entsog
european network
of transmission system operators
for gas

ENTSOG
SUMMER SUPPLY REVIEW

2021

Table of Contents

Executive Summary

ENTSOG has completed the review of the European gas picture for Summer 2021, April to September. The 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, as well as in the ongoing R&D plan.

The key findings of this review are:

- Beginning of the summer 2021 shows the strong recovery from the COVID-19 coronavirus pandemic shock in 2020 and Q1 2021, driven by an increase of economic and social activities, as COVID lockdown measures eased in most parts of Europe.
- Increase in gas demand due to the European economic recovery after lifting COVID-19 pandemic restrictions drove the seasonal gas demand in Europe to an increase of 3% compared with previous summer, reaching 1,824 TWh.
- The European gas hubs reached the highest gas prices in the last 10 years (latest historical data registered in ENTSOG), fluctuating between 20 and 65 €/MWh over the April – September 2021 period.
- Gas demand for power generation decreased in absolute terms, driven by a significant increase in gas wholesale prices, which was not favourable to generation costs and profitability of gas-fired generation.
- The storage level at the beginning of the summer 2021 (April 1st) was equal to 31%, one of the lowest storage level of the last 6 summers, mainly driven by high wholesale gas prices, combined with lifting of Covid-related restrictions, and the increase of the demand across Europe and recovery of the European economy. In mid May - September 2021 the stock level was increasing, reaching a 75% by the end of September - the lowest storage level of the last 6 summers. This low storage level at the end of the injection period has impacted the supply profile in winter 2021/2022 with higher import and lower useage of storage facilities.
- April and May 2021 was colder than usual, implying an extension of the winter heating season for the residential sector.
- A sum of the imports flows to Europe has slighty increased during summer 2021 compared with summer 2020.
- European indigenous production (hereafter national production) reduced by 11%, continuing the decreasing trend already observed in previous summer season.

Detailed data for the cross-border flows is available on the Transparency Platform[1].

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 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.

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 summer 2021. 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[2]

Different events on the European gas market caused fluctuations in the supply and demand balance from April to September 2021. The major ones were:

- Beginning of the summer 2021 shows the strong recovery from the COVID-19 coronavirus pandemic shock in 2020 and Q1 2021, driven by an increase of economic and social activities, as COVID lockdown measures eased in most parts of Europe.
- In summer 2021, the wholesale gas prices rose sharply, reaching historical highs in September 2021.
- Gas demand increased in general across Europe, mainly driven by economy recovery after lifting COVID-19 related pandemic restrictions. Additionally, April and May 2021 was colder than usual, implying an extension of the winter heating season for the residential sector, which translates into higher demand for gas and slower refilling of gas storages.

[1] Transparency Platform: https://transparency.entsog.eu/

[2] Source: Platts

- Lower than expected gas inflows from important sources (such as LNG and Norway) resulted in lower supply to inject into storages. LNG supply in summer 2021 decreased by 11% compared with summer 2020, mainly driven by the strong LNG demand in Asian markets and the price differential between Asian wholesale gas benchmarks and European benchmarks. Supply from Norway was down by 6% in summer 2021 compared with the previous summer, mainly driven by planned maintenances and unplanned outages on Norwegian gas infrastructure in summer 2021.

Gas Prices at European hubs

The following graphs show the evolution of gas prices in Europe during summer 2021, as well as the overall monthly ranges and averages in comparison to those of 2020.

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, with rather no exceptions.

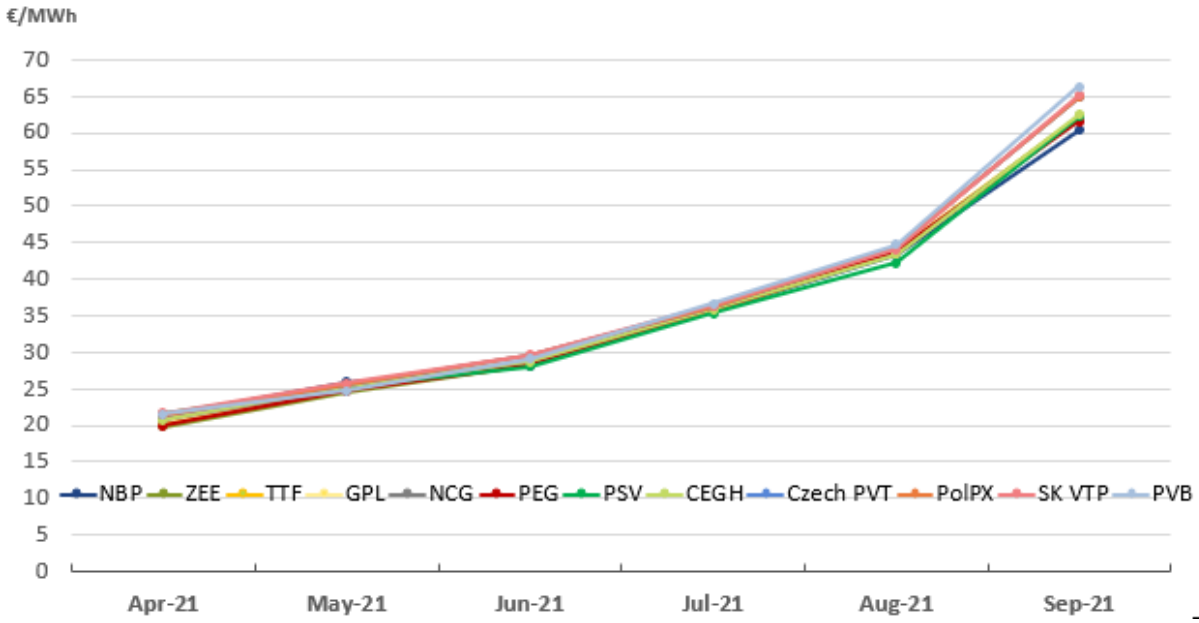


Figure 1. Day-ahead average price at EU Hubs. Source: Bloomberg.

European wholesale gas prices fluctuated between 20 and 65 €/MWh over the April – September 2021 period. The European gas hubs reached the highest gas prices in the last 10 years (latest historical data registered in ENTSOG) driven by a gas demand increase caused by the jump in consumption caused by economy recovery after lifting COVID-19 related pandemic restrictions and cold weather in the Q2 2021. From July the European gas prices

increased sharply, mainly driven by lower than expected gas supply from LNG and Norway (supplies decreased by 11% and 6% in summer 2021 respectively).

