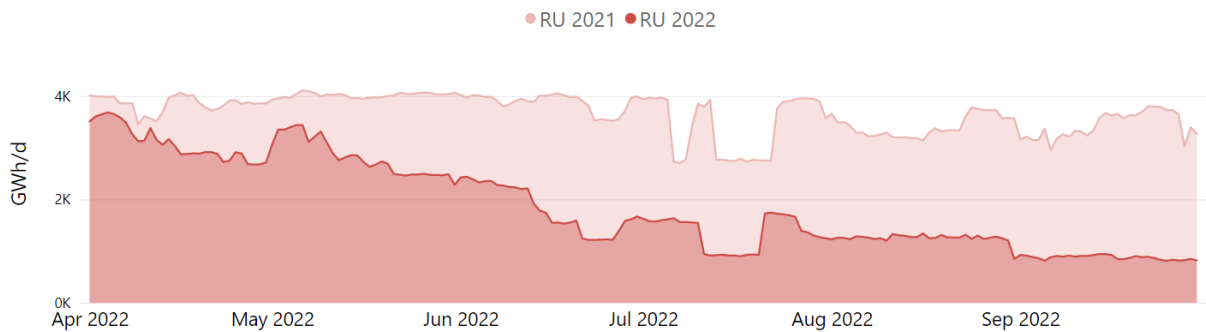


Figure 9 - Net underground gas storage profile for summer 2022

Figure 10 brings more light into the Russian gas supply over time. Four main trends were noted in the summer 2022 for Russia:

- Trend 1) Russian supply decreased around 28% in April.
- Trend 2) Sharp increase of Russian supply after which a steady decrease by almost 35% between 6 May and 12 June.
- Trend 3) Rapid decrease of Russian supply in mid-June followed by alleged compressor station maintenance works in late July.
- Trend 4) Two-step decrease of Russian supply between July and end of September (around 50%).

Russia's Pipeline Gas Flows Comparison 2021 vs 2022



Trend 1) Reduction of flows to EU via Ukraine.	Trend 2) Sharp increase of Russian Supply after which a steady decrease by almost 35% between May 6th and June 12th.	Trend 3) Rapid decrease of Russian Supply in mid-June followed by alleged compressor station maintenance works in late July.	Trend 4) two-step decrease of Russian Supply between July 22 and end of September (around 50%).
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Figure 10 - Russian supply for summer 2022

Figure 11 shows the total LNG import into European countries. Total LNG imports increased by almost 75% in Europe in comparison with 2021. The most notable changes of over 100% increase of LNG imports was observed in Belgium, the Netherlands, Lithuania, are followed by very high increases in the United Kingdom, France, Spain and Poland. The Portuguese LNG imports increased the least by only around 5%.

Total LNG Imports increased by almost 75% (EU + UK)

LNG Import per country (TWh)

Country	LNG Import 2021	LNG Import 2022	Increase
BE	23.95	62.09	159.30%
NL	38.13	88.44	131.93%
LT	9.55	19.40	103.07%
UK	55.61	106.66	91.81%
FR	93.47	174.30	86.49%
ES	81.25	138.97	71.05%
PL	21.23	33.26	56.66%
GR	12.91	18.65	44.38%
HR	10.00	13.53	35.34%
IT	60.01	75.42	25.68%
PT	29.93	31.49	5.22%

