



# ENTSOG SUMMER SUPPLY REVIEW

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2023

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## Executive Summary

ENTSOG has completed the review of the European gas picture for the summer of 2023, April to September. ENTSOG'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 ENTSOG reports.

The key findings of this review are:

- The consumption of gas in the EU continued its decline, falling below the levels observed in the last five summer seasons. Total gas demand values in the summer season reduced by around 3% (1,301 TWh vs 1,262 TWh) in the EU and 5% (1,608 TWh vs 1,524 TWh) in Europe overall year-on-year. The mild weather, decrease in demand from the industrial sector, and other factors, including the subsequent lower electricity use, collectively influenced the decline in gas demand during the summer season 2023.
- The total demand decreased by 15% at the EU (1,492 TWh vs 1,262 TWh) and European (1,797 TWh vs 1,524 TWh) levels compared to the 5-year average, as indicated in the EC regulation<sup>1</sup> regarding voluntary demand reduction. The Union has implemented further measures to increase its level of preparedness regarding gas supply disruption following the escalation of Russian military aggression against Ukraine since February 2022.
- EU wholesale day-ahead monthly average gas prices range-d from the lowest at 26.64 €/MWh to the highest at 46.15 €/MWh during the Summer season 2023. Following the historic peak reached in August 2022 (235.34 €/MWh), prices continued a downward trajectory, being 51% lower than the winter season 2022/23 and showing a 73% decrease year-on-year.
- In the summer season 2023, European gas production reached approximately 337 TWh, falling by 26% compared to the previous summer. This reduction was driven mainly by falling domestic production of the largest gas producer in the EU - the Groningen gas field in the Netherlands, which is closed from October 1, 2023.
- On 1 October 2023, the EU gas storage facilities reached 96% on average or 1,091 TWh - highest amount of gas stored within the last 5 years. The high storage filling level at the beginning of injection period (56%), decrease in gas consumption over the year and dedicated measures introduced by the Member States, together with the individual consumers behaviour, contributed to the record volume of gas in storage at the beginning of the winter period 2023/24.

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<sup>1</sup> Council Regulation (EU) 2022/1369 of 5 August 2022 on coordinated demand-reduction measures for gas

- The total supply to European countries reached 2033 TWh in the Summer season 2023, a 16% decrease compared to the previous Summer. In addition to the lower gas consumption, the high storage filling rate at the beginning of the Summer 2023 (injection period) contributed to the low import levels.
- The share of LNG supply increased from 31% in Summer 2022 to 37% in Summer 2023, highlighting its growing role as both a balancing source and a supplier to fill storage during injection period.
- The gas supply by pipelines was 940 TWh in Summer 2023, with a share of 46% in total supply mix. Norway remained the biggest pipeline gas supplier with a share of 27%, followed by supply from North Africa – both Algeria and Libya – with a share of 9%. The share of gas supplied to Europe via pipelines from Russia decreased to 7% in the Summer 2023, down from 14% in the previous Summer.

Detailed data for the cross-border flows is available on the ENTSOG Transparency Platform<sup>2</sup>.

The figures in the review report are available on dashboard [SR2023.dashboard.pbix](https://www.entsog.eu/outlooks-reviews)<sup>3</sup>.

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.*

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<sup>2</sup> Transparency Platform: <https://transparency.entsog.eu/>

<sup>3</sup> SR2023.dashboard.pbix: <https://www.entsog.eu/outlooks-reviews>

## Introduction

This review, as part of the ENTSOG Annual Work Program 2024, is published on a voluntary basis and aims at providing an overview of the demand and supply balance during the Summer 2023. 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 2023. The major ones between April and September 2023 were:

- In June 2023, the Dutch Government announced plans to close Groningen, Europe’s largest gas field, starting from October 1, 2023.
- The risk of supply disruptions in Australia, one of the world’s largest producers of LNG and a major exporter to Asian countries, caused European gas prices to surge in August 2023.
- The EU has achieved its target of filling gas storage facilities to 90% of capacity roughly two months ahead of the November 1 deadline, in accordance with the regulation adopted in June 2022<sup>4</sup>. This measure aims to optimize the EU's preparation for the upcoming winter.
- In September 2023, Norwegian maintenance, both planned and unplanned, affected several key gas infrastructure assets, resulting in an extended period of reduced exports from Norway.

A significant number of new gas infrastructure facilities were commissioned over the past year, with a notable emphasis on the expansion of new LNG import capacities. Details of the newly commissioned/upgraded infrastructure in summer season 2023 can be found in Table 1.

**Table 1 - Newly commissioned/upgraded infrastructure in summer 2023**

Country	Project Name	Start date	Capacity
Germany	Brunsbüttel LNG terminal	March 2023	5 bcm/year
Bulgaria/Turkey	IP Strandzha (BG)/Malkoclar (TR) (flow direction upgrade)	April 2023	TR to BG: 117 GWh/day
Italy	Piombino (FSRU Golar Tundra)	May 2023	5 bcm/year
Spain	Gijón (Musel) LNG terminal	July 2023	7 bcm/year

<sup>4</sup> Regulation (EU) 2022/1032 of the European Parliament and of the Council of 29 June 2022 amending Regulations (EU) 2017/1938 and (EC) No 715/2009 with regard to gas storage



## Gas Prices at European Hubs

Figure 1 shows the evolution of gas prices in Europe during the Summer 2023. The following graph presents the day-ahead average prices evolution for various EU gas Hubs. The graph demonstrates a consistent trend among the majority of EU Hubs, all reacting in the same direction.

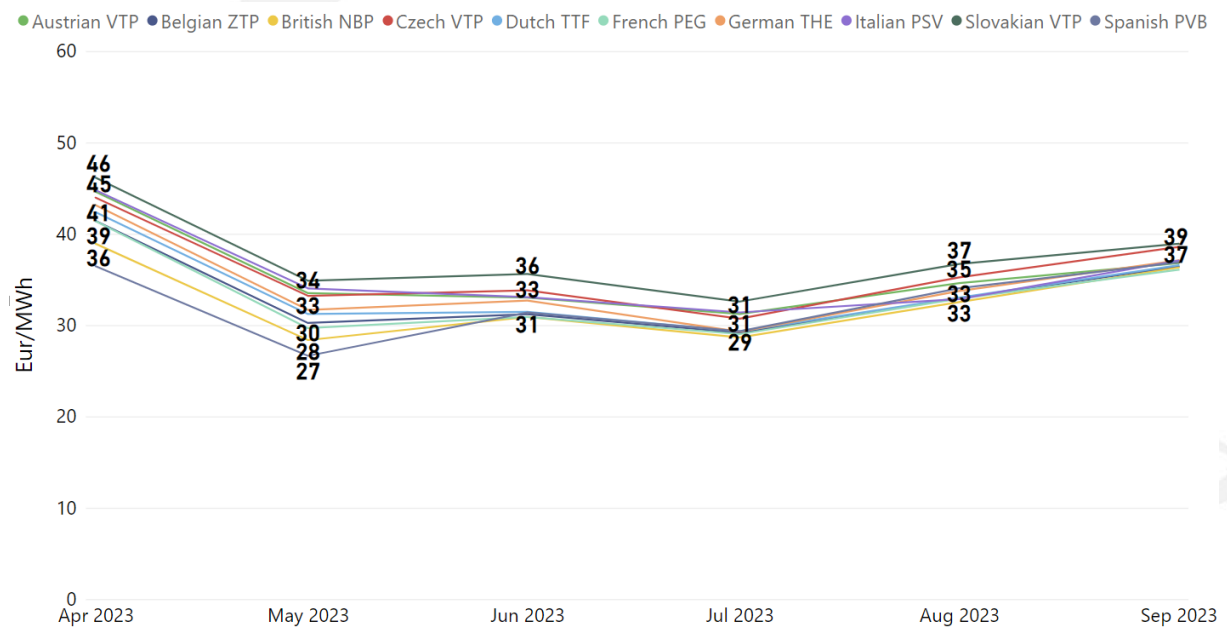


Figure 1 - Day-ahead average gas price at EU gas Hubs<sup>5</sup> (see [SR2023.dashboard.pbix](#))

- EU wholesale day-ahead monthly average gas prices ranged from the lowest at 26.64 €/MWh (Spanish PVB) to the highest at 46.15 €/MWh (Slovakian VTP).
- Following the historic peak reached in August 2022 (235.34 €/MWh), prices continued a downward trajectory, being 51% lower than the winter season 2022/23 (winter season average 70.08 €/MWh) and showing a 73% decrease year-on-year (Summer season average 128.75 €/MWh).

