entsog

european network
of transmission system operators
for gas

ENTSOG
WINTER SUPPLY REVIEW

2019/2020

Contents

Winter Supply Review 2019/2020

Executive Summary

ENTSOG has completed the review of the European gas supply and demand for Winter 2019/2020 (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 2019/2020 (3,216TWh) slightly decreased by 0.14% from previous winter. Additionally, in March, due to the COVID-19 pandemic some declines in in consumption by industry and power generation were observed.**
- **Daily peak demand, together with the average daily demand value for the highest 14-day coldest period, in winter 2019/2020 kept the decreasing trend already observed in previous winter season, with a decrease close to 7-8% in both demand cases.**
- **The storage level at the end of the winter season reached 598TWh, the highest seen in last eight winters, mainly caused by the starting of the winter season with the highest UGS level of the last eight seasons together with a relatively low UGS utilisation.**
- **Robust inflows of LNG weighed on the market were observed during winter 2019/2020, increasing LNG supply from 507TWh to 697TWh, following the high trend of LNG regasification observed previous season.**
- **European gas prices reached the minimum values of the last 8 winters season mainly driven by a weak demand across Europe subdued by mild winter weather, oversupplied market, and some declines in consumption by industry and power generation during March due to the COVID-19 . The observed decreasing trend for the European gas prices and demand was extended during the summer season due to the implementation of COVID-19 safety measures and it will be reflected in the subsequent editions of Summer Supply Review Report.**

Detailed data for the cross-border flows are 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 infrastructures.

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

1. Introduction

This review, as part of the ENTSOG Annual Work Program 2020 is published on a voluntary basis and aims at providing an overview of the demand and supply balance during Winter 2019/2020. 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 2019 and March 2020. The major gas related topics were[2]:

OCTOBER

- Imports from Algeria decreased by 62% year on year, amid the start of new long-term contracts between Italy and Algeria's state-owned producer which reduced the level of volumes contracted.

NOVEMBER

- Flows via Nord Stream pipeline to Germany in November edged up to capacity despite the decision from the EU's General Court in Luxembourg in September to annul a 2016 European Commission decision giving Gazprom access to extra capacity in OPAL, which receives most of the gas sent via Nord Stream.
- Storage withdrawals in Central and Eastern Europe were replaced by much stronger Russian flows. Storage holders were unlikely to send out their stocks yet in the hope of higher prices later in the winter, therefore Russian gas flows have picked up, especially into Central and Eastern Europe.

DECEMBER

- US sanctions on Nord Stream 2 were signed into law by US President in December, leading into delays the Nord Stream 2 pipeline project from Russia to Germany. Meanwhile, Russia and Ukraine compromised on gas transit deal.

[2] Source: Platts

JANUARY

- Re-routing of Russian gas exports to Europe with the start-up of the TurkStream gas pipeline to Turkey replacing some flows via Ukraine.

FEBRUARY

- Russian gas supplies to Europe edge up in February, staging a small recovery in February after the decrease in January driven by unseasonably warm weather combined with a re-routing of gas away from Ukraine due to contractual changes impacted flows.

MARCH

- Russian gas supplies to Europe continued to recover in March after a significant slump at the turn of the year.
- Demand in general across Europe subdued by the mild winter weather and more recently some declines in consumption by industry and power generation due to COVID-19 pandemic.
- Flows via Ukraine into Bulgaria, Greece, North Macedonia and Turkey have effectively ceased, with TurkStream now replacing those volumes.

The level of storages at the end of Winter 2019/2020 was the highest (598.4 TWh) of the 8 last years with a relatively low use of storages at the end of the season.

2. Gas Prices and Quantities at European hubs

The following graphs show the evolution of gas prices in Europe during winter 2019/2020, as well as the overall monthly ranges and averages in comparison to those of 2018/2019 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. Italian and Polish gas prices remained slightly higher. The price drop observed across Europe during Winter 2019/2020 continued in summer mainly driven by a demand, in general across Europe, subdued by the mild winter weather and, more recently, declines in consumption by industry and power generation during March due to the coronavirus pandemic.

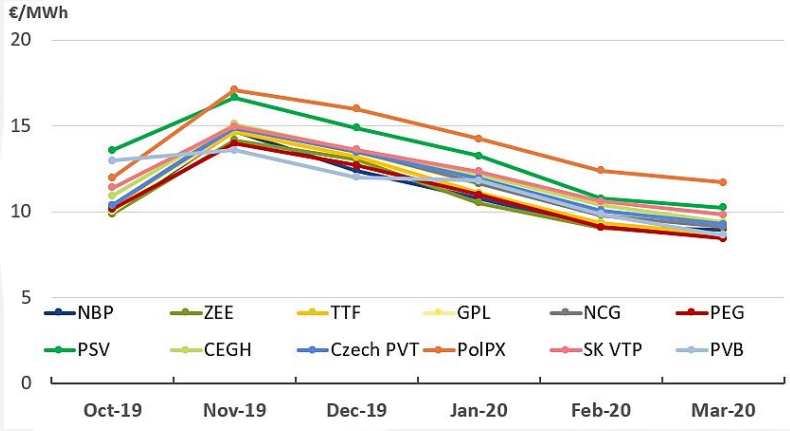

Figure 1 - Day-ahead average prices at European hubs in €/MWh (Source: Bloomberg)

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.

The average price decreased significantly in winter 2019-2020, showing as a general trend lower prices levels when compared to the ones seen in the previous winter. Starting form 11 €/MWh in October 2019 and reaching the minimum average value of the last eight winter seasons in March 2020 9.3€/MWh. The price ranges were higher in all the season compared with 2018/2019.

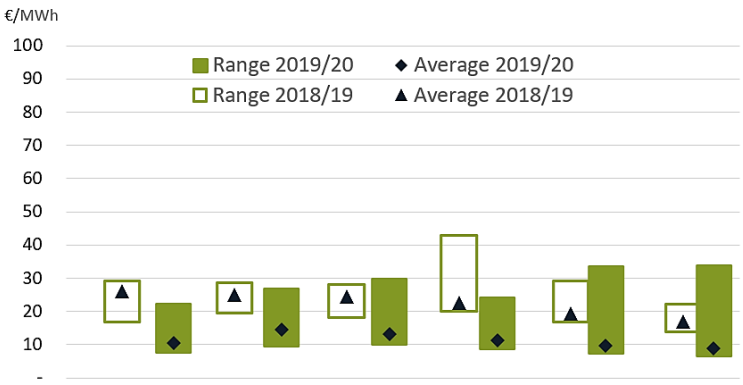

Figure 2 - Ranges and averages of the day-ahead hub prices at European hubs in €/MWh (Source: Bloomberg)

3. Demand

3.1. European seasonal gas demand

The total gas demand during the winter season 2019/2020 was slightly lower (3,216TWh) compared with previous winter season (3,221TWh).

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 has been unseasonably weak in January mainly driven by warm weather. Gas demand in March was slightly higher compared to March 2019, despite the beginning of the spread of COVID19.

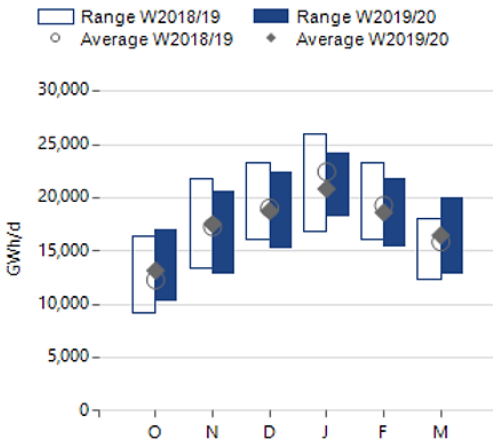

Figure 3 - Total gas demand. Winter 2018/2019 vs Winter 2019/2020

Figures 4 and 5 show the demand range and average on a monthly basis 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, January gas demand for residential, commercial and industrial sector had a slightly decrease 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 October.

