



Quarterly Report

on European Gas Markets

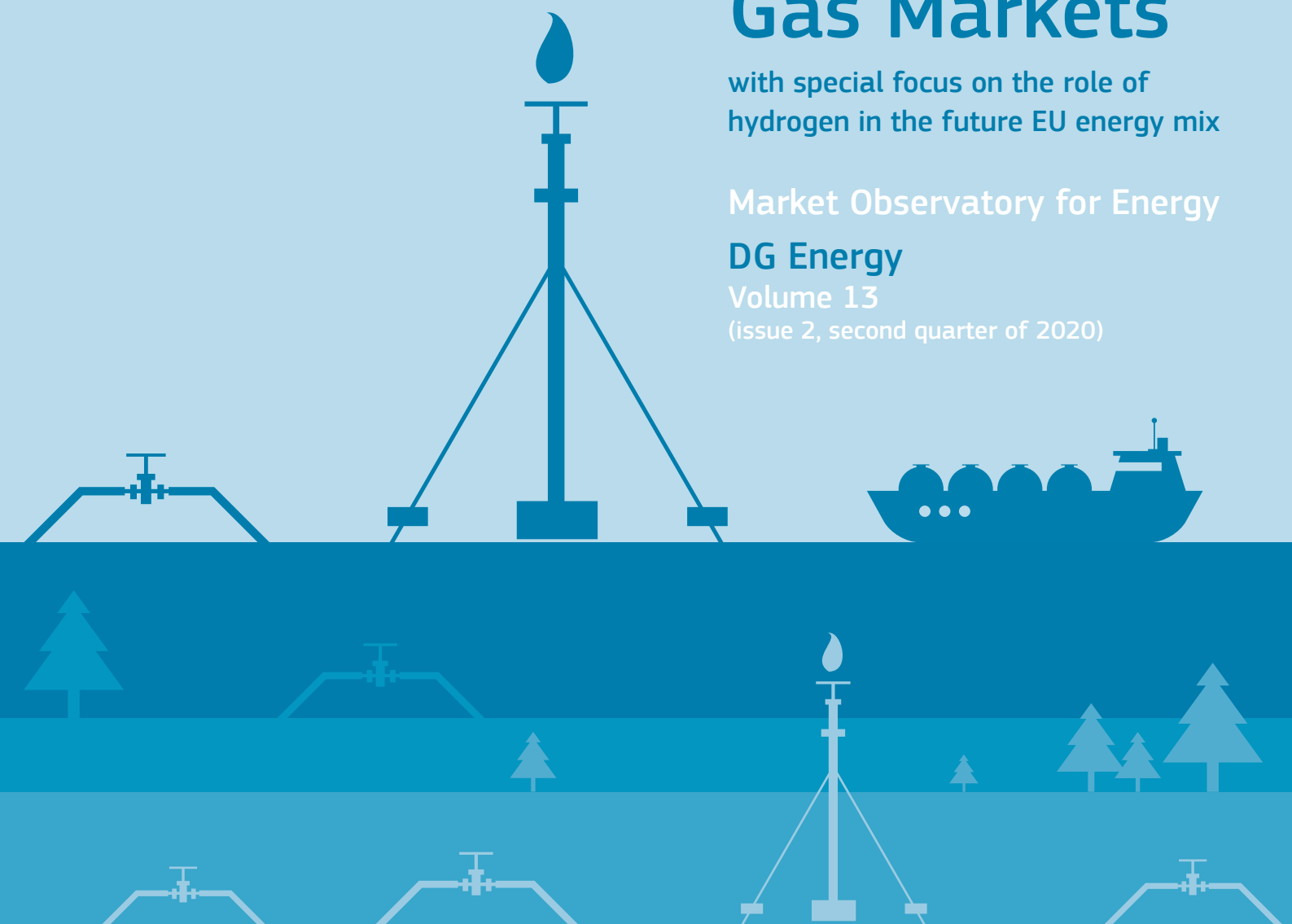
with special focus on the role of
hydrogen in the future EU energy mix

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HIGHLIGHTS OF THE REPORT

- **Widespread lockdown measures related to the Covid-19 coronavirus pandemic across the EU deeply impacted the lifestyles, the economy and the energy markets in the second quarter of 2020.** GDP in the EU fell by 13.9% in Q2 2020 in year-on-year comparison, affecting the energy markets and causing a demand destruction, amongst others on the European gas markets.
- In the second quarter of 2020 **EU gas consumption decreased by 10%** (8 bcm) compared to Q2 2019, mainly impacted by falling gas demand in industry, decreasing gas use in power generation, and lower injection needs in gas storages. Gas consumption in Q2 2020 was 71 bcm in the EU.
- Indigenous **gas production in the EU, amounting to 15 bcm in Q2 2020, was down by 14%** (2.5 bcm) compared to Q2 2019. In Q2 2020 the Netherlands produced 6.8 bcm of gas, Romania - 2 bcm, followed by Germany (1.3 bcm) and Italy (1 bcm). In the first half of 2020, gas production in the EU amounted to 30.5 bcm, down from 37.7 bcm in the first half of 2019.
- **EU net gas imports fell by 14% year-on-year** (14 bcm) in Q2 2020. Russian pipeline supplies covered 42% of extra-EU net gas imports. LNG imports together covered 25% of the total EU imports. Norwegian pipeline gas was only the third biggest import source (23%), followed by pipeline imports from North Africa (5%). Net gas imports amounted to 83 bcm in Q2 2020, while in the first half of 2020 it reached 163 bcm.
- **Nord Stream remained the most important supply route of Russian pipeline gas to the EU in Q1 2020**, as the amount of gas through the Ukrainian transit was still down by 47% in year-on-year comparison. The share of the Nord Stream reached 42% (14 bcm transit), the Ukrainian transit came to the second place, with 32% (11 bcm), followed by the Belarus route (23% - 8 bcm), and TurkStream had a share of 3% (1bcm) within the Russian pipeline gas imports. In the first half of 2020 18 bcm gas was transited through Ukraine, 27 bcm through Nordstream, 15 bcm through the Yamal pipeline (Belarus) and slightly more than 2 bcm through the Turkstream. Traded volume on Gazprom's Electronic Sales Platform (ESP) reached 8 bcm in Q2 2020, up by 165% in year-on-year comparison, underlining the growing importance of the ESP in Gazprom's European sales.
- **Gas storage levels in the EU stood at 80% at the end of June 2020, which was the highest in the last nine years at this time of the year.** A filling rate of 80% on EU average is more typical at the end of August, not at the end of June.
- **EU LNG imports decreased by 3% year-on-year** in Q2 2020, after the dynamic growth in the recent quarters. United States, albeit losing 7 percentage points of its market share, remained the most important LNG supplier to Europe, ensuring 23% of the total EU imports in Q2 2020, ahead of Qatar (22%) and Russia (18%). In Q2 2020 France was the biggest LNG importer in the EU (6.5 bcm), ahead of Spain (5 bcm) and Italy (4 bcm).
- **The EU's estimated gas import bill fell to the lowest in the last six years, amounting to €6.2 billion in the Q2 2020**, down from €15.8 billion (by 60%) in Q2 2019, principally owing to falling import prices (by 55%) and decreasing imports. The EU LNG import bill was estimated at €1.4 billion in Q2 2020, down from €3.5 billion in Q2 2019. In the first half of 2020, the total gas import bill was €16 billion, down from €34 billion in the first half of 2019.
- **Increase in gas traded volumes on the European hubs was 7% (plus 1 091 TWh)** in Q2 2020 year-on-year, slowing down compared to the growth rate of 32% in the previous quarter. Besides decreasing gas consumption, market participants increased their trade activities back in March 2020 before the lockdowns, attracting trade volumes away from Q2 2020. The share of trade on the most liquid hub in the EU, Dutch TTF, was 72% among the observed European hubs.
- **Spot prices on the European gas hubs extended their falls of the previous quarter, and were down by 50-60% year-on-year in Q2 2020.** By the end of May 2020 the TTF spot price fell to 3.5 €/MWh, the lowest since the start of the trade on this hub. Subdued gas demand coupled with slow accommodation of gas supply resulted in significant price falls on the markets. In May and early June 2020 the TTF developed a discount to the US Henry hub, implying unprofitability of US LNG exports to Europe and cancellation of US LNG cargoes. In June 2020 gas demand and wholesale prices started to recover at the time of lifting the pandemic related restrictions.
- **Retail gas prices showed a decrease of 11% year-on-year for industrial customers in second quarter of 2020**, and Industry with large annual consumption experienced bigger retail gas price falls. In most of the European capitals gas prices for households were lower in June 2020 compared to a year earlier.