<sup>5</sup> Source: Global S&P (Platts)

### Demand

Figure 2 and Figure 3 represent the total gas demand change in Summer 2023 compared to Summer 2022 by country.

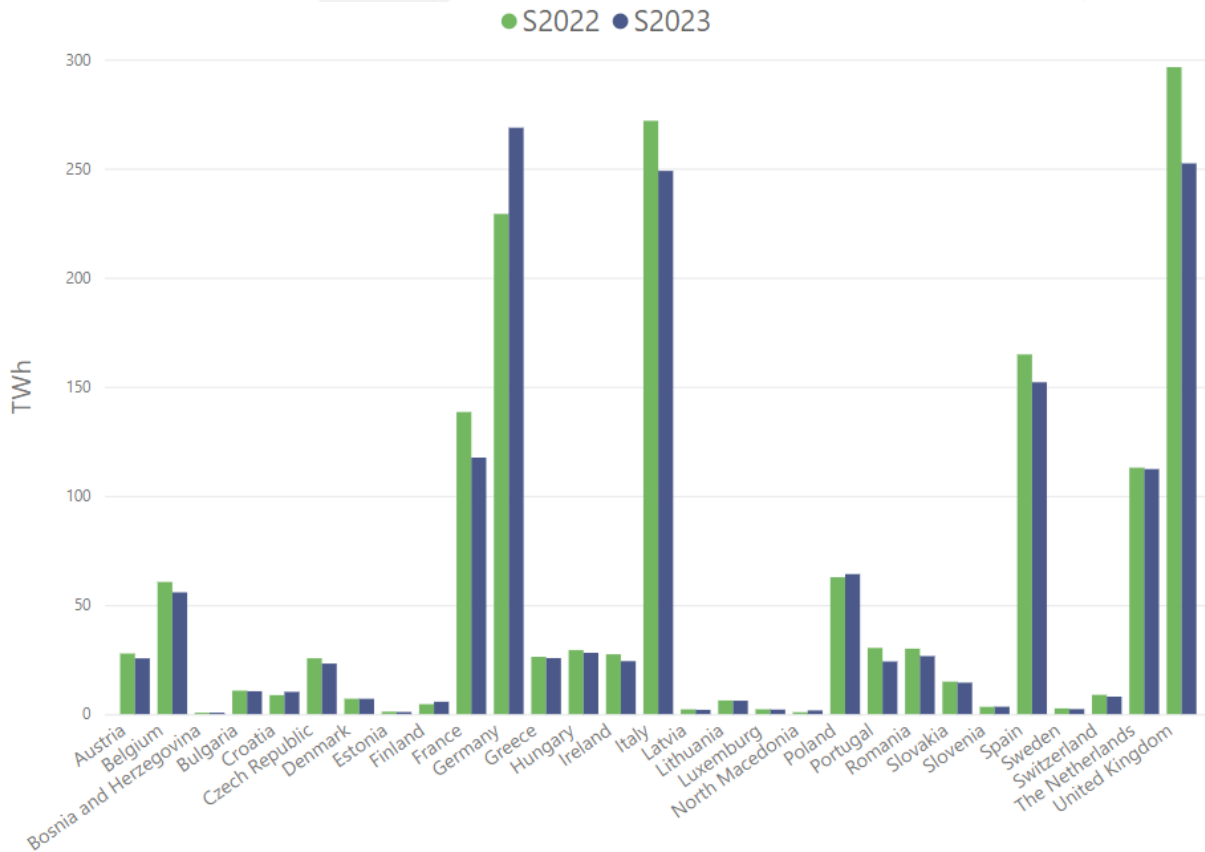


Figure 2 - Total gas demand by country. Summer 2022 vs 2023 (see [SR2023.dashboard.pbix](#))

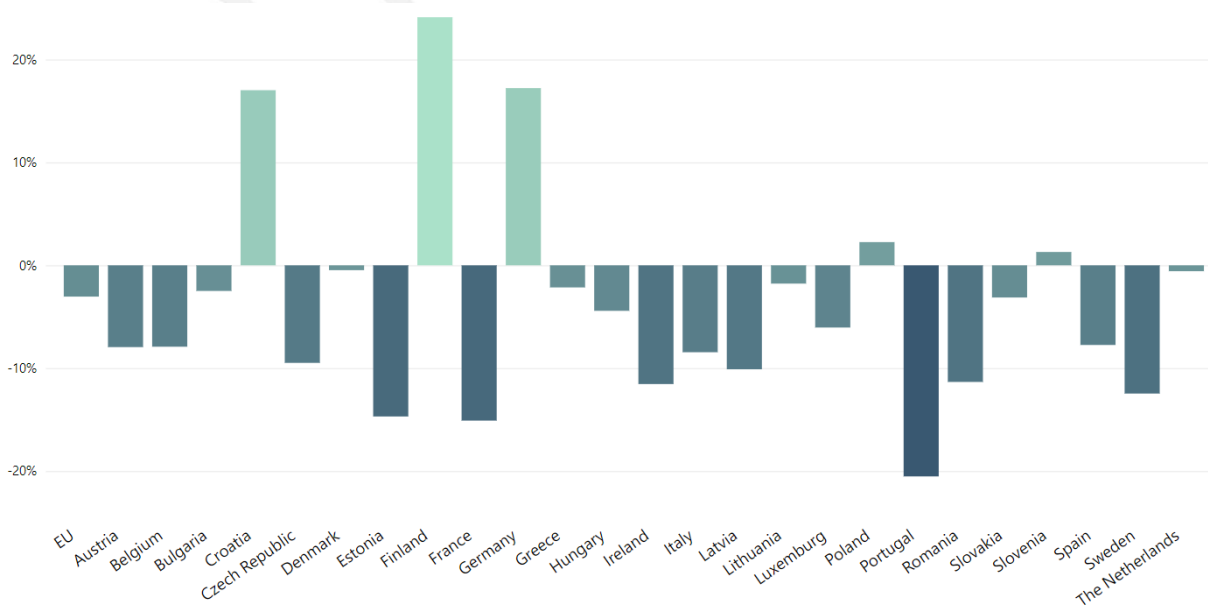


Figure 3 – Demand variation by country in EU %. Summer 2022 vs 2023 (see [SR2023.dashboard.pbix](#))