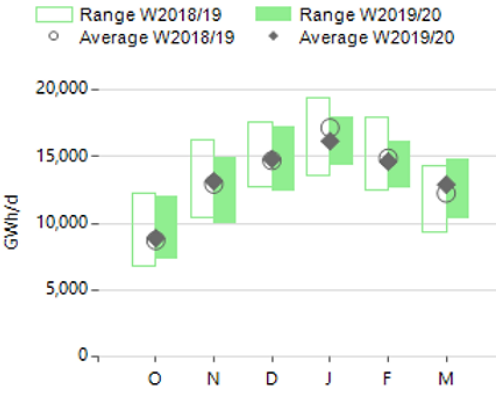

Figure 4 - Final gas demand *

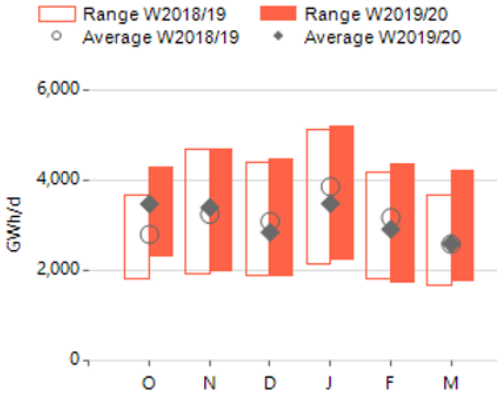

Figure 5 - Power generation gas demand *

** 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

The power generation from gas in 2019/2020 increased by 1.59% compared with the previous winter season, as shown in **Figure 6**. The power generation from gas has been increasing for many years together with renewable sources (such as wind, solar and hydropower), whereas coal and other fossil sources were reduced in general terms.

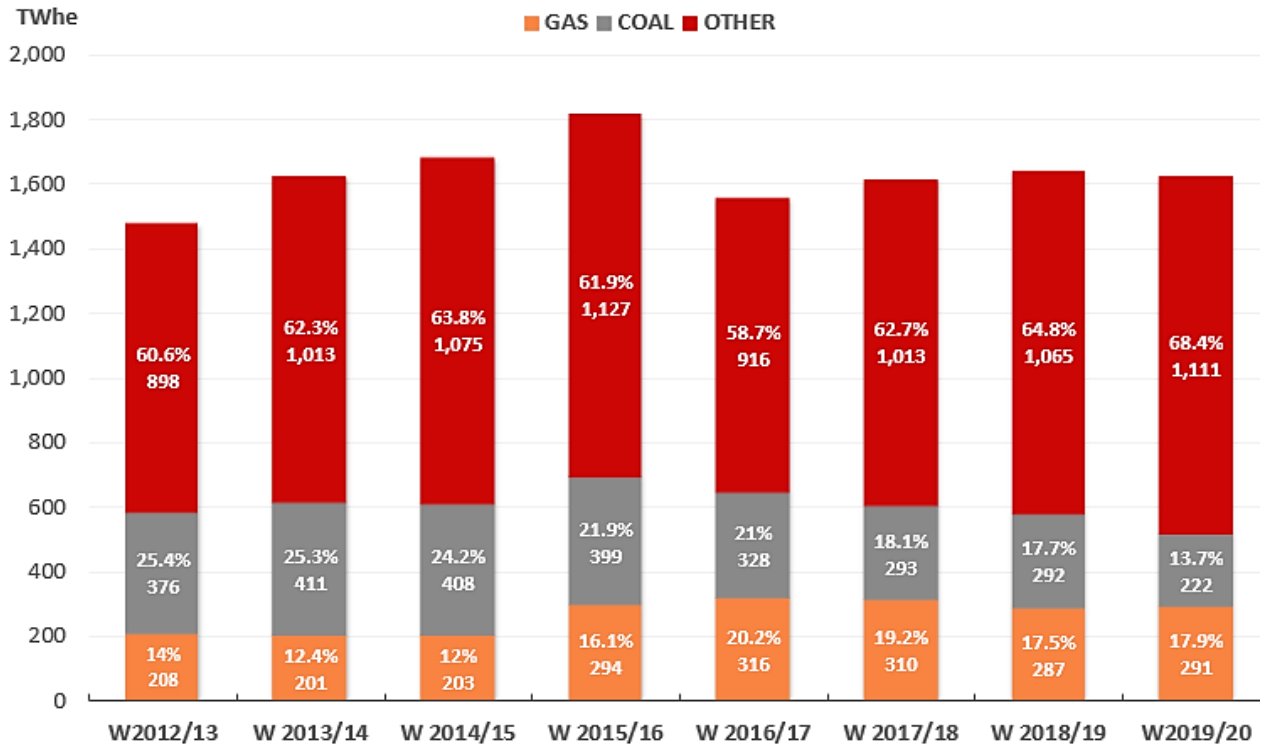

Figure 6 - Gas, coal and other sources in the electricity mix. Winters 2012-20.
(Source: own elaboration based on data from ENTSO-E)

In absolute terms, the electricity produced from gas during the winter season 2019-2020 was 291TWhe, representing 18% of the generation mix with an increment of 1% compared with the previous winter season, as shown in **Figure 7** and **Figure 8**. Moreover, coal and lignite show a reduction of 3% and 2% respectively in the generation mix (29% for coal and 19% for lignite reduction in absolute values) compared to the previous winter. Non-fossil fuels do not show large variations from the previous year regarding the generation mix, however, in absolute values there is an increase of 16% in wind, 5% in solar and 12% in hydraulic generation.

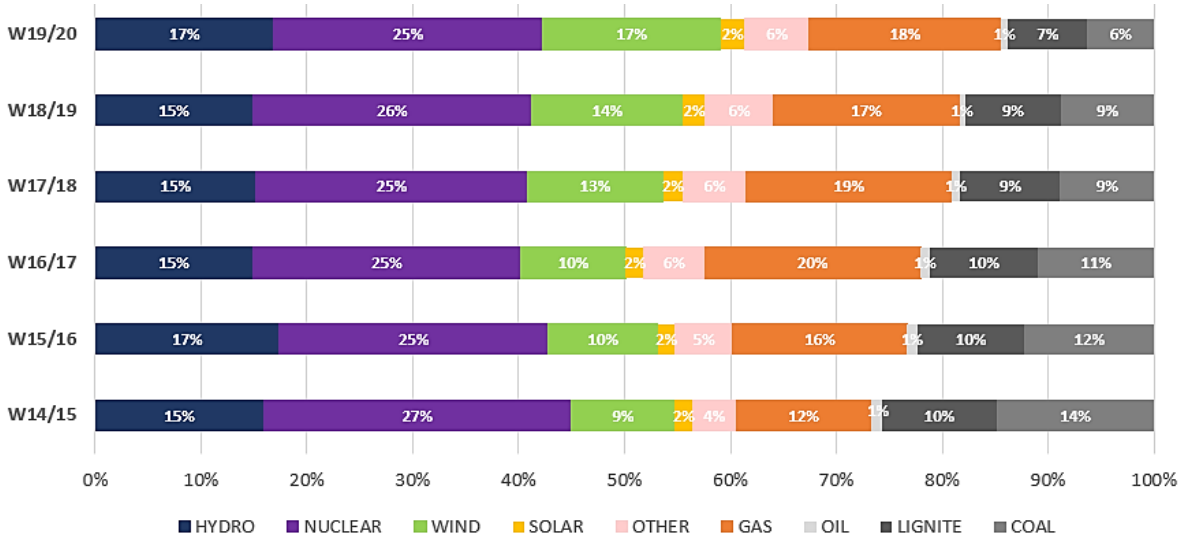

Figure 7 - Electricity generation mix. Source: own elaboration based on data from ENTSO-E in 2019/2020