EXECUTIVE SUMMARY

- **The second quarter of 2020 can be described as the peak period of widespread lockdown measures in almost all EU Member States, relating to the Covid-19 coronavirus pandemic, which fundamentally impacted the life of European citizens, the economic activity, including the energy markets.** In Q2 2020 the EU economy, already contracting in the previous quarter, underwent a steep fall owing to the halt of various economic activities, and GDP in the EU-27 fell by 13.9% in year-on-year comparison. This signalled a steeper economic fall in the EU than in the 2008/2009 economic crisis. On the energy markets this could be translated in a so-called demand destruction, which resulted in unprecedented low crude oil and gas prices (or price levels not seen since decades) in April and May 2020. The supply side of the energy market could accommodate to the falling demand only gradually, resulting in low spot energy prices. On 12 April 2020, the OPEC+ group managed to agree in substantial production cuts that helped to stabilise crude oil prices as of May. In June 2020, confinement measures were eased or lifted in most of the EU Member States, which contributed to the rebound in economic activities, energy demand and energy prices.
- **In the second quarter of 2020 EU gas consumption decreased by 10% in year-on-year comparison,** after falling by 4% in previous quarter. Gas-fired electricity generation also decreased by 10% year-on-year, owing to the falling demand for electricity in industry and abundant renewable generation. Less injection need for storages also contributed to decrease in gas demand. Furthermore, milder than usual weather reduced gas demand for heating needs in April at the end of the heating season. During the weeks of April in some Member States (e.g. France, Italy) gas consumption was down by 20-30% year-on-year, showing the deep impact of lockdown measures. In absolute numbers, gas consumption in Q2 2020 amounted to 71 bcm, down from 79 bcm a year before, whereas in the first half of 2020 EU gas consumption amounted to 203 bcm, down from 217 bcm a year before.
- **EU gas production fell by 14% year-on-year** in the second quarter of 2020; amounting to less than 15 bcm. Gas production decreased in the biggest EU gas producing countries, including the Netherlands (-16%) and in Romania (-17%). In Q2 2020 the Netherlands produced 6.8 bcm of gas, Romania had a production of 2 bcm, followed by Germany (1.3 bcm) and Italy (1 bcm), respectively down from 8.1 bcm, 2.4 bcm, 1.3 bcm and 1.2 bcm measured in Q2 2019. In the first half of 2020, gas production in the EU amounted to 30.5 bcm, among the biggest producers, the Netherlands (14 bcm), Romania (4.6 bcm) and Germany (2.6 bcm), and down from 37.7 bcm in the first half of 2019.
- **EU net gas imports fell by 14% in the second quarter of 2020,** compared to Q2 2019. In Q2 2020 the amount of net gas imports (83 bcm) and domestic gas production (15 bcm) exceeded the quarterly gas consumption of 71 bcm, implying that in the injection season gas storage levels rose by 27 bcm. However, less injection needs in Q2 2020 largely explained why gas imports and production fell more steeply than gas consumption, in year-on-year comparison. Pipeline gas imports from Russia fell by 23% year-on-year in Q2 2020, whereas pipeline imports from Norway decreased by only 1%. Algerian pipeline gas imports fell steeply, by 37% compared to Q2 2019, driven by uncompetitive oil-indexed prices and increasing domestic gas demand in the country, implying less export opportunities. Pipeline gas import from Libya, having only a small share in EU imports, also fell by 17%. In the first half of 2020 EU net gas imports reached 163 bcm, down from 183 bcm in the first half of 2019.
- **Russian pipeline supplies remained the main source of EU gas imports,** covering 42% of extra-EU imports in Q2 2020, close to the six-year low of the previous quarter. The share of gas re-gasified at LNG terminals was 25%, followed by pipeline supplies from Norway (23%) and North Africa (5%). When looking at the combined share of pipeline and LNG imports per country, Russia's share was 46% in the total extra-EU gas imports, followed by Norway (24%), and the share of LNG sources other than from Russia, Norway and Algeria was 22%. In year-on-year comparison, decreasing share of Russia (-6 percentage points) and that of North Africa (-1.5%) was mainly compensated by the increasing share of LNG (+4.5%), whereas the share of Norwegian gas supply also went up (+3 percentage point) in the EU gas supply mix. The EU's estimated gas import bill in Q2 2020 fell to €6.2 billion, more than 60% less than a year earlier, mainly as a result of falling import prices (by 55%) and decreasing gas imports. The total EU LNG import bill amounted to an estimated €1.4 billion in Q2 2020, down from €3.5 billion a year before. In the first half of 2020, the total gas import bill was €16 billion, down from €34 billion in the first half of 2019.
- In the second quarter of 2020, **Nord Stream remained the main supply route of Russian gas to the EU, as transit through Ukraine was still substantially down** in year-on-year comparison. Nord Stream covered 42% of the total Russian supplies (around 14 bcm), up by 10 percentage points compared to in Q2 2019. The share of the Ukrainian transit route fell to 32% (11 bcm) down by 15 percentage points in year-on-year comparison. In Q2 2020 the amount of gas transited through Ukraine fell by 47% year-on-year. In Q2 2020 gas supplies transiting Belarus also fell by 14% compared to Q2 2019, and covered 23% (8 bcm) within the total EU imports from Russia. TurkStream had a share in the Russian gas transit of 3% in Q2 2020, and around 1 bcm gas was shipped via this route to the EU. In the first half of 2020 18 bcm gas was transited through Ukraine, 27 bcm through Nordstream, 15 bcm through the Yamal pipeline (Belarus) and slightly more than 2 bcm through the Turkstream, which makes questions around how the contractual obligation of shipping at least 65 bcm through the Ukrainian transit route could be fulfilled by Gazprom this year. However, this might be influenced by falling demand for gas, as Gazprom revised its export target to Europe (incl. Turkey) downward to 167 bcm from last year's of 199 bcm fulfilment. Meanwhile, the traded volume on Gazprom's Electronic Sales Platform (ESP) reached 8 bcm in Q2 2020, up by 165% in year-on-year comparison, underlining the growing importance of the ESP in Gazprom's European sales.
- **In the recent months, there were several developments around the Nord Stream 2 gas pipeline project.** On 15 May 2020 the German national regulator Bundesnetzagentur rejected the application of Nord Stream 2 AG for the derogation from EU internal gas market regulation (unbundling rules and third party access) for the section of the Nord Stream 2 pipeline located in German territory. For granting this derogation, in the view of the regulator and referring to the regulation in force, the project should have been finalised by May 2019, which was not the case. On 4 June 2020, US senators announced a bill expanding

sanctions on Nord Stream 2 and Turkish Stream natural gas pipelines, as the US consider the project will boost Russia's economic and political influence in Germany and other European countries. The new bipartisan legislation aims at the Nord Stream 2 project by expanding sanctions to include penalties on parties involved in pipe-laying activities and parties providing underwriting services, insurance or reinsurance on the project.

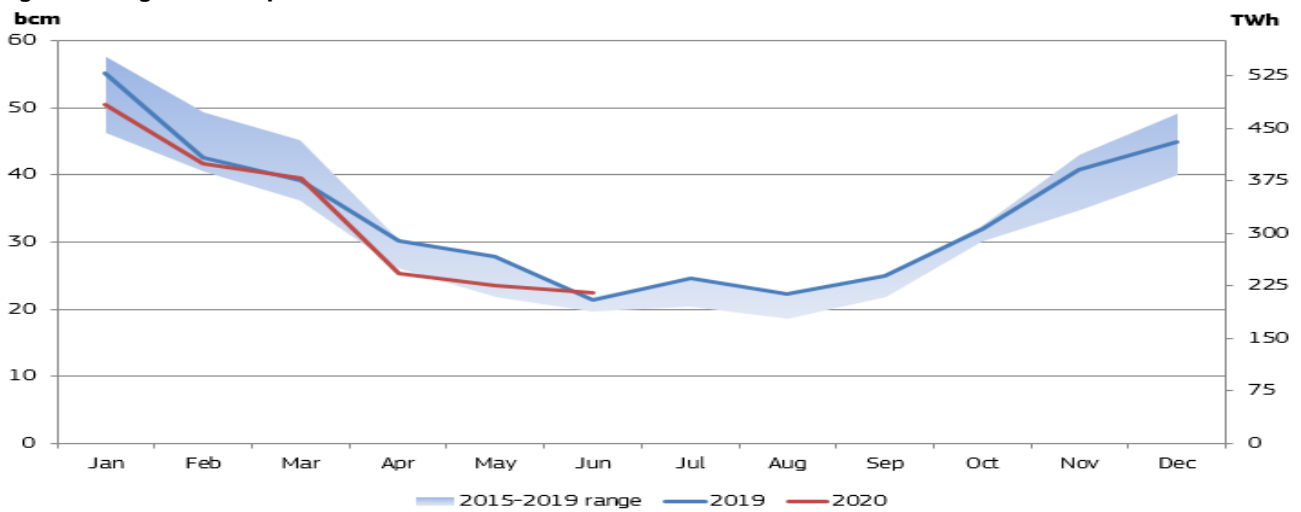
- On 1 April 2020 the **new Spanish virtual LNG hub (TVB)** was launched, resulting in banding the six LNG terminals of the country together in a single LNG balancing tank. As a result, more vessels arrived at terminals, which had been less frequently used in the past. The implementation of the TVB is widely seen as an attempt to address a systemic underuse of the country's gas infrastructure.
- **EU LNG imports, after the dynamic growth over several quarters, decreased by 3% in the second quarter of 2020 in year-on-year comparison.** Gas demand steeply fell, along with import gas prices, in consequence as of April 2020 several announcements were made on cancellation of LNG shipments, especially from the US, which started to impact the total LNG imports in June 2020, when year-on-year LNG imports in the EU decreased by 21%. Price differentials among different regions (e.g. between Europe and Asia) practically disappeared amid the decreasing price trend on the oversupplied global LNG markets. In Q2 2020 the share of United States dropped to 23% in the total EU LNG imports, from 30% measured in Q1 2020, Qatar came back to the second place, with a share of 22%, ahead of Russia (18%). It seems that Qatari LNG exports showed a bigger resilience to the falling gas demand in Europe, probably owing to significant volume of long-term contracts between Qatar and European destinations. In Q2 2020 France was the biggest LNG importer in the EU (6.5 bcm), ahead of Spain (5 bcm) and Italy (4 bcm). The average EU LNG regasification terminal utilisation rate, in parallel with falling imports, decreased from around 60% in April and May to 41% in June 2020, which was the lowest since September 2018, when US LNG exports to Europe had started to pick up.
- **Gas storage levels in the EU stood at 80% at the end of June 2020, which was highest in the last nine years at this time end of the year.** A filling rate of 80% is rather typical at the end of August, not at the end of June. Gas injections in Q2 2020 amounted to 26% of the total storage capacity, as opposed to 33% in the second quarter of 2019, signalling lower injection needs in Q2 2020 than a year before, as at the beginning of the quarter storage levels already stood 13 percentage points higher than in Q2 2019. On 30 June 2020 the average EU storage level (80%) was 7 percentage points higher than at the end of Q2 2019. Less intensive storage injection activity also contributed to the lower demand on the European gas markets. Permanently high storage rates over the last few quarters might have also contributed to lower injection expectations for the next winter and spring in 2021, implying lower 2021 summer prices and further widening 2021 summer-winter price spreads.
- **Spot gas prices in Q2 2020 extended their steep falls already occurred in the previous quarter, and were in the range of 4.9–7.1€/MWh on the European gas hubs.** To put it on year-on-year comparison, gas prices on the EU hubs fell by 50-60%. However, looking at the daily evolution of wholesale gas prices, the Dutch TTF spot price fell as low as 3.5€/MWh by the end of May 2020, unprecedented low in the history of gas trade on TTF. Gas prices in Europe were impacted by the demand destruction in consequence of the imposed lockdown measures, lower demand in power generation owing to the abundant renewable availability, less injections needs in storage capacities and LNG supply that started to accommodate to the falling demand only with a time lag (cancellation of cargos). As of June lockdown measures were eased and lifted in most of the EU countries, and the gas oversupply decreased on the market, spot prices started to recover. During May and June 2020 there were several trading days when the TTF price fell below the US Henry hub price, making US LNG exports to Europe unprofitable. The average price ratio of the Japanese LNG prices and the TTF was 1.3, similar to Q1 2020 (1.2), whereas the ratio between the Japanese prices and the US Henry hub fell to 1.3 from 1.9. On quarterly average, the price ratio of the TTF and Henry hub was close to parity in Q2 2020. Forward gas prices decreased in April and May 2020, though by the end of Q2 2020 they rebounded, showing less volatility compared to the spot contract.
- **In Q2 2020 the increase in traded volumes on the European gas hubs perceptibly slowed down, up by only 7% (1 091 TWh) year-on-year,** whereas in the previous quarter the growth rate was still 32%. The total traded volume on the most liquid European hubs was around 15 8080 TWh (equivalent to around 1 320 bcm and representing 17 times the combined EU consumption of natural gas in Q2 2020). As gas consumption decreased, it is not surprising that the growth in trade volumes also slowed down, given that back in March 2020 traders focussed on re-adjusting positions ahead of lockdown measures that attracting trade volumes away from Q2 2020. In Q2 2020, the share of the Dutch TTF hub in the total European trade rose further and reached 72% (up by 6 percentage points compared to Q2 2019), reinforcing its leading role in Europe and making it more attractive to global gas traders as well.
- **Retail gas prices for industrial customers** with average annual consumption **were down by an estimated 11% in Q2 2020** in year-on-year comparison, while customers with higher annual consumption benefited from bigger decreases (18-21% in different consumption bands), implying that recent price falls on the wholesale gas markets already appeared in industrial retail price contracts. In June 2020, with the exception of two EU capitals out of the observed 24, prices were lower compared to the same month of the previous year.