**Table 2 – Demand per country for Summer 2022 and Summer 2023**

Country	Demand S2022, TWh	Demand S2023, TWh	Difference, %
Austria	27.76	25.56	-7.95%
Belgium	60.58	55.79	-7.91%
Bulgaria	10.76	10.49	-2.49%
Croatia	8.71	10.19	17.02%
Czech Republic	25.59	23.16	-9.48%
Denmark	7.05	7.02	-0.47%
Estonia	1.13	0.97	-14.69%
Finland	4.56	5.66	24.11%
France	138.44	117.55	-15.09%
Germany	229.22	268.7	17.22%
Greece	26.24	25.68	-2.15%
Hungary	29.37	28.07	-4.42%
Ireland	27.43	24.26	-11.54%
Italy	271.88	248.91	-8.45%
Latvia	2.18	1.96	-10.11%
Lithuania	6.25	6.14	-1.78%
Luxemburg	2.2	2.07	-6.05%
Poland	62.74	64.16	2.25%
Portugal	30.34	24.11	-20.52%
Romania	29.98	26.59	-11.33%
Slovakia	14.89	14.42	-3.13%
Slovenia	3.33	3.38	1.30%
Spain	164.81	152.05	-7.74%
Sweden	2.62	2.29	-12.46%
The Netherlands	112.93	112.28	-0.57%
<b>EU</b>	<b>1301.01</b>	<b>1261.46</b>	<b>-3.04%</b>
Bosnia and Herzegovina	0.5	0.49	-2.72%
North Macedonia	0.87	1.69	93.61%
Switzerland	8.84	8.01	-9.39%
United Kingdom	296.46	252.34	-14.88%
<b>Europe</b>	<b>1607.69</b>	<b>1523.99</b>	<b>-5.21%</b>

- The consumption of gas in the EU continued its decline, falling below the levels observed in the last five summer seasons (**Figure 4**). Total gas demand values in the summer season reduced by around 3% (1,301 TWh vs 1,262 TWh) in the EU and 5% (1,608 TWh vs 1,524 TWh) in Europe overall year-on-year. The mild weather, energy-saving measures, a decrease in demand from the industrial sector, and other factors, including the subsequent lower electricity use, collectively influenced the decline in gas demand during the summer season 2023.

- Comparing with the previous season, the evolution of gas demand by country (**Figure 3**) shows a decreasing trend in most of the countries while it remains rather stable or even slightly up in some. Based on the received data, gas consumption - in the order of percentage changes - fell by the largest percentage in Portugal (by 21%). Among the countries with the highest gas consumption, demand significantly dropped in the United Kingdom (by 15%), France (by 15%), Italy (by 8%) and Spain (by 8%).

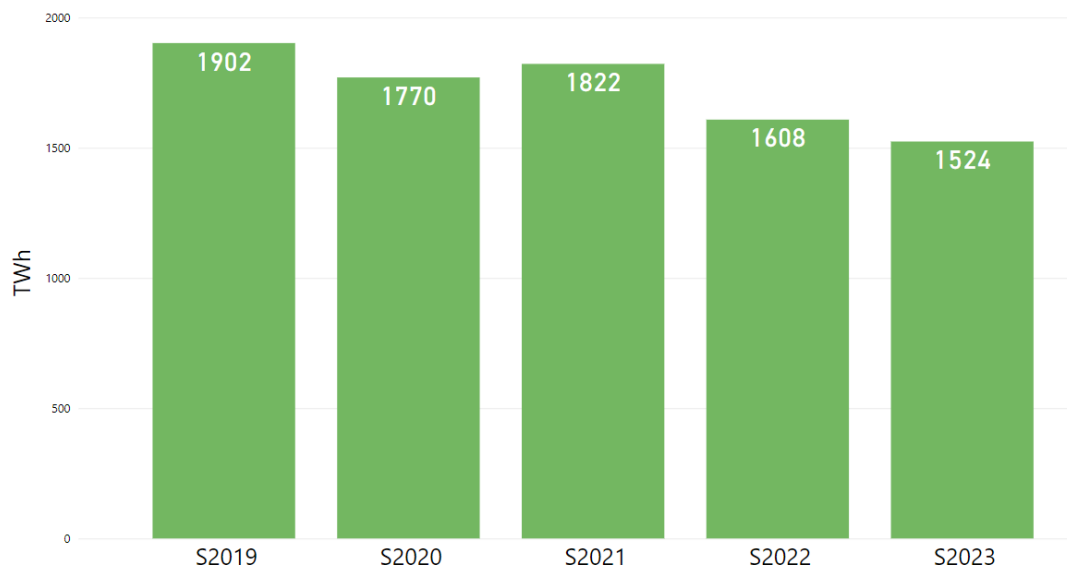


Figure 4 - Historical gas demand. Summers 2019 – 2023 (see [SR2023.dashboard.pbix](#))

Figure 5 represents gas consumption for power generation per country during the summer season 2023.

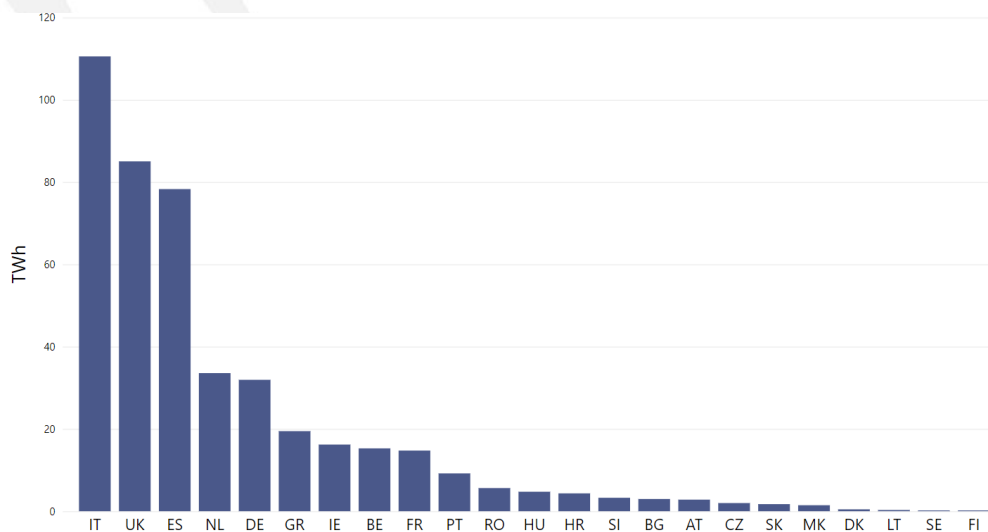


Figure 5 - Gas consumption for power generation<sup>6</sup>. Summer 2023 (see [SR2023.dashboard.pbix](#))

<sup>6</sup> The graph refers to the countries for which demand breakdown is available (with exception of Austria, Bosnia and Herzegovina, Estonia, Latvia, and Poland).

> **Seasonal electricity power generation (TWh<sub>e</sub>)<sup>7</sup>**

- In the Summer season 2023, the electricity produced from gas was 227 TWh<sub>e</sub>, and it decreased by 13% compared to the previous season 2022. Meanwhile, coal (hard coal and lignite) use in the electricity mix decreased significantly by 56%, as shown in Figure 6. The reduction in fossil fuel use in electricity generation is explained by a decline in electricity demand combined with an increase in the share of renewable and nuclear sources.

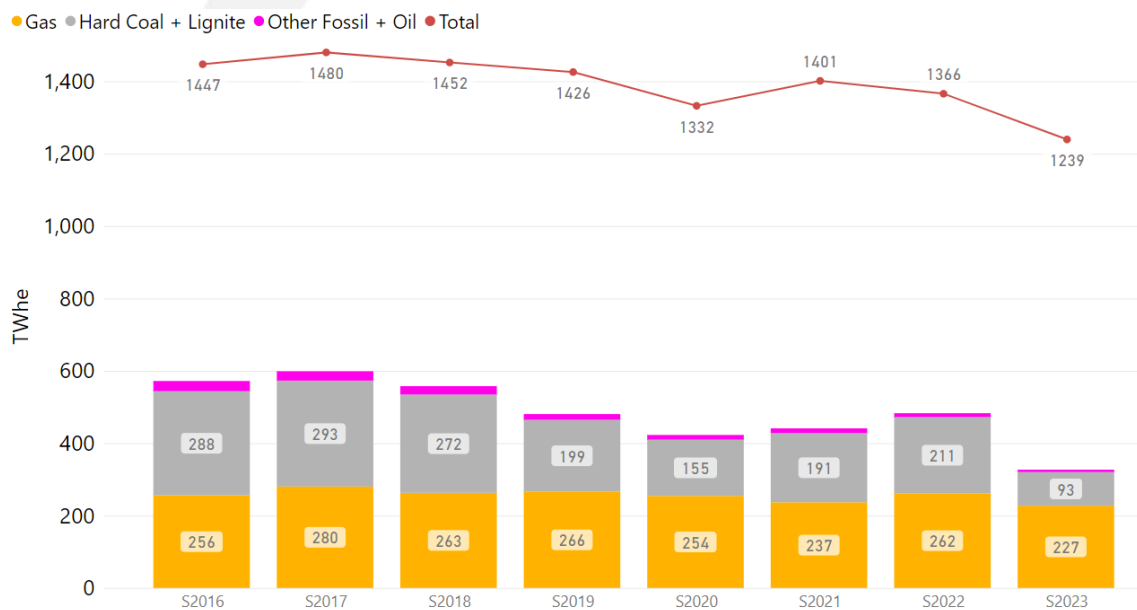


Figure 6 – Fossil fuel sources in the electricity mix. Summers 2016 - 2023 (see [SR2023.dashboard.pbix](#))