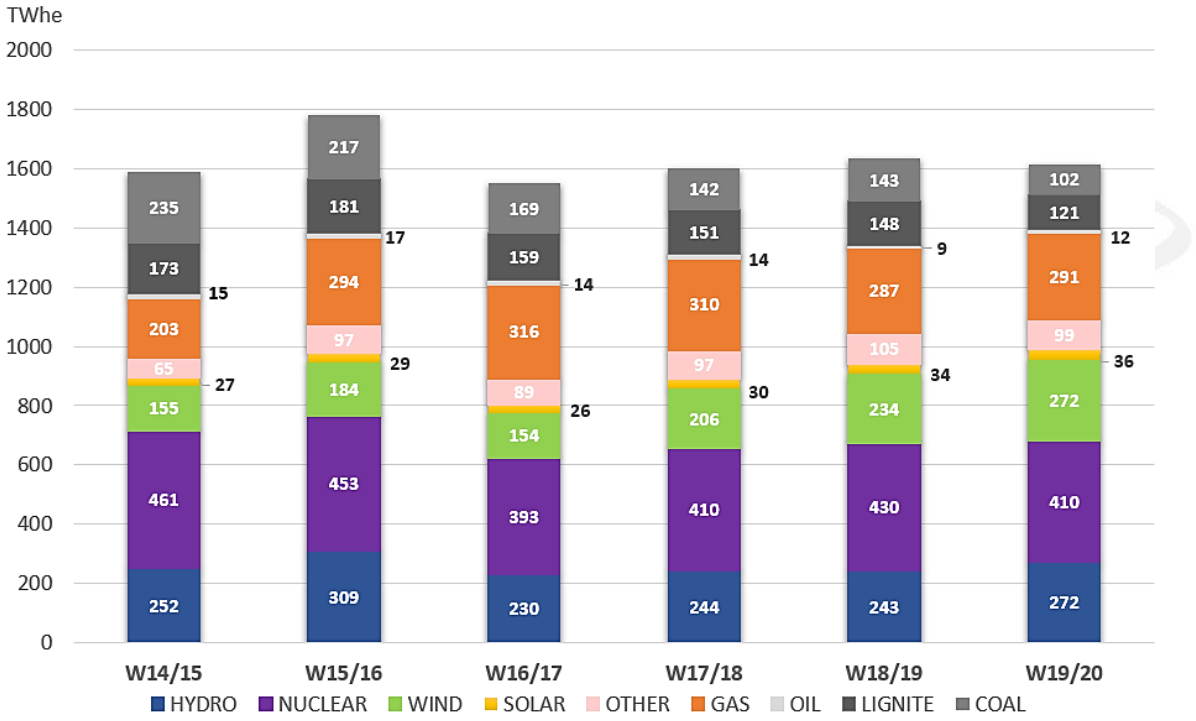

Figure 8 - Electricity generation mix in absolute values. Source: own elaboration based on data from ENTSO-E in winter 14-20

The increase of gas for power generation in the EU along the years resulted in a significant coal to gas switch, even in case of slightly lower power generation in winter 2017-18 and 2018-19 comparing to the previous year. Additionally, the decrease of the used of gas for power generation since winter 2017-18 compared to previous seasons is mainly connected with the increase of generation from renewable energy sources (RES).

> Winter demand evolution 2015-2020

Figures 9 and 10 show the demand total consumption and the demand monthly average for winter 2015/16-2019/20. In winter 2019/2020 the demand has been stable with previous winter, , slightly decreasing by -0.14%. The demand monthly average profile is in line with Winter 2016/17 and 2018/19, following a similar trend.

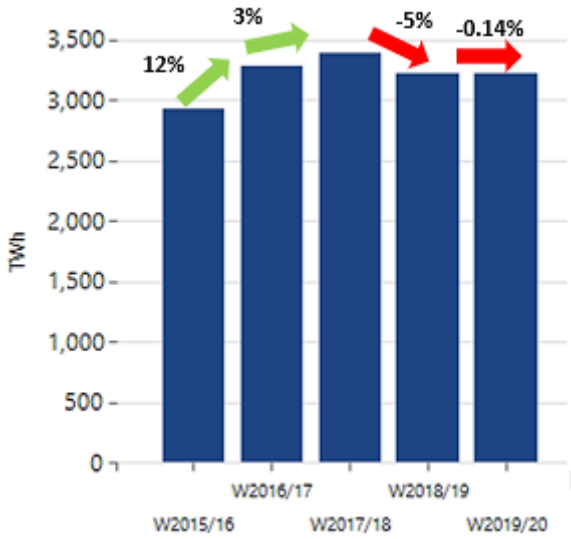

Figure 9 - Total consumption of natural gas. Winters 2015/2016 – 2019/2020

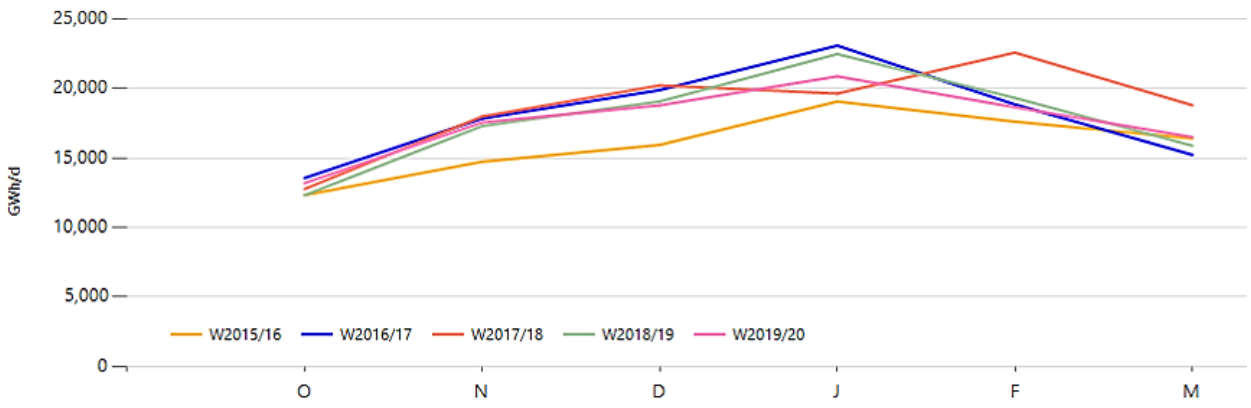

Figure 10 - Daily average of monthly gas demand. Winter 2015/2016 – 2019/2020

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 slightly increase in final gas consumption (around 1%), from winter 2018/19 to 2019/20 driven by similar climatic conditions and gas market in Europe.

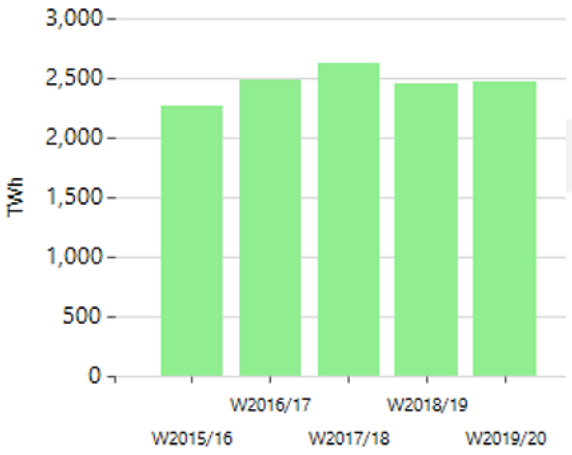

Figure 11 - Final gas consumption (residential, commercial and industrial). Winters 2015/2016 – 2019/2020 *

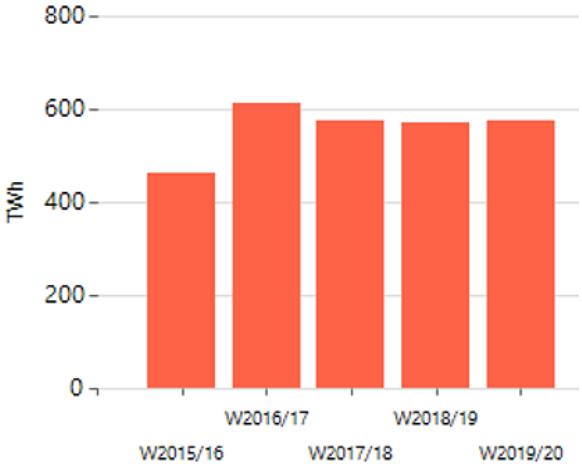

Figure 12 - Gas consumption for power generation. Winters 2015/2016 - 2019/2020 *

** 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 demand on a country level show a decreasing trend, or rather stable in some countries, in most of the countries comparing with previous season. Based on the received data, demand for natural gas only increased in Croatia, France, Hungary, Ireland, Netherlands, Poland, Portugal, Spain and United Kingdom. In countries with lower gas consumption, small increase might cause relatively high increase in percentage change.