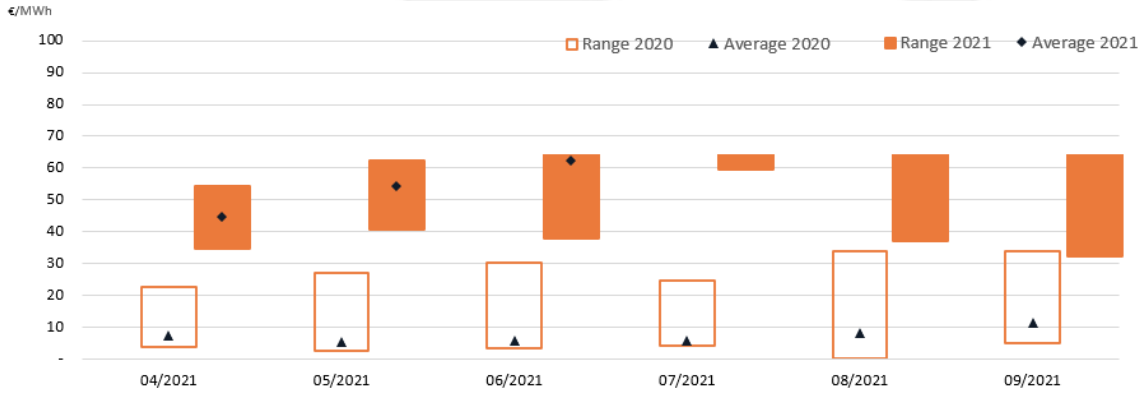


Figure 2. Range and average prices. Source: Bloomberg.

Figure 2 compares the maximum range and average of the day-ahead summer price for the last two summers over all the European hubs. The average price over all hubs increased significantly in 2021, showing higher prices levels when compared to the ones seen summer 2020. The price ranges were higher in all the season compared with 2020. The price convergence between the European hubs continued and were following similar price signal.

Demand

> European seasonal gas demand

Total gas demand was 1,824 TWh in summer 2021, 3% higher than the one in the previous summer (1,770 TWh). Beginning of the summer 2021 shows the strong recovery from the COVID-19 coronavirus pandemic shock in 2020 and Q1 2021, driven by an increase of economic and social activities, as COVID lockdown measures eased in most parts of Europe.

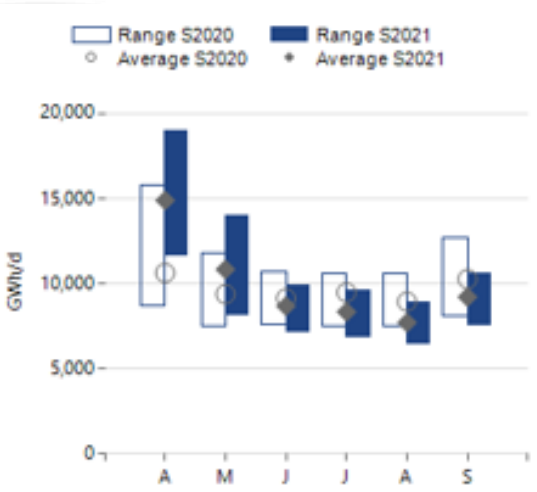


Figure 3. Total gas demand.

Figure 3 shows how the monthly average demand levels during the summer season 2021 significantly increased in April (by around 40%) and May (+15%) compared with the same months in summer 2020, due to offset of COVID-19 related pandemic restrictions and lower than usual temperatures, implying an extension of the winter heating season for the residential sector.

> Summer demand evolution 2017-2021

Figure 4 and **Figure 5** show the total consumption and the demand monthly average for summer 2017-2021. In summer 2021 the demand has increased by 3%, due to the European economic recovery after lifting COVID-19 pandemic restrictions and low base period consumption in summer 2020.

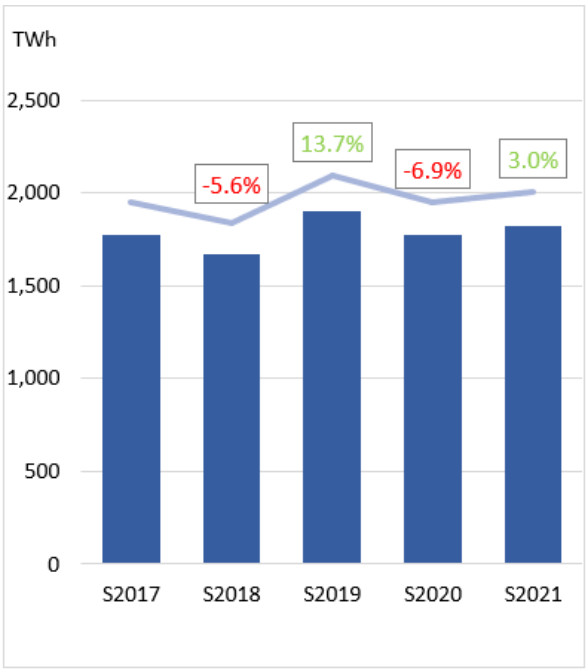


Figure 4. Total consumption. Summer 2017-2021.

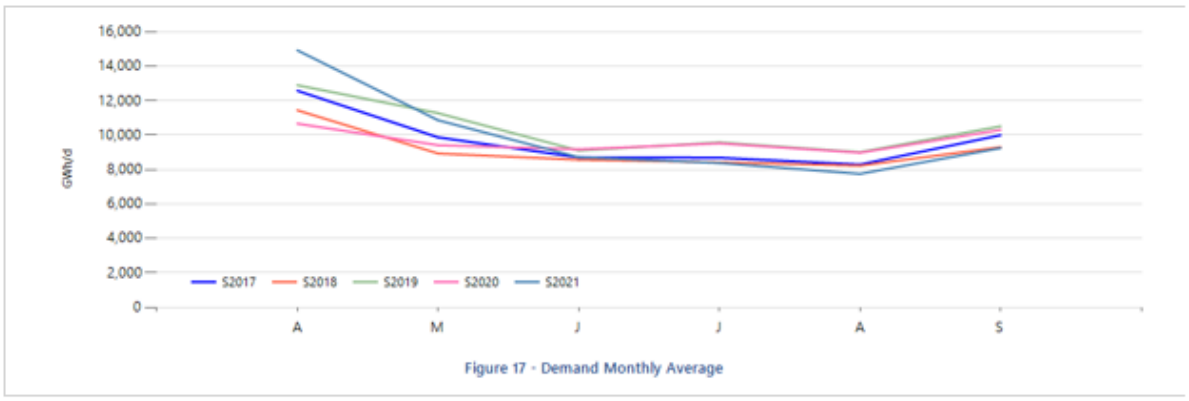


Figure 5. Demand monthly average. Summer 2017-2021.

