



ENTSOG

WINTER SUPPLY REVIEW

2020/2021

Contents

| | |
|--|----|
| Winter Supply Review 2020/2021..... | 3 |
| Executive Summary | 3 |
| 1. Introduction | 4 |
| 2. Gas Prices and Quantities at European hubs..... | 6 |
| 3. Demand | 7 |
| 3.1. European seasonal gas demand..... | 7 |
| 3.2. Peak demand 2020/2021 | 16 |
| 4. Supply..... | 23 |

Winter Supply Review 2020/2021

Executive Summary

ENTSOG has completed the review of the European gas supply and demand for Winter 2020/2021 (October to March). The Seasonal Reviews aim to provide a deeper understanding 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. They also help to build experience and a solid background for the assumptions considered in the Winter Outlook. Such knowledge is also factored in the recurrent TYNDP process to ensure consistency and continuous improvement in every ENTSOG report. The main findings of this Winter Review are:

- ⇒ **Seasonal gas demand during the winter season 2020/2021 was slightly higher (3,319 TWh) compared with previous winter season (3,216 TWh).**
- ⇒ **In absolute terms, the electricity produced from gas during the winter season 2020/2021 was 284 TWhe, representing 18% of the generation mix (same share as in the previous winter season).**
- ⇒ **Daily peak demand, together with the average daily demand value for the highest 14-day coldest period, in winter 2020/21 noted an increase close to 7-8% in both demand cases.**
- ⇒ **The stock level for the Winter 2020/2021 started from a level of 1053 TWh. At the end of the winter season the storage level reached around 337 TWh, what corresponds to a UGS utilisation relatively high (717 TWh).**
- ⇒ **The low trend of LNG regasification activity was observed during winter 2020/21, driven by the increase of Asian LNG prices as well as the Suez Canal being blocked at the end of March 2021. The rest of the other supply sources remained at similar levels compared to the ones from 2019/2020 with slight increase in Algeria, Norway and Russia. New Caspian supply source was introduced - Azerbaijan has started commercial natural-gas supplies to the European Union via the Trans Adriatic Pipeline (TAP) end of November 2020.**
- ⇒ **European gas prices pushed significantly higher in December/ January, as demand rose on a lower temperature outlook, in turn depleting storage stock levels on an underlying LNG supply tightness.**

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

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

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 infrastructures.

1. Introduction

This review is published on a voluntary basis and aims at providing an overview of the demand and supply balance during Winter 2020/2021. The report brings transparency to the internal analysis carried out by ENTSOG for the purpose of developing the seasonal Supply Outlooks and the Union-wide TYNDP, as well as for the ongoing R&D plan.

More generally, the report aims to provide an overview of European trends that could not be captured at national level and to build experience for future reports.

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.

Overview

Different events on the European gas market caused fluctuations in the supply and demand balance from October 2020 and March 2021. The major gas related topics were²:

OCTOBER

- ⇒ Russian natural gas supplies to Europe recovered strongly in October. The main reason for the jump was the end of the heavy use of virtual reverse flow at the Velke Kapusany interconnection point between Ukraine and Slovakia, which had capped the volume of Russian gas entering Europe through the summer.

NOVEMBER

- ⇒ Russian exports to Europe via the four main corridors — Nord Stream, Yamal-Europe, Ukraine and TurkStream — remained at 2020 highs in November.

DECEMBER

- ⇒ Russian gas flows to Europe hit 2020 high in December.

JANUARY

- ⇒ Russian gas exports to Europe dropped back in January. Flows have been constrained in 2021 after the volume of gas that Gazprom agreed to transit via Ukraine under a five-year deal signed in December 2020. Limited supply of LNG is maintained in Europe.

FEBRUARY

² Source: Platts

- ⇒ Norway's pipeline gas exports to continental Europe and the UK dropped off in February compared with the previous month as unplanned outages reduces export levels. LNG imports into Europe, have not yet recovered to the levels seen last February 2020, before the coronavirus pandemic struck.

MARCH

- ⇒ March rates were still lower on an annual basis after LNG fell back towards April as a combination of high temperatures affected demand for the fuel and deliveries were delayed due to the blockage of the Suez Canal. The main falls were seen from the UK and Italy, both of whom are heavily reliant on Qatari LNG volumes that typically travel through the Suez Canal.

2. Gas Prices and Quantities at European hubs

The following graphs show the evolution of gas prices in Europe during winter 2020/2021, as well as the overall monthly ranges and averages in comparison to those of 2019/2020 winter season.

Figure 1 displays the evolution of the day-ahead winter average prices at different European gas hubs. As in the previous winter review, most of the European hubs follow a similar trend by reacting in the same direction, with rather no exceptions. Only PVB (Spain) shows a spike in value in January due to a very high LNG market value linked to the Asian market.

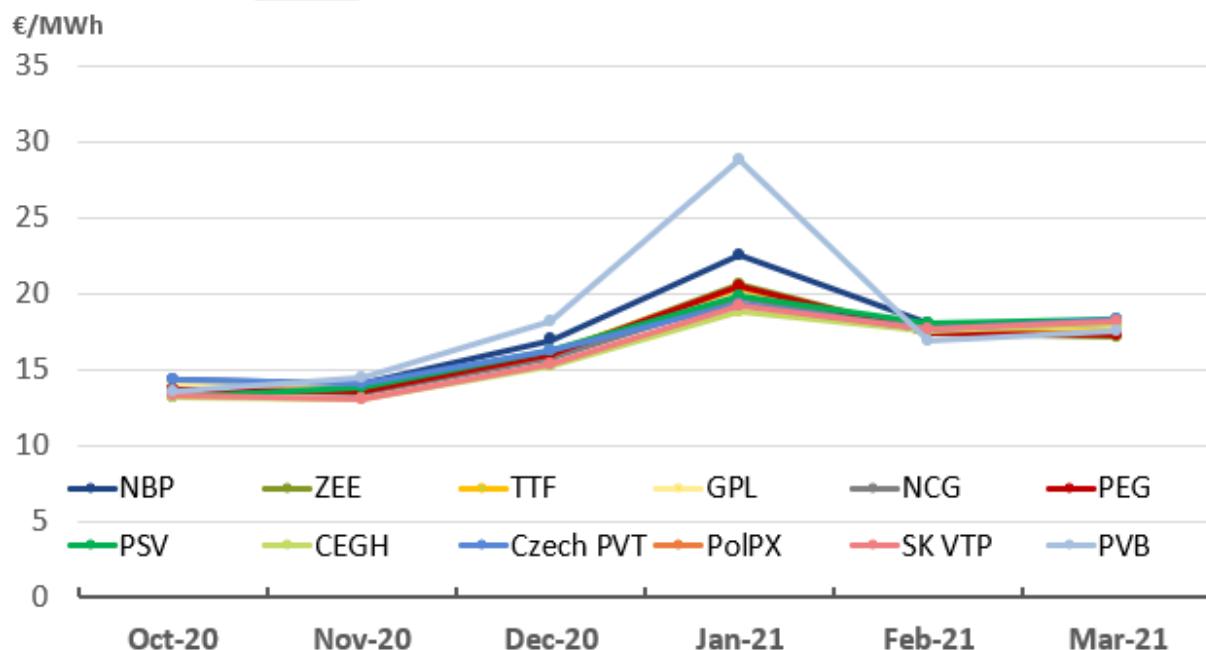


Figure 1 - Day-ahead average prices at European hubs in €/MWh (Source: Bloomberg)

Figure 2 compares the maximum range and average of the day-ahead winter price for the last two winter seasons over all the European hubs.

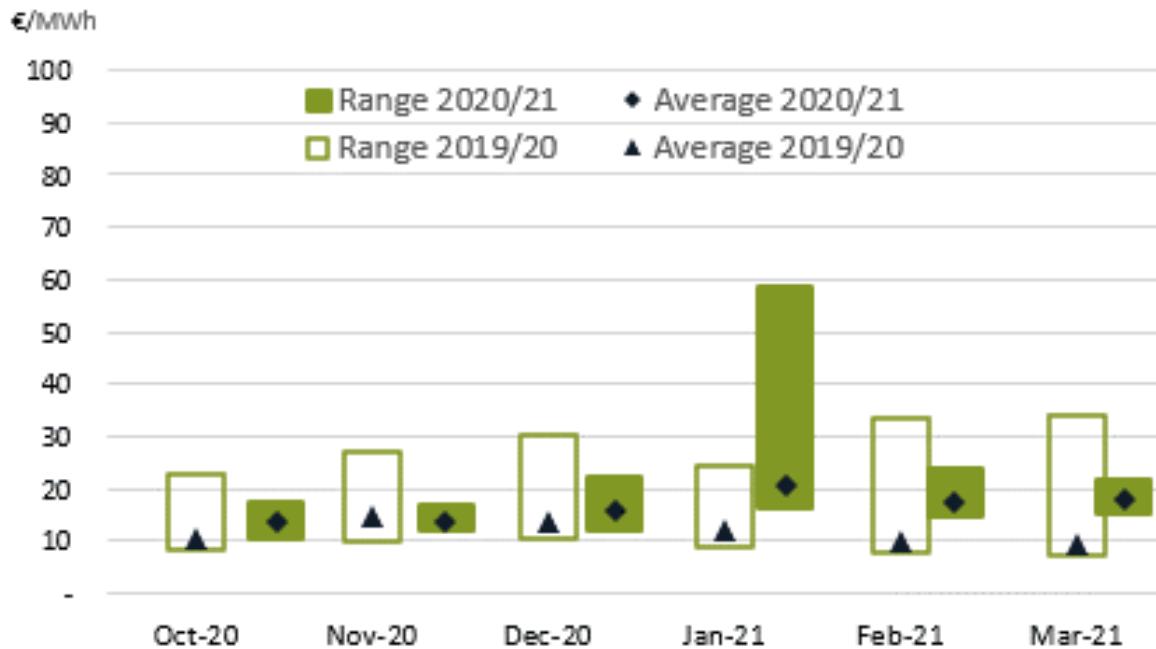


Figure 2 - Ranges and averages of the day-ahead hub prices at European hubs in €/MWh (Source: Bloomberg)

The average price increased significantly in winter 2020-2021, showing as a general trend higher prices levels when compared to the ones seen in the previous winter. Starting from 13.9 €/MWh in October 2020 and reaching the maximum average value in winter 2020-2021 in January at 21€/MWh, as demand rose on a lower temperature outlook, in turn depleting storage stock levels on an underlying LNG supply tightness. The price ranges were lower almost in all the season compared with 2019/2020 and (exception: January 2021). This corresponds to less volatility in the price and thus to a good stability of the gas market over this period.

3. Demand

3.1. European seasonal gas demand

The total gas demand during the winter season 2020/2021 was slightly higher (3,319 TWh) compared with previous winter season (3,216TWh).

Figure 3 shows how the daily monthly average demand levels, for total demand in EU, are quite comparable with previous winter season, as well as the maximum and minimum values. Gas demand across Europe in February has been higher compared to February 2020 mainly driven by lower than forecasted temperatures.