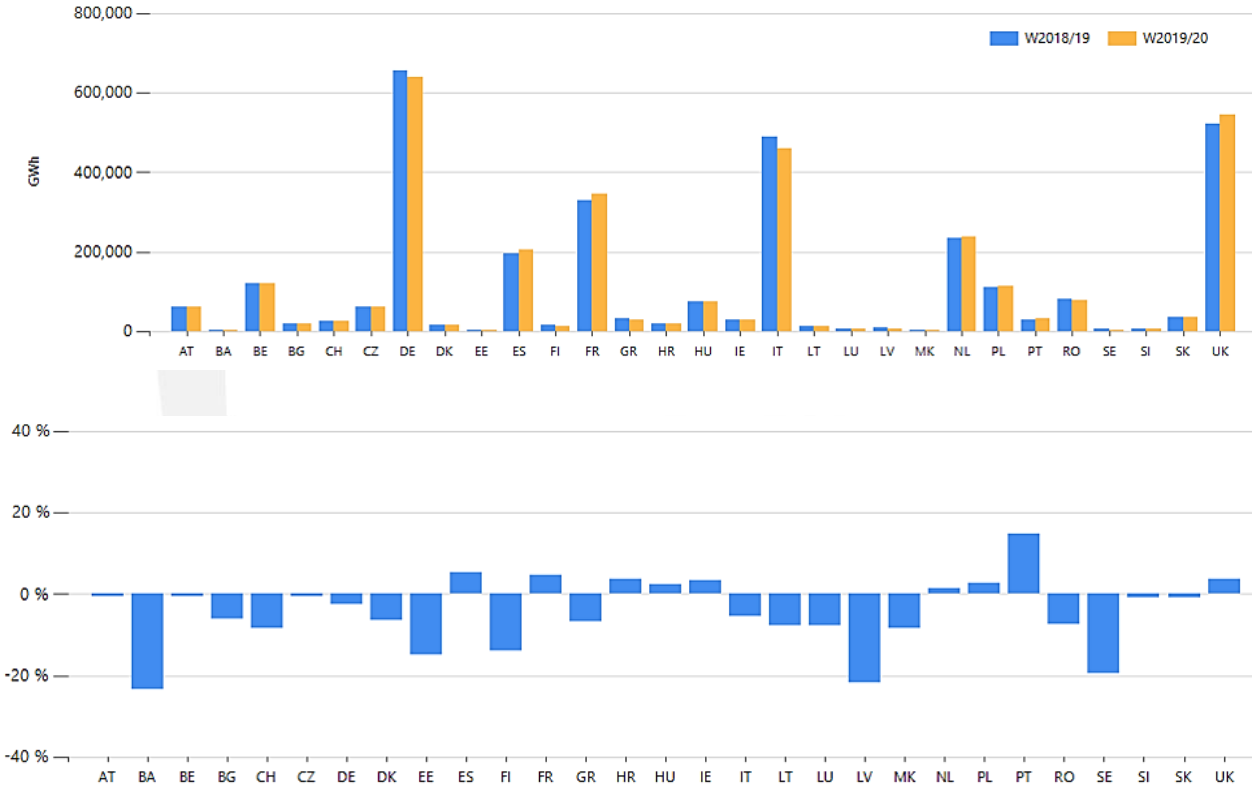

Figure 13 - Total winter demand and variation (%). Country detail. Winter 2018/2019 vs. Winter 2019/2020

> 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 that the average.

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

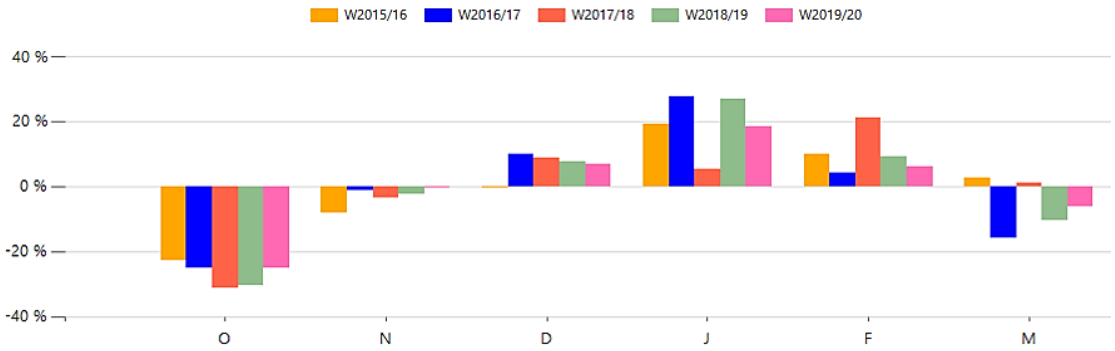

Figure 14 - Winter modulation 2015/2016 – 2019/2020

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 mild temperatures in the coldest month of the winter (December, January and February) are reflected in the decreased of the daily average demand in winter 2019/2020.

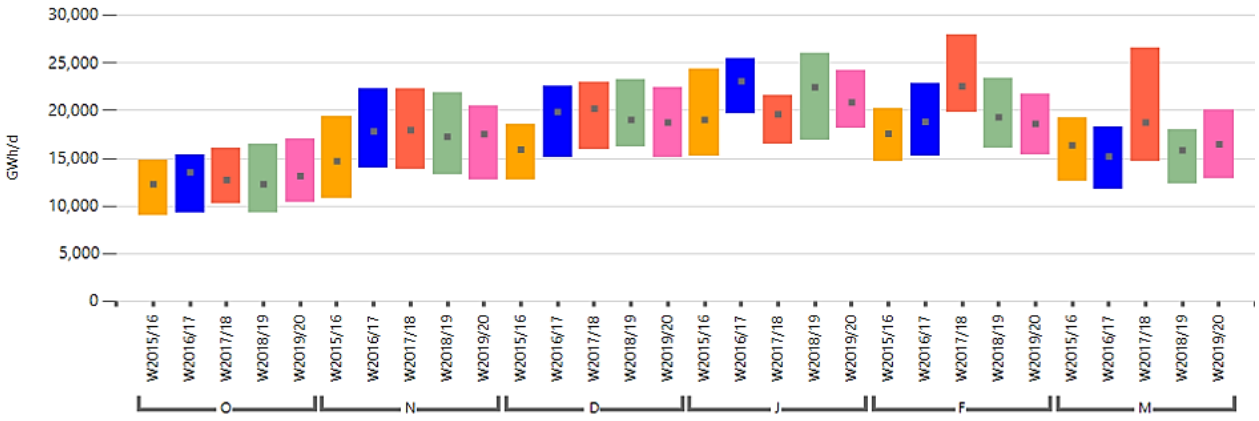

Figure 15 - Monthly demand ranges and average daily demand for each month. Winters 2015/2016 – 2019/2020

3.2. Peak demand 2019/2020

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 demand was reached at the second part of January 2020 during the cold spell, in the middle of the 14-day peak period, as shown in **Table 1**. Likewise, the peak and 14-day period for final demand and for the power generation was reached during the cold spell in January 2020.

Table 1 - Values and dates of high demand situations

14- day peak period	16/01/2020 to 29/01/2020	**Peak day**	22/01/2020
Average 14-day demand	21,879 GWh/d	**Peak demand**	24,245 GWh/d

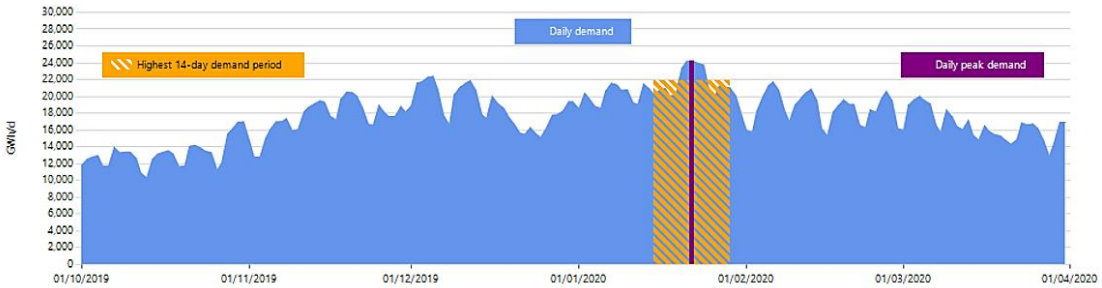

Figure 16 - Total demand daily profile. Winter 2019/2020

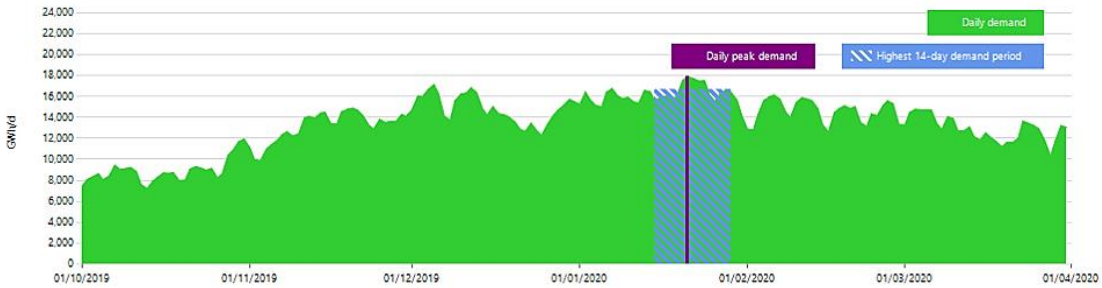

Figure 17 - Final demand (residential, commercial and industrial) daily profile. Winter 2019/2020 *