> Country detail

The evolution of gas demand on a country level show an increasing, or rather stable in some countries, trend in most of the countries comparing with previous year due the lifting of the COVID-19 restrictions. Based on the received data, demand for natural gas in all the major European gas markets (Germany, Italy, Spain and France) increased comparing to the previous summer period by some increases in consumption by industry due to the economic recovery after lifting COVID-19 pandemic restrictions.

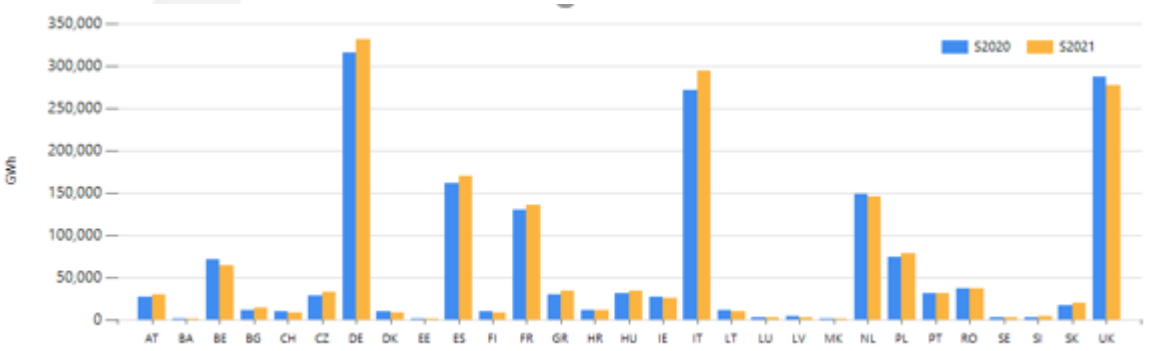


Figure 6. Summer total gas demand. Country detail.

Figure 7. Summer total gas demand. Country detail (difference in % between seasons).

> Seasonal modulation

The pattern followed by demand is linked to the climatic conditions from April to September.

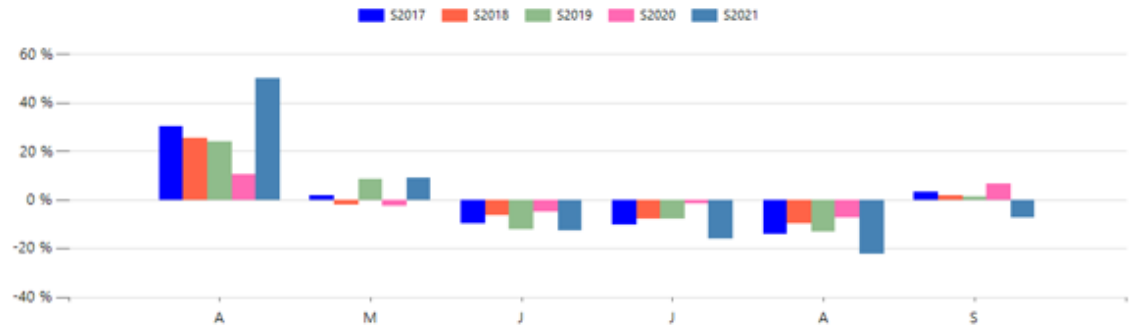


Figure 8. Summer modulation 2017-2021.

Figure 8 shows the deviation of the monthly average demand from the summer average for each of the last five summers:

- April is regularly the month with the highest demand (a remarkable increase in the April demand 2021 compared with the last five summers).
- Demand in June, July and August are systematically lower than the average.
- May and September are closer to the summer average gas demand (a remarkable increase in the May demand 2021 compared with the last five summers).

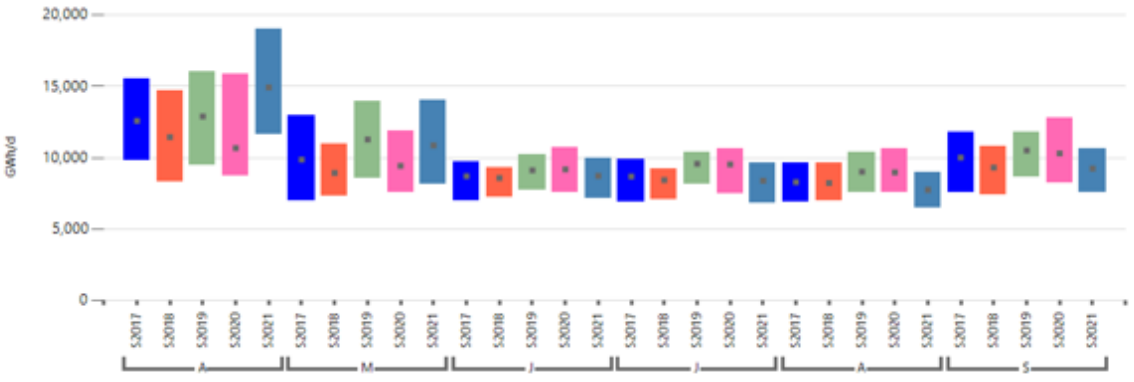


Figure 9. Monthly demand: monthly average (·) and ranges ( ).

Figure 9 shows the monthly variation between the maximum and the minimum daily demand. Summer 2021 shows an increase in the daily average demand from the levels in 2020 in April and May due to the economic recovery after lifting COVID-19 pandemic restrictions.

> Seasonal electricity power generation (TWhe)[3]

In absolute terms, the electricity produced from gas during summer 2021 was around 208 TWhe, representing about 16% of the generation mix, as shown in **Figure 10, Figure 11** and **Figure 12**. According to ENTSO-E data, compared to summer 2020, gas demand for power generation has decreased[4] in absolute terms, driven by a significant increase in gas wholesale prices, which was not favourable to generation costs and profitability of gas-fired generation. Besides demand side factors, the share of gas was impacted by changes in the local power generation mixes in each country. Even with increasing carbon prices, high wholesale gas prices in summer 2021 prompted the comeback of coal to power mix in many European countries, compared with summer 2020. Additionally, the decrease in gas-fired generation was in Europe also compensated by increasing nuclear. The share of renewables in the Europe power generation mix remained constant in summer 2021. Wind, solar and hydro together amounted to around 38% of the European power mix both in the summer 2020 and 2021.