% Change by Countries

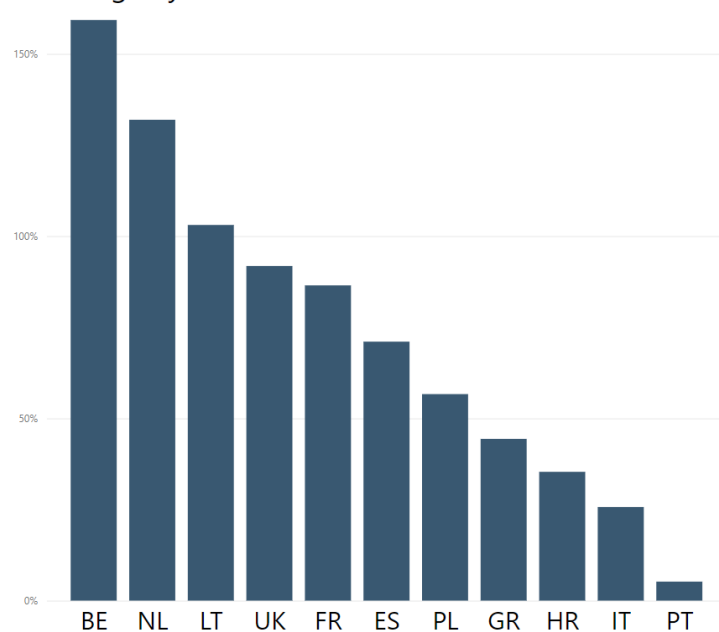


Figure 11 - Summer 2022 LNG supply comparison with summer 2021 per country

Figure 12 presents total seasonal supply per import source in 2021 and 2022. Russia's pipeline imports decreased by around 50%. LNG imports increased by 75% in comparison with 2021. Norwegian Imports decreased by 10%. Interestingly, the national production has increased by around 26% breaking the trend of previous years.

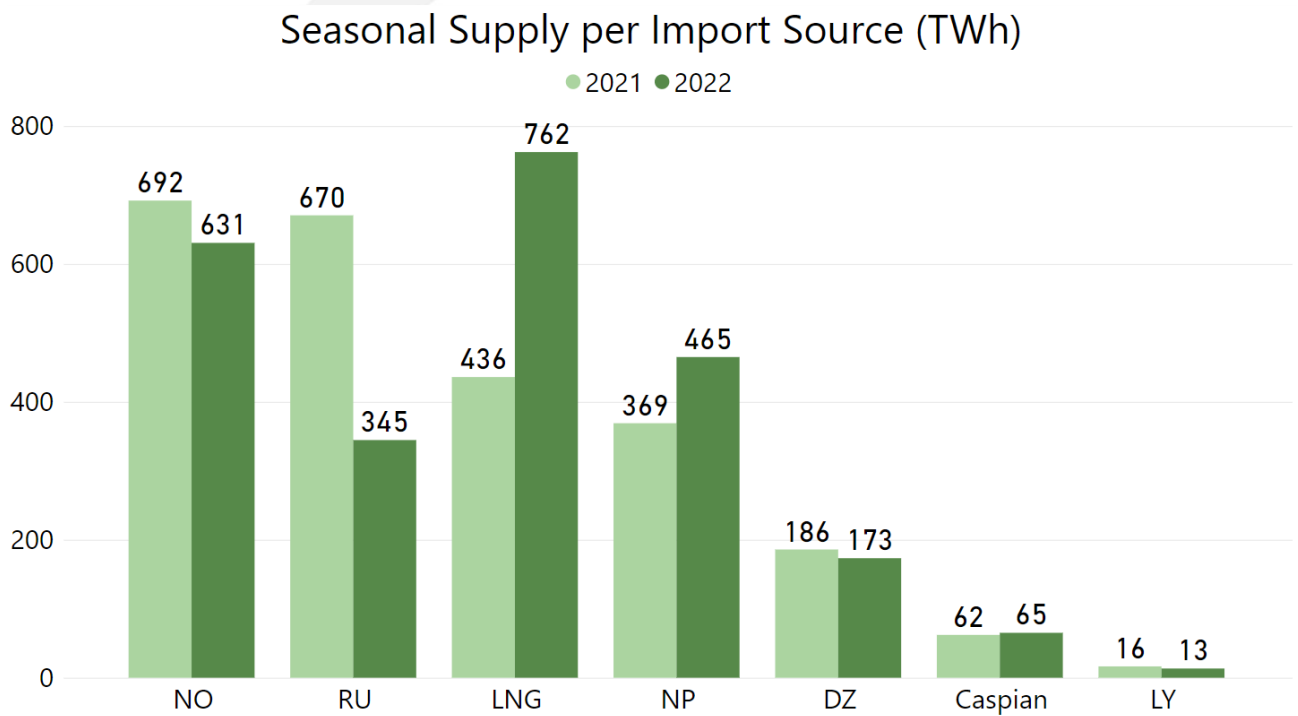


Figure 12 - Supply sources for summer 2022 in comparison with summer 2021

Figure 13 presents the summer supply mix in 2022 and 2021. The total imports in 2022 remained constant (2430 TWh in 2021 vs. 2450 TWh in 2022). Supply sources' contributions in the summer 2022 were however drastically different than in the summer 2021. The highest share of 31% of LNG, supply from Norway (26%) and national production (19%) were followed by only 14% of Russian pipeline supply. Imports from Norway were partially delivered to the UK and the EU (212 TWh vs. 419 TWh) as can be seen in **Figure 14**. Algeria delivered around 12 TWh less, the Caspian region supplied 3 TWh more when Libya supplied around 3 TWh less. The EU exported around 30 TWh to the United Kingdom as depicted in the **Figure 15**. The summer supply mix of 2021 is displayed in **Figure 16**.