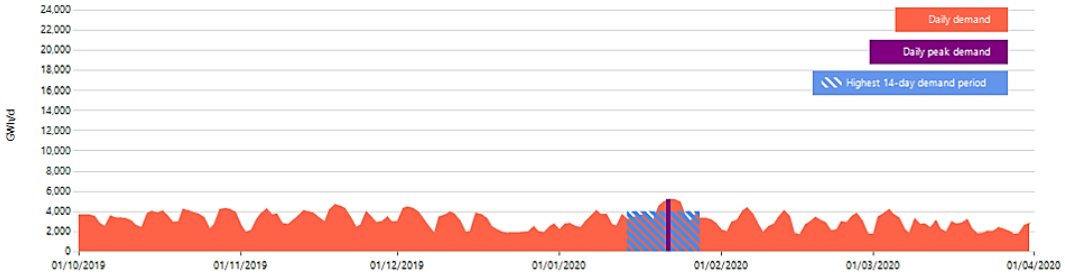

Figure 18 - Power generation demand daily profile. Winter 2019/2020 *

**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 2011-2020

Peak demand, in the same way as the seasonal demand, decreased across Europe in Winter 2019/2020**. Figure 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 2019/2020 kept the decreasing trend already observed in previous winter season, with a decrease once again close to 7 %. The peak demand in 2019/2020 is comparable with the daily peak demand in 2015/2016. Average daily demand value for the highest 14-day coldest period decreases significantly (8%) compared to the last two winter seasons.

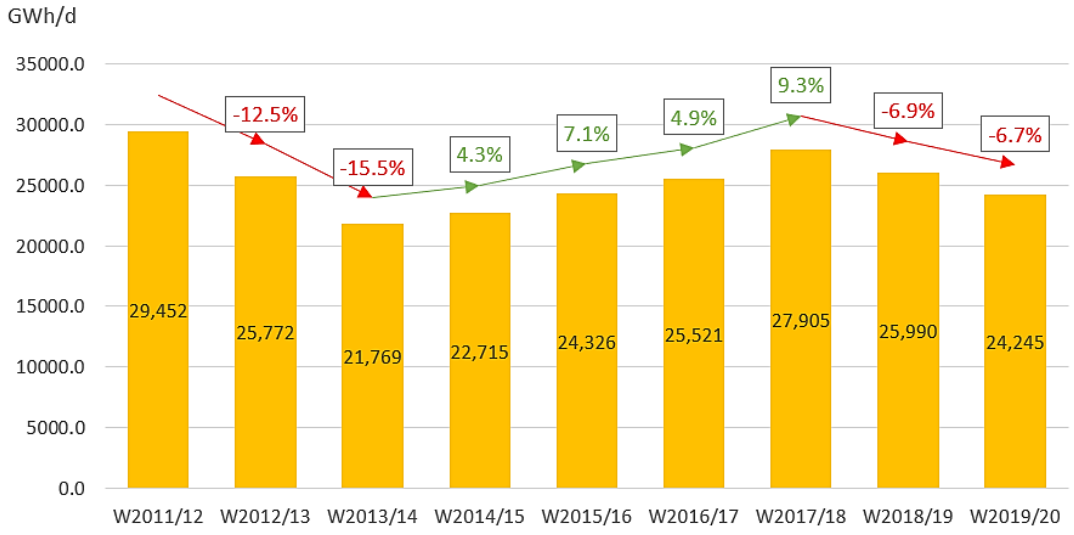

Figure 19 - Daily peak demand. Winters 2011/2012 – 2019/2020

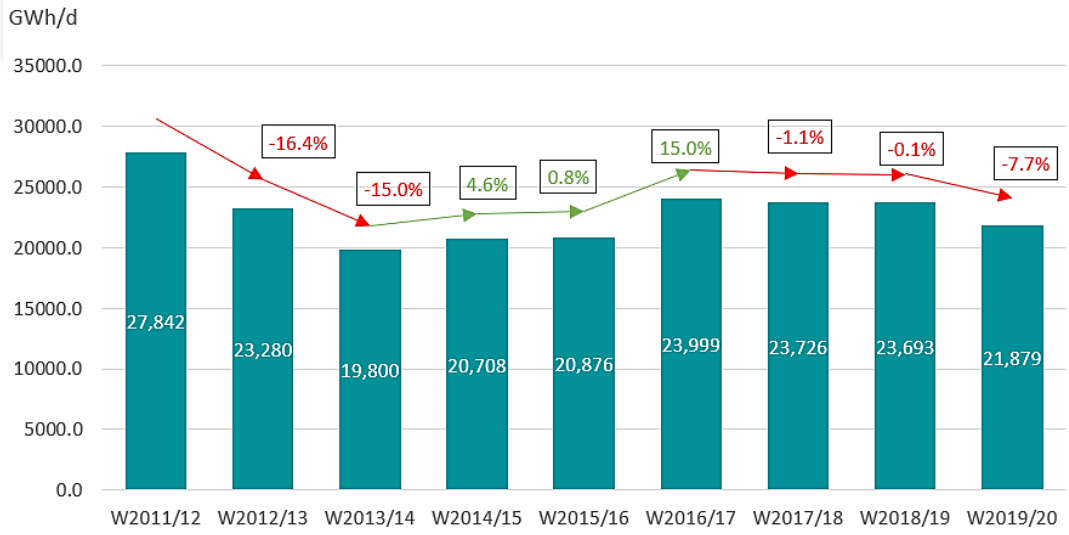

Figure 20 - Average daily demand for highest 14-day demand period. Winters 2011/2012 – 2019/2020

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. It is important to mention that the total value of these graphs is lower than the previous figures because the information of the split is not available for all the countries. As it was observed before, there is a reduction in the power generation and ex-power generation demand compared with previous winter season.

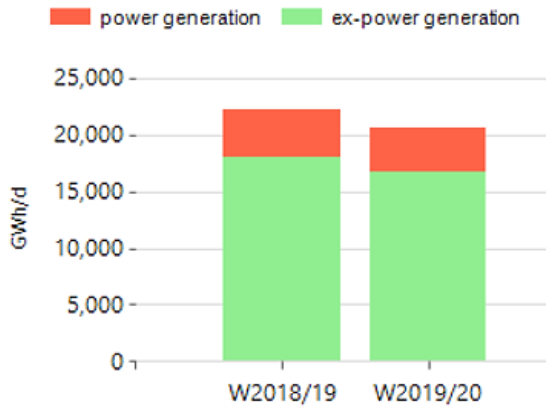

Figure 21 - Average daily demand for highest 14-day demand period split *

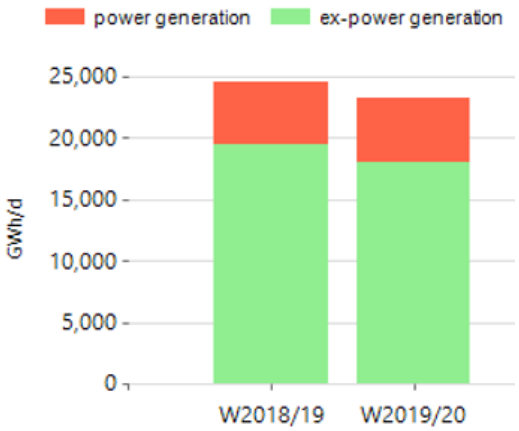

Figure 22 - Daily peak demand split *

** These graphs refer to the countries for which demand breakdown is available (with exception of 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 a decreasing trend in most of the countries comparing with previous winter season. **Figure 23** shows, based on the received data, that only Spain, France, Portugal and Ireland experienced increase in their peak consumption. While Estonia, Finland and Sweden had a peak consumption 20% lower than previous winter.