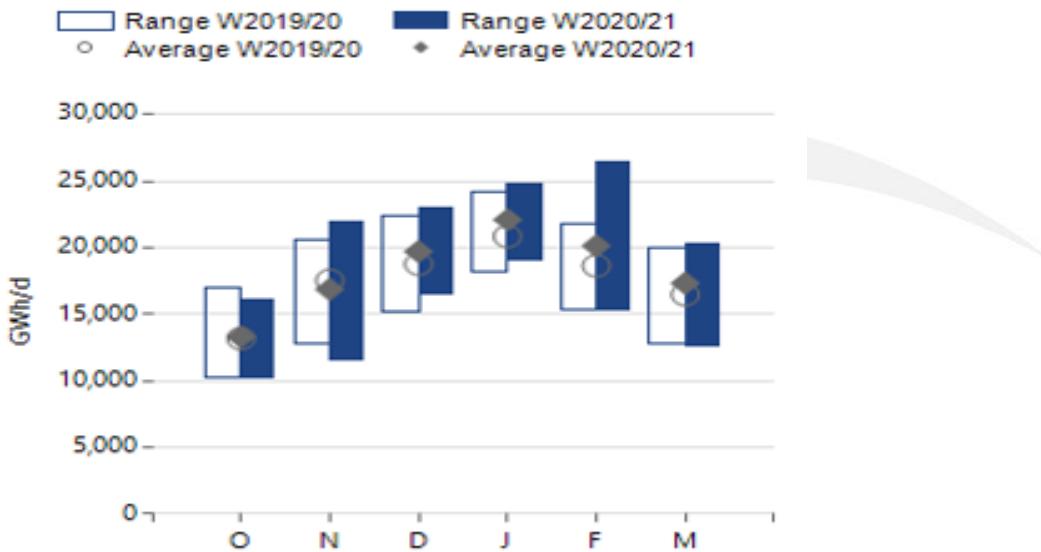


Figure 3 - Total gas demand. Winter 2019/2020 vs Winter 2020/2021

Figures 4 and 5 show the demand range and monthly average when split into final demand (residential, commercial and industrial) or power generation sectors, for the countries where the demand breakdown is available. As previous winter season, residential, commercial and industrial sector represents more than 80% of the total demand. Differing from previous season, February gas demand for residential, commercial and industrial sector had a sharp increase particularly driven by the climatic conditions in Europe, while the rest of the season remains quite stable. Additionally, favourable European gas market and climatic conditions around Europe mainly led to an increase of gas demand for power generation in winter season 2020/21.



Figure 4 - Final gas demand *

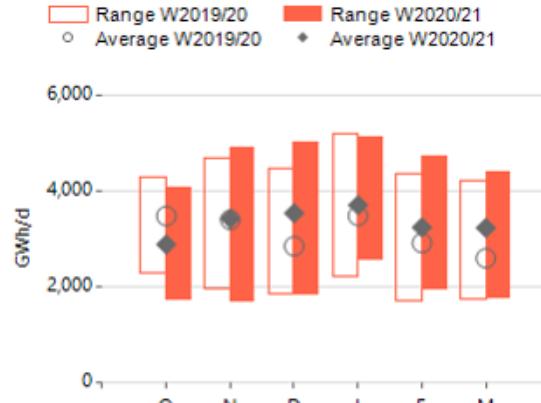


Figure 5 - Power generation gas demand *

* These graphs refer to the countries for which demand breakdown is available (with exception of Austria, Bosnia and Herzegovina, Latvia and Poland). In years and countries where the data breakdown has not been provided, then demand forms part of Residential, Commercial and Industrial.

> Electricity power generation from gas

Linked to the electricity production decrease, the power generation from gas in 2020/21 decreased by 2.4% compared with the previous winter season, as shown in Figure 6. The power generation from gas has been decreasing in the years 2017 – 2019. However, the decline is correlated with the overall decline in electricity generation and is not commensurate with the declines in other fossil sources, whereas renewable sources (such as wind, solar and hydropower) were increased in general terms.

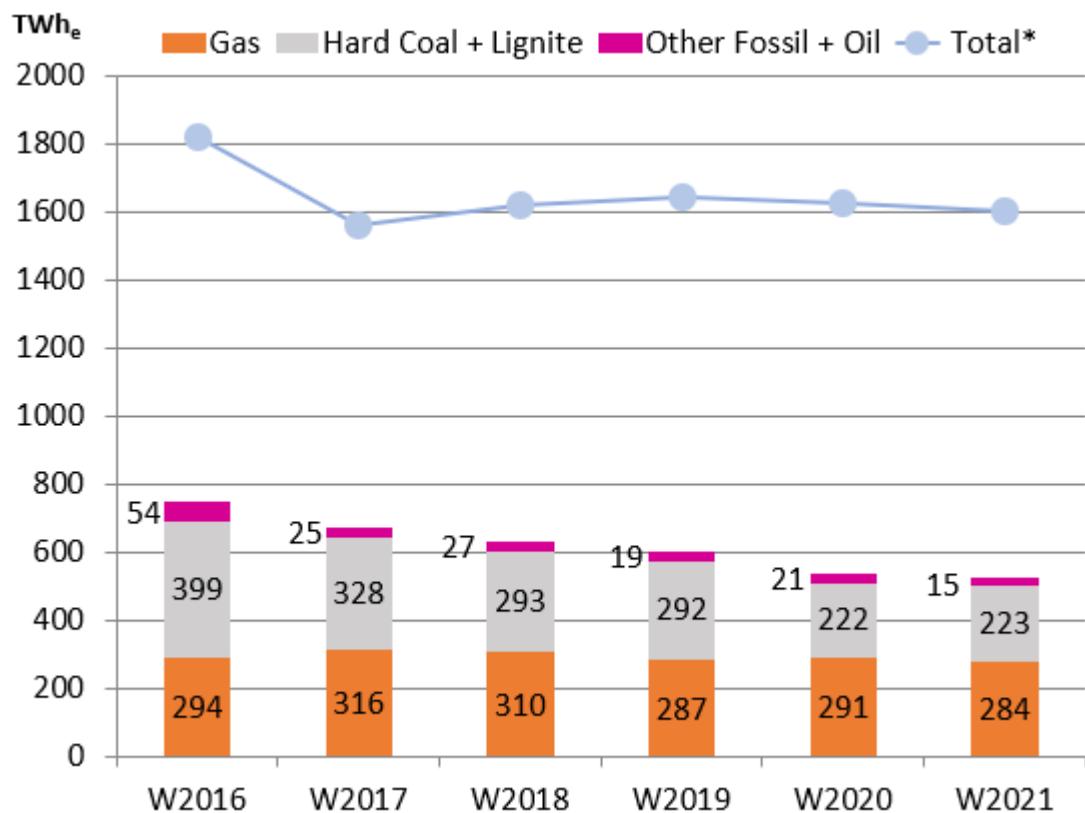


Figure 6 - Gas, coal and other sources in the electricity mix. Winters 2016-21
(*the total electricity power generation mix is detailed in Figure 7).

Source: own elaboration based on data from ENTSO-E.

In absolute terms, the electricity produced from gas during the winter season 2020/2021 was 284TWh_e, representing 18% of the generation mix (same share as in the previous winter season), as shown in Figure 7 and Figure 8. Non-fossil fuels do not show large variations from the previous year regarding the generation mix, however, in absolute values there is a decrease of 7% in wind and an increase of 8% in solar and 7% in hydraulic generation.

W2021 total electricity generation: 1,600TWh

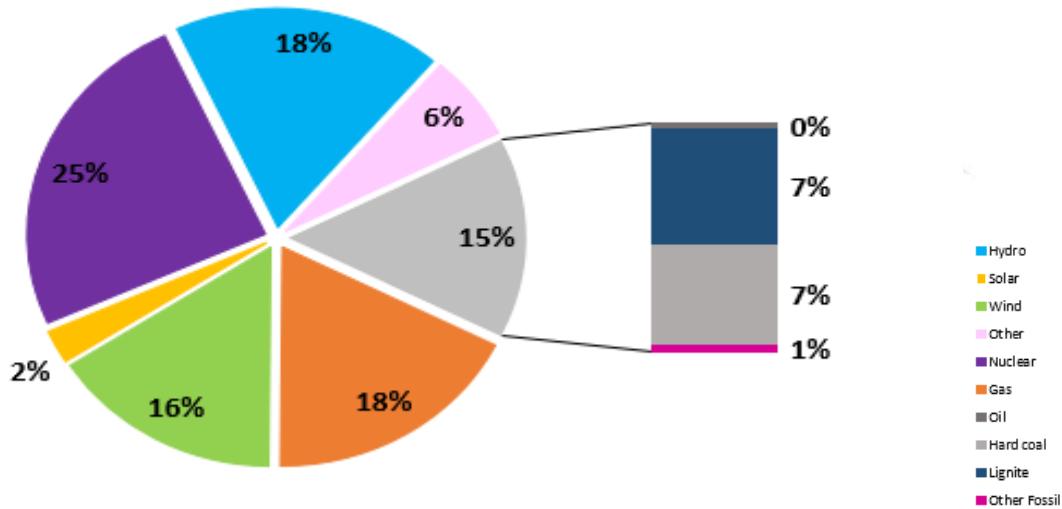


Figure 7 - Seasonal electricity power generation share. Source: own elaboration based on data from ENTSO-E in 2020-2021

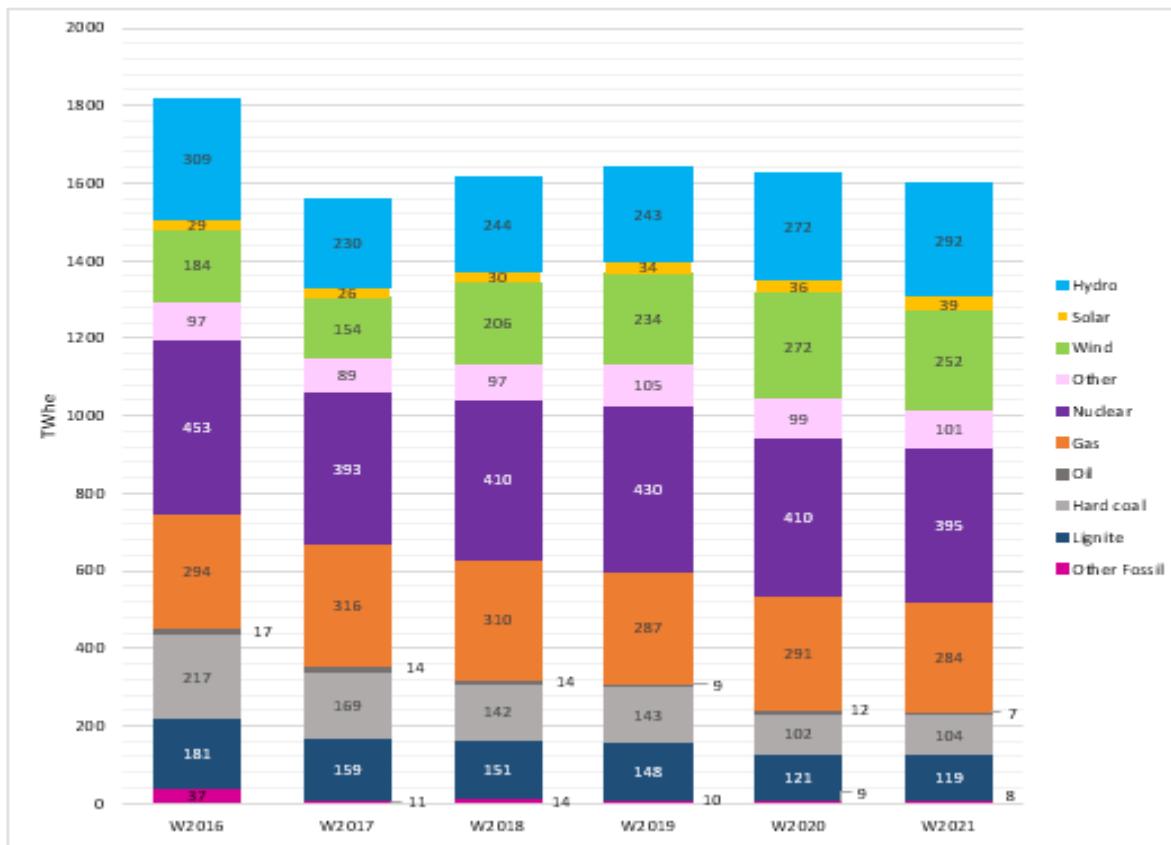


Figure 8 - Electricity generation mix in absolute values. Source: own elaboration based on data from ENTSO-E in winters 16-21³

The slightly decrease of gas for power generation in the EU in winter 2020/21 comparing to the previous year is mainly connected with the increase of generation from renewable energy sources (RES) and the total power generation decrease.