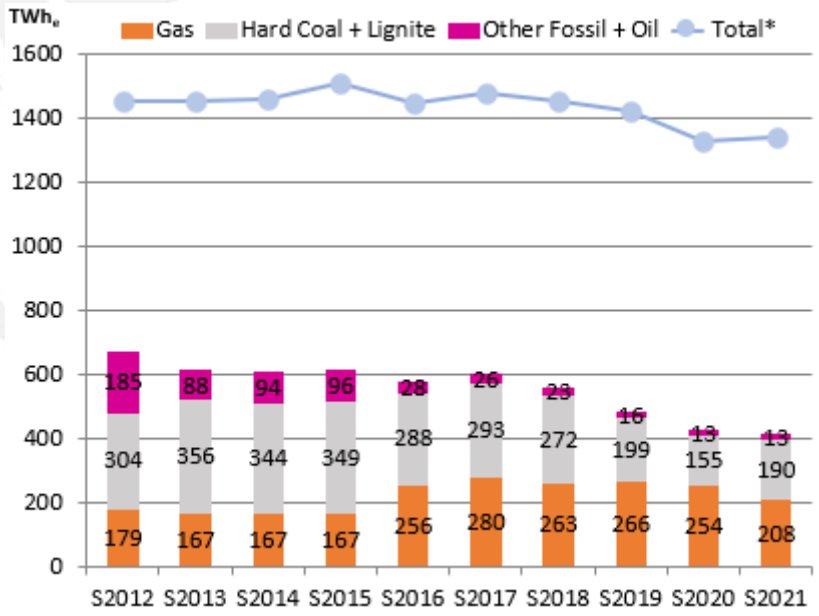


Figure 10. Seasonal electricity power generation (*the total electricity power generation mix is detailed in Figure 7). Source: ENTSOG elaboration based on ENTSO-E data.

[3] Efficiency needs to be applied for conversion.

[4] This data could differ from ENTSO-G data due to the estimated allocation between sectors by some TSOs.

Figure 11. Sesonal electricity power generation mix in absolute values. Source: ENTSOG elaboration based on ENTSO-E data.

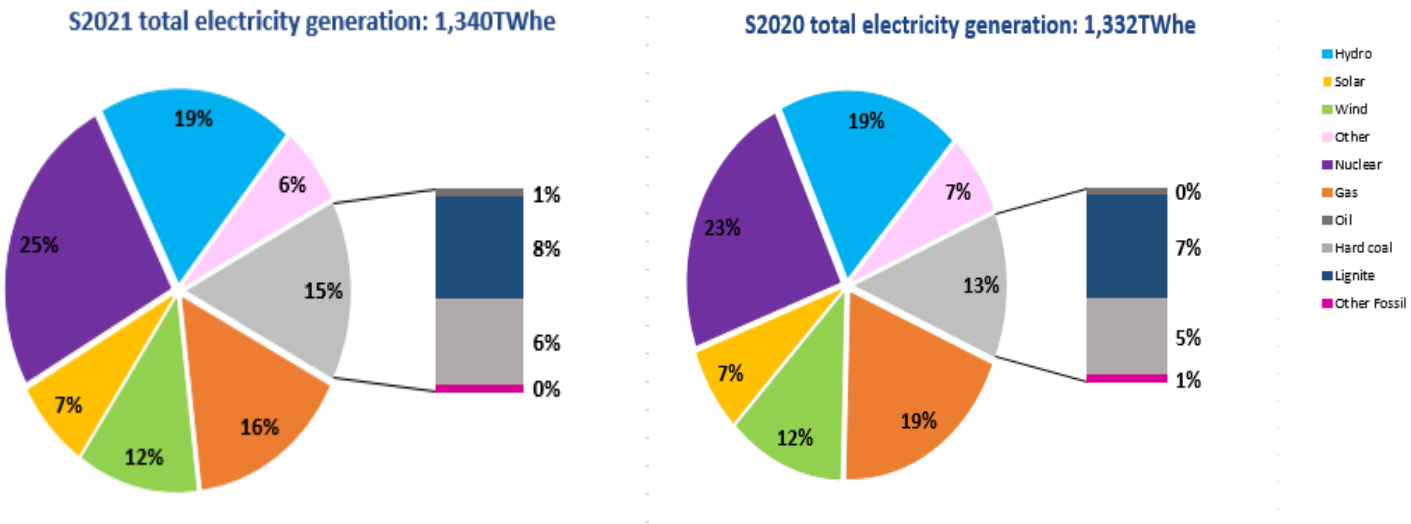


Figure 12. Sesonal electricity power generation share. Source: ENTSOG elaboration based on ENTSO-E data.

Supply

> European seasonal gas supply

Figure 13 shows the evolution of the aggregated gas supply in Europe during summer 2021.

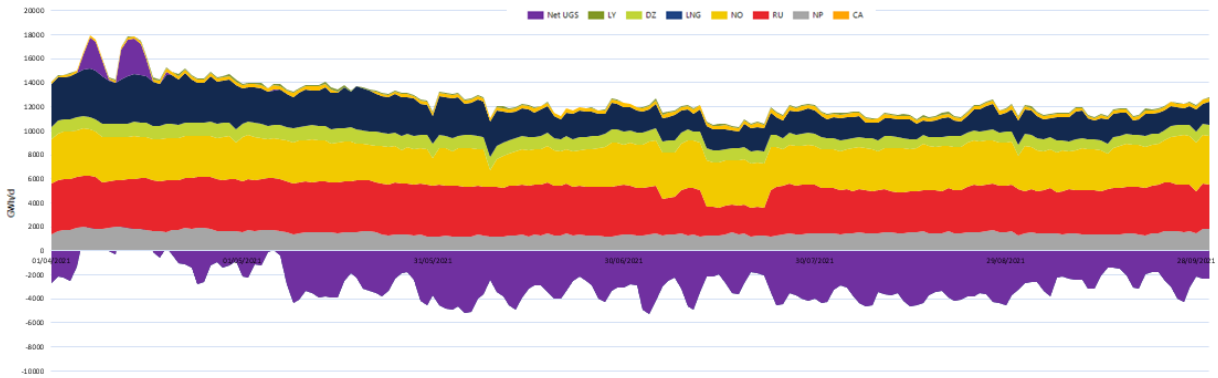


Figure 13. Summer supply profile 2021.

The next graphs give an overview of national production and supply import shares during the summers 2020 and 2021 in both absolute and relative terms. The total summer supply in 2021 was 2,450 TWh. **Figure 14** shows the seasonal supplies by source for the last two summers in absolute figures.