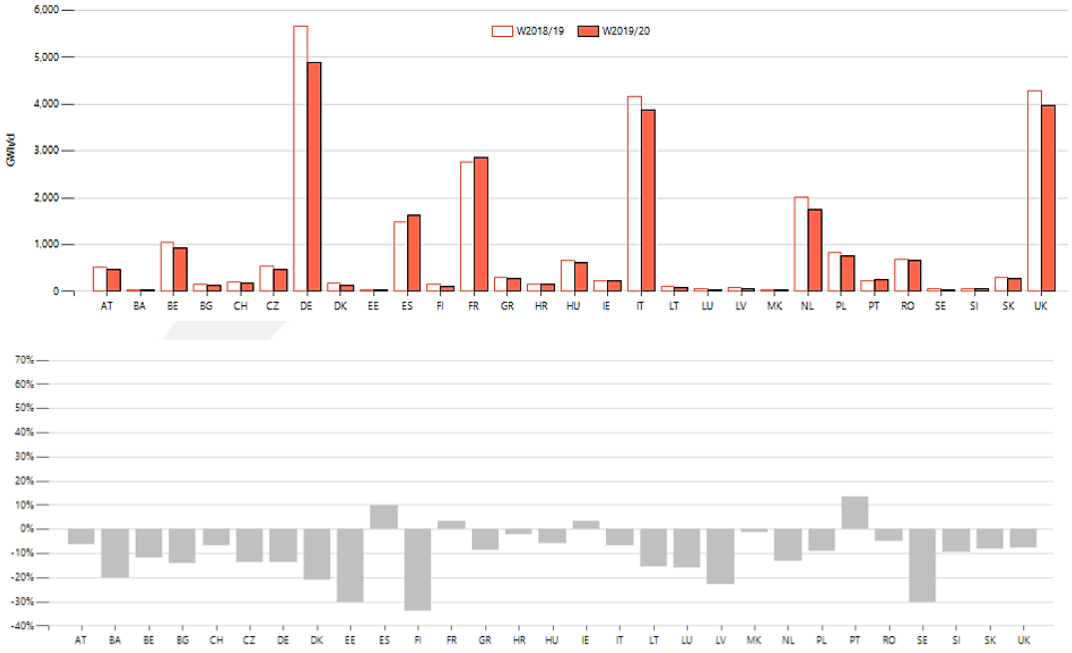

Figure 23 - Daily peak demand and variation. Winter 2018/2019 vs. 2019/2020

The same way as for daily peak demand, **Figure 24** shows that most of the countries decreased their 14-day high demand compared with last winter. Only Spain, Croatia, Hungary, Portugal and Ireland experienced increase in their 14-day high demand consumption.

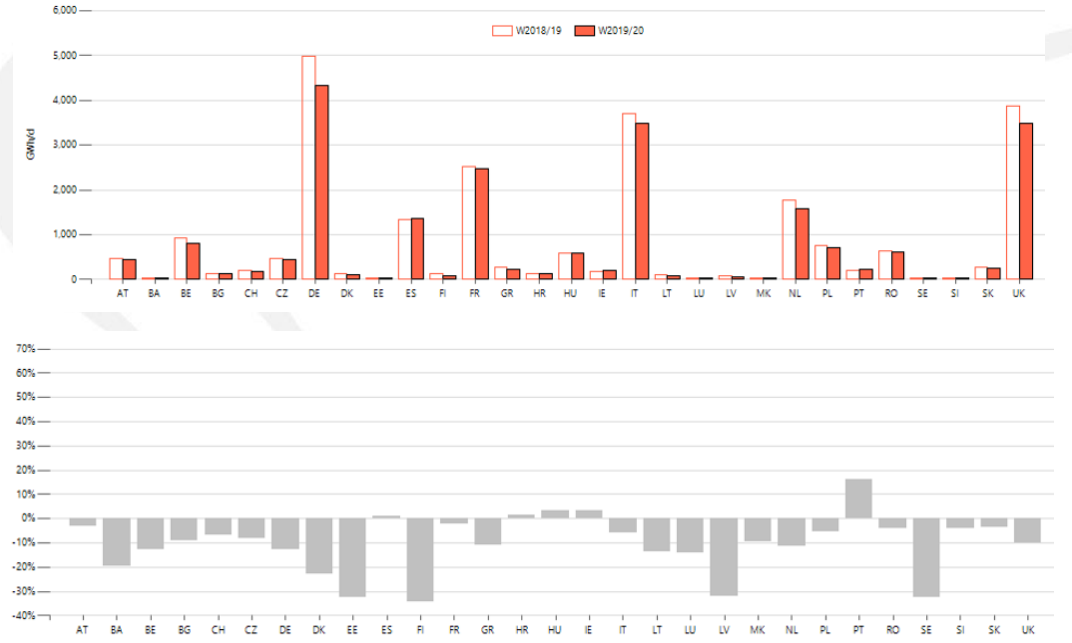

Figure 24 - Average 14-d demand and variation. Winter 2018/2019 vs. 2019/2020

Figure 25 shows the minimum, maximum and average daily demand during winter 2019/2020, 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 were the data is not clearly shown in the first figure.

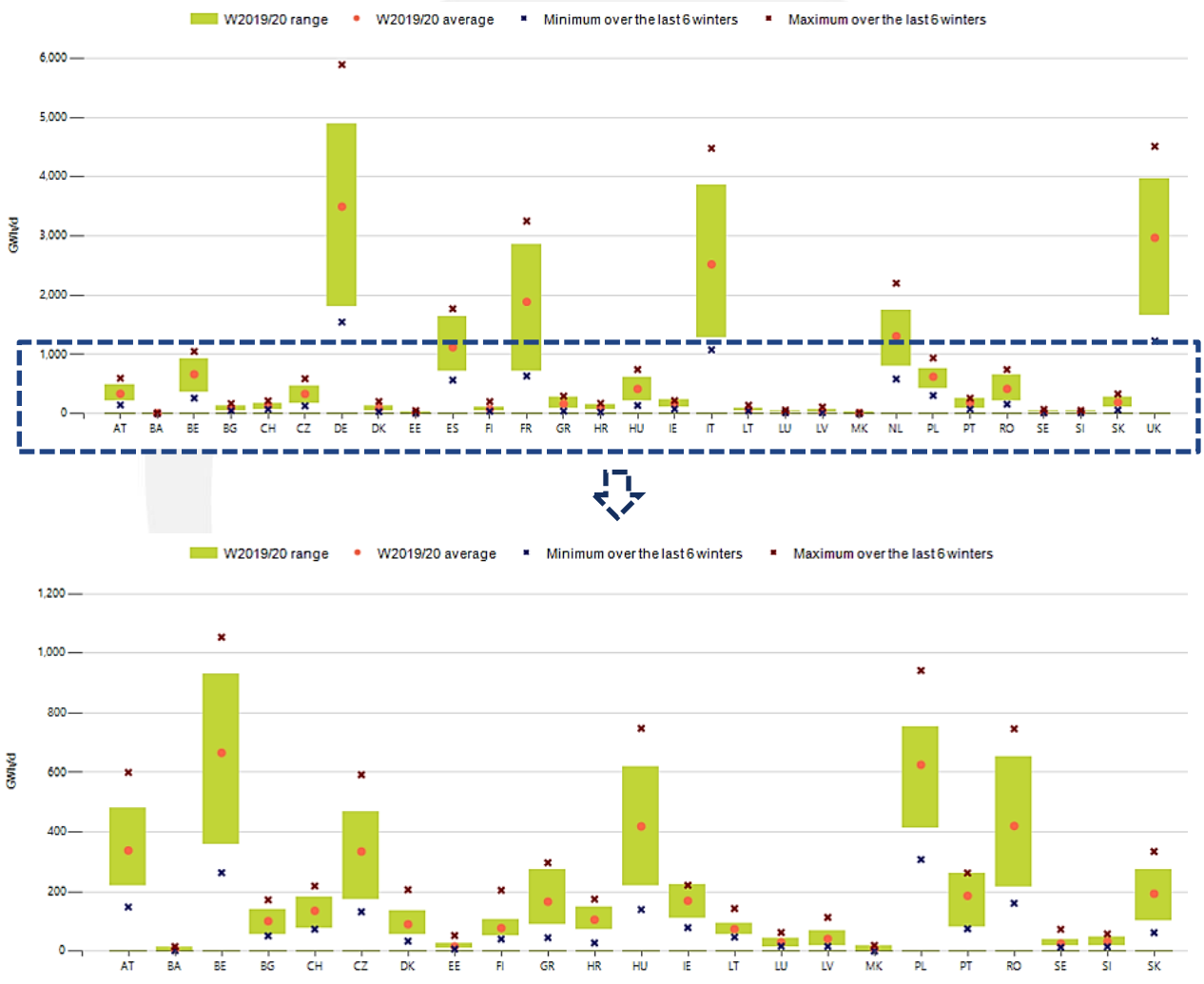

Figure 25 - Winter maximum, minimum and average demand

> Simultaneity

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

As defined, the European peak simultaneity during the peak day on 22nd January 2020, was 97%, same as the average considering this last 5 winters.