> Winter demand evolution 2017-2021

Figures 9 and 10 show the demand total consumption⁴ and the demand monthly average for winter 2017/18-2020/21. In winter 2021 the demand has slightly increased by 3.21% compared to previous winter. The demand monthly average profile is in line with Winter 2018/19 and 2019/20, following a similar trend.

³ This data could differ from ENTSO-G data due to the estimated allocation between sectors by some TSOs.

⁴ Total consumption is commercial, industrial, residential and power generation consumptions

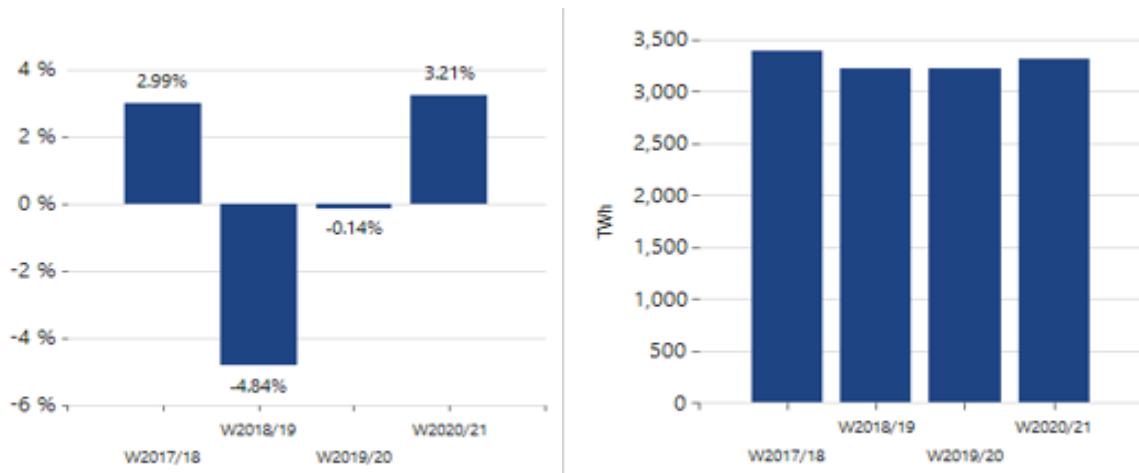


Figure 9 - Total consumption of natural gas. Winters 2017/2018 – 2020/2021

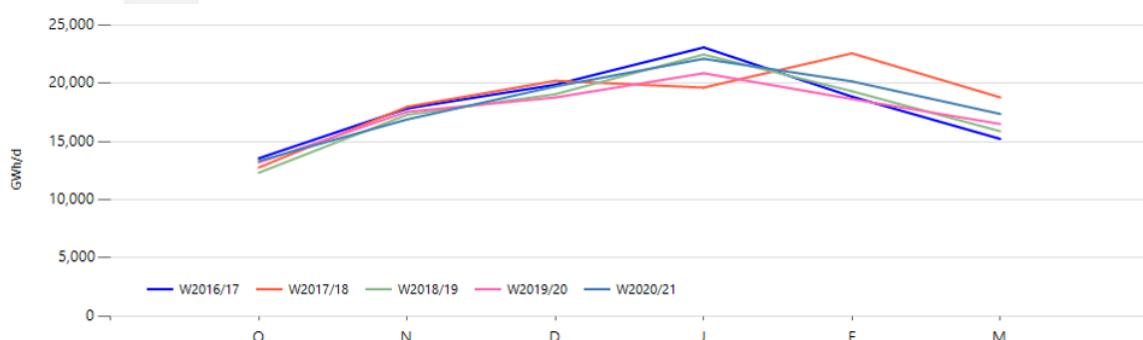


Figure 10 - Daily average of monthly gas demand. Winter 2016/2017 – 2020/2021

Figures 11 and 12 show by sector (residential, commercial, industrial and power generation) the gas consumption, for those countries that the gas demand breakdown is available. The winter consumption remains quite stable, with a slight increase in final gas consumption (around 1%), from winter 2019/20 to 2020/21 driven by similar climatic conditions and gas market in Europe. These figures indicate us that the increase of total gas consumption of gas is driven by power generation.

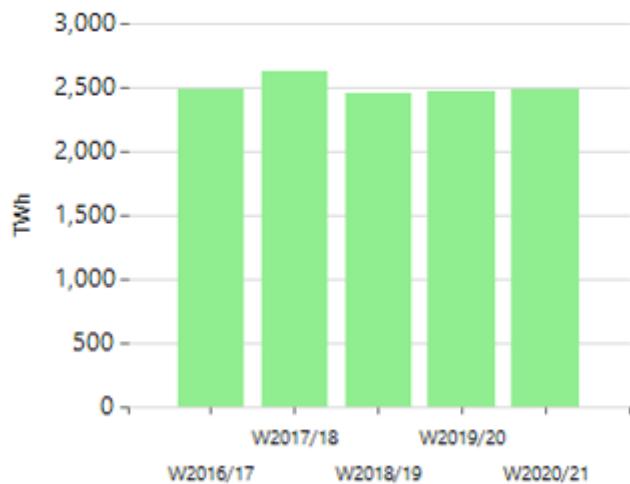


Figure 11 - Final gas consumption (residential, commercial and industrial). Winters 2016/2017 – 2020/2021 *

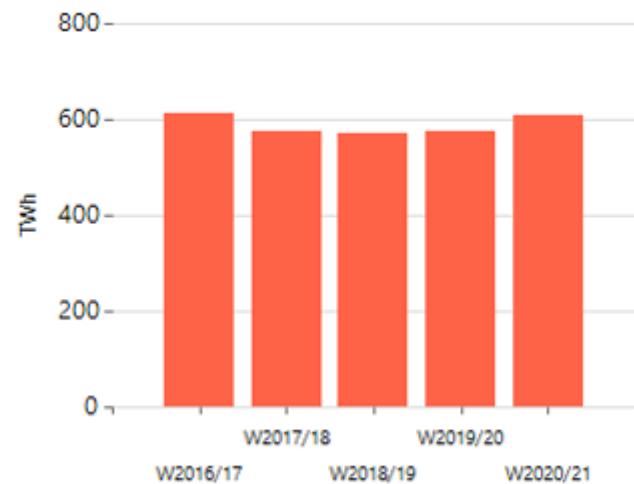


Figure 12 - Gas consumption for power generation. Winters 2016/2017 - 2020/2021 *

* These graphs refer to the countries for which demand breakdown is available (with exception of Austria, Bosnia and Herzegovina, Latvia and Poland). In years and countries where the data breakdown has not been provided, then demand forms part of Residential, Commercial and Industrial.

> Country detail

Comparing with previous season, the evolution of gas demand on a country level (**Figure 13**) shows a slightly increasing trend in most of the countries, while remains rather stable in others. Based on the received data, demand for natural gas mainly increased in Czech Republic, Germany, Italy, Netherlands, Poland. In countries with lower gas consumption, small increase might cause relatively high increase in percentage change. A decreasing trend was only observed in France, Spain, Portugal and Ireland.

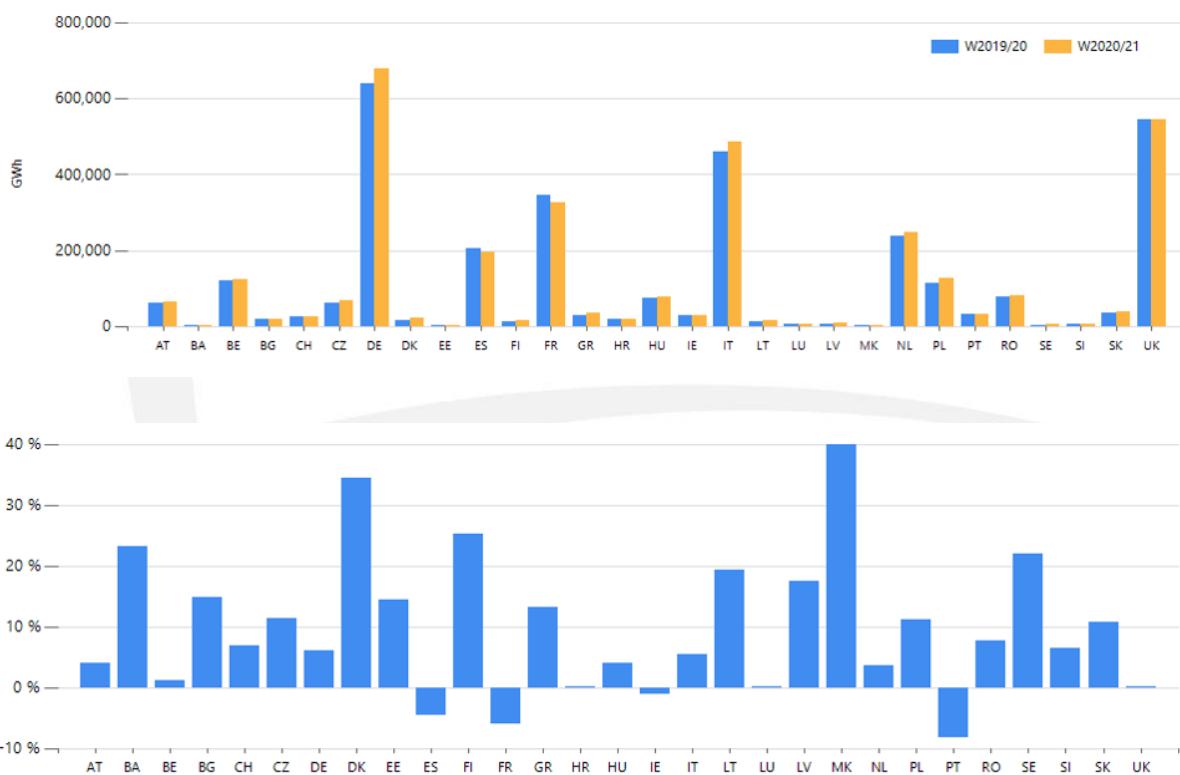


Figure 13 - Total winter demand and variation (%). Country detail. Winter 2019/2020 vs. Winter 2020/2021

> Seasonal modulation

The pattern followed by winter demand is strongly linked to the climatic conditions, like the presence of cold snaps or particularly mild conditions in one or several months during the hole winter season.

Figure 14 shows the deviation of the monthly average demand from the winter average for each of the last five winters:

- October is regularly the month with the lowest demand.
- Demand in December, January and February are systematically higher than the average.

- November and March demand are closer to the winter average.

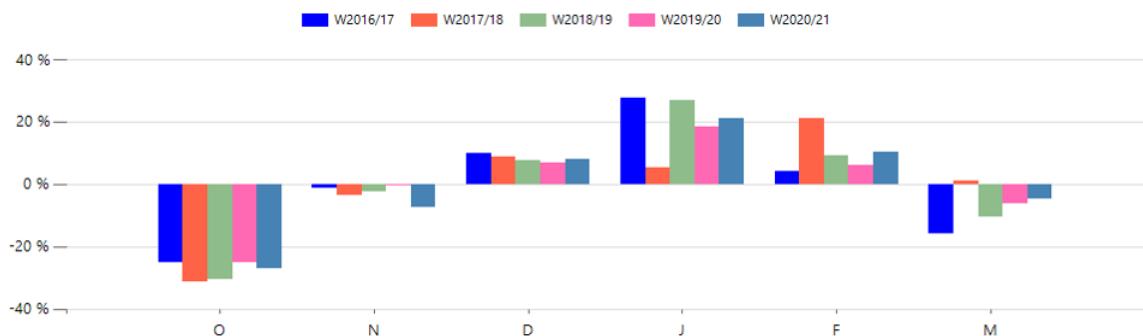


Figure 14 - Winter modulation 2016/2017 – 2020/2021

Figure 15 shows the monthly variation between the maximum and minimum daily demand and the average daily demand for each month of the last five winters. The low temperatures in the coldest month of the winter (December, January and February) are reflected in the increased of the daily average demand in winter 2020/21.