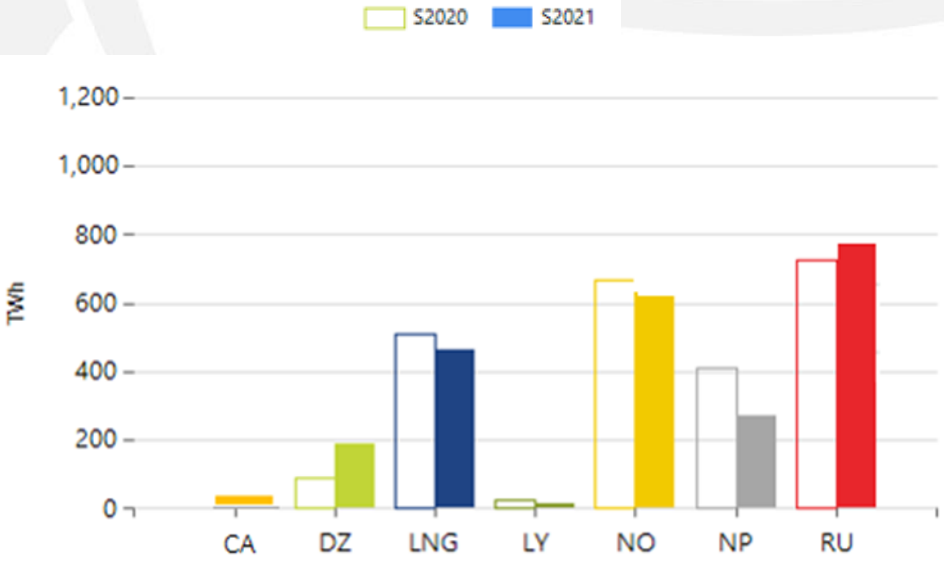


Figure 14. Seasonal supply.

Note: As the Trans Adriatic Pipeline (TAP) is operational from December 2020, the flows from Caspian Region show up for the first time in summer 2020.

In line with previous summer season, national production kept a decresing trend. The decrease in the European gas production in summer 2021, from 410 TWh to 365 TWh (11% less), was mainly driven by Hungary, Denmark and Italy. On the other hand, in Q2 and Q3

2021, gas production showed an increase year-on-year in some European countries, what might have been related to increasing market prices. The four biggest gas producer countries were: United Kingdom (135 TWh), the Netherlands (with 102 TWh of production), Romania (43 TWh) and Germany (30 TWh).

LNG supply in summer 2021 decreased by 11% compared with summer 2020, mainly driven by the strong LNG demand in Asian markets. The price differential between Asian wholesale gas benchmarks and European benchmarks was big enough to attract most of LNG cargoes, limiting LNG imports in the EU. In summer 2021 the total LNG supply amounted to 435 TWh, down from 491 TWh a year before. France became the biggest LNG importer (93 TWh), followed by Spain, Italy, UK and the Netherlands. Croatia, who has only started the import of LNG last summer, had an import of around 10 TWh in April-September 2021.

Pipeline gas supply from Algeria showed a remarkable increase of 110% compared with summer 2020 (from 89 TWh to 186 TWh), which could have been related to the increase in wholesale gas prices on the European hubs. Algerian supply having oil-indexed contracts became competitive to hub-based pricing, including Spain and Italy, where Algerian supply competes with, amongst others, LNG supply having hub-linked prices.

Pipeline gas supply from Libya fell further, by 32% year-on-year (from 24 TWh to 16 TWh). At the same time, the Trans Adriatic Pipeline (TAP), operational since December 2020, ensured around 48 TWh gas supply in the EU in summer 2021, and representing around 2% of the EU total gas supply. TAP allows Europe to get access to Caspian Region gas resources via the Southern Gas Corridor.

Similarly to the previous summer, Russia was the main gas supplier of the EU. Pipeline gas supply from Russia rose by 8% compared with summer 2020 (from 715 TWh to 774 TWh).

In contrast, supply from Norway was down by 6% in summer 2021 (from 665 TWh to 625 TWh), mainly driven by planned maintenances and unplanned outages on Norwegian gas infrastructure in summer 2021.

Figures 15 and 16 show the supply shares in summer 2021 compared with summer 2020. Increase in gas supply from Algeria resulted in an increasing share within the total summer supply (7% in summer 2021 up by 3 percentage points compared to summer 2020). Russian share in supplies faced a slight increase of 2 percentage points compared to previous summer and Norway and LNG share in supply faced a slightly decrease of 3 and 2 percentage points respectively. Decrease in national production resulted in a decreasing share within the total summer supply (15% in summer 2021 down by 2 percentage points compared to summer

2020). The new Caspian Region supply source represented around 2% of the total summer gas supply. Libya supply source remained at the same supply share as previous summer season.

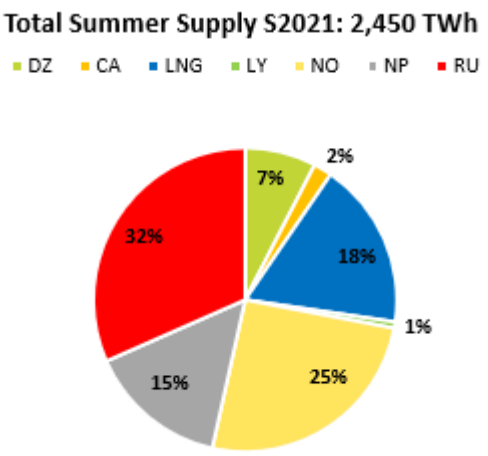


Figure 15. Supply shares. Summer 2021.

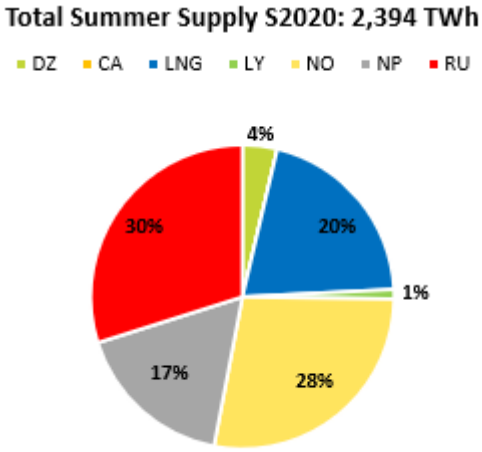
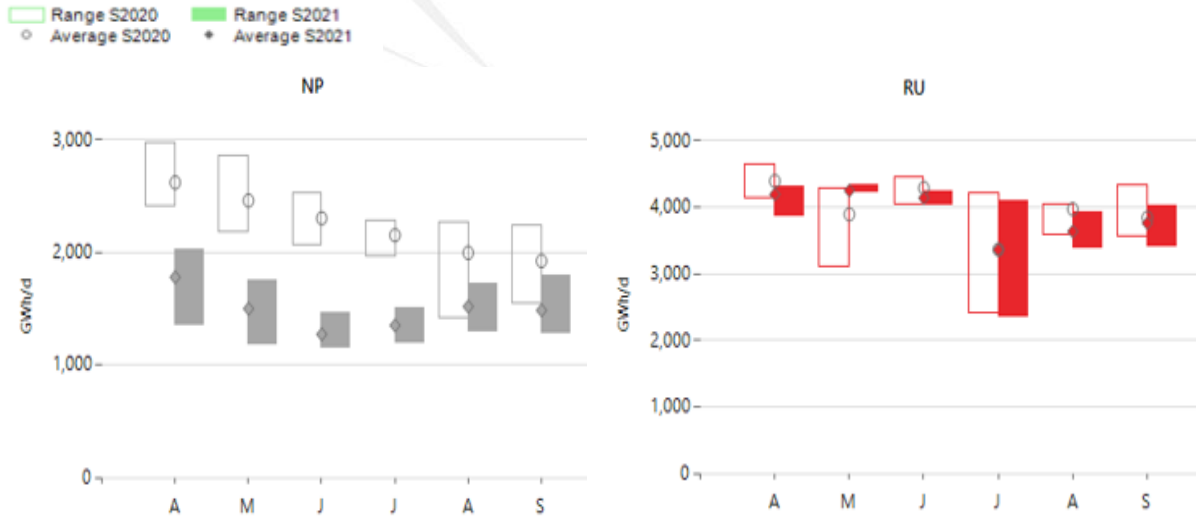