1. Gas market fundamentals

1.1 Consumption

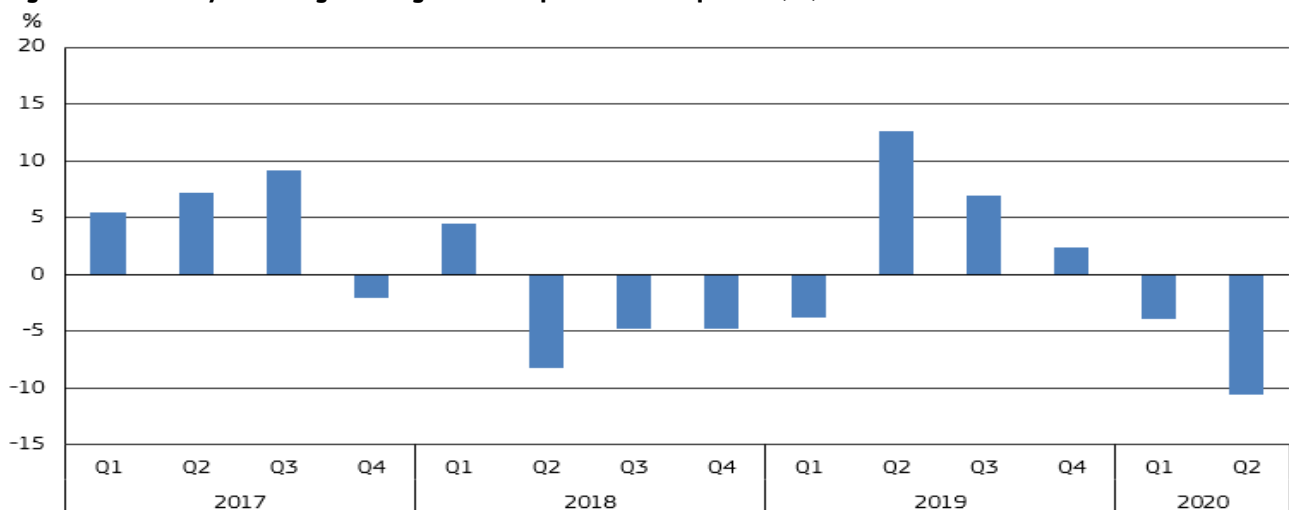
- EU gas consumption¹ in the second quarter of 2020 decreased by 10% in year-on-year comparison, after going down by 4% in the previous quarter. In absolute numbers, the quarterly gas consumption in Q2 2020 amounted to an estimated 71.3 bcm, decreasing from Q2 2019 (79.4 bcm), and down from (131.8 bcm) in Q1 2020, following the seasonal decrease after the end of the winter heating period. Such a huge year-on-year decrease in Q2 2020 could not be observed over the last six years, owing to the broad impact of confinement measures relating to the Covid-19 pandemic, which could be tracked in gas demand for industry and electricity generation. In electricity generation, demand for gas also fell by 10% year-on-year (decreasing by 12 TWh). Weather across Europe was generally milder than usual in April, whereas in May temperatures were lower than usual, impacting residential heating needs mainly in April at the end of the heating season. In parallel with easing of the confinement measures, demand for natural gas increased in June after the lows in April and May, comparing to the average of the last five years, as Figure 1 below shows. In the first half of 2020 gas consumption in the EU amounted to 203 bcm, down by 16 bcm (8%) compared to the same period of 2019.

Figure 1. EU gas consumption



Source: Eurostat, data as of 10 September 2020 from data series nrg_103m. In the next edition of this report numbers might change retrospectively.

Figure 2. Year-on-year change in EU gas consumption in each quarter (%)

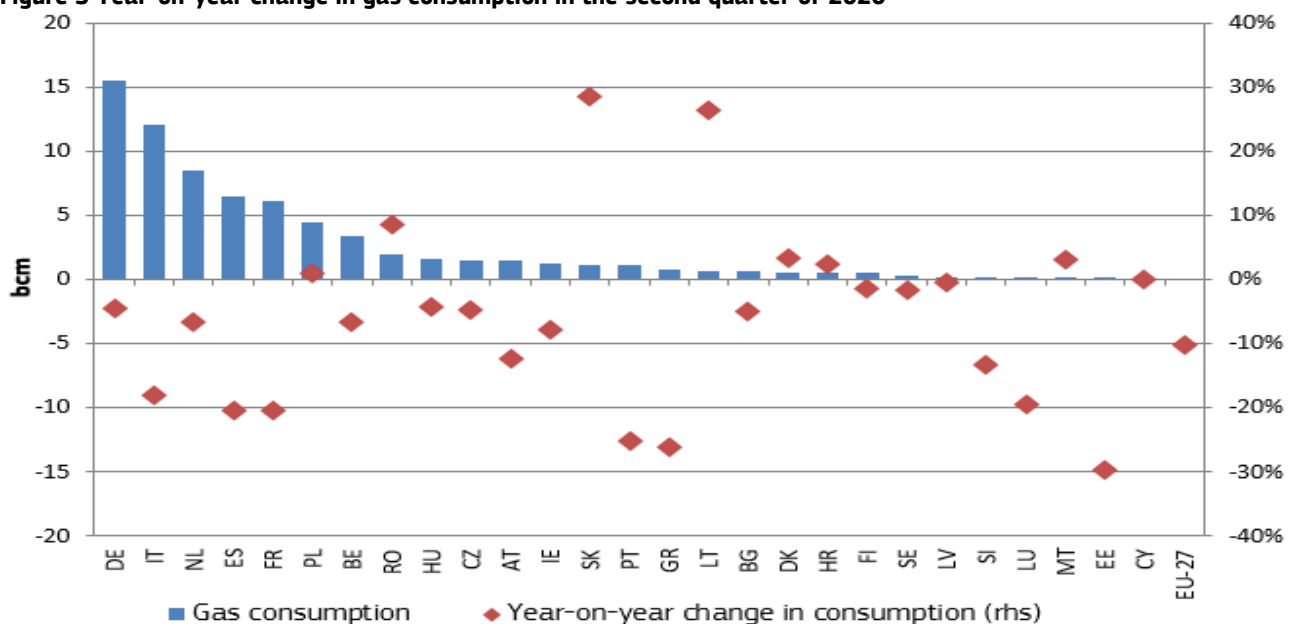


Source: Eurostat, data as of 10 September 2020 from data series nrg_103m. In the next edition of this report numbers might change retrospectively

¹ EU aggregates, unless otherwise indicated, refer to EU-27, and in order to ensure comparability over time, values of earlier periods and year-on-year comparison indices also refer to EU aggregates without the United Kingdom. Therefore, in comparison to earlier editions, total EU aggregate numbers might differ in the current report.

- In the second quarter of 2020, the biggest year-on-year increase in gas consumption could be observed in Estonia (30%, though representing only a minor increase of 0.02 bcm) and Greece and Portugal (respectively representing decreases of 26% and 25%, and 0.3 bcm and 0.4 bcm, compared to Q2 2019). Gas consumption, measured in percentages, went up by the most in Slovakia (by 29%, 0.2 bcm) and in Lithuania (by 26%, 0.1 bcm). In Spain and Italy gas consumption in Q2 2020 fell year-on-year respectively by 20% and 21% (in volumes: -2.7 bcm and -1.7 bcm). In the remaining EU Member States the change in gas consumption remained in the range of -20% to +10%, compared to Q2 2019. However, there were only seven countries, where consumption grew in Q2 2020. In the United Kingdom² consumption of natural gas decreased by 12% (2 bcm) in Q2 2020 compared to the second quarter of 2019.
- In absolute numbers, gas consumption in Q2 2020 decreased the most in Italy (by -2.7 bcm), Spain (-1.7 bcm), France (-1.6 bcm), Germany (-0.7 bcm) and the Netherlands (-0.6 bcm).
- In the first half of 2020 gas consumption in the EU was down by 4.4 bcm in Italy (or -11%), being the first country that introduced territorial and then nationwide confinement measures, Germany (-2.7 bcm, -6%), France (-2.6 bcm, -11%) and Spain (-2 bcm, -12%), compared with the first half of 2019. In the United Kingdom consumption of gas decreased by 3.1 bcm (-7%) during the same period.