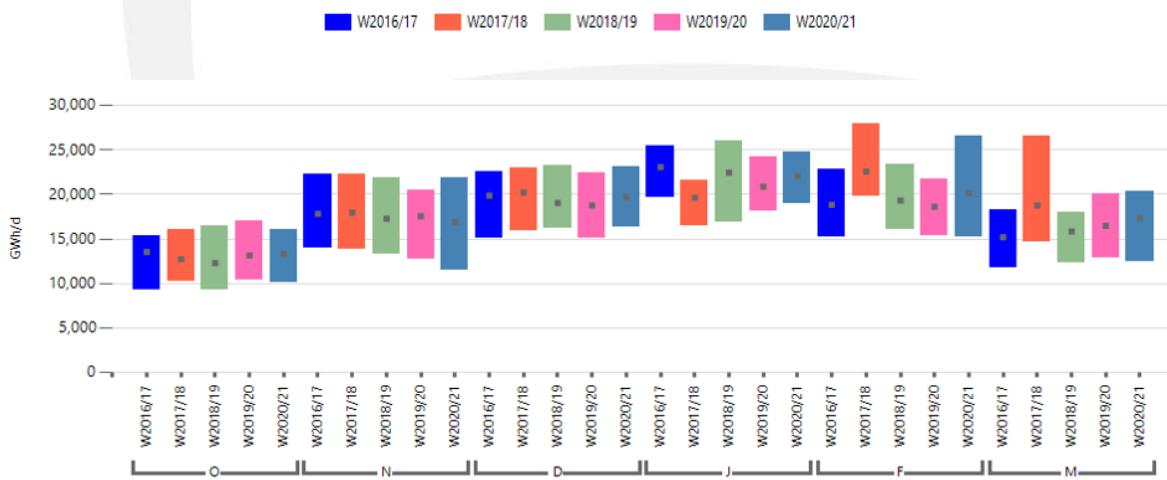


Figure 15 - Monthly demand ranges and average daily demand for each month. Winters 2016/2017 – 2020/2021

3.2. Peak demand 2020/2021

Figures 16, 17 and 18 show the total demand in daily profile, as well as the evolution of the daily demand split by sectors (residential, commercial, industrial and power generation).

The peak for final demand and for the power generation demand was reached in the first part of February 2021. Highest 14-day demand period was noted in January, as shown in **Table 1**.

Table 1 - Values and dates of high demand situations

| | | | |
|------------------------------|--------------------------|--------------------|--------------|
| 14-day peak period | 05/01/2021 to 18/01/2021 | Peak day | 12/02/2021 |
| Average 14-day demand | 23,544 GWh/d | Peak demand | 26,503 GWh/d |

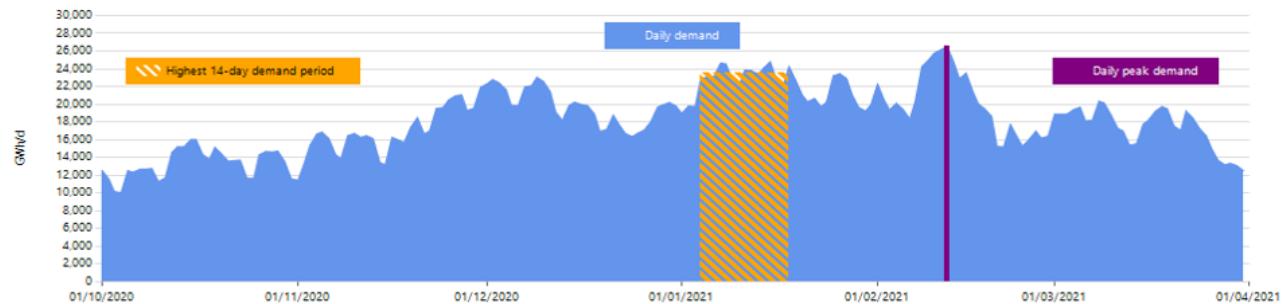


Figure 16 - Total demand daily profile. Winter 2020/2021



Figure 17 - Final demand (residential, commercial and industrial) daily profile. Winter 2020/2021 *

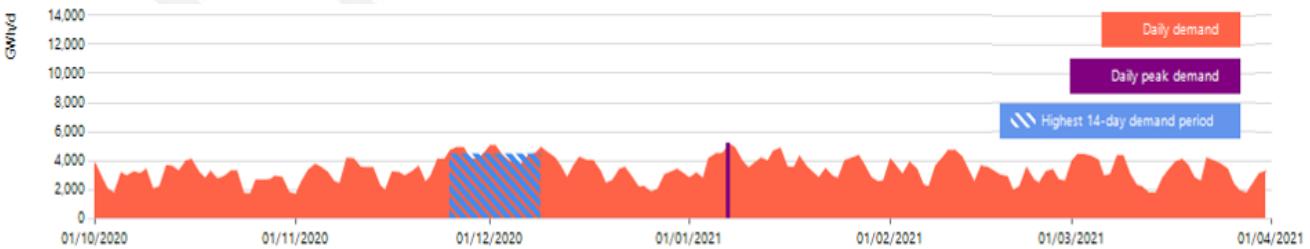


Figure 18 - Power generation demand daily profile. Winter 2020/2021 *

*These graphs refer to the countries for which demand breakdown is available (with exception of Austria, Bosnia and Herzegovina, Latvia and Poland). In years and countries where the data breakdown has not been provided, then demand forms part of residential, commercial and industrial.

> Peak demand evolution 2011-2021

Peak demand, in the same way as the seasonal demand, increased across Europe in Winter 2020/2021. **Figures 19 and 20** show the daily peak demand and the average daily demand for highest 14-day demand period. The daily peak demand in winter 2020/2021 changed the decreasing trend already observed in previous two winter seasons, with a substantial increase close to 9 %. The peak demand in 2020/2021 is comparable with the daily peak demand in 2018/2019. Average daily demand value for the highest 14-day coldest period increases significantly (close to 8%) compared to the last winter season.

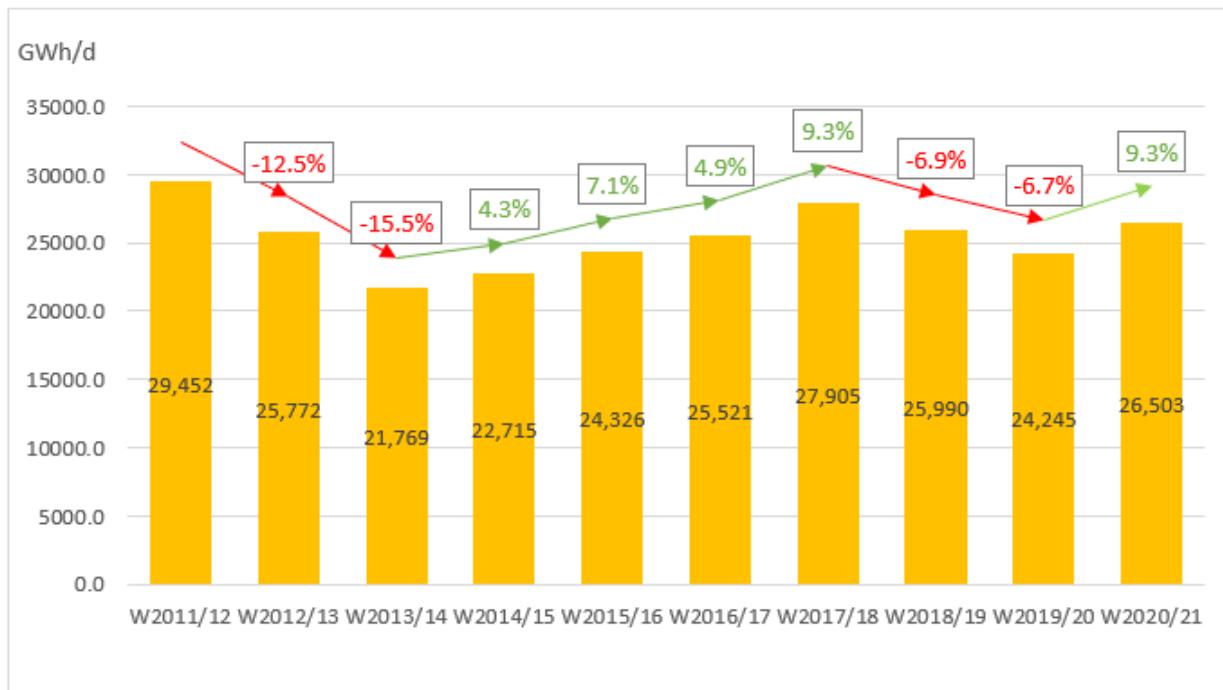


Figure 19 - Daily peak demand. Winters 2011/2012 – 2020/2021.

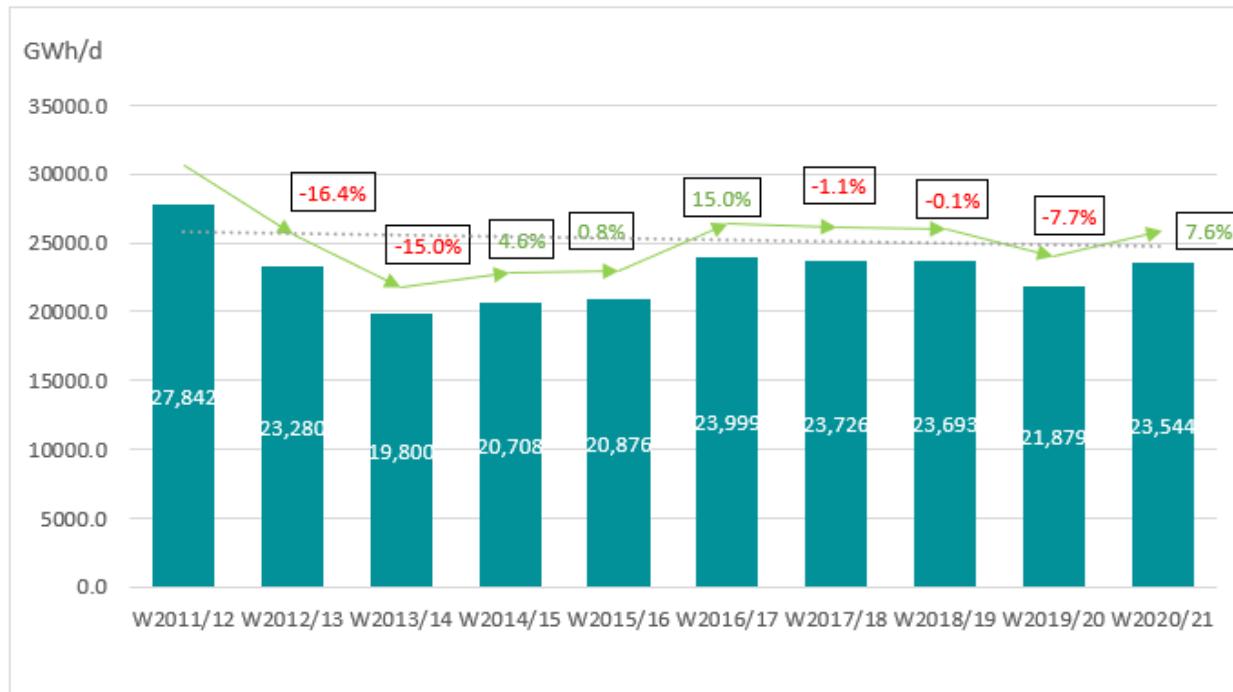


Figure 20 - Average daily demand for highest 14-day demand period. Winters 2011/2012 – 2020/2021.

Figures 21 and 22 show by sector (residential, commercial, industrial and power generation) the gas average daily demand for highest 14-day demand and the daily peak demand, for those countries that the gas demand breakdown is available (as information of the split is not available for all the countries). There is a slightly increase in the power generation and ex-power generation demand compared with previous winter season.