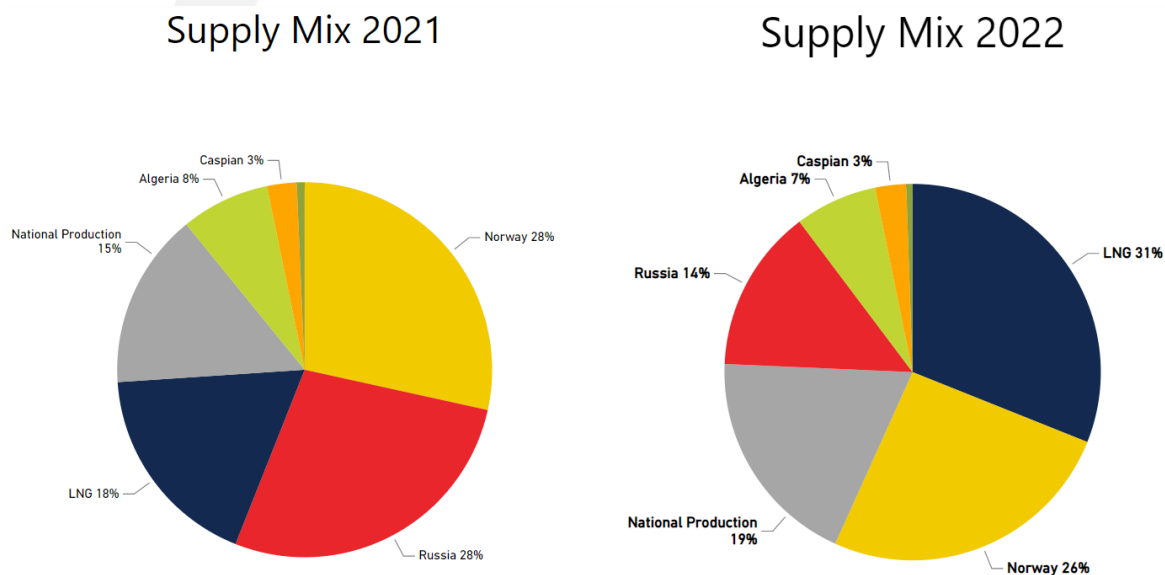
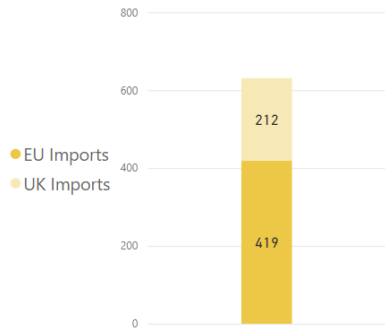
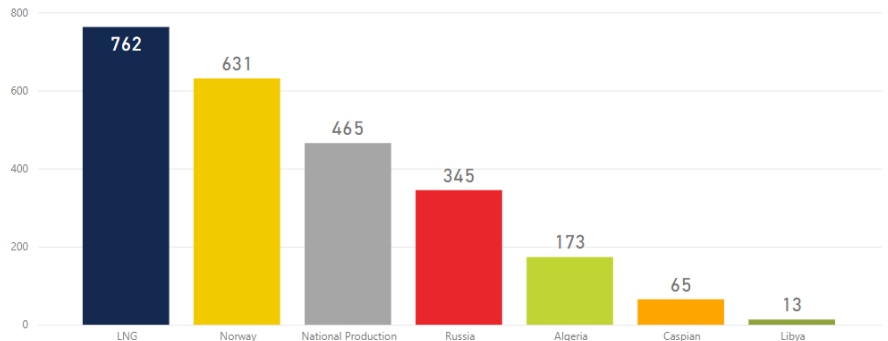


Figure 13 – Summer supply mix 2021 and 2022 comparison

NO Imports (TWh)



Supply Mix 2022 (TWh)



2.45K
Sum of total imports 2022 (TWh)