- Based on data from ENTSOE Transparency Platform (EU data) and National Grid ESO data (UK data), the electricity generation mix showed a 9% decline compared to the previous summer season, following the impact of milder weather and reduced industrial demand.
- Gas represented 18% of the electricity generation in the summer season 2023 with a year-on-year decrement of 1%, as shown in **Figure 7**. The increase in renewable generation, especially from hydro sources, along with improved availability of nuclear power, has been replaced by the use of gas and coal-fired generation.

<sup>7</sup> Source: ENTSOG elaboration based on ENTSO-E Transparency Platform data and National Grid ESO data. The gas demand to achieve this electricity production is higher in thermal terms due to the gas-fired power plants' efficiency factor.

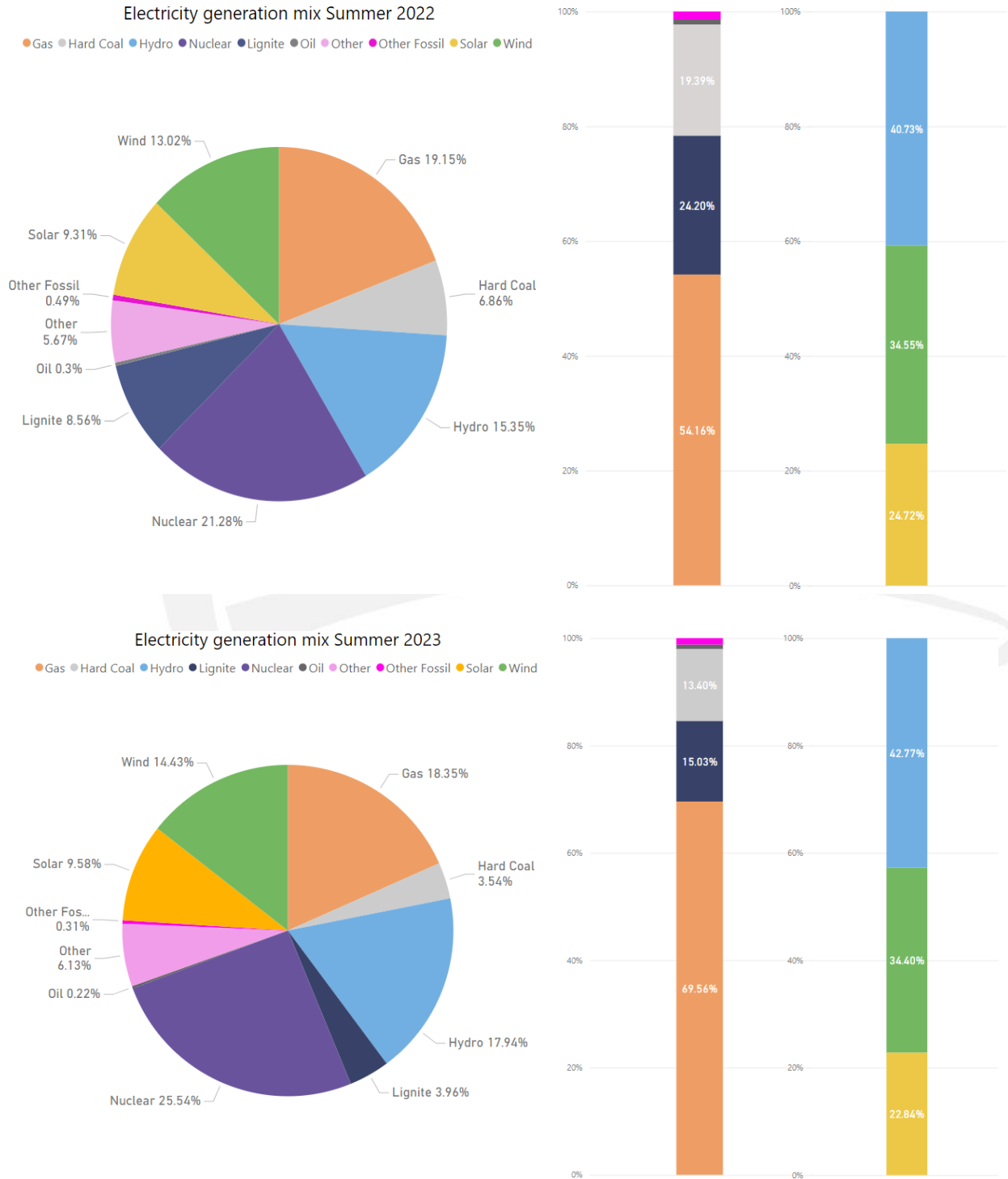
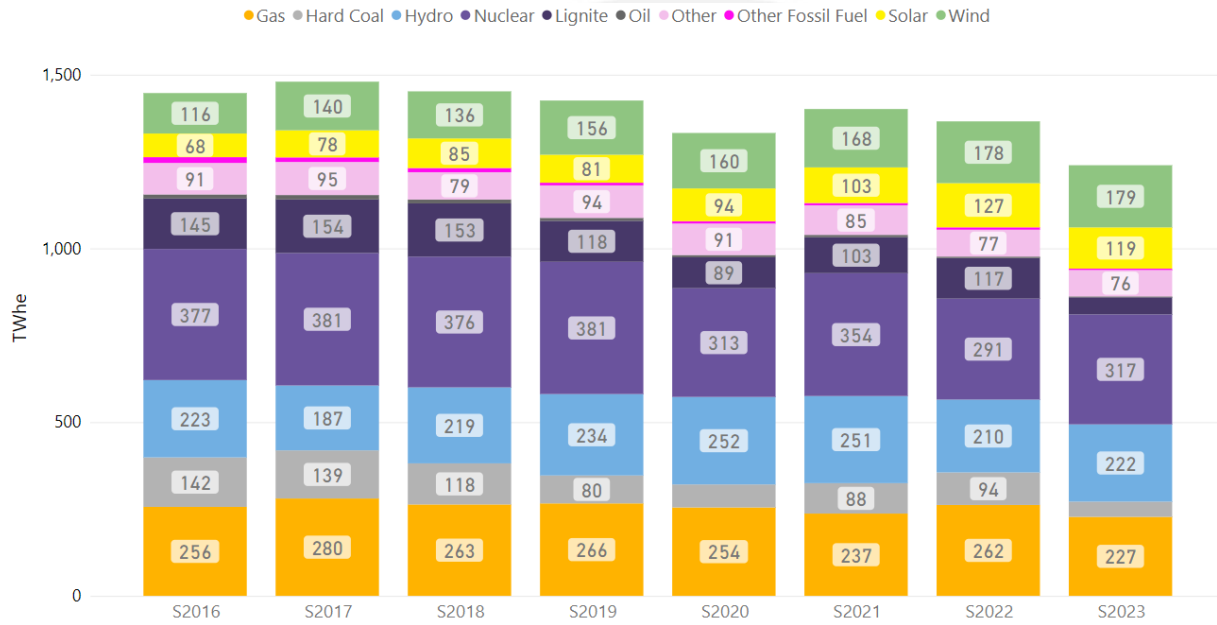


Figure 7 - Electricity power generation mix. Summer 2022 vs 2023 (see [SR2023.dashboard.pbix](https://www.entsoe.eu/summarsupplyreview2023))

**Figure 8** shows the electricity generation mix for the Summers S2016 – S2023.



**Figure 8 - Historical electricity generation mix S2016 - S2023** (see [SR2023.dashboard.pbix](https://www.entsoe.eu/summertime/summertime_dashboard.aspx))

## Supply

Figure 9 shows the evolution of the aggregated gas supply in European countries during the last summer season 2023.