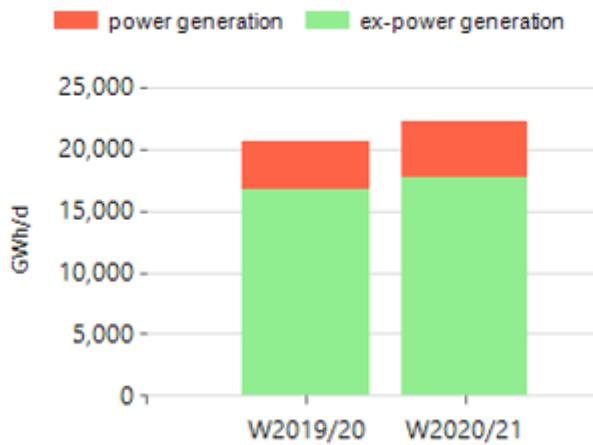


Figure 21 - Average daily demand for highest 14-day demand period split *

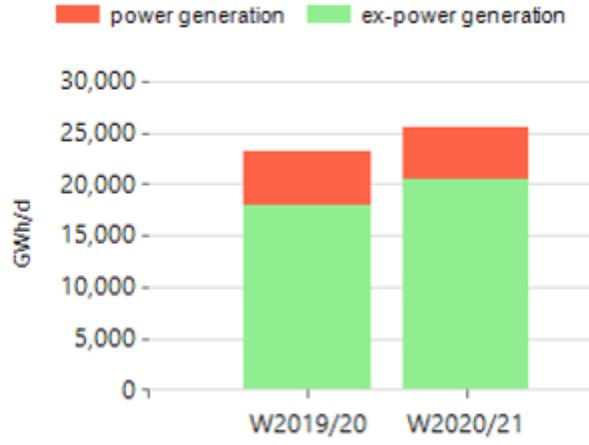
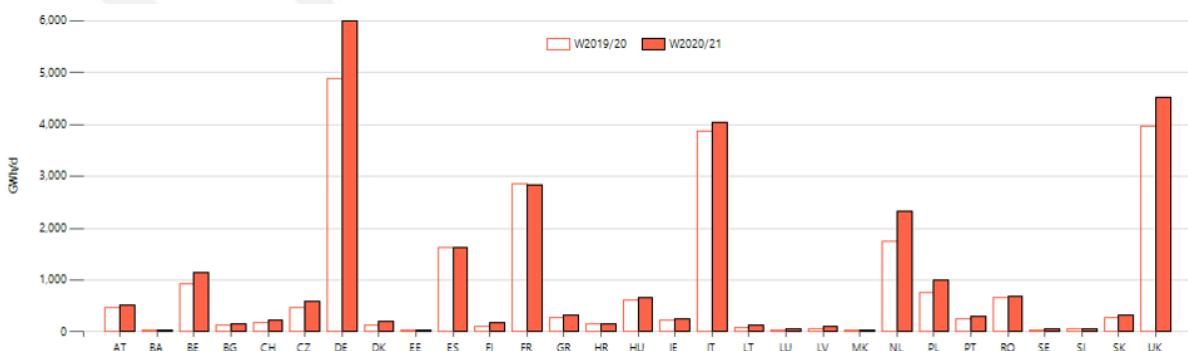


Figure 22 - Daily peak demand split *

* These graphs refer to the countries for which demand breakdown is available (with exception of Austria, Bosnia and Herzegovina, Latvia and Poland). In years and countries where the data breakdown has not been provided, then demand forms part of residential, commercial and industrial.

> Country detail

The evolution of gas peak demand on a country level, show an increasing trend in most of the countries comparing with previous winter season. **Figure 23** shows, based on the received data, that mainly Belgium, Germany, Hungary, Italy, Netherlands, Poland and United Kingdom experienced increase in their peak consumption.



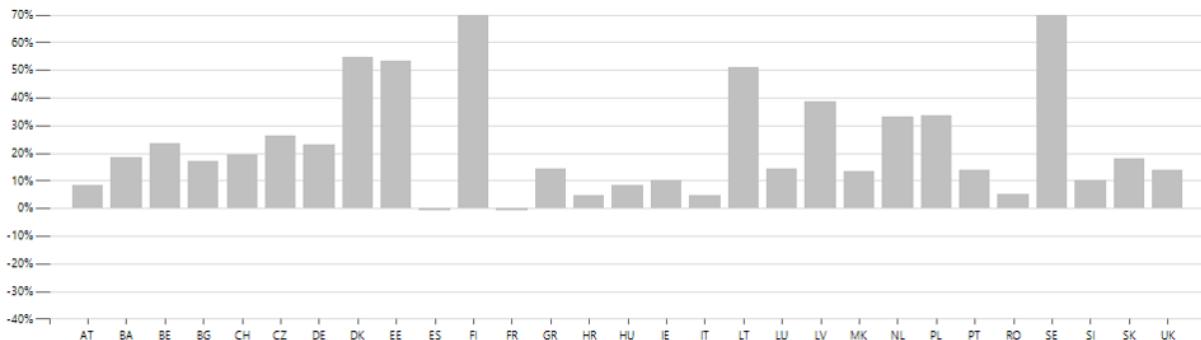


Figure 23 - Daily peak demand and variation. Winter 2019/2020 vs. 2020/2021

The same way as for daily peak demand, **Figure 24** shows that for most of the countries their 14-day high demand level is comparable with last winter. Germany, Italy, Netherlands, Poland and United Kingdom experienced mostly an increase in their 14-day high demand consumption.

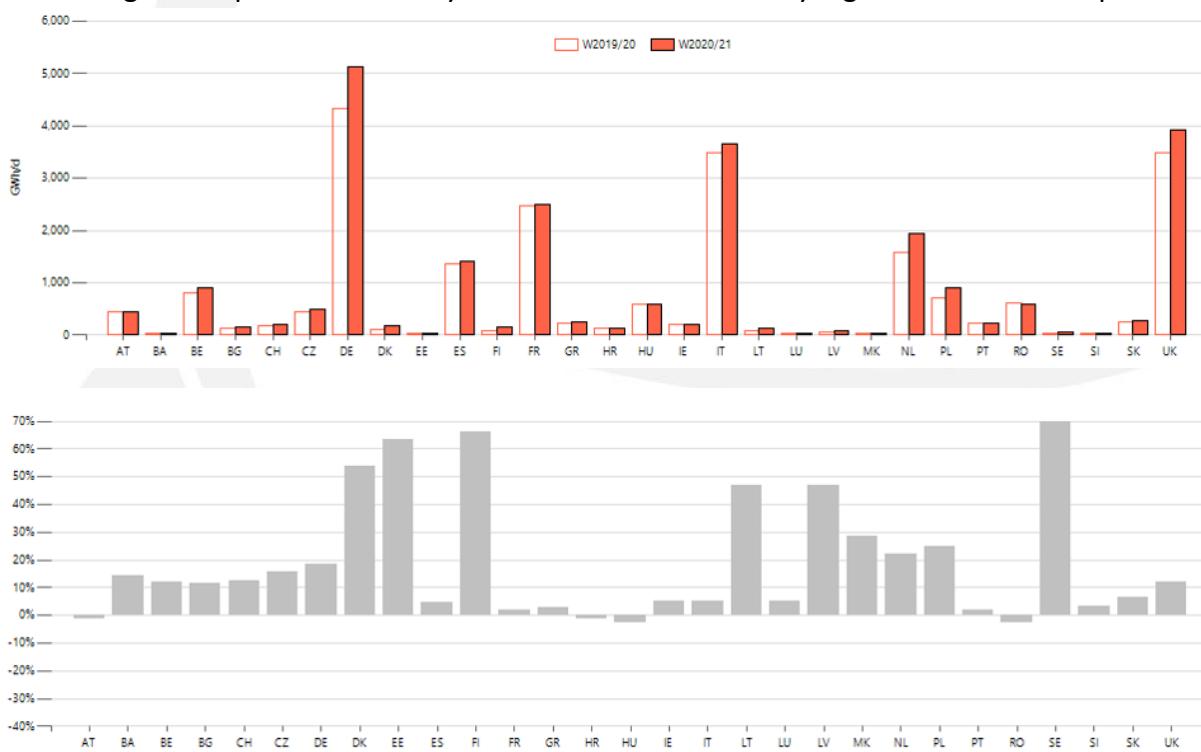


Figure 24 - Average 14-d demand and variation. Winter 2019/2020 vs. 2020/2021

Figure 25 shows the minimum, maximum and average daily demand during winter 2020/2021, as well as the daily maximum and minimum demand of the last six winters per country. The second figure gives more detail of those countries where the data is not clearly shown in the first figure.

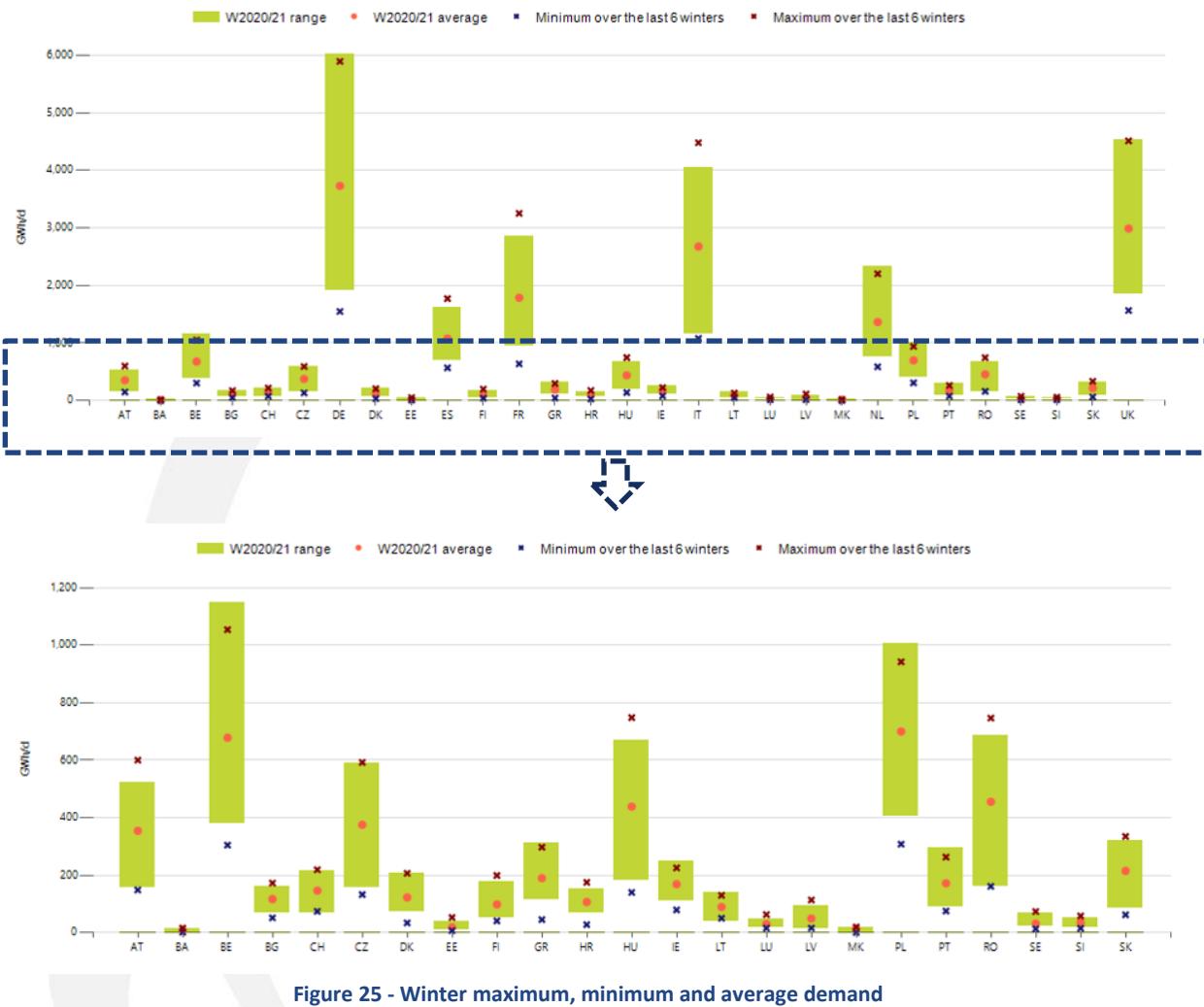


Figure 25 - Winter maximum, minimum and average demand

> Simultaneity

To measure the simultaneity between the peak days in different countries, the “Un-simultaneous Peak” is described as the sum of the peak day demands of the individual countries having occurred un-simultaneously, defining:

- The European Peak Simultaneity (EPS)
 - o EPS = European Peak Demand / Un-simultaneous Peak (%)
- The simultaneity of an individual country in the European peak day (CPS)
 - o CPS = Country demand on the European peak day/Country peak demand (%)

As defined, the European peak simultaneity during the peak day on 12th February, was 93%, slightly lower as the average considering this last 5 winters.