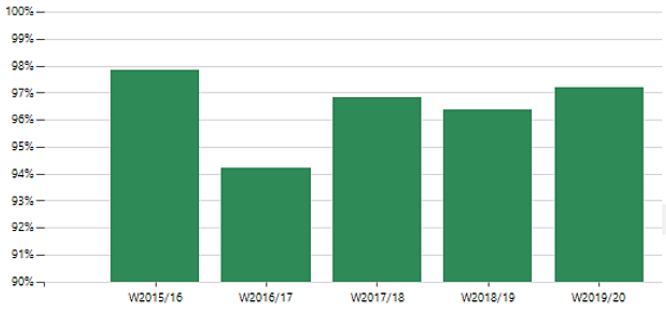

Figure 26 - European peak simultaneity

Table 2 - Peak demand and European peak simultaneity. Winters 2015/ 2016 - 2019/2020

Winter	Day	Peak Demand (GWh/d)	EU Peak Simultaneity (%)
W2015/16	19/01/2016	24,326	98%
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%

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 2019/2020.

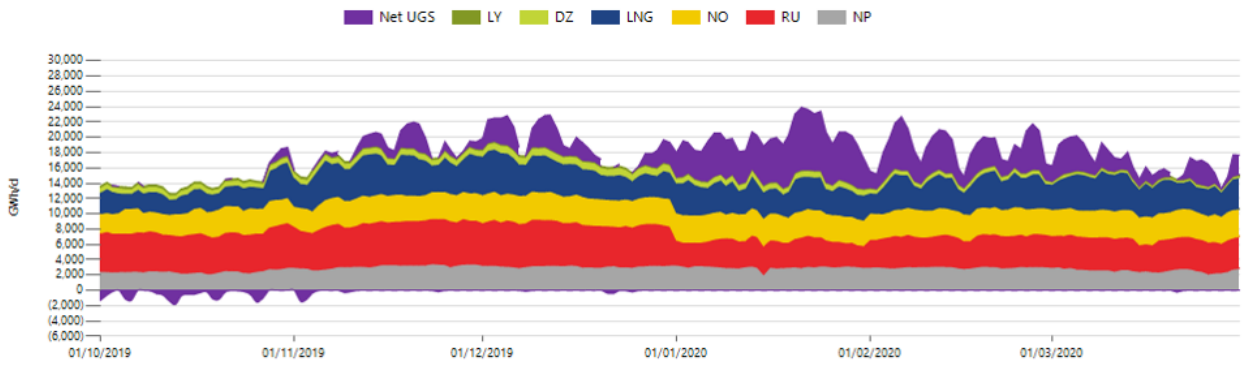

Figure 28 - Supply profile. Winter 2019/2020

The next graphs give an overview of National production and supply imported shares during the Winters 2018/2019 and 2019/2020 in both absolute and relative terms. **Figure 29** shows the seasonal supplies by source for the last two winters in absolute figures. The total supply (without UGS) has been lower in Winter 2019/2020 (2,857 TWh) comparing with (2,965 TWh) previous winter.

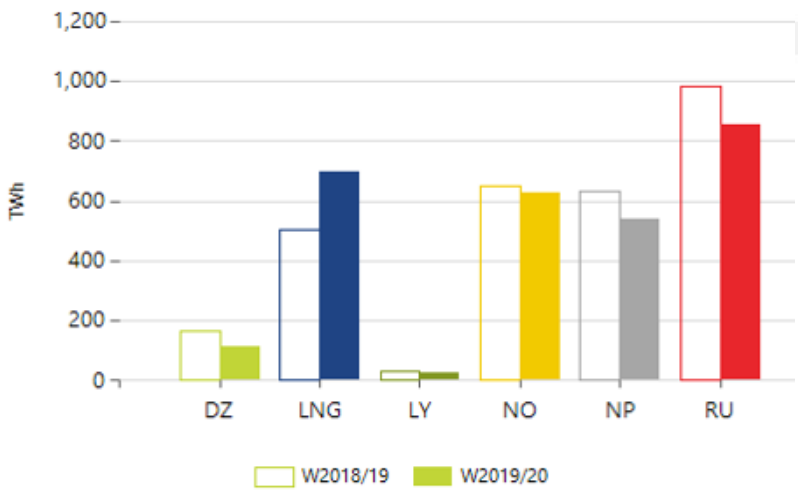

Figure 29 - Total supply by source

Following the trend of previous season, national production kept its decreasing trend, as it was observed in previous winter season, decreasing from 635TWh to 541TWh (15% less). This reduction was driven by a falling domestic production in some European countries, along with a remarkable higher stock levels during the winter season and a robust LNG inflow. As well as

previous season, a robust inflow of LNG weighed on the market has been observed. Indeed, LNG supply increased from 507TWh to 697TWh following the high trend of LNG regasification activity observed during winter 2018/2019, driven by the decrease of Asian LNG prices and high shipping rates, which stopped the Atlantic-produced LNG of being shipped to the Pacific Market.

On the other hand, differing from previous season, Russian gas supplies to Europe had a remarkable decreased from 984TWh to 854TWh (13% less) compared with winter 2018/2019. Weak demand, combined with sky-high gas stocks across Europe in 2020, is partly responsible for the low Russian deliveries, while landmark changes to flows via Ukraine have altered the way gas reaches central, eastern, and south-eastern Europe. Moreover, annual Norwegian pipeline gas supplies to Europe slightly decreased (3%) during the winter season compared with previous season, mainly driven by the increased competition from LNG. At the same time, imports from Algeria remarkably decreased from 163TWh to 112TWh, caused by the start of new long-term contracts between Italy and Algeria's state-owned producer, which both reduced the level of volumes contracted, together with competitive against other sources of Italian gas supplies.

Figures 30 and 31 show the supply shares in winter 2019/2020 compared with winter 2018/2019. LNG share in supplies faced a remarkable increase of 8% compared with previous winter. The rest of the supply sources remained at similar levels compared to the ones from 2018/2019 with slight decrease in Russia (-4%), Algeria (-2%) and European indigenous production (-3%).

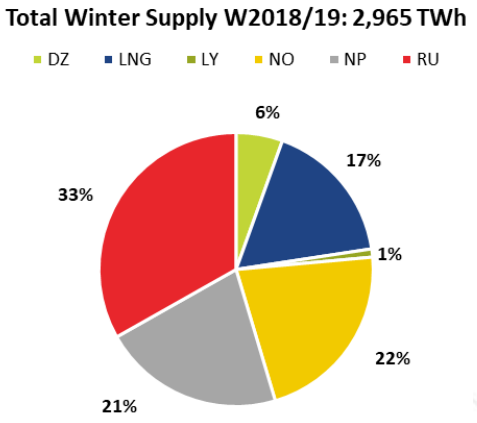

Figure 30 - Shares in supply mix. Winter 2018/2019

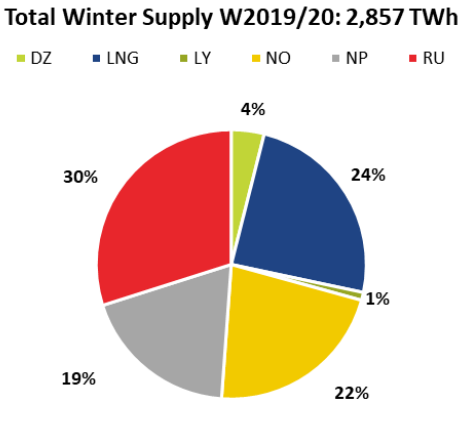

Figure 31 - Shares in supply mix. Winter 2019/2020

> 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)

Differing from previous season, Russian gas supplies to Europe dropped down from January to March mainly driven by weak demand along Europe, combined with high storages level limiting the imports in Europe and routing of gas away from Ukraine due to TurkStream commissioned in January 2020. Moreover, annual Algerian pipeline gas supplies to Europe decreased significantly over the winter mainly caused by the reduction of the contracted volume between Italy and Algeria together with competitive against other sources of Italian gas supplies. While LNG supply keeps being a competitive supply source.

> 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 USG injection and withdraw profile of European storages. The peak deliverability of UGS was 8,174 GWh/d, meaning a 7% decrease from the previous year (8,731 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 2018/19 and 2019/20. The average and range utilisation is in line with previous winter season. Storage withdrawals remained weak due to unusually mild winter resulting in an oversupplied market this year.