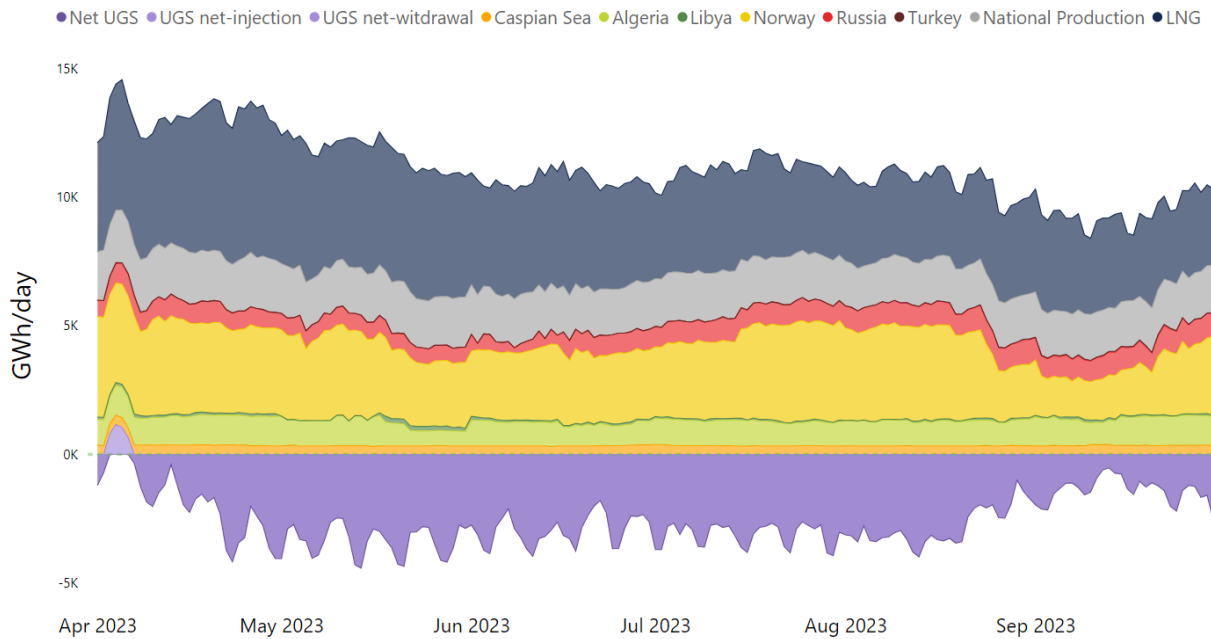


Figure 9 - Summer 2023 supply profile (see [SR2023.dashboard.pbix](#))

Figure 10 shows the seasonal supply by source, including national production, during the Summer 2022 and Summer 2023.

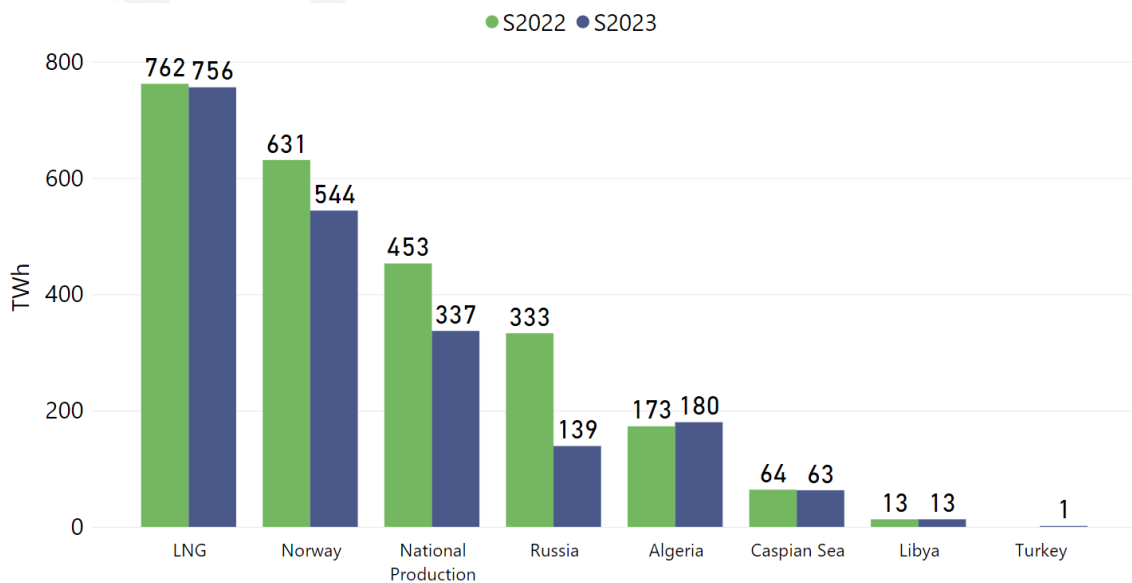
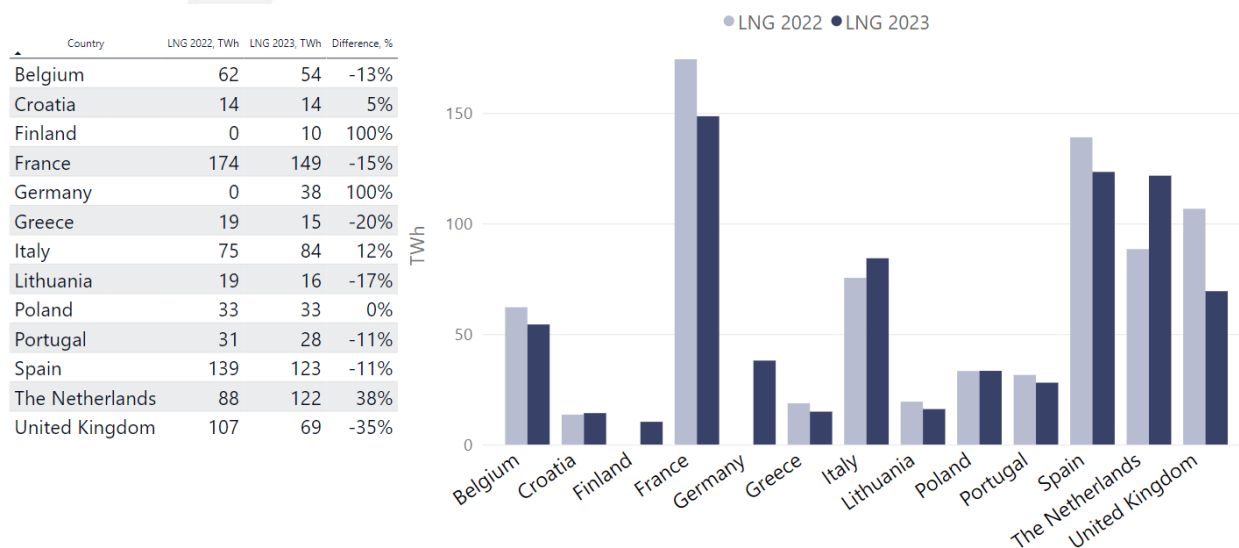


Figure 10 - Total supply by source. Summer 2022 vs 2023 (see [SR2023.dashboard.pbix](#))

- In the Summer season 2023, European gas production reached approximately 337 TWh, falling by 26% compared to the previous Summer. This reduction was driven mainly by falling domestic production of the largest gas producer in the EU - the Groningen gas field in the Netherlands, which is closed from October 1, 2023.
- LNG supply was slightly down by less than 1% in the summer season of 2023, reaching more than 750 TWh. **Figure 11** shows the total LNG import into European countries. During the Summer 2023, France retained its position as the EU's largest LNG importer (149 TWh), followed by Spain (123 TWh) and the Netherlands (122 TWh).