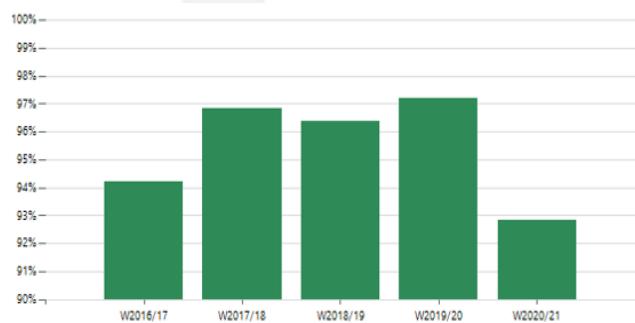


Figure 26 - European peak simultaneity

Table 2 - Peak demand and European peak simultaneity. Winters 2016/2017 – 2020/2021

| Winter | Day | Peak Demand (GWh/d) | EU Peak Simultaneity (%) |
|----------|------------|---------------------|--------------------------|
| W2016/17 | 18/01/2017 | 25,521 | 94% |
| W2017/18 | 28/02/2018 | 27,905 | 97% |
| W2018/19 | 23/01/2019 | 25,990 | 96% |
| W2019/20 | 22/01/2020 | 24,245 | 97% |
| W2020/21 | 12/02/2021 | 26,503 | 93% |



Figure 27 - Simultaneity of the highest single day between last 2 winters

4. Supply

> European seasonal gas supply

Figure 28 shows the evolution of the aggregated gas supply in Europe during the last winter season 2020/2021.

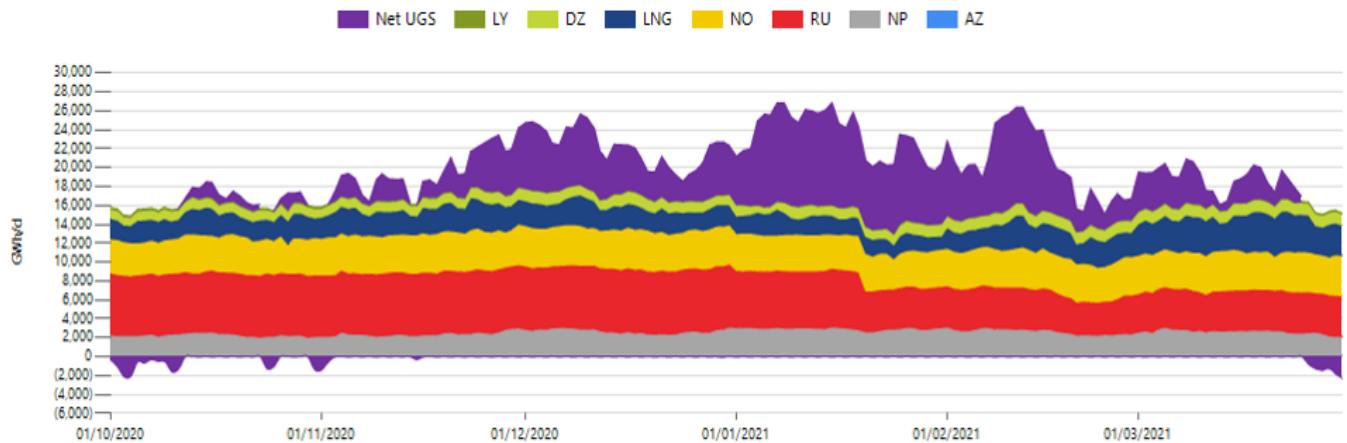


Figure 28 - Supply profile. Winter 2020/2021

The next graphs give an overview of national production and supply imported shares during the Winters 2019/2020 and 2020/2021 in both absolute and relative terms. **Figure 29** shows the seasonal supplies by source for the last winter in absolute figures. The total supply (without UGS) has been lower in Winter 2020/2021 (2,762 TWh) comparing with (2,857 TWh) previous winter.

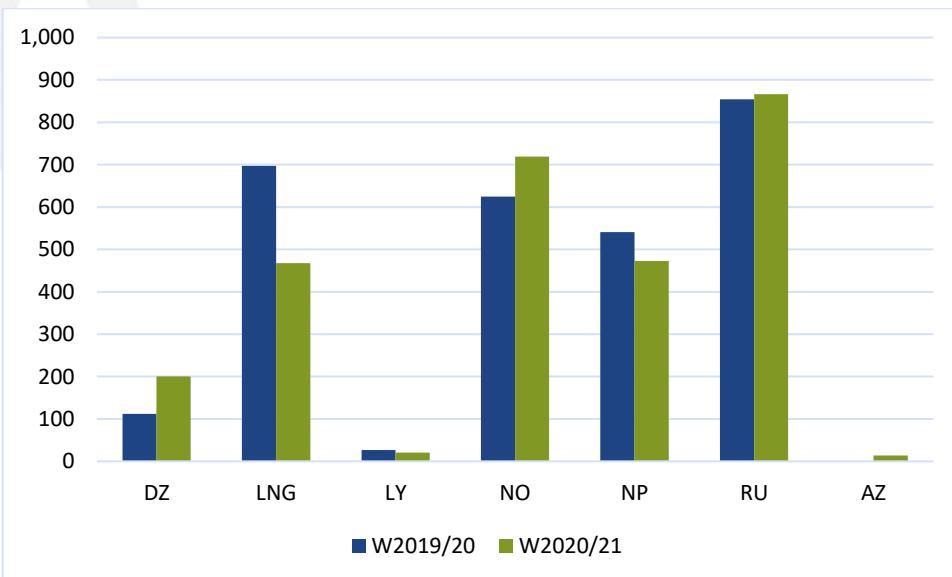


Figure 29 - Total supply by source. Winter 2019/20 – 2020/21 (TWh)

Following the trend of previous season, national production kept its decreasing trend, as it was observed in previous winter season, decreasing from 541 TWh to 473 TWh (13% less). This reduction was driven by a falling domestic production in some European countries during the winter season.

Differing from previous season, LNG have been affected by the record high Japan/Korea Marker (JKM) pricing seen in the winter 2020/21 (LNG shipping change from Europe to the more profitable Asia market) as well as the Suez Canal being blocked at the end of March 2021. As a result, pipeline gas imports were up, to cover the LNG reduction (33% decrease), with storage also picking up to balance the system at the end of the winter 2020/21 delivery period.

Compared with winter 2019/2020 Russian gas supplies to Europe had a slight increase of more than 1%. Russian deliveries in the fourth quarter were significantly higher than the rest of 2020 as market conditions normalized following the European gas price crash in the summer. A combination of factors — including a second consecutive mild winter at the start of 2020, high gas storage stocks, and low prices and weak demand in the first half — affected total Russian exports in 2020. In October 2020 the main reason for the increase of Russian gas supplies to Europe was the end of the heavy use of virtual reverse flow at the Velke Kapusany interconnection point between Ukraine and Slovakia, which had capped the volume of Russian gas entering Europe through the summer.

Moreover, annual Norwegian (plus 15% in absolute terms) and Algerian (plus 79% in absolute terms) pipeline gas supplies to Europe slightly increased their share in the supply mix (plus 3% both) during the winter season compared with previous season. Skyrocketing Asian spot LNG prices made global LNG market conditions less favourable for export to Europe. Following the low trend of LNG regasification activity observed during winter 2020/21, imports necessary to meet demand for the season would have to come from sources other than LNG.

Algerian flows to Italy have revised strongly upward in winter 2020/2021. The increased flows at Mazara del Vallo are probably connected with oil-linked contracts being competitive with hub TTF in winter 2020/2021 season.

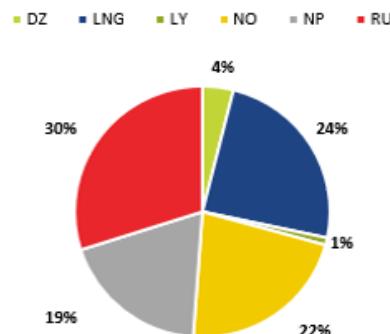
Additionally, heavy maintenance on the Trans Tunisian Pipeline in September 2020 imposes an upper limit on Algerian flows during the month. However, in winter 2020/2021 a share of the Libyan flows at Gela remain unchanged comparing with the previous season.

Moreover, as Azerbaijan has started commercial natural-gas supplies from Shah Deniz 2 field in the Caspian Sea to the European Union (into Italy, Greece, and Bulgaria) via the Trans Adriatic Pipeline (TAP) as of 31 December 2020, a new supply route has been introduced. The share in the

supply mix of the new AZ gas source just started in January 2021 is marginal – its impact will be better reflected in the subsequent editions of Summer and Winter Supply Review Reports.

Figures 30 and 31 show the supply shares in winter 2020/2021 compared with winter 2019/2020. LNG share in supplies faced a remarkable decrease of 8% compared with previous winter. The rest of the supply sources share remained at similar levels compared to the ones from 2019/2020 with slight increase in Algeria, Norway (+3%), Russia (+1%) and decrease in European indigenous production (-3%).

Total Winter Supply W2019/20: 2,857 TW



Total Winter Supply W2020/21: 2,762 TWh

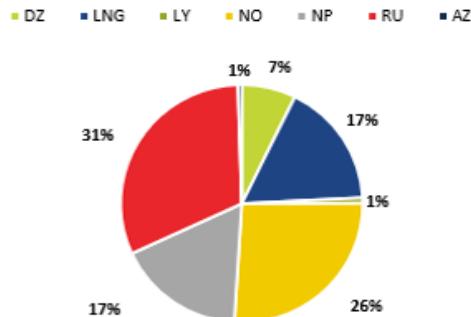


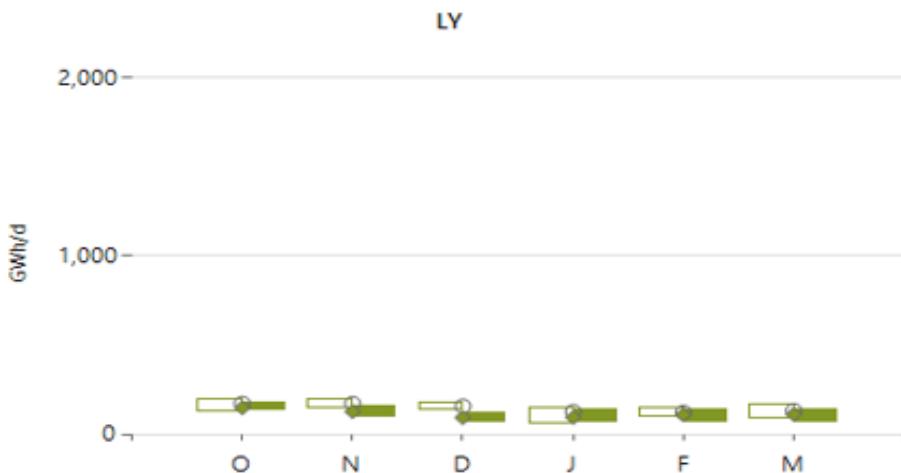
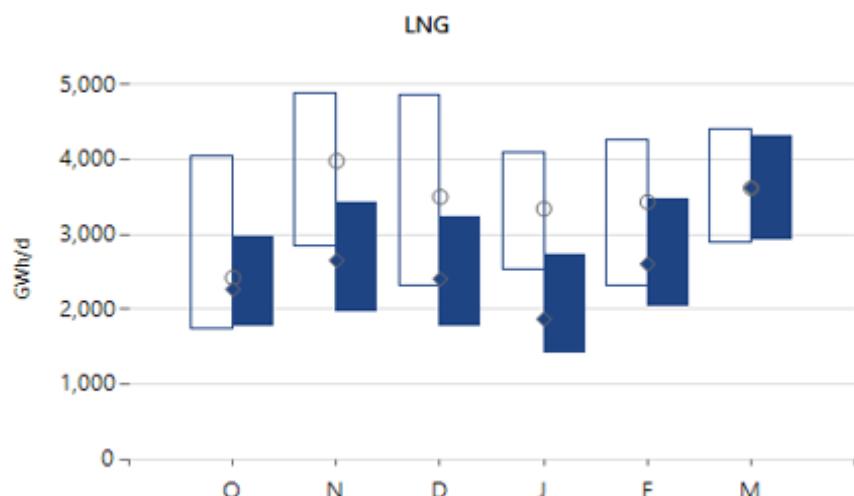
Figure 30 - Shares in supply mix. Winter 2019/2020