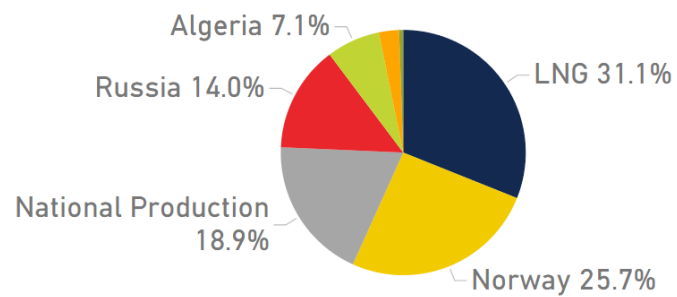
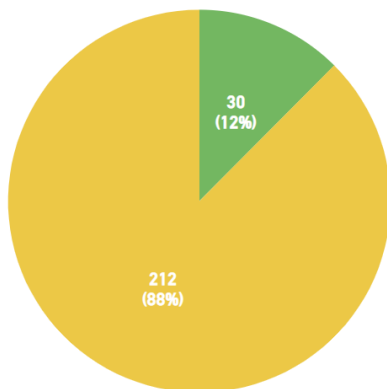


Figure 14 – Summer supply mix 2022

Pipeline Import by point (TWh)

● EU Imports ● Norway



UK Exports to the EU (TWh)

● Ireland ● Belgium

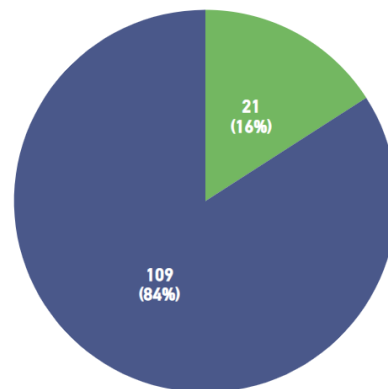


Figure 15 – United Kingdom imports and exports

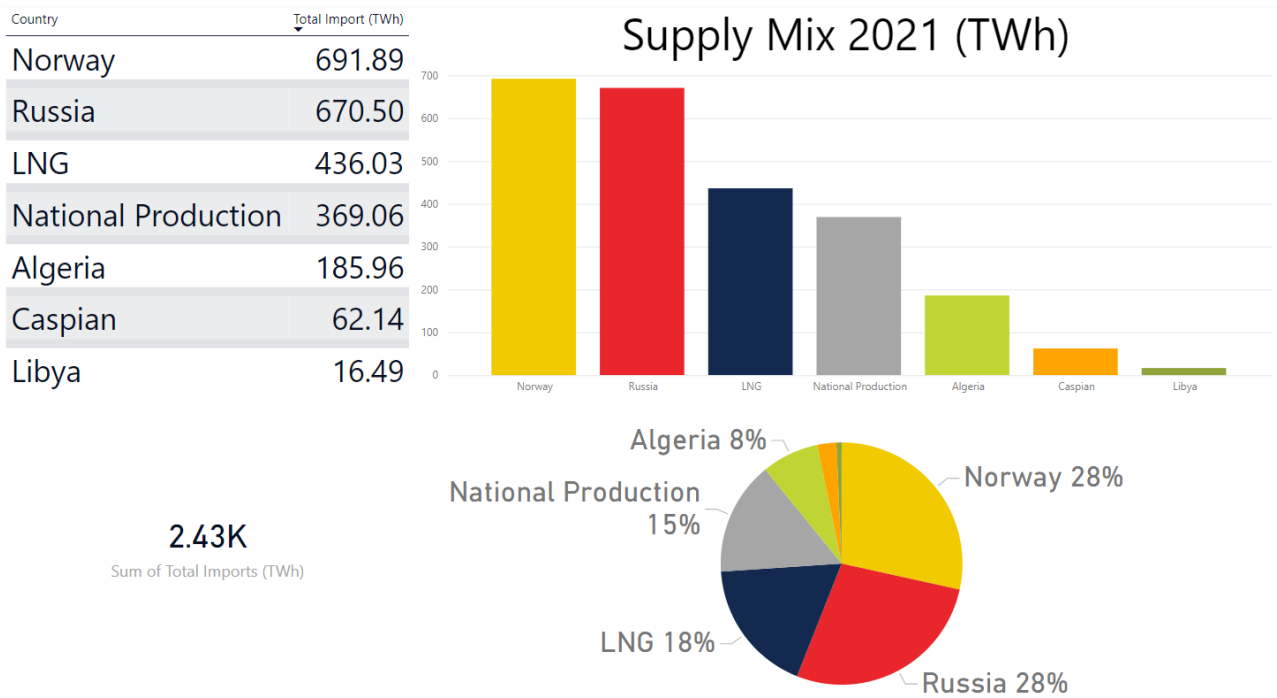


Figure 16 – Summer supply mix 2021

Figure 17 shows the historical trends of all the supply sources. Most notable changes in the trends:

- Supply from Norway decreased by around 9%.
- Russian pipeline supply decreased by around 50%.
- National production increased by 26%.
- LNG supply increased by around 75%.
- Algerian supply decreased by around 5%.
- Caspian supply remained constant (<1% increase). Trans Adriatic Pipeline (TAP), operational only from December 2020, ensured already around 48 TWh of gas supply to the EU in summer 2021, representing around 2% of the EU's total gas supply. TAP allows Europe to get access to the Caspian Region's gas resources via the Southern Gas Corridor.

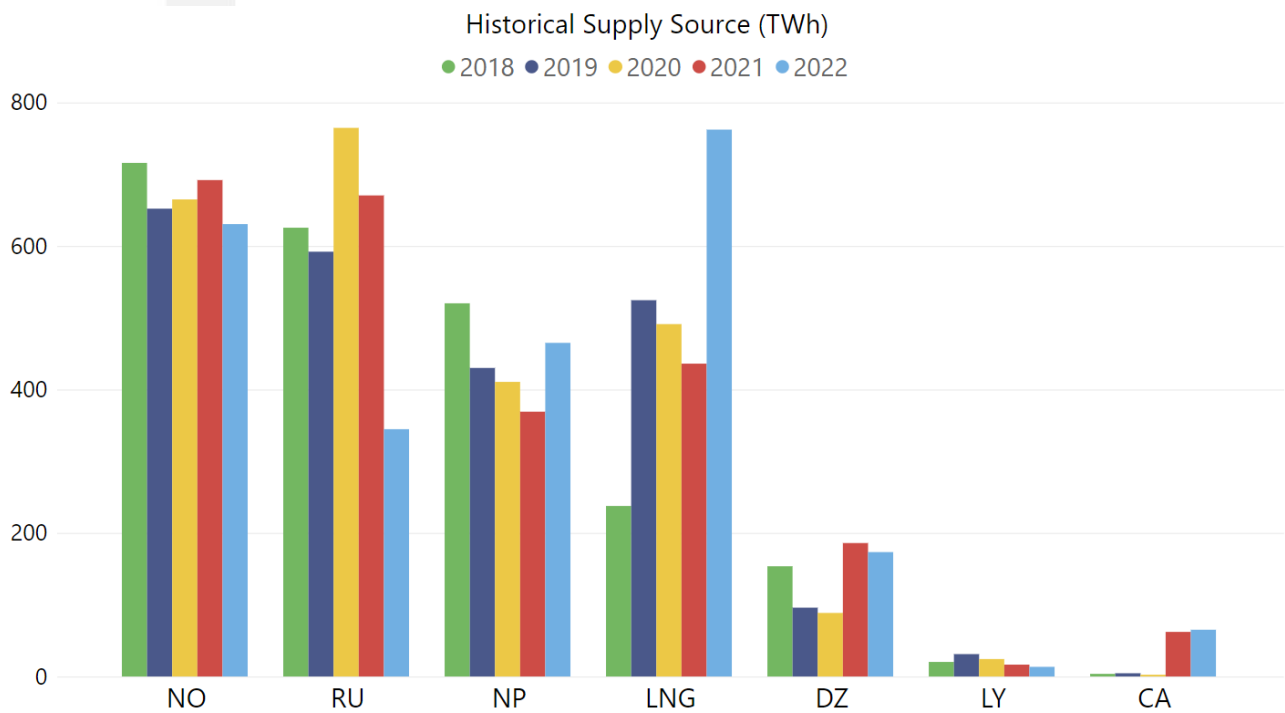


Figure 17 - Historical gas supply sources

Figure 18 shows exports from the EU. The exports to the United Kingdom was 30 TWh, to Ukraine 3 TWh and 0.7 TWh to Morocco.