Figure 3 Year-on-year change in gas consumption in the second quarter of 2020

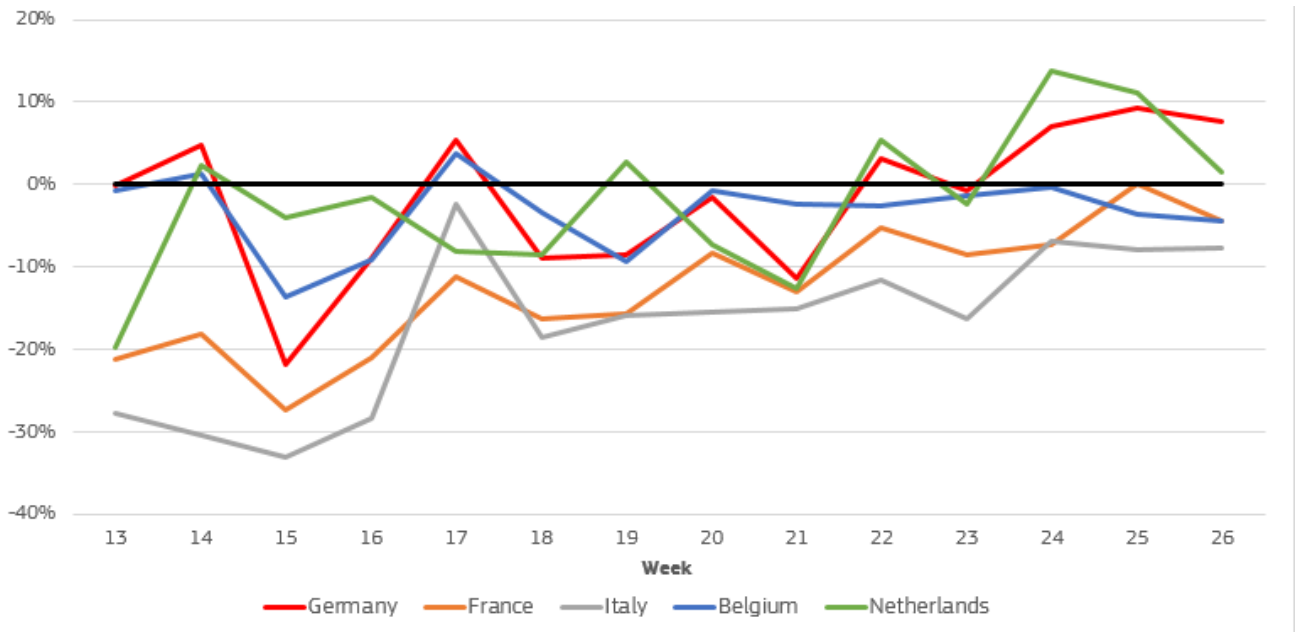


Source: Eurostat, data as of 10 September 2020 from data series nrg_103m. In the next edition of this report numbers might change retrospectively.

- During a significant part of the second quarter of 2020, confinement measures, introduced in order to curb the spreading the Covid-19 coronavirus, severely impacted the movement of persons and economic activity in most of the EU Member States. As of early and mid-May many countries started to review their confinement policies and by June 2020 most of the travel restrictions within and between EU Member States were lifted, which resulted in increasing demand for energy and gas as well.
- Figure 4 shows the weekly evolution of demand for gas in the industrial sector and for other non-local distribution companies' customers in some selected EU Member States in the second quarter of 2020. It is obvious that countries implementing severe confinement measures (e.g. Italy and France) faced a huge decrease in their non-household gas consumption (sometimes reaching 20-30%) in the weeks of April 2020 (week 13-17). However, as of early June (week 22) the situation has gradually improved as the general energy demand, including that for natural gas, rose in parallel with less strict (or completely abandoned) confinement measures.

² The United Kingdom has in many respect still much relevance for the European gas market, therefore developments in this country are often mentioned in the text

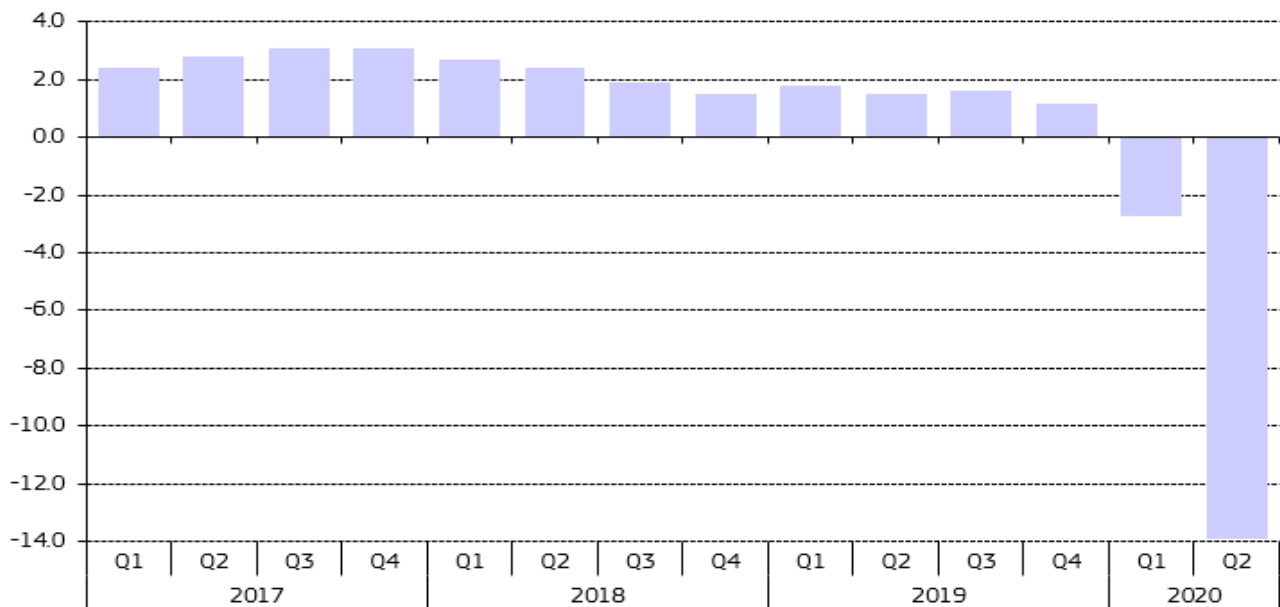
Figure 4 Change in weekly consumption of natural gas for industrial and non-households customers in Q2 2020 in some EU countries, as compared to the same week of the previous year



Source: S&P Global Platts Eclipse, own computations. The chart shows in different countries change in gas consumption in the industry or customers supplied by non-local distribution companies, an approximation of non-household consumers, therefore the numbers are not fully comparable across countries.

- In the second quarter of 2020, after undergoing a contraction of 3.3% in Q1 2020, an unprecedented fall in economic activity in Europe could be observed, as GDP in the EU-27 decreased by 13.9% in year-on-year comparison³, probably signalling the deepest period of the economic recession since the outbreak of the Covid-19 pandemic. As the drop in the economic activity was steeper than the decrease in demand for natural gas, it can be assumed that the consumption of some other fossil fuels (e.g.: oil and petroleum products) fell even more steeper than that of natural gas.

Figure 5 Change in EU27 GDP, in year-on-year comparison (%)

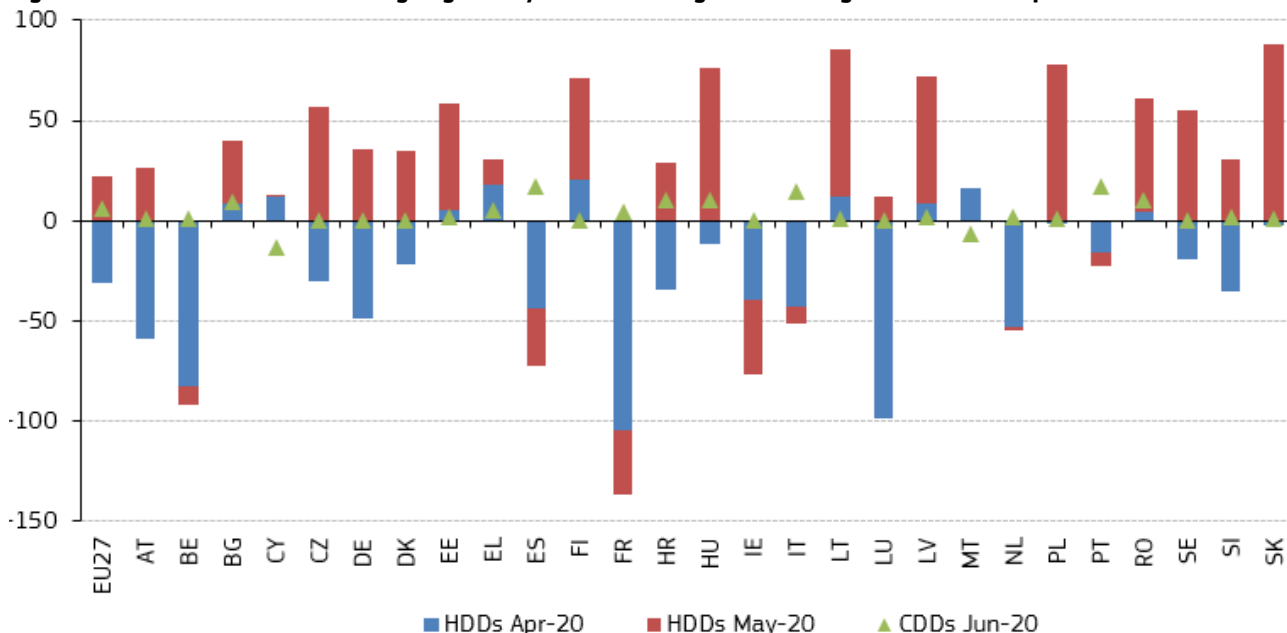


Source: Eurostat, data as of 8 September 2020 from data series namq_10_gdp - Seasonally and calendar adjusted data

³ Source: Eurostat, data as of 8 September 2020 from data series namq_10_a10; seasonally and calendar adjusted data

- Figure 5 shows the deviation of actual heating degree days (HDDs) from the long-term average⁴ in individual EU Member States in the April and May 2020, along with the deviation of the actual cooling degree days (CDDs) from the long term average. As the second quarter of the year begins with the end of the winter heating season and ends with the beginning of the summer season implying increasing residential cooling needs, it is worth to look at both HDDs and CDDs. April 2020 was milder than usual, possibly further reducing the overall gas demand in consequence of less heating needs, however, May was colder than normal, but this only might have impacted gas demand in some northern European countries. Temperatures in June 2020 were broadly in line with the seasonal averages, with the exception of some southern European countries, not implying significant cooling needs in most of the countries.