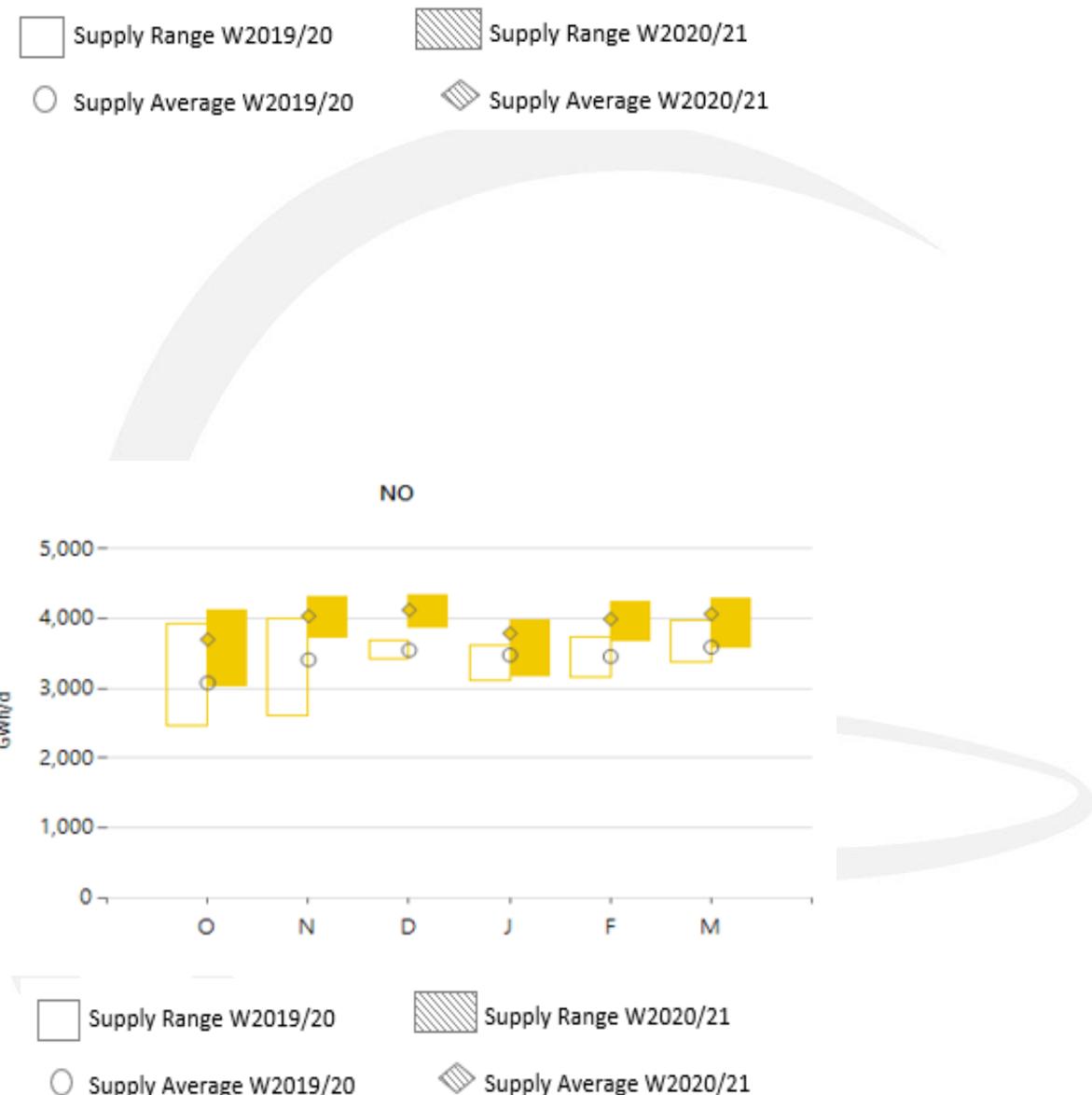
Figure 31 - Shares in supply mix. Winter 2020/2021

> Supply Modulation

The following graph (**Figure 32**) illustrates for each import supply sources, as well as for indigenous production, the average flow per month and the monthly range of the last two winter season (lowest and highest daily flow of each month for the winter season).







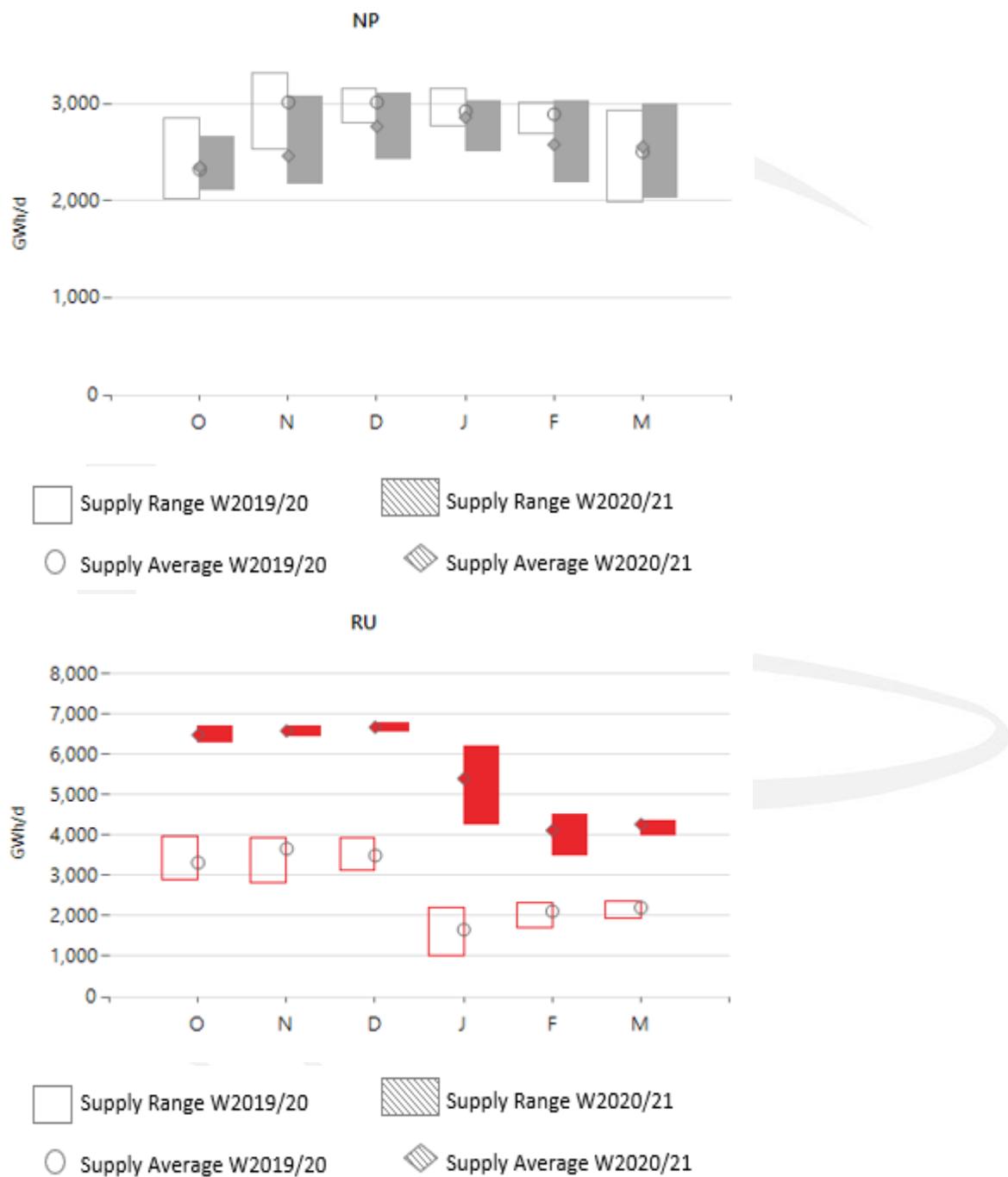


Figure 32 - Supply daily range (GWh/d)

> Underground Storages

The utilisation of the underground storages depends on many factors, linked to price signals such as summer-winter spread or climatic and economic considerations having impact on gas demand.

Figure 33 shows UGS injection and withdraw profile of European storages. The peak deliverability of UGS was 10,774 GWh/d, meaning a 32% increase from the previous year (8,174 GWh/d). **Figure 34** provides the average withdraw and the daily range of withdrawal and injection for the whole Europe for every month of the winters 2019/20 and 2020/21. We can observe a high use of the storages coming from the high storage level at the beginning of winter and low temperatures.

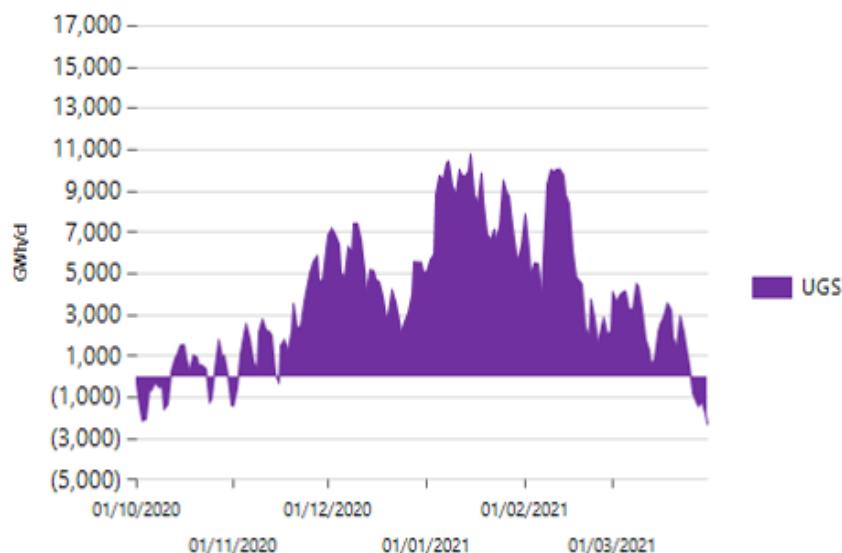


Figure 33 - UGS injection/withdraw profile. Winter 2020/2021

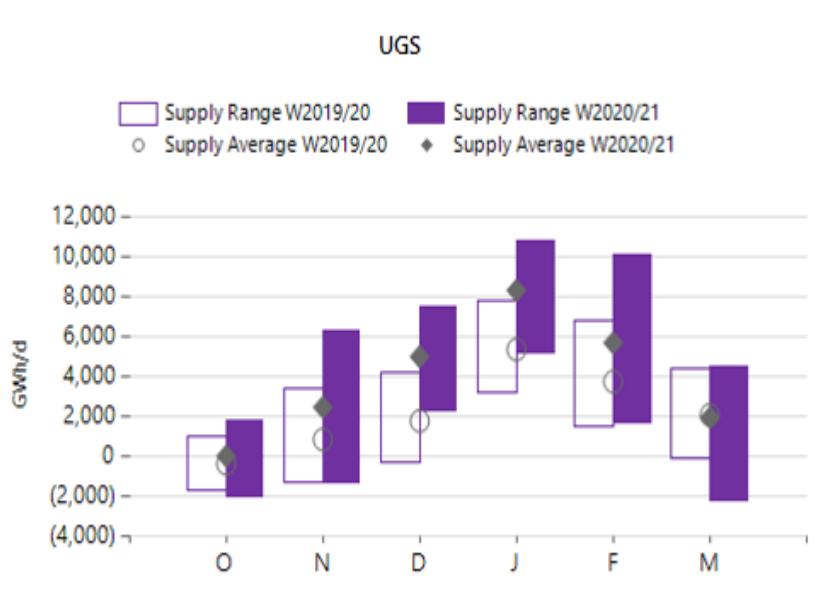


Figure 34 - UGS daily range of withdrawal and injection. Winter 2020/2021 vs. Winter 2019/2020

Table 3 provides the stock level at the beginning of the winter season and at the end of the last 10 seasons.