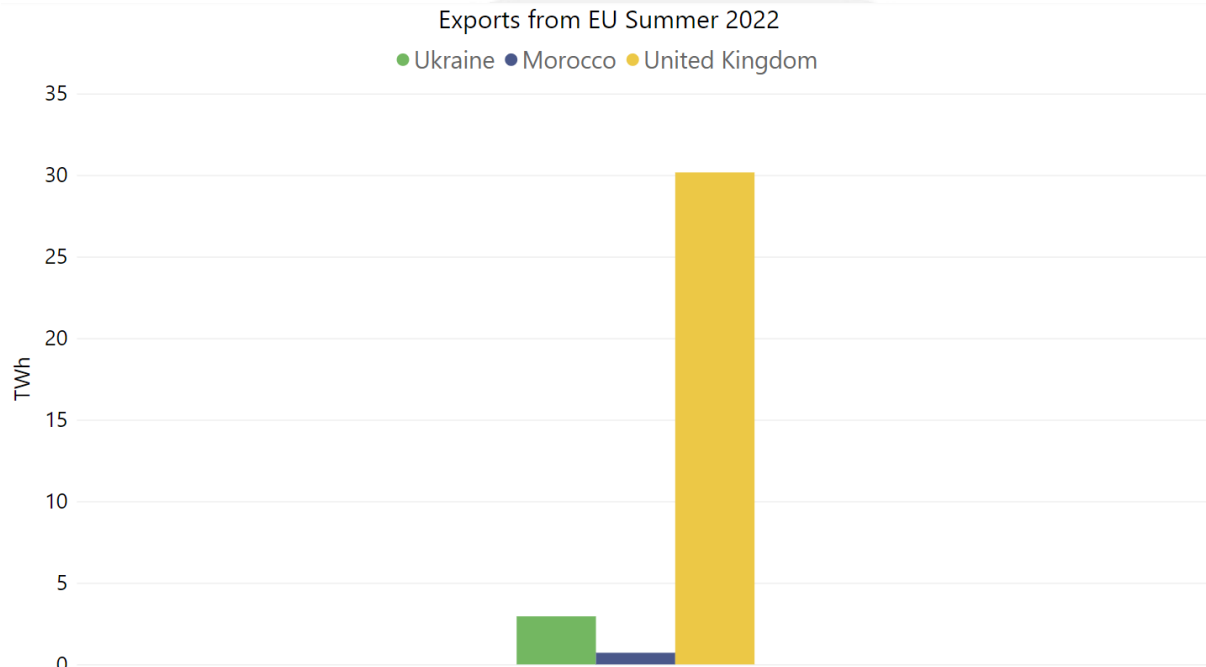


Figure 18 - Summer 2022 exports

Underground Storages

The evolution of the injection season depends on many factors, in particular the willingness of shippers (or other entities designated by Member States) to inject gas, and the actual amount of gas available for injection. The factors are linked to price signals such as summer/winter spread, EU and national laws stipulating mandatory injections, climatic effects on temperature-driven consumption, and economic considerations of end users. **Figure 19** shows the storage injection and withdrawal profile of European storages (countries as listed in **Table 2**)