Figure 6 Deviation of actual heating degree days from the long-term average in the second quarter of 2020



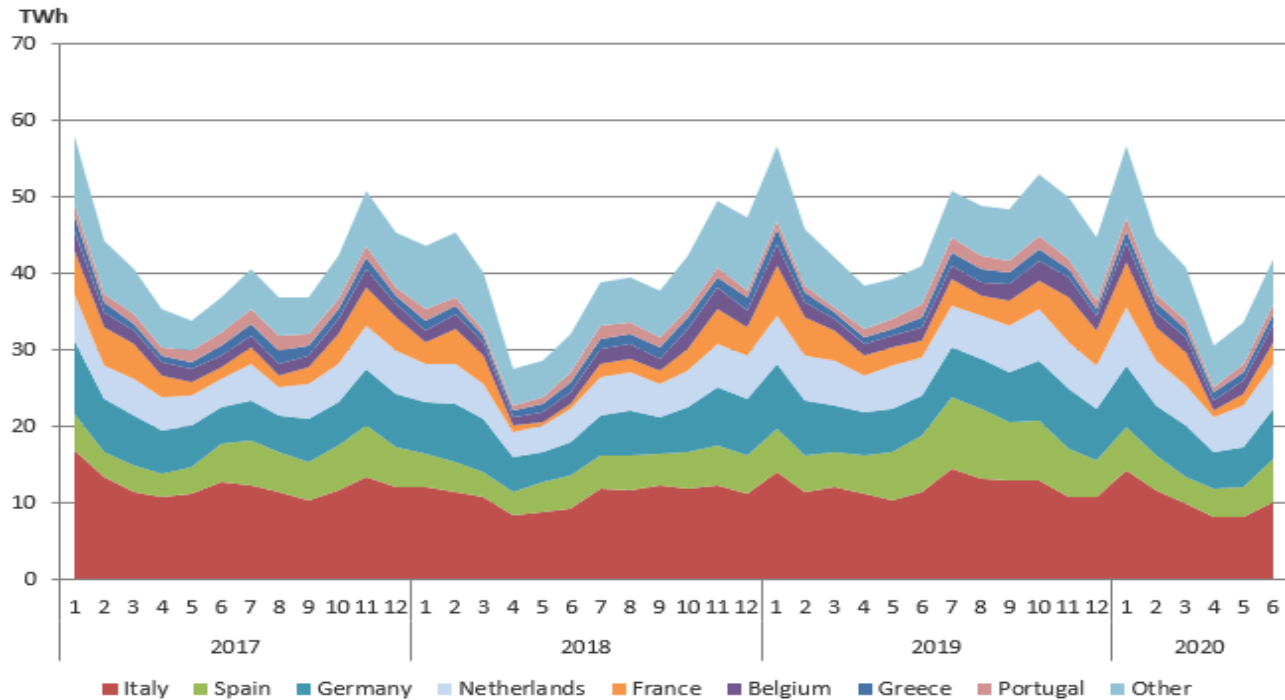
Source: Joint Research Centre (JRC), European Commission

- Based on data from ENTSO-E, gas-fired power generation was down by more than 10% in the second quarter of 2020, compared to the same period of 2019. In absolute terms, electricity generated from gas decreased by 12.6 TWh year-on-year, as Figure 7 shows. In Q2 2020 gas wholesale prices reached historical lows (in some cases the lowest since the existence of given hubs) in Europe, which could have been beneficial for gas use in power generation, even amid increasing carbon prices. However, besides the demand related impact, stemming from limited demand for gas in the industry, the role of renewables in the EU power generation mix was particularly strong in Q2 2020. Wind, solar, biomass and hydro together represented almost 40% of the EU power mix, leaving only a smaller share for gas (less than 20%) in spite of decreasing fuel costs. Power generation from solid fuels continued its falling trend, decreasing by a third over the same period of 2019⁵. Carbon prices rebounded from 17€/t_{CO2e} to 27€/t_{CO2e} during Q2 2020, reaching 21.2 €/t_{CO2e} on average, which did not contribute either to the competitiveness of coal and lignite in EU power generation.
- In Q2 2020 the amount of electricity generated from gas went down in Spain by 29% in year-on-year comparison, and was down by 24% in France and by 20% in Italy. In Germany gas fired generation changed only slightly (-1%), whereas in the Netherlands and Belgium it rose respectively by 3% and 11%. Besides demand side factors, the role of gas was impacted by changes in the local power generation mixes. In Spain rise in electricity generation from hydro and solar contributed to the replacement of gas in the local mixes. Nuclear power generation decreased in Spain, France and Belgium, pointing to reinforcing role of renewables. In the Netherlands steep fall in solid fuel generation was compensated by increasing gas, nuclear and strongly rising renewables, underlying the general trend in the EU as mainly renewables replaced dwindling fossil fuel generation. In Germany practically all forms of power generation (with the exception of solar and hydro) decreased in Q2 2020 in year-on-year comparison, pointing to lower demand and probably increasing imports from the neighbouring markets. In France, the situation was similar, albeit among increasing solar and hydro the bulk of decrease in generation (nuclear and gas) was related to lower electricity demand.

⁴ Long term average temperatures, heating and cooling degree days refer to the period between 1978 and 2018

⁵ See more information in Quarterly Report on the European Electricity Markets, Vol. 13, Issue 2

Figure 7 Gas-fuelled power generation in the EU



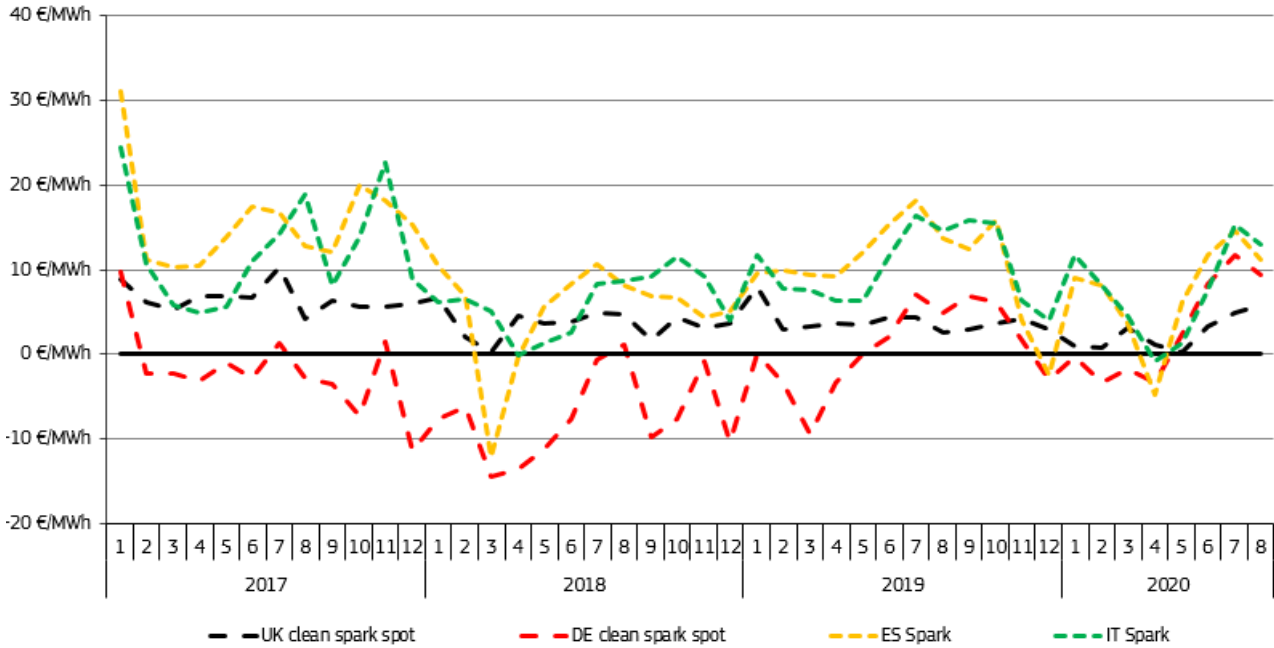
Source: Based on data from the ENTSO-E Transparency Platform and national data sources, data as of 14 September 2020.

- Clean spark spreads – measuring the profitability of gas-fired generation by taking into account variable costs – became positive again in Q2 2020 in Germany, Spain and Italy, respectively averaging 2.5 €/MWh, 4.4€/MWh, 2.6€/MWh, implying that gas-fired generation was profitable⁶ in the biggest markets of continental Europe (See Figure 8⁷). Gas prices fell steeply in April and May 2020, slightly recovering in June, and this, albeit low wholesale electricity prices and increasing emission allowance prices, helped in improving the profitability of gas fired electricity generation. Higher clean sparks spreads in Spain and Italy, compared to Germany, was primarily owing to higher wholesale electricity prices in these two markets.
- In the United Kingdom, also having relevance for the European gas market, clean spark spreads averaged 1.5 €/MWh, in Q2 2020, almost identical with the spread in Q1 2020 but halving since Q2 2019. This implied minor profitability of gas-fired generation in the country. However, increasing renewable generation, like in many other markets, rendered the position of gas generation difficult in Q2 2020 in the UK, down by 30% in year-on-year comparison.