**Figure 11 - LNG supply per country. Summer 2022 vs 2023 (see [SR2023.dashboard.pbix](#))**

- Gas supply from Norway showed a decrease by 14% in the Summer season 2023 ensuring more than 540 TWh. The flows from Norway were affected by heavy maintenance and unplanned outages at the gas fields during September 2023. Consequently, this affected the ability to inject gas into storage, leading to a lower flow into storage in September.
- Compared to the Summer season 2022, pipeline gas supply from Algeria increased slightly by 4%, reaching around 180 TWh in the Summer 2023. Meanwhile, the supply from Libya and the Caspian Sea remained stable at 13 TWh and 63 TWh respectively.
- Since April 2023, flows from Turkey have been delivered through the IP Strandzha (BG) / Malkoclar (TR) route, which was previously used in the reverse direction for exports from the EU to Turkey. Since 2023, network users have been receiving gas via the Turkish gas grid from LNG terminals, which are entirely or partially operated by Turkish operator BOTAS.
- Russian pipeline gas supply to Europe totalled 139 TWh in the Summer 2023, marking a nearly 60% decrease compared to the previous year. **Figure 12** shows Russian pipeline gas



flows in Summer 2022 and Summer 2023. Russian deliveries into Europe by pipeline are limited to flows via Ukraine and TurkStream.

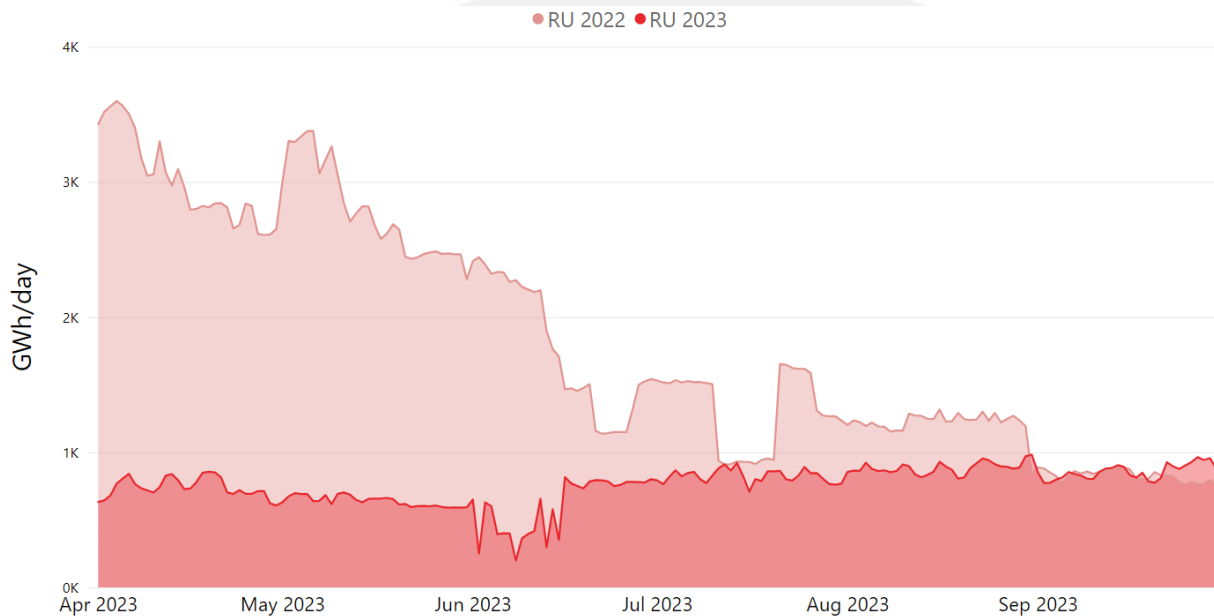


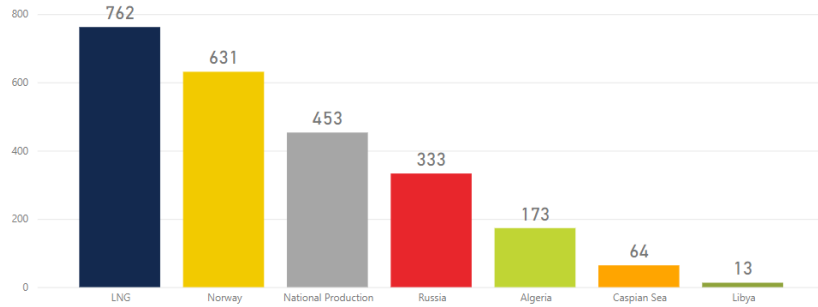
Figure 12 - Russian pipeline gas flows. Summer 2022 vs 2023 (see [SR2023.dashboard.pbix](#))

Figure 13 shows the supply mix in Summer 2022 compared to the Summer 2023.

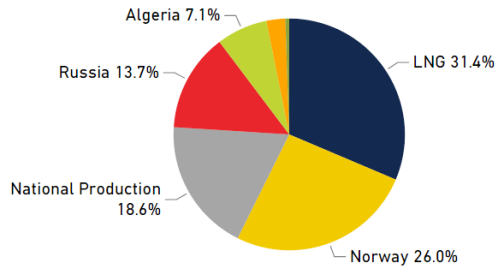
- The total supply to European countries was 2033 TWh in the Summer season 2023, a 16% decrease compared to the previous Summer. In addition to the lower gas consumption, the high storage filling rate at the beginning of the Summer 2023 (injection period) contributed to the low import levels.
- The gas supply by pipelines was 940 TWh in Summer 2023, with a share of 46% in total supply mix. Norway remained the biggest pipeline gas supplier with a share of 27%, followed by supply from North Africa – both Algeria and Libya – with a share of 9%. The share of gas supplied to Europe via pipelines from Russia decreased to 7% in the summer 2023, down from 14% in the previous Summer.
- The share of LNG supply increased from 31% in Summer 2022 to 37% in Summer 2023, highlighting its growing role as both a balancing source and a supplier to fill storage during injection period.

Supply source	Total, TWh
Algeria	173
Caspian Sea	64
Libya	13
LNG	762
National Production	453
Norway	631
Russia	333

### Supply Mix S2022, TWh

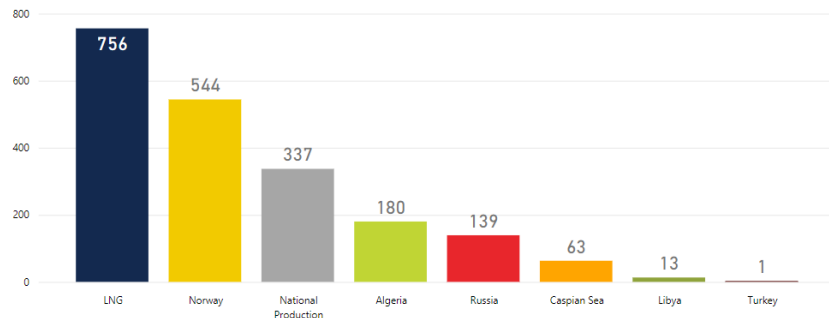


**2429**  
Sum of Total, TWh



Supply source	Total, TWh
Algeria	180
Caspian Sea	63
Libya	13
LNG	756
National Production	337
Norway	544
Russia	139
Turkey	1

### Supply Mix S2023, TWh



**2033**  
Sum of Total, TWh

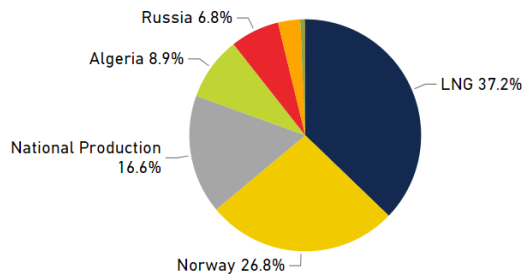


Figure 13 – Supply mix. Summer 2022 vs 2023 (see [SR2023.dashboard.pbix](#))

Figure 14 shows the evolution of the different supply sources during the last five Summers.