Figure 16. Supply shares. Summer 2020.

> Supply modulation

The following graph (**Figure 17**) illustrates for each import supply source, as well as for indigenous/national production, the average flow per month and the monthly range of the last two summer seasons (lowest and highest daily flow of each month for the summer season).



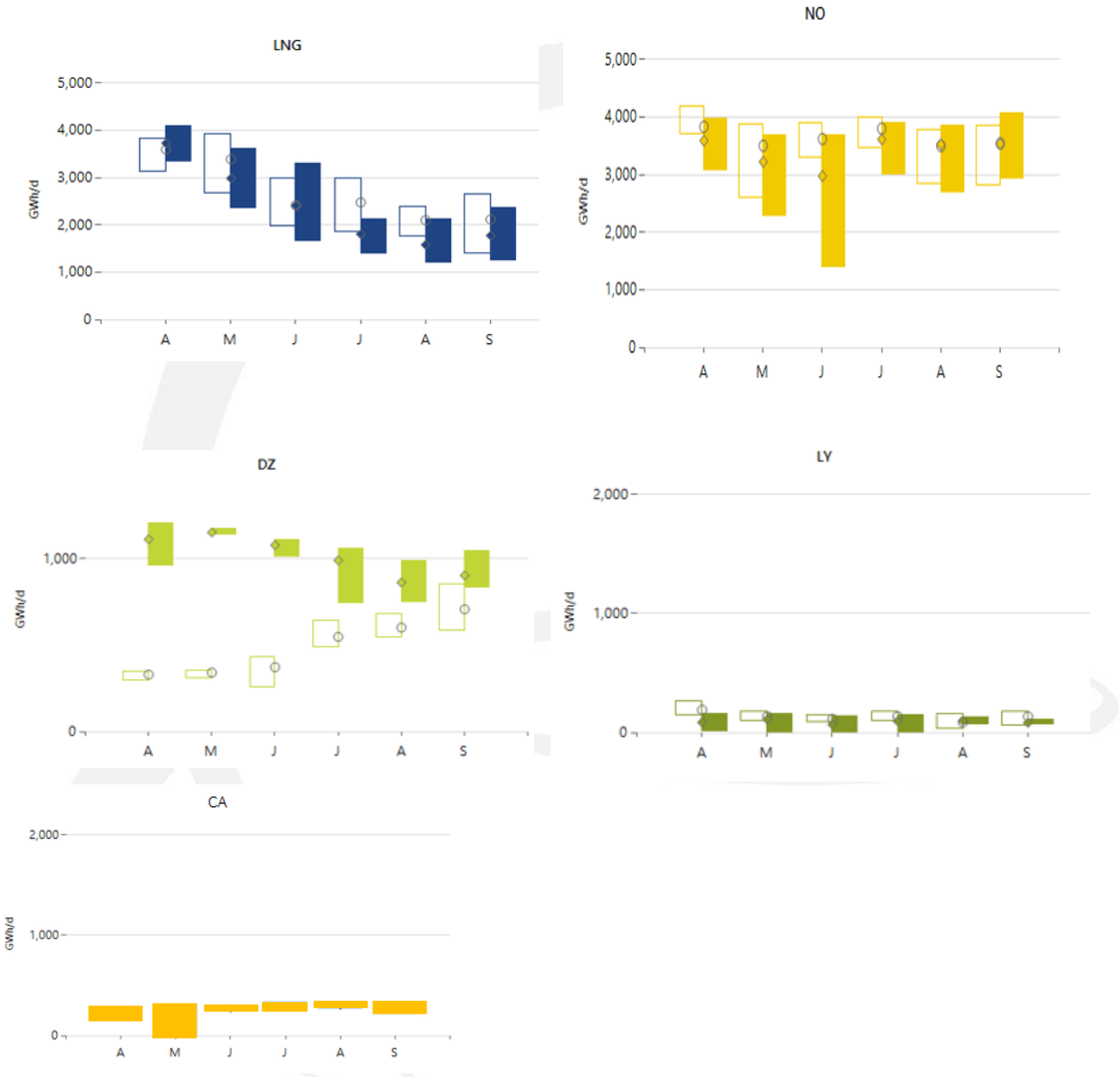
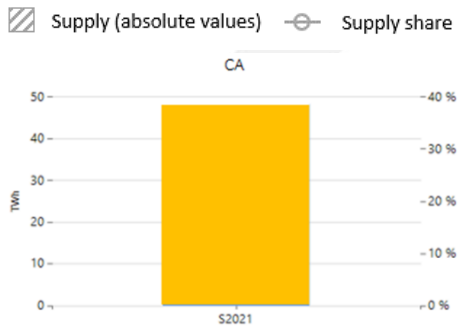


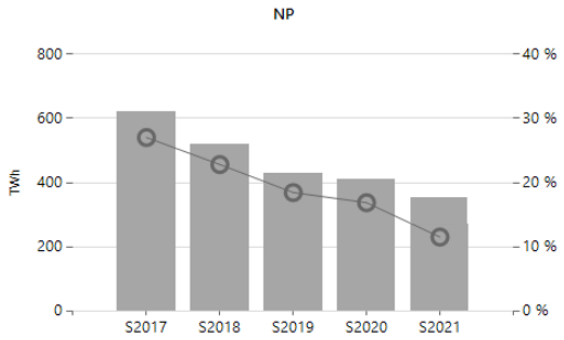
Figure 17. Monthly supply modulation.