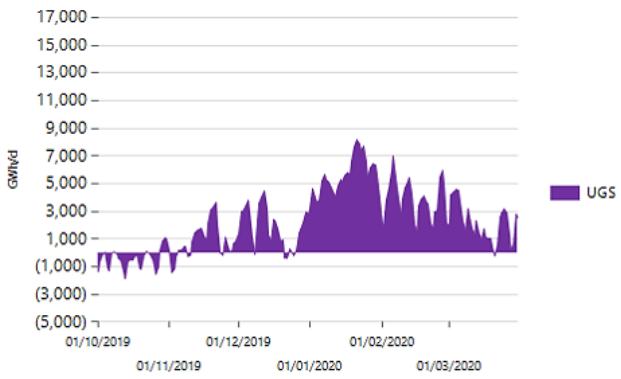

Figure 33 - UGS injection/withdraw profile. Winter 2019/2020

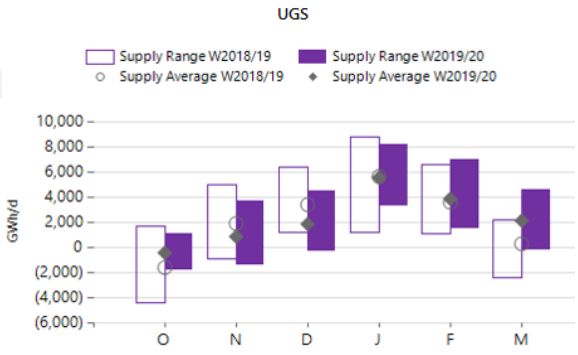

Figure 34 - UGS daily range of withdrawal and injection. Winter 2019/2020 vs. Winter 2018/2019

Table 4 provides the stock level at the beginning of the winter season and at the end of the last 9 seasons.

Table 3 - UGS Utilisation (TWh) Winter 2011/2012 – 2019/2020. (Source: AGSI)

	Gas in the storages 1-Oct (TWh)	Gas in the storages 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	898.8	441.4	457.4
W19-20	1063.2	598.4	464.8

Figure 35 compares the stock level evolution curve of the last 8 winters. The stock level for the Winter 2019/2020 started from a level of 1063TWh. The injection period was short, the maximum stock level was reached on 28th October (1084TWh). At the end of the winter season the storage level reached 598TWh, the highest seen in last eight winters, this corresponds not only to the fact that the gas in the storages at the beginning of the season was the highest of the last 8 years but also to a UGS utilisation relatively low (465TWh).

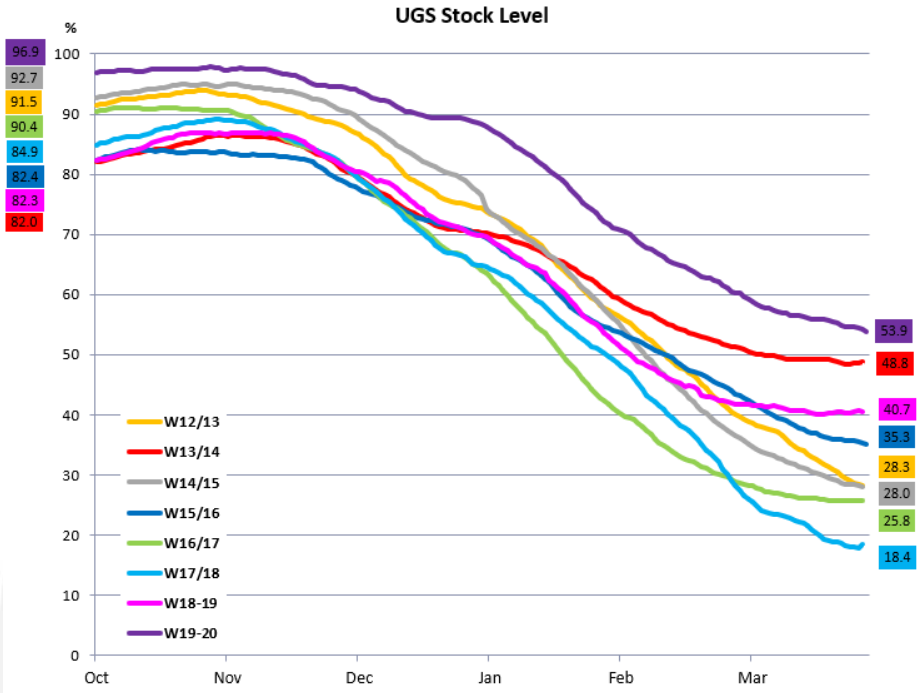

Figure 35 - Evolution of UGS stock level. Winters 2011/2012 – 2019/2020 (Source: AGSI)

> 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.

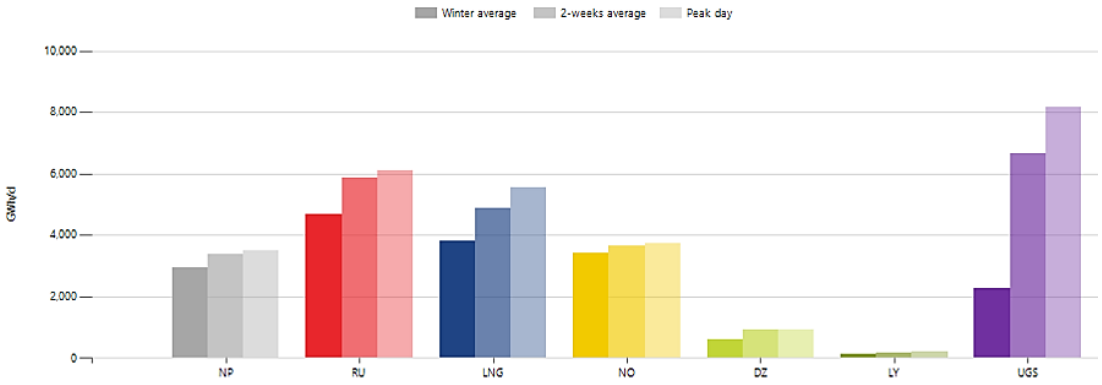

Figure 36 - Daily average supply / Average daily supply for highest 14-day demand period / Supply for peak day demand. Winter 2019/2020

> Winter supply evolution 2015/2016 -2019/2020

Figure 37 shows the evolution of the different supply sources during the last five winters. When comparing the last five winters, national production is decreasing year by year while LNG increases surpassing Norway imports which is slightly lower than in the previous winter.

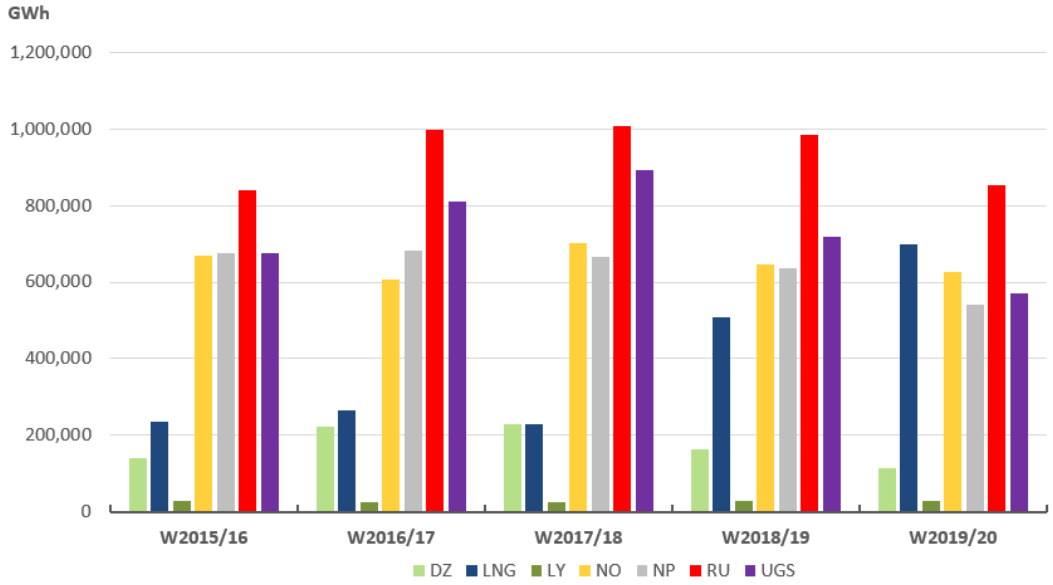

Figure 37 - Evolution of winter gas supplies 2015/2016 – 2019/2020

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