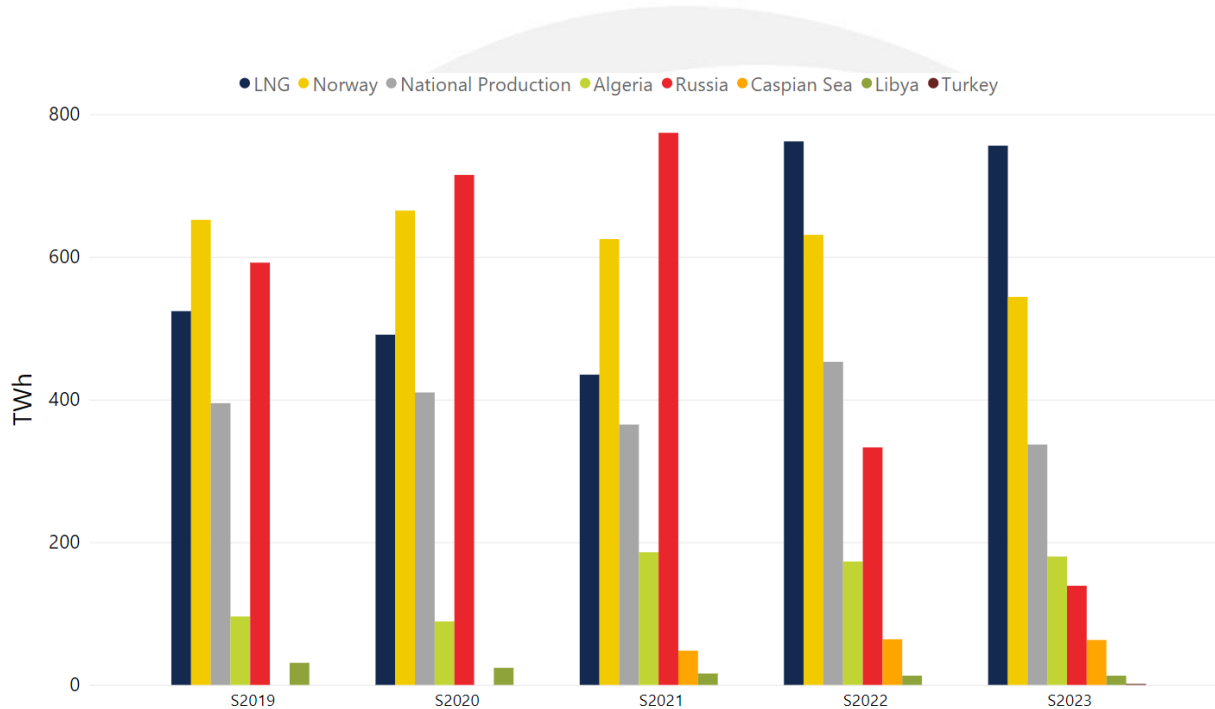


Figure 14 - Evolution of gas supplies. Summer 2019 – 2023 (see [SR2023.dashboard.pbix](#))

Figure 15 shows exports from the EU countries.

- The exports to Serbia were 42 TWh, to Ukraine 27 TWh, to Morocco 5 TWh, and around 1 TWh each to North Macedonia and Moldova.

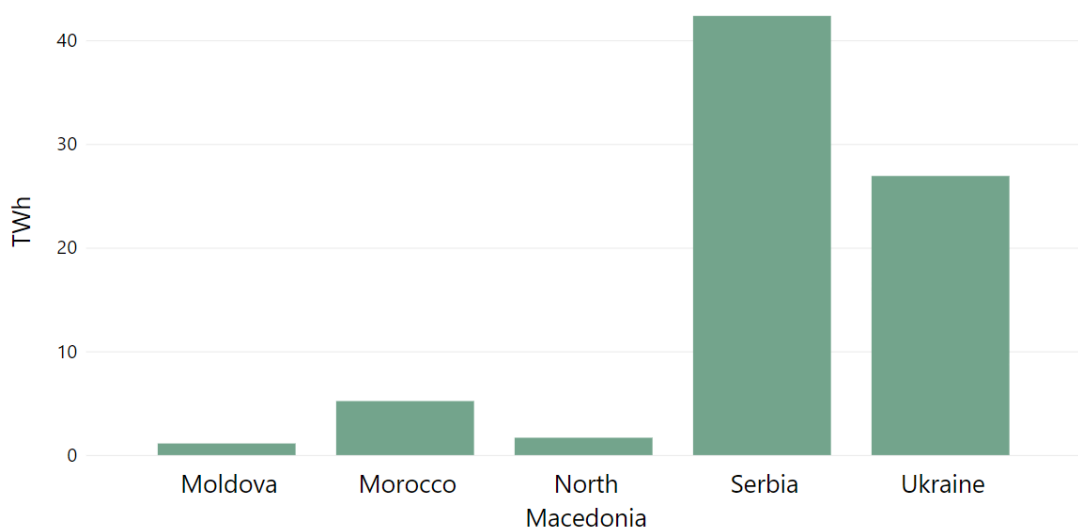


Figure 15 - Exports from the EU countries. Summer 2023 (see [SR2023.dashboard.pbix](#))

## Underground Gas Storage

The evolution of the injection season depends on various factors, notably the willingness of shippers (or other entities designated by Member States) to inject gas and the actual amount of gas available for injection. These factors are interconnected with price signals, such as the summer/winter spread, as well as the EU national laws mandating injections, climatic effects influencing temperature-driven consumption, and the economic considerations of end-users.