⁶ Assuming an average gas power plant efficiency, see more in the Glossary

⁷ Charts of clean spark spreads can also be found in the Quarterly Report of European Electricity Markets (Vol. 13, Issue 2). Data on the share of gas in electricity generation come from the database of ENTSO-E

Figure 8 Clean spark spreads in Germany, Spain, Italy and the United Kingdom



Source: Bloomberg

1.2 Production

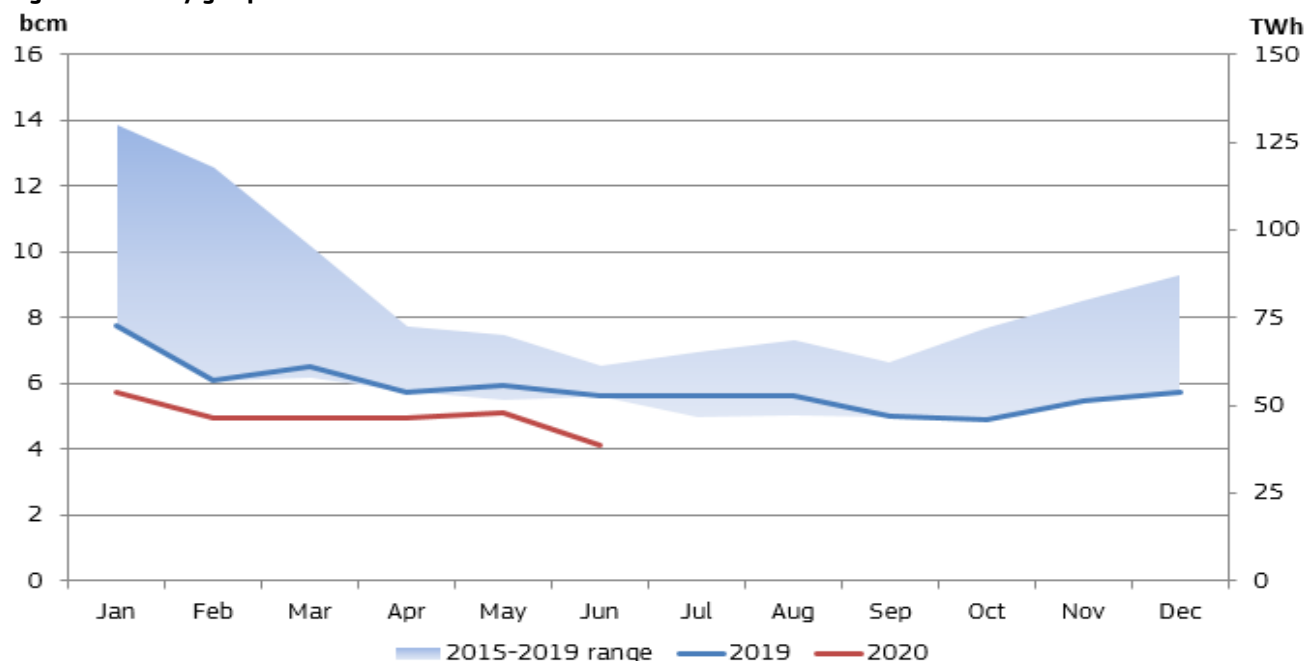
- In the second quarter of 2020 EU gas production reached approximately 14.8 bcm⁸, 14% (2.5 bcm) less than in the same quarter of 2019 (See Figure 9). During the whole Q2 2020 gas output was below the 2015-2019 range, reflecting the dwindling trend of gas production in the EU.
- In the biggest EU producer Netherlands natural gas production in Q2 2020 decreased by 16% (by 1.3 bcm), amounting to 6.8 bcm, being the lowest since Q3 2015. For the first time, total gas production from the Groningen field fell below 0.5 bcm in June 2020⁹, owing to the high flexibility of Dutch supply, with storage levels significant, low LNG prices and the economy contracting due to the coronavirus pandemic. The production gap for the biggest Groningen gas field was set to 11.8 bcm for the gas year 2019 (1 October 2019 to 30 September 2020), which will be further diminished for the gas year starting in October 2020 (9.3 bcm).
- In Romania, being the second biggest gas producer in the EU, production went down by 17% (1.2 bcm), falling to 2 bcm in Q2 2020, which was the lowest in the last six years. Gas output in Denmark showed a very strong decrease (by 65%, 0.7 bcm year-on-year, principally owing to the suspension of production at the Tyra fields in the Danish North Sea, ahead of the redevelopment¹⁰ until 2022), and in Germany, Italy and Ireland production went down by 0.2 bcm each (in percentage change respectively by 11%, 20% and 22%). Germany produced 1.3 bcm natural gas, whereas Italy had a production of 1 bcm, and Ireland and Denmark respectively produced 0.5 bcm and 0.4 bcm.
- In the first half of 2020 gas production in the EU amounted to 30.5 bcm, down from 37.7 bcm in the first half of 2019. The Netherlands produced 14 bcm gas (vs. 18.7 bcm a year before), followed by 4.6 bcm in Romania (5.1 bcm in the first half of 2019) and by Germany (2.6 bcm vs 3 bcm a year before).
- The United Kingdom managed to increase its gas production (by 9%, 0.9 bcm) in Q2 2020 to 10.4 bcm, whereas in the first half of 2020 it produced 20.8 bcm (vs 19.9 bcm a year before). Gas production in Norway decreased by 12%, from 29.2 bcm in Q2 2019 to 25.7 bcm in Q2 2020. Although production costs of Norwegian gas fields are highly competitive in Europe, decrease in gas demand and LNG imports also impacted Norwegian gas production in the second quarter of 2020.

⁸ Given that in some countries data for some periods are based on estimation, this number might retrospectively change

⁹ <https://www.spglobal.com/platts/en/market-insights/latest-news/natural-gas/070720-groningen-monthly-gas-output-drops-below-500-mil-cu-m-for-first-time>

¹⁰ <https://dk.total.com/total-denmark/better-energy-projects-denmark/tyra-redevelopment-tyra-gas-field-processing-90-nations-gas-production>

Figure 9 Monthly gas production in the EU



Source: Eurostat, data as of 10 September 2020 from data series nrg_103m. In the next edition of this report numbers might change retrospectively.

1.3 Imports

- According to Eurostat¹¹, net imports decreased by 14% in the second quarter of 2020 (year-on-year), mainly driven by a 10% reduction (year-on-year) in the EU gas demand. Net imports in different EU countries showed a high variation in Q2 2020, ranging from a decrease of 50% (in Slovakia) to an increase of 35% (in Lithuania, though by marginal value, 0.2 bcm) in year-on-year comparison. Among big gas consumer countries net imports decreased in Spain (21%), Germany (17%), Italy (10%) and France (by 5%), whereas in Romania and the Netherlands it respectively rose by 25% and 22%. In Poland net imports remained practically unchanged, whereas in Greece it rose slightly, by 2%.
- In the second quarter of 2020, the total net extra-EU gas imports reached 82.6 bcm, down by 14% from 96.3 bcm in the same period of 2019. The five biggest importers in the EU were Germany and Italy (both 18 bcm), France (12 bcm), Spain (7 bcm) and Belgium (3 bcm), representing together more than 70% of the total EU net gas imports in Q2 2020. In the first half of 2020, total net gas imports in the EU amounted to 163 bcm, down from 183 bcm in the first half of 2019.
- According to ENTSO-G data, imports amounted to 929 TWh in the second quarter of 2020, of which 75% through pipelines and 25% through LNG terminals. Pipeline gas imports from Russia, similarly to the previous quarter, fell significantly, by 23% in year-on-year comparison, as gas transit through the Ukrainian route practically halved compared to Q2 2019. Pipeline gas imports from Algeria fell further in Q1 2020 (by 37%), similarly to that from Libya (17%), whereas imports from Norway decreased only by 1% in Q2 2020 in year-on-year comparison. At the same time, LNG imports, sharply contrasting the trend of the preceding quarters, decreased slightly year-on-year, and reached 236 TWh in Q2 2020.
- Russia remained the top gas supplier of the EU, however, the share of Russian pipeline gas in the extra-EU gas imports fell to 42% in the second quarter of 2020, down from 47% in Q2 2019, and close to the lowest in the last six years reached in the preceding quarter¹².
- Pipeline gas imports from Norway decreased only by 1% year-on-year in the second quarter of 2020, which was less than the total gas decrease (14%), in consequence the country's share in extra-EU gas imports rose to 23%¹³, compared to Q2 2019, when it was

¹¹ Net imports equal imports minus exports and do not account for stock changes.

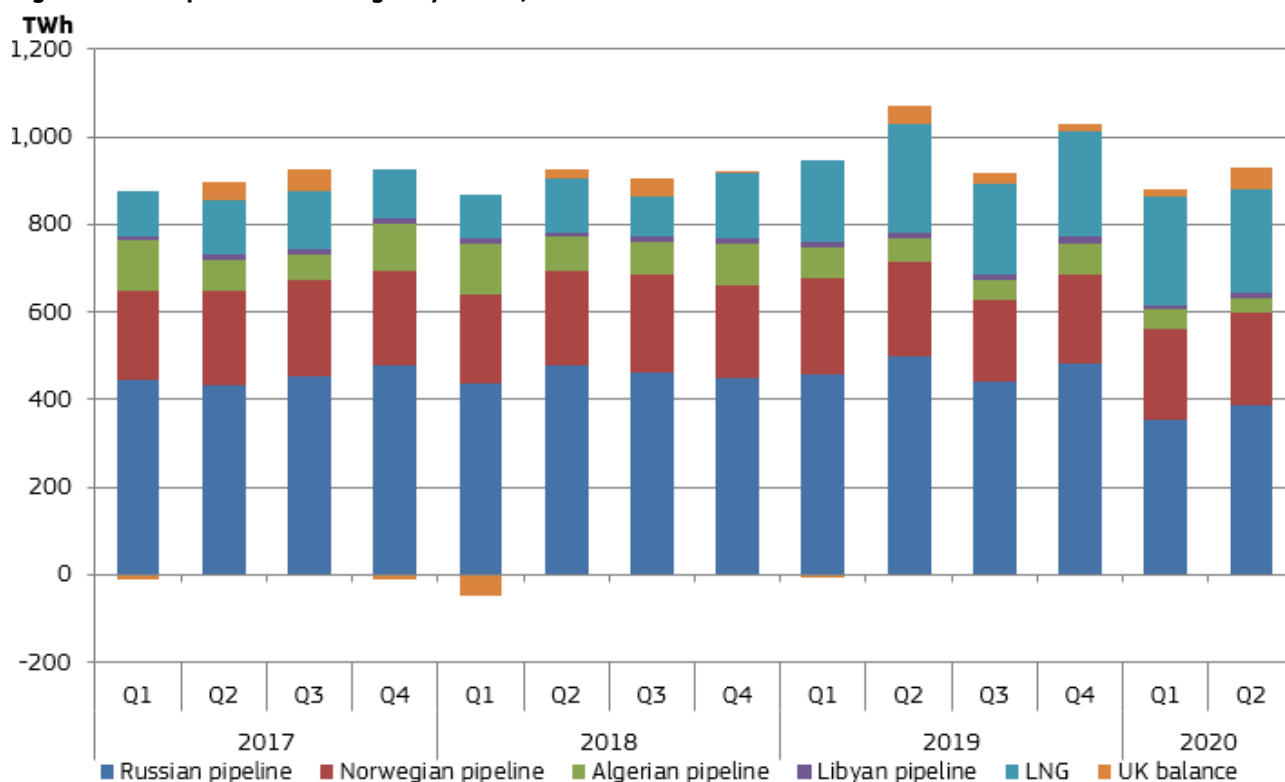
¹² It is worth to note that Russia increased its importance in the EU LNG imports as well over the last two years, numbers presented in this section, with the exception of LNG or unless otherwise indicated, refer to pipeline imports

¹³ Note that Norway to UK flows reported by ENTSO-G includes some gas from UK offshore fields, resulting in an overestimation of Norwegian imports.

only 20%. In the second quarter of 2020 Norwegian gas production¹⁴ amounted to 25.7 bcm in Q2 2020, decreasing by 12% year-on-year, as wholesale gas prices fell close to or even below in some period the production costs of the Norwegian fields, and gas from Norway had to compete with LNG imports.