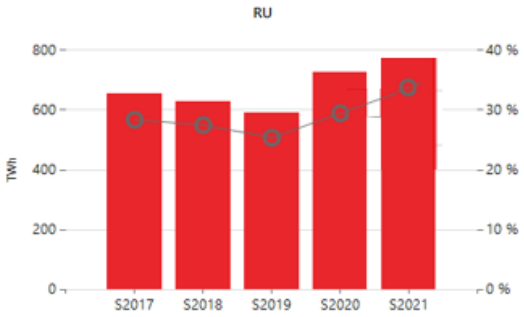
> Summer supply evolution 2017-2021

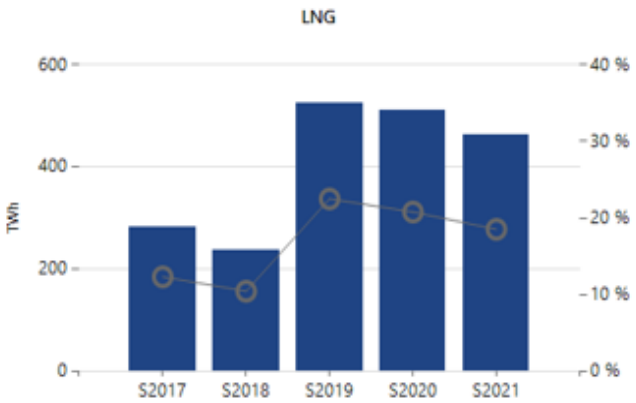
Figure 18 shows the evolution of the different supply sources per season, both in absolute and relative terms, during the last five summers.

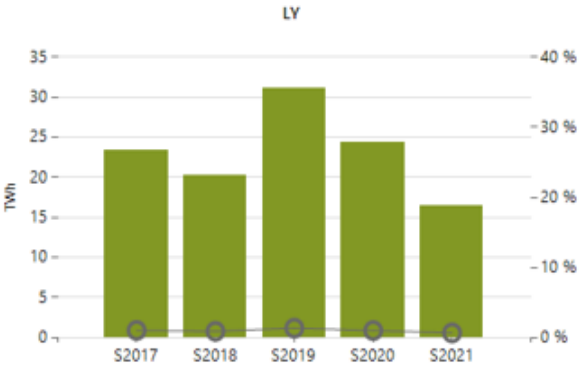


Note: As the Trans Adriatic Pipeline (TAP) is operational from December 2020, the flows from Caspian Region show up for the first time in summer 2020.









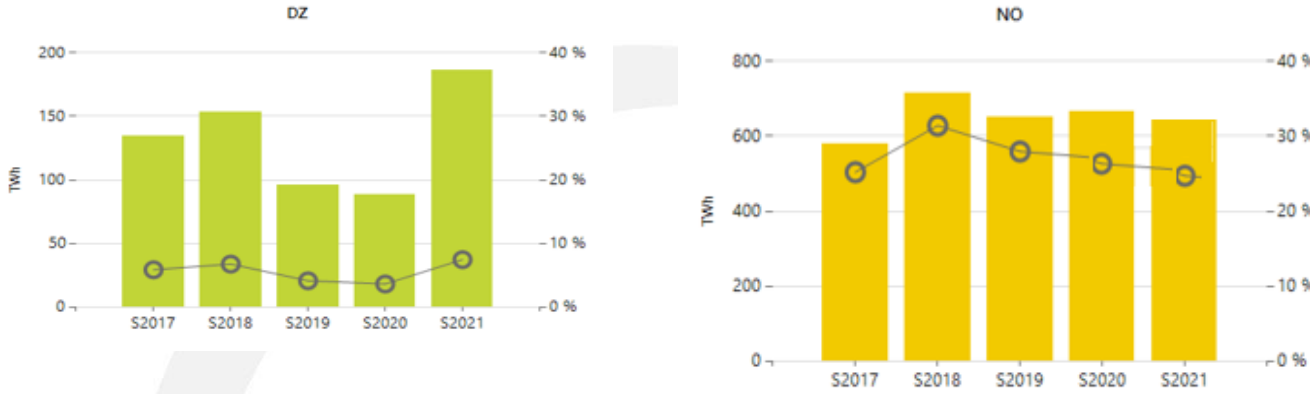


Figure 18. Evolution of summer gas supplies 2017-2021.

> Underground Storages

The evolution of the injection season depends on many factors, in particular the willingness of shippers to inject gas and the actual amount of gas available for injection after the gas demand is satisfied. The first factor may be linked to price signals such as summer/winter spread, unless the national regulatory framework implies some mandatory injection, and the second one is linked to climatic and economic considerations. **Figure 19** shows UGS injection and withdraw profile of European storages.

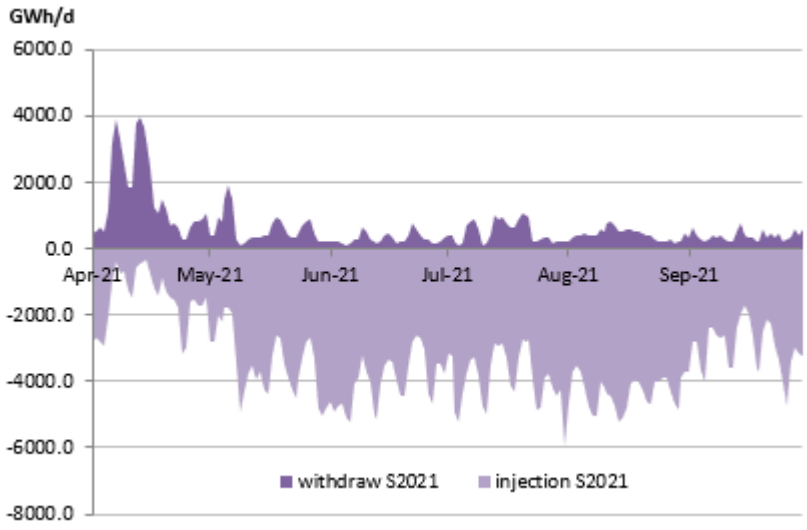


Figure 19. UGS injection/withdraw profile of European storages.

Figure 20 provides the average injection and the daily range between the lowest and highest injection for the whole Europe for every month of the summers 2020 and 2021.