**Figure 16** compares the stock level evolution curve of the last 5 summers.

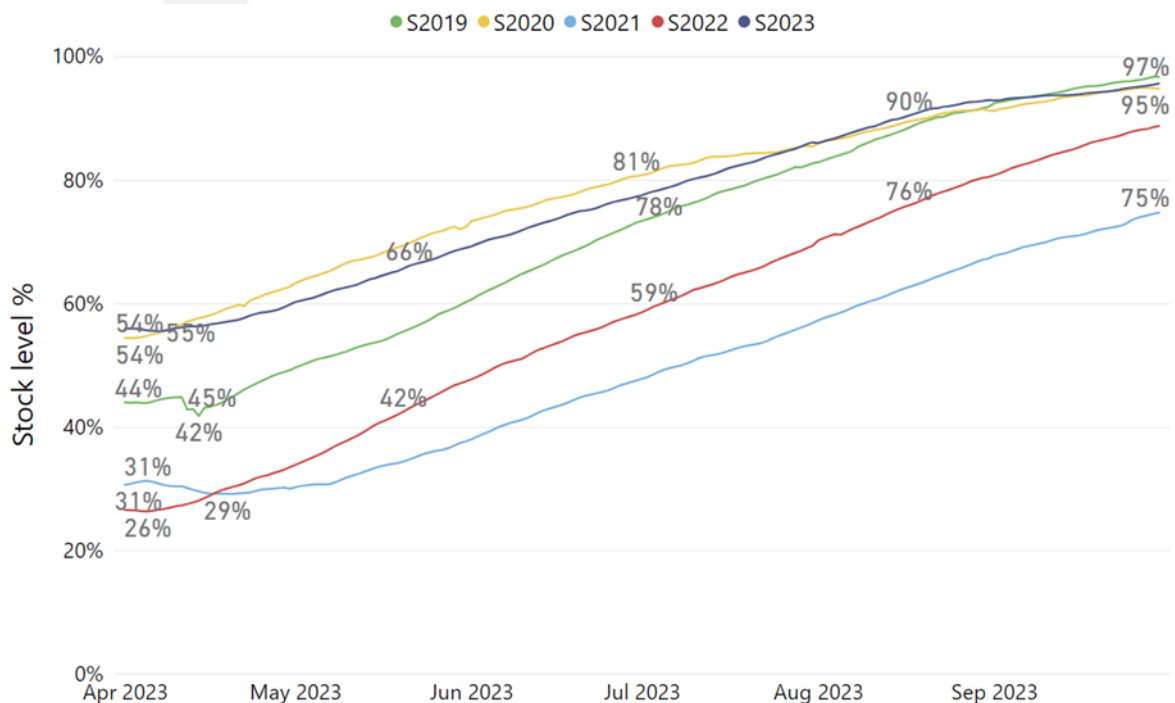


Figure 16 - Evolution of UGS stock level. Summer 2019 – 2023<sup>8</sup> (see [SR2023.dashboard.pbix](#))

- According to data from AGSI+, the gas storage platform operated by GIE, the EU stock level at the beginning of the injection season remained historically high at 56% full (628 TWh).
- On 1 October 2023, the EU gas storage facilities reached 96% on average or 1,091 TWh - highest amount of gas stored within the last 5 years. The high storage filling level at the beginning of injection period, decrease in gas consumption over the year and dedicated measures introduced by the Member States, together with the individual users behaviour, contributed to the record volume of gas in storage at the beginning of the winter period 2023/24.

<sup>8</sup> Source: AGSI+

Figure 17 shows the storage net-injection and net-withdrawal profile of European storage.

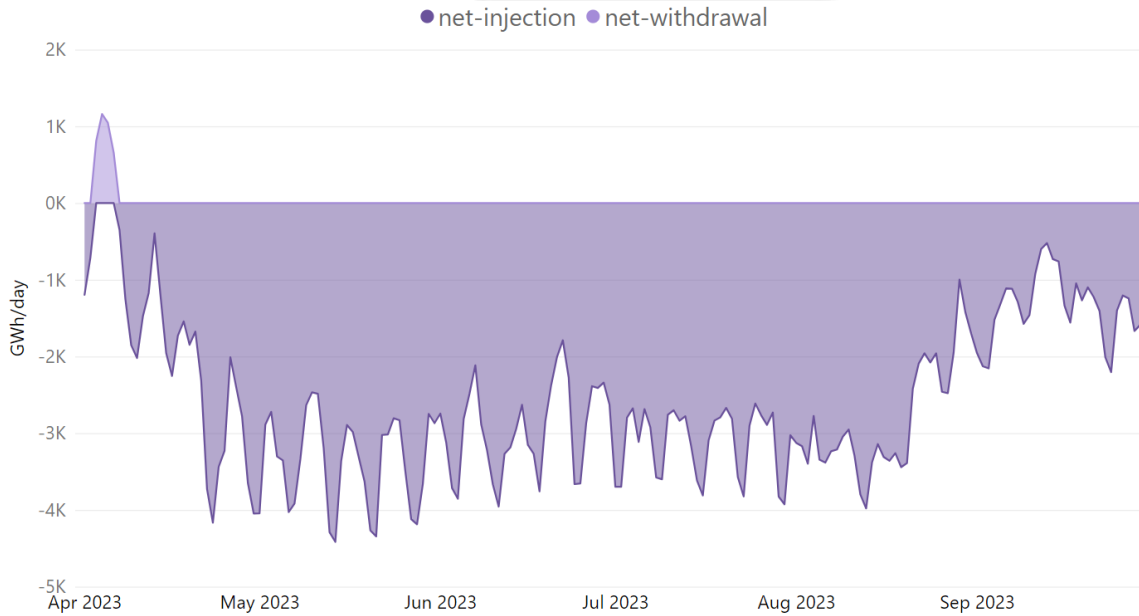


Figure 17 - UGS net-injection/net-withdrawal profile of European storage. Summer 2023 (see [SR2023.dashboard.pbix](#))

- The injection season for Summer 2023 began in April and remained active until September. A high storage filling level by the end of August (filling rate 93%) and heavy maintenance outages at the gas fields in Norway affected the ability to inject gas into storage, resulting in a lower flow into storage in September 2023.

Figure 18 provides the average net-injection / net-withdrawal and the daily distribution ranges between the lowest and highest injection in GWh/day for every summer season month in 2022 and 2023.

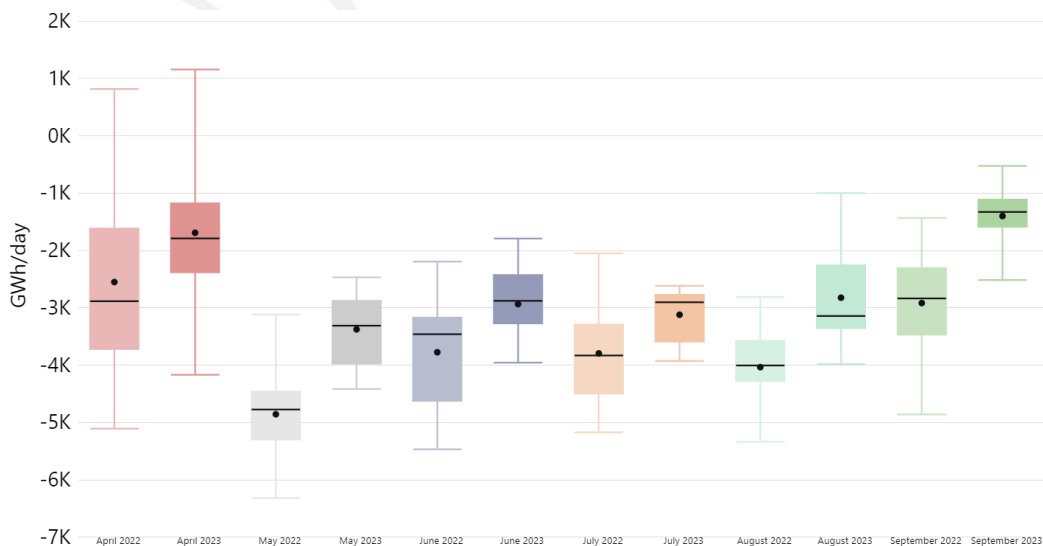


Figure 18 - UGS daily range of net-injection and net-withdrawal per month. Summer 2022 vs 2023 (see [SR2023.dashboard.pbix](#))

- Throughout Summer 2022, a higher range of net injection was observed compared to the Summer season 2023, indicating higher injection rates in the previous season. This is because the initial level at the beginning of the injection season in Summer 2022 was significantly lower than that in Summer 2023 (27% vs 56%).

**Table 3** shows that the highest storage level of almost 100% was reached at the beginning of November 2023.

**Table 3 - Historical maximum stock levels<sup>9</sup>**

Summer season	Stock level at 30-Sep	Maximum stock level	Date
S2019	96.7%	97.8%	2019-10-27
S2020	94.8%	95.9%	2020-10-11
S2021	74.7%	77.3%	2021-10-21
S2022	88.7%	95.7%	2022-11-13
S2023	95.6%	99.6%	2023-11-05

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<sup>9</sup> Source: AGSI+

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