- In the second quarter of 2020 pipeline gas imports from Algeria continued to fall, decreasing by 37% year-on-year, which resulted in a decreasing share within the total extra-EU imports (3.4% in Q2 2020 vs. 5% in Q2 2019). This was probably owing to increasing domestic gas use in the country (implying less export opportunities), and the uncompetitive nature of the still-significant oil indexed contracts in Algerian gas exports. Imports from Libya continued to fall (-17% in Q2 2020 compared to the same period of the previous year), and its share was only 1.4% in the total EU gas imports.
- In Q2 2020, similarly to the preceding four quarters, LNG supply sources as whole confirmed their combined second place in EU external import gas supply, ensuring around 25% of the total imports, 2 percentage points up compared to Q2 2019. However, compared to Q1 2020 there is a decline of 3 percentage points, reflect the impact of cancellation of LNG shipments in Q2 2020, owing to low gas demand and wholesale gas prices across Europe.
- In the first half of 2020 gas imports in the EU fell by 10%, in year-on-year comparison, as result of 23% less import from Russia, a decrease of 3% in Norwegian imports, whereas gas imports from Algeria and Libya fell steeply (respectively by 38 and 16%). LNG imports were still on the rise, up by 12% in the same period.

Figure 10 EU imports of natural gas by source, 2017-2020



Source: Based on data from the ENTSO-G Transparency Platform, data as of 8 September 2020.

Exports to the Baltic-states and Finland are not included in the chart owing to unavailability of reliable data

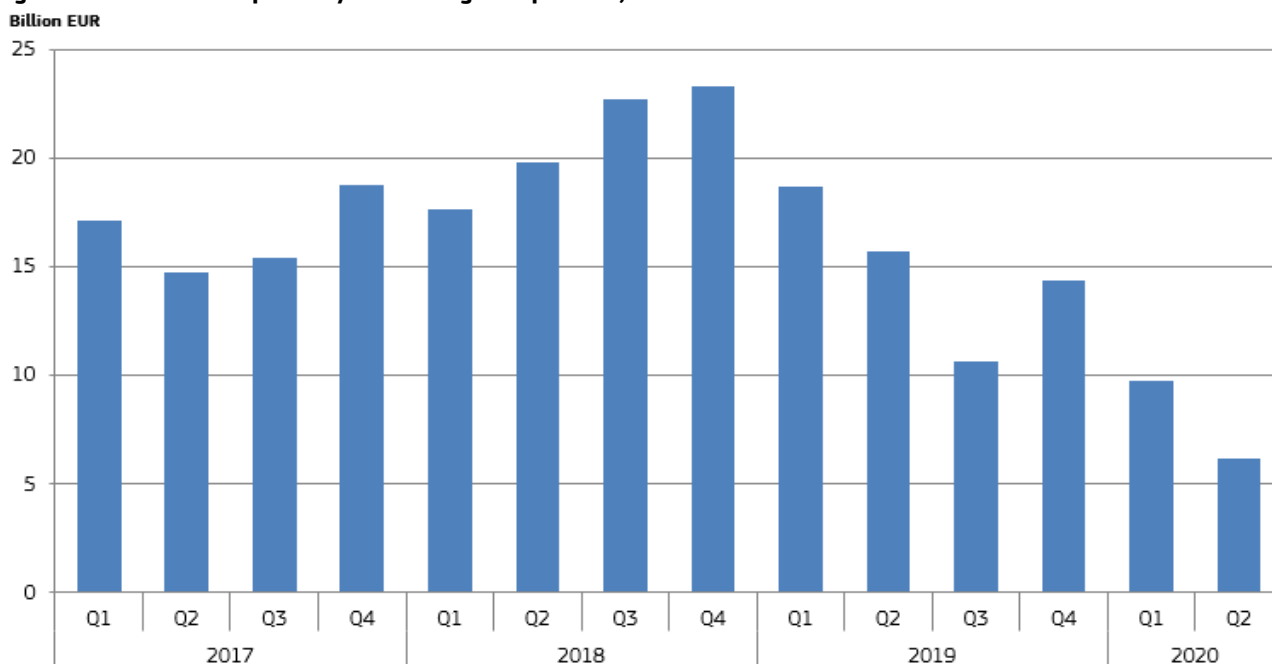
Russia, Norway, Algeria and Libya include pipeline imports only; LNG imports coming from these countries are reported in the LNG category.

A trade balance with the UK is estimated, reflecting that the UK is no longer part of the EU, and it is not easy to determine the origin of gas molecules arriving to the EU after going through the UK market (it can be UK production, imports from Norway of LNG imports from the UK, etc.).

- Due decreasing import volumes and falling average import prices, in the second quarter of 2020 the estimated gas import bill fell to as low as €6.2 billion, (in comparison to €15.8 billion in Q2 2019, falling by more than 60% year-on-year). As wholesale gas prices in Europe fell to historic lows in Q2 2020, falling more than by a half in year-on-year, the quarterly bill was even lower than the through set in Q1 2020 (€9.8 billion). In the first half of 2020 the total gas import bill was €16 billion, down from €34 billion in the first half of 2019.

¹⁴ <https://www.npd.no/en/facts/news/Production-figures/2020/production-figures-march-2020/>

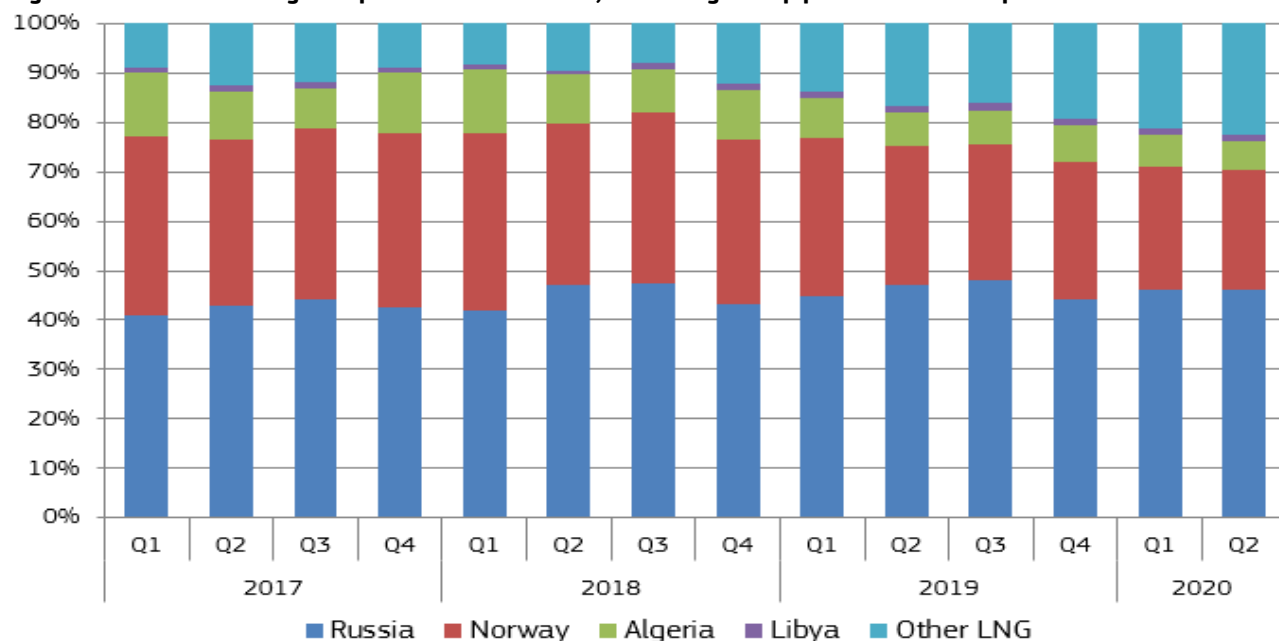
Figure 10 – Estimated quarterly extra-EU gas import bill, in billions of euros



Source: ENTSO-G, Eurostat and own data calculations for the EU weighted average of import gas prices

- Given that Russia, Norway and Algeria are also active on the LNG market, and the importance of LNG increased over the last few years in the EU gas market, it is worth to look at the combined imports of pipeline gas and LNG from these countries and to calculate the share of import sources in this way, too. As Figure 11 shows, the share of Russia within total extra-EU gas imports (pipeline and LNG together) amounted to 46% in Q2 2020, split by 42% of pipeline imports and 4% of LNG, indicating that Russia is also an important actor in European LNG imports, not only in the traditional pipeline gas supply. Russia is trying to maintain its market share by switching to a more competitive export strategy, integrating EU benchmarks in the contract price formation formula. Whereas between the first quarters of 2019 and 2020 the share of pipeline import gas of Russian origin went down from 46% to 42% within the total extra-EU gas imports, by taking into account LNG the share of Russia decreased from 52% to 46%.
- The share of Norway was 24% in Q2 2020 (vs. the aforementioned share of 23% for the pipeline imports only), and the share of Algeria is 5.9% with LNG (as opposed to 3.4% only including pipeline gas). The share of LNG in the total extra-EU imports was 22%, (on the top of LNG accounted in shipments from Russia, Norway and Algeria), reaching the highest over the last six years. The import share of LNG was still up, by almost 5 percentage points compared to Q2 2019. It seems that the decrease in the share of Russia and Algeria was replaced by the increasing shares of LNG (amongst others from Qatar, US, Nigeria, etc.), and gas imports from Norway.