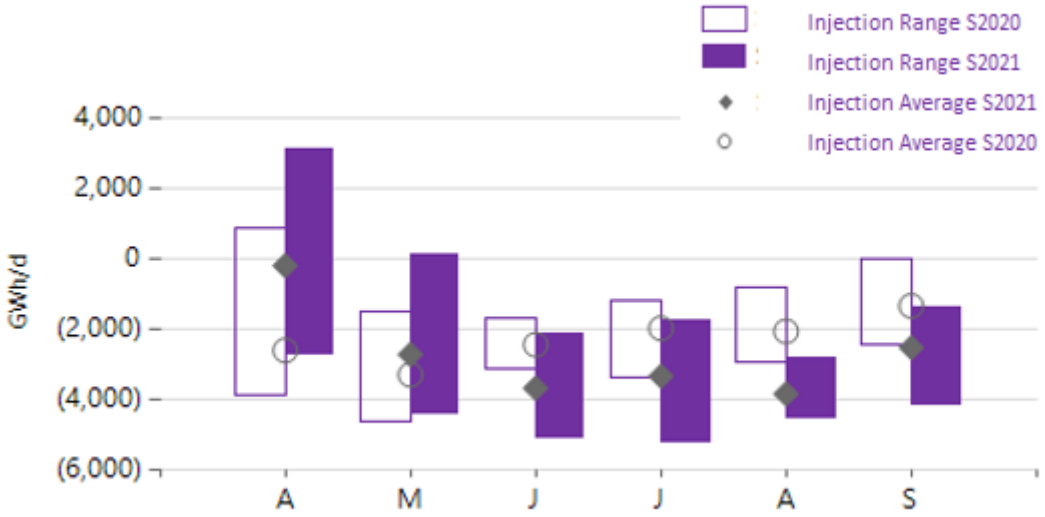


Figure 20. Net UGS.

Table 1 provides the evolution of the stock level as a percentage of the WGV during summer (source AGSI platform).

Table 1. Stock level 2021

Country %	2021-04-01	2021-05-01	2021-06-01	2021-07-01	2021-08-01	2021-09-01	2021-10-01	Max Stock level	Date
AT	24.8	21.82	21.81	30.11	35.6	46.54	53.55	57.03	2021-10-24
BE	24.11	23.15	29.97	41.86	59.49	76.91	87.21	92.98	2021-10-31
BG	12.28	11.54	23.25	31.86	44.89	59.02	71.63	76.59	2021-10-19
CZ	28.37	25.85	33.05	46.27	56.3	71.38	85.16	87.39	2021-10-22
DE	27.76	26.1	31.79	41.89	50.33	59.69	68.02	72.25	2021-11-01
DK	35.23	32.31	34.44	42	58.5	70.46	82.62	84.02	2021-10-04
FR	22.17	23.1	37.59	49.41	65.55	83.52	92.29	95.41	2021-10-21
ES	59.91	60.22	64.13	67.93	70.96	72.36	73.22	83.13	2021-11-08
HR	19.92	23.24	36.86	49.31	65.87	80.4	90.18	90.76	2021-09-30
HU	49.1	50.74	57.4	65.84	73.63	79.99	83.24	83.31	2021-09-30
IT	36.79	43.39	57.39	66.01	74.11	82.35	85.63	87.79	2021-10-24
LV	25.88	21.64	36.3	48.47	67.86	78.84	79.85	80.99	2021-10-13
NL	22.64	17.87	20.86	29.3	38.02	48.44	58.48	61.77	2021-10-10
PL	38.21	40.29	50.93	65.43	81.65	91.38	96.31	96.90	2021-10-09
PT	38.21	40.29	50.93	65.43	81.65	91.38	96.31	96.90	2021-10-09
RO	17.25	13.89	24.09	34.59	48.09	62.44	72.57	75.00	2021-10-24
SK	42.57	34.7	37.62	49.87	55.82	62.17	71.92	73.05	2021-10-10
SE	7.95	66.33	66.33	66.41	66.41	66.42	66.42	66.42	2021-08-20
UK	47.25	7.87	12.25	14.27	33.36	89.29	98.04	107.76	2021-11-20
Europe Total	30.86	30.12	37.94	47.61	57.27	68.02	75.11	77.47	2021-10-21

The storage level at the beginning of the summer 2021 (April 1st) was equal to 31%, one of the lowest storage level of the last 6 summers, mainly driven by high wholesale gas prices, combined with lifting of Covid-related restrictions, and the increase of the demand across Europe and recovery of the European economy. In mid May - September 2021 the stock level was increasing, reaching a 75% by the end of September - the lowest storage level of the last 6 summers. This low storage level at the end of the injection period has impacted the supply profile in winter 2021/2022 with higher import and lower useage of storage facilities. **Figure 21** compares average stock level evolution curve of the last six summers (source AGSI).

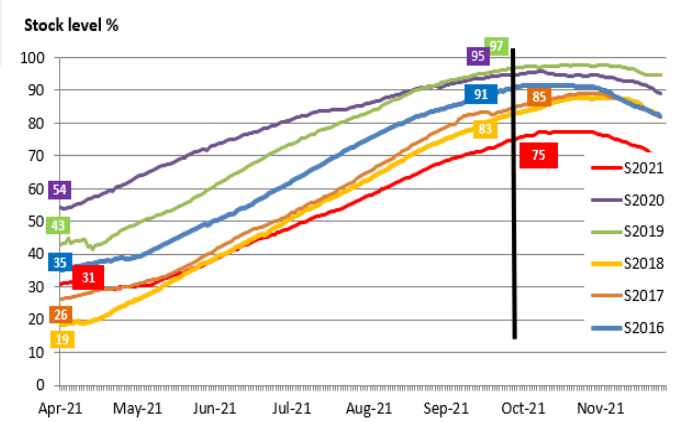


Figure 21. Evolution of stock level. Summers 2016-2021 (AGSI).

Table 2 shows the stock level on September 30th in comparison with the maximum stock level at the end of the injection season. The maximum stock level reached in 2021 was 77%, 19 percentage points lower compared to summer 2020.

The stock level at the end of September 2021 (75%) was the lowest at this time of the last 6 summers (ranging historically between 83% and 97%).

Table 2. Stock level: 30 September vs. maximum of the year (AGSI).

Summer	30 Sep.	Maximum stock level	
S2016	91%	92%	09/10/2016
S2017	85%	89%	29/10/2017
S2018	83%	88%	07/11/2018
S2019	97%	98%	27/10/2019
S2020	95%	96%	11/10/2020
S2021	75%	77%	21/10/2021

Transported gas

The overall transported gas at the European aggregated level is the sum of gas demand, exports and injection for each month.

Figure 22. Transported gas.

As observed in **Figure 22**, the total transported gas during summer 2021 (2,452 TWh) was 1% higher in comparison with previous summer season (2,432 TWh). Demand was higher among the season than the one from the previous summer. The higher transported gas is mainly driven by lifting of Covid-related restrictions and the recovery of the European economy.

Publisher ENTSOG AISBL
Avenue de Cortenbergh 100
1000 Brussels, Belgium

Co-Authors Jacques Rebérol, Magdalena Bogucka, Kacper Zeromski and Louis Watine

Cover picture Courtesy of Gascade

ENTSOG AISBL
Avenue de Cortenbergh 100 | 1000 Brussels, Belgium
Tel. +32 2 894 51 00

info@entsog.eu | www.entsog.eu