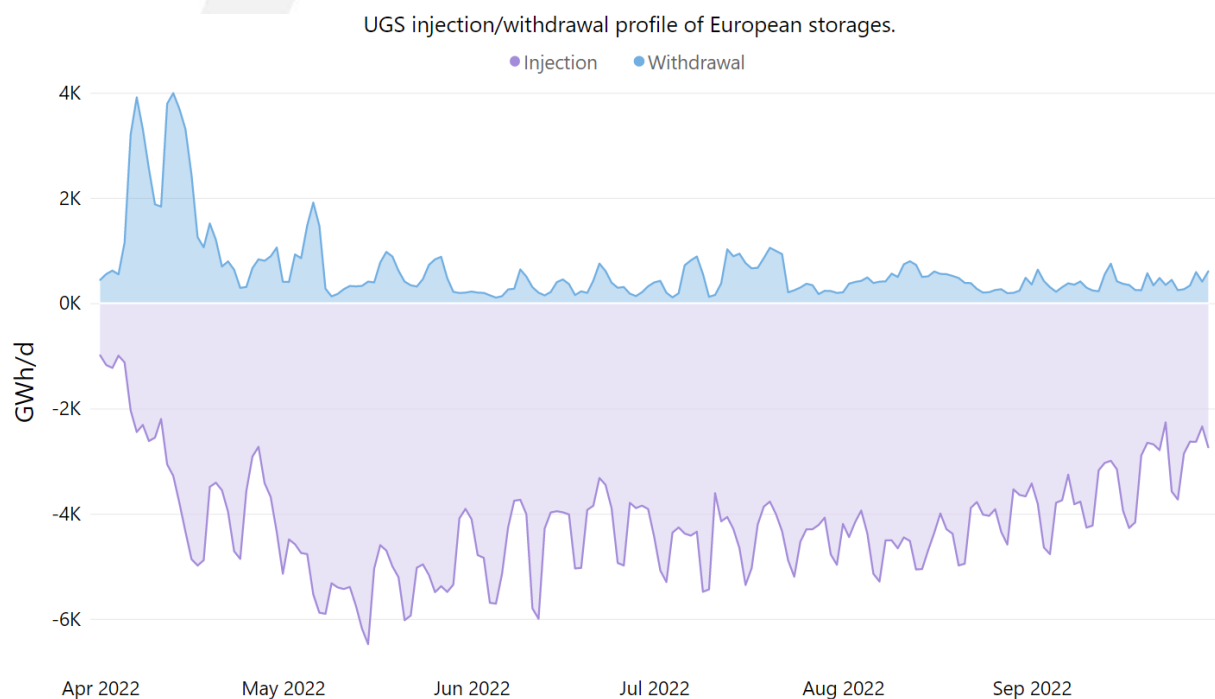


Figure 19 - UGS injection/withdrawal profile of European storages

Figure 20 provides the average net injection / withdrawal and the daily distribution ranges between the lowest and highest injection in GWh/d for the whole Europe except Bosnia and Serbia for each consecutive month of the summer periods of 2021 and 2022.

The most notable months with comparatively different storage distribution in Europe were April and May.

The box plots of April, May and August show differences that were further investigated. April 2022 shows minimum values of approximately 45% less than April 2021, meaning that the injection rate was higher in April 2022 than April 2021. In May 2022 there was no net withdrawal, which is different in comparison with May 2021, where there was a few days of net withdrawal. The August 2022 box plot is comparatively taller than for August 2021. Higher injection values in August 2022 were noted.

All the other months from June till September show relatively similar ranges in 2022 as in 2021.