Table 3 - UGS Utilisation (TWh) Winter 2011/2012 – 2020/2021. (Source: AGSI)

| | 1-Oct (TWh) | 31- Mar (TWh) | UGS Utilisation (TWh) |
|---------------|-------------|---------------|-----------------------|
| W11-12 | 601.7 | 331.3 | 270.5 |
| W12-13 | 716.2 | 222.8 | 493.5 |
| W13-14 | 724.1 | 433.4 | 290.7 |
| W14-15 | 867.4 | 274.6 | 592.9 |
| W15-16 | 838.6 | 364.1 | 474.5 |
| W16-17 | 972.9 | 278.1 | 694.8 |
| W17-18 | 903.8 | 191.1 | 712.7 |
| W18-19 | 886.1 | 437.5 | 448.6 |
| W19-20 | 1063.4 | 601.4 | 462.0 |
| W20-21 | 1053.2 | 336.5 | 716.8 |

Figure 35 compares the stock level evolution curve of the last 10 winters. According to AGSI+, the gas storage platform operated by GIE, the storage withdrawals reached 10.8 TWh on the 15th of January 2021, the highest during the whole winter. This value is almost as high as the 11.4 TWh reached on 28th February 2018, which is still the highest value since 2011 due to the cold spell in March 2018. The stock level for the Winter 2020/2021 started from a level of 1053TWh. At the

end of the winter season the storage level reached around 337TWh, what corresponds to a UGS utilisation relatively high (717TWh).

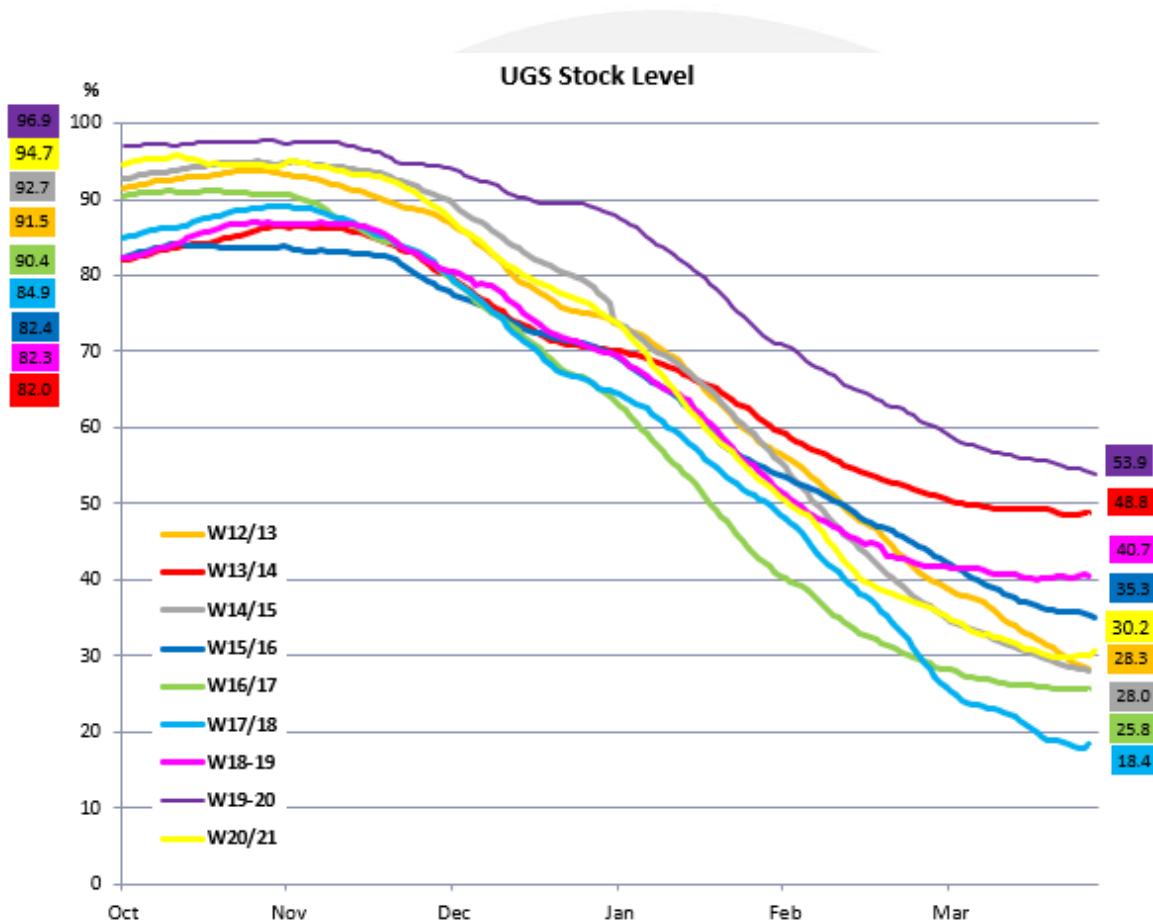


Figure 35 - Evolution of UGS stock level. Winters 2011/2012 – 2020/2021 (Source: AGSI)

> Supply coverage of high daily demands

Figure 36 compares the supply level of the different sources under different demand conditions. It reflects the ability of the different supply sources to increase or decrease the supply levels in response to demand changes, varying the supply mix significantly depending on the demand level. It shows that especially underground storages are the main source of flexibility in high demand situations.

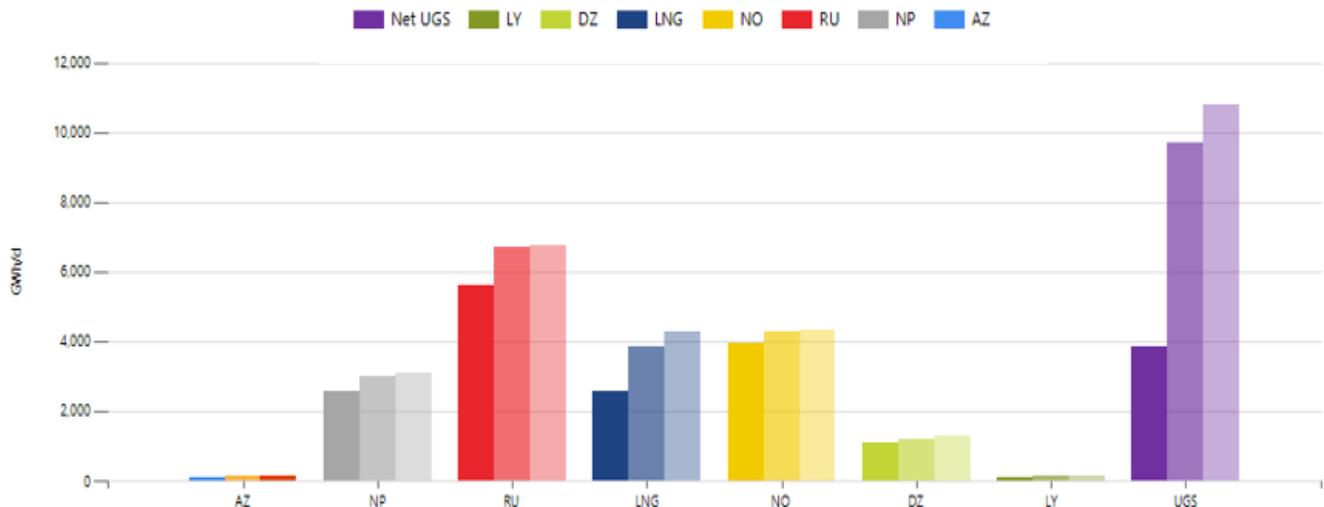


Figure 36 - Daily average supply / Average daily supply for highest 14-day demand period / Supply for peak day demand.
Winter 2020/2021

> Winter supply evolution 2016/2017 -2020/2021

Figure 37 shows the evolution of the different supply sources during the last six winters. When comparing the last six winters, national production is decreasing year by year while LNG decreases in winter season 2020/21 comparing with the previous one; Norway and Russia imports are meanwhile higher than in the previous winter.

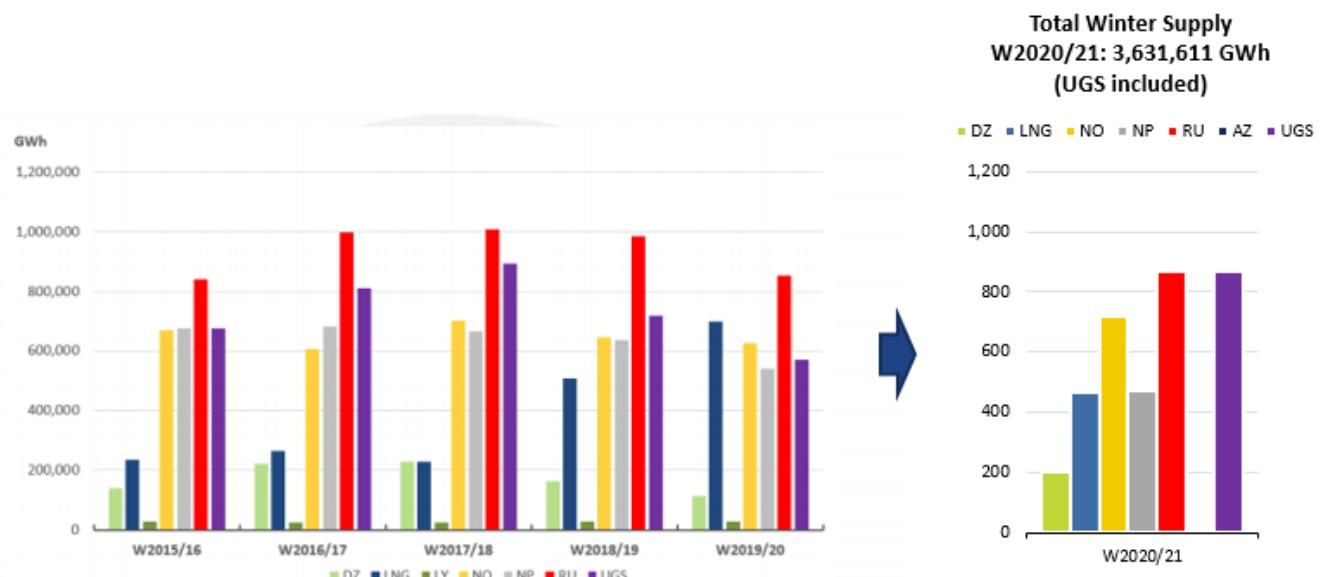


Figure 37 - Evolution of winter gas supplies 2015/2016 – 2020/2021

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Avenue de Cortenbergh 100
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Co-Authors Paula Di Mattia, Kacper Zeromski and Jacques Reberol

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

info@entsog.eu | www.entsog.eu