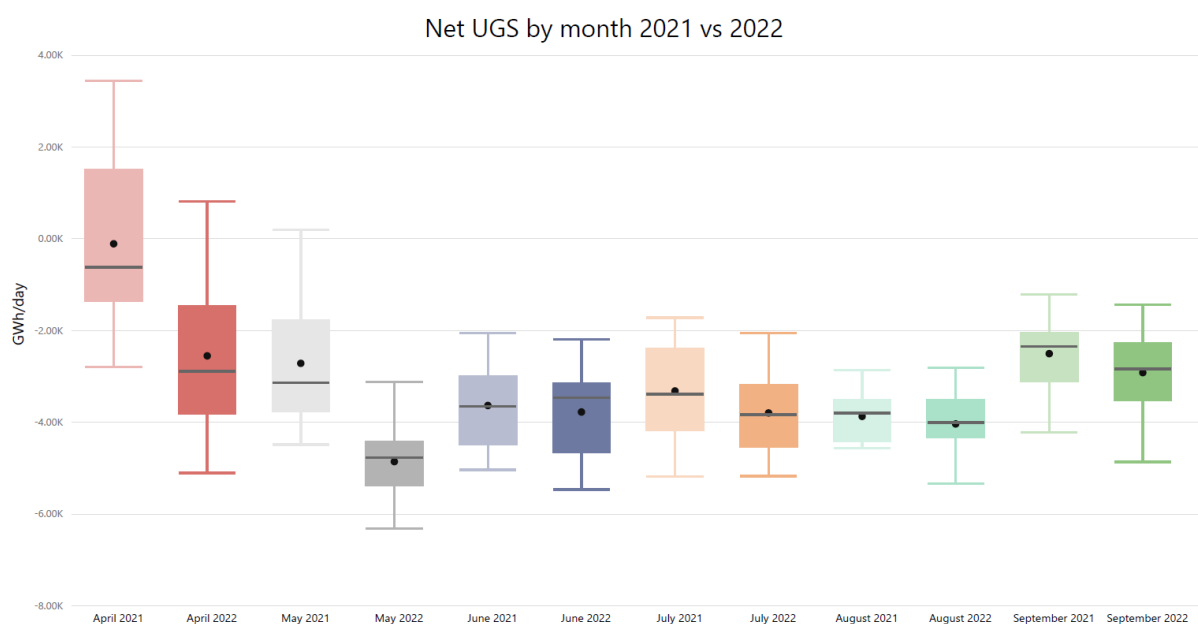


Figure 20 - Net UGS 2021 vs. 2022 per month

Figure 21 shows that storage levels on 1 April 2022 were lower than in 2021 and the lowest in comparison with the last 4 years. This is due to the Russian invasion of Ukraine, low injections into European storages by GAZPROM during the previous filling season, and the very high wholesale gas prices. From around mid-April the stock level was increasing sharply to reach its peak value in November, constituting a remarkably extended injection period.

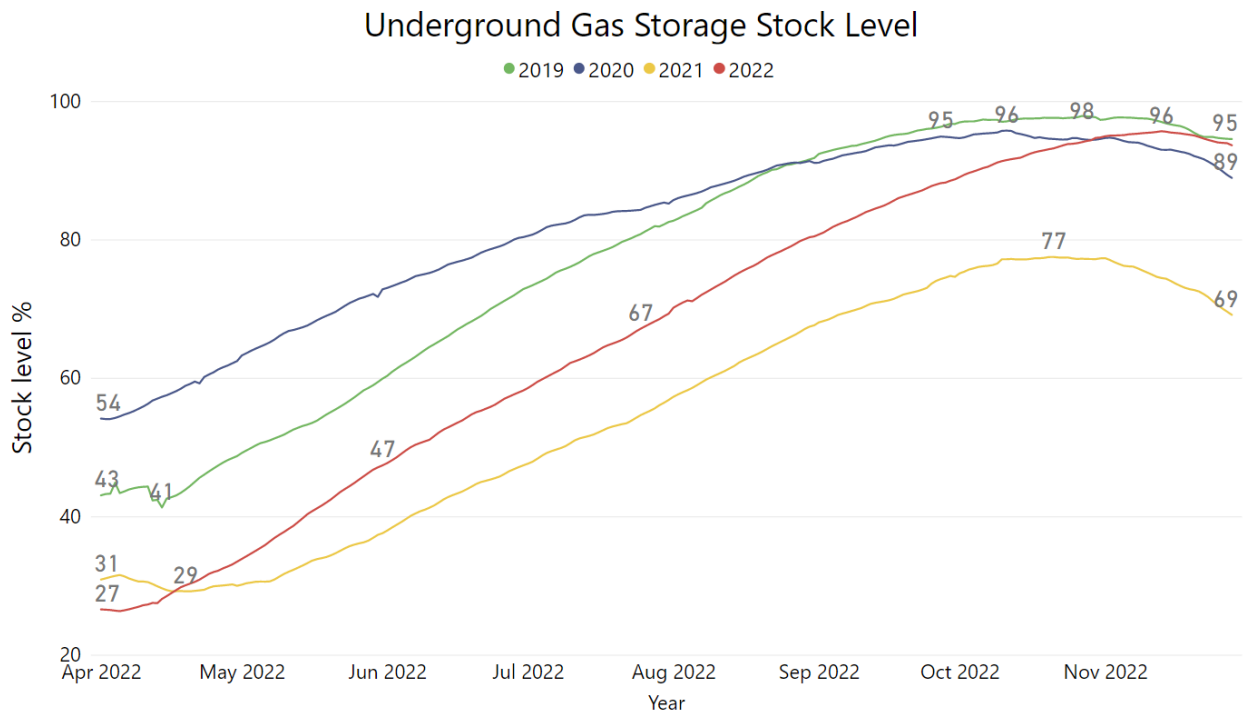


Figure 21 - Stock level over summers 2019 - 2022⁴

⁴ Source: AGSI

Table 3 shows that the storage level of 89% at the end of the summer 2022 was higher than in the previous summer. The highest storage level of 95% was reached only on 13 November.

Table 3 - Historical maximum stock levels⁵

Summer	30 Sep.	Maximum stock level	Month	Day
S2016	90.74%	92.0%	October	9
S2017	84.58%	89.2%	October	29
S2019	96.69%	98.0%	October	27
S2020	94.69%	96.0%	October	11
S2021	74.60%	77.0%	October	21
S2018	82.98%	87.6%	November	7
S2022	89.00%	95.0%	November	13

⁵ Source: AGSI

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