Figure 11 – The share of gas imports within the total, combining both pipeline and LNG imports

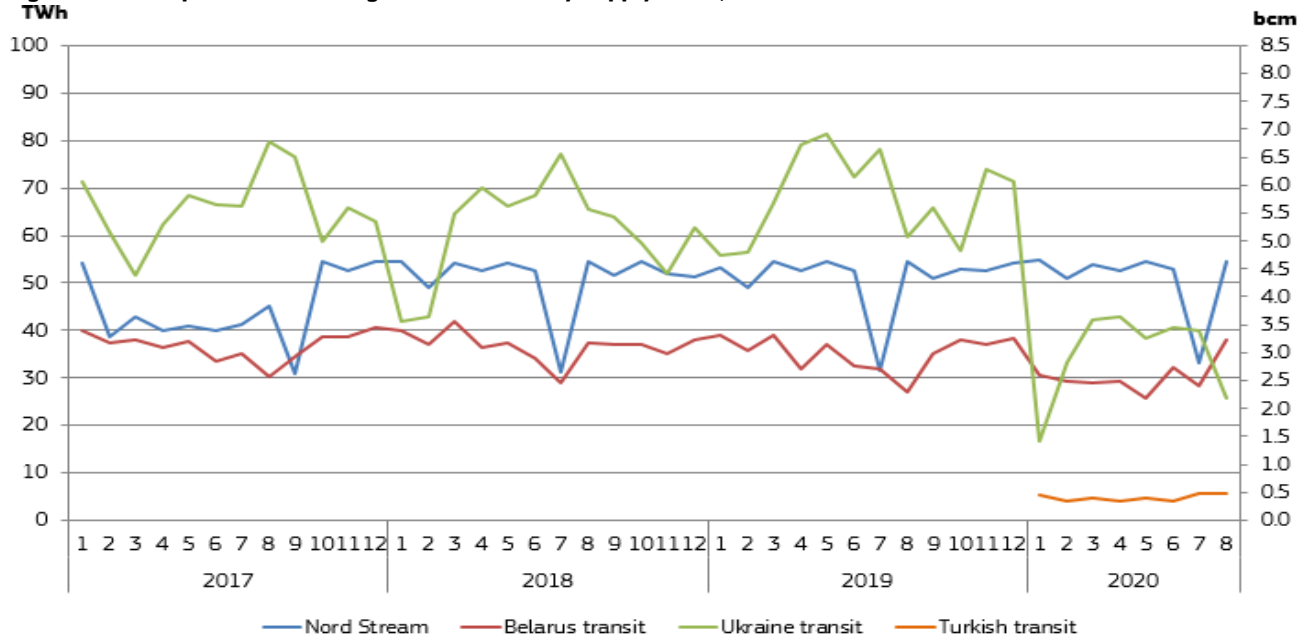


Source: Based on data from the ENTSO-G Transparency Platform, data as of 8 September 2020.

1.3.1. Pipeline imports from Russia and EU supply to Ukraine

- Figure 12 shows the breakdown of EU gas imports from Russia on the four main pipeline supply routes: Ukraine (which includes the Brotherhood Pipeline and the - recently less important - Balkan route), Belarus (mainly the Yamal pipeline), Nord Stream and the recently inaugurated TurkStream.
- In the second quarter of 2020 the volume of Russian imports fell by 23%, if compared with the same quarter of 2019. As shown on Figure 12, gas flows transiting Ukraine were 47% lower than in Q2 2019. During Q2 2020 a monthly average of 3.4 bcm of gas of Russian origin was transited through Ukraine, whereas in Q2 2019 the average monthly transit volume was 6.5 bcm. As in the previous quarter, Russian gas volumes stored in EU countries might have served European customers rather than using the Ukrainian transit route. In the first half of 2020 around 18 bcm gas was transited through Ukraine (by the end of August it was still only around 23 bcm), which is worth to compare with the contractual obligation of 65 bcm for 2020.
- Flows through Belarus were also down significantly, by 14% in Q2 2020 compared to the same quarter of 2019. In contrast, gas flows through the Nord Stream remained practically unchanged (+0.1% year-on-year).
- As a result, in Q2 2020 the share of the transit through Ukraine was down in year-on-year comparison, reaching only 32% (though up from 26% in Q1 2020), compared to 47% in Q2 2019. Nordstream remained the main supply route of Russian gas to Europe, as its share reached 42% of the total Russian pipeline gas imports in Q2 2020 in the EU, up from 32% a year earlier. The Belarus transit route represented 23% in Q2 2020, slightly up from 21% in Q2 2019. The share of TurkStream was still lower, around 3% in Q2 2020 (even slightly down from 4% in Q1 2020).
- In Q2 2020 Nord Stream represented 17% (14 bcm) in the total net extra-EU imports, Ukraine had a share of 13% (11 bcm), and the Belarus transit route ensured 10% (8 bcm). At the same time, the TurkStream had a share of less than 2%, with slightly more than 1 bcm gas transit within the total net extra-EU gas imports in Q2 2020. In the first half of 2020 18 bcm gas was transited through Ukraine, 27 bcm through Nordstream, 15 bcm through the Yamal pipeline (Belarus) and slightly more than 2 bcm through the Turkstream.
- Amid lower share of pipeline gas imports from Russia, directly competing with LNG imports and pipeline imports from Norway in the European gas market, the importance of transit through Ukraine seemed further decreasing, in spite of the existing agreement for the period of 2020-2024, setting a minimum amount of Russian gas transit through the country (65 bcm for 2020). The Trans-Balkan pipeline, which transited Russian gas to the countries of the Balkans coming from the Ukrainian route, now operates as route for the Russian gas coming through the TurkStream, though amid much lower utilisation rate, as low transit volumes through this pipeline indicated.

Figure 12 EU imports of natural gas from Russia by supply route, 2017-2020

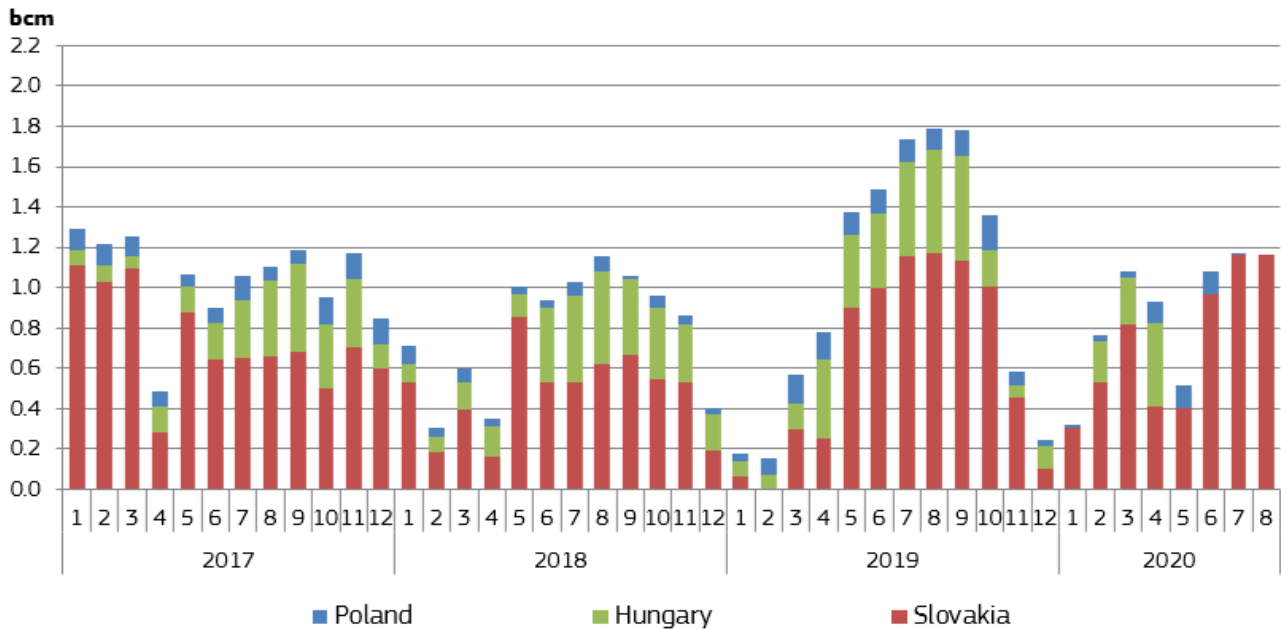


Source: Based on data from the ENTSO-G Transparency Platform, data as of 8 September 2020. Deliveries to Estonia, Finland and Latvia are not included; transit volumes from Russia to the Former Yugoslav Republic of Macedonia and Serbia are excluded. Since the inauguration of Turk Stream flows to Turkey via the Balkans are not significant.

- In the second quarter of 2020, in parallel with the so-called demand destruction (depicting the devastating impact of the Covid-19 pandemic) on the European gas markets, Ukrainian natural gas imports from EU countries fell to 2.5 bcm, from the 2.8 bcm in Q1 2020. In order to better reflect the seasonal impacts, it is worth to compare with Q2 2019, when Ukrainian gas imports from the EU amounted to 3.6 bcm, implying a decrease of 31% year-on-year in Q2 2020. The country imported 1.8 bcm of gas from Slovakia, 0.4 bcm from Hungary and 0.3 bcm from Poland in Q2 2020. Ukrainian gas storage filling rates were more than 20 percentage point higher in Q2 2020 than in the same period of 2019, this also could explain lower gas import needs. In the first half of 2020 total Ukrainian gas imports from the EU amounted to 4.7 bcm, which was comparable with the volume of the first half of 2019 (4.5 bcm).
- Although also impacted by lower gas demand and trade, sales on the Gazprom’s Electronic Sales Platform (ESP) reached 8.6 bcm in Q2 2020, which was comparable with the volume of 8 bcm in Q1 2020. However, in year-on-year comparison a huge increase (165%) could be observed in Q2 2020, as in the second quarter of 2019 sales amounted to only 3.3 bcm. In June 2020 alone monthly sales amounted to the highest (4.3 bcm) since the beginning of the trade in September 2018. In the first half of 2020 the total ESP sales amounted to 16.6 bcm. By the end of August cumulative ESP sales reached more than 20 bcm.
- This is a significant number, given at the end of April Gazprom revised its export plans to Europe for 2020, targeting 167 bcm exports (including Turkey as well), in comparison to the 2019 exports of 199 bcm¹⁵. In Q2 2020 the principal delivery points from ESP sales were the Slovakian virtual trading point (VTP Slovakia - 2.2 bcm delivered), the German Gaspool market (2 bcm), the delivery point Olbernhau on the German-Czech border (1.2 bcm), the NCG market in Germany, the virtual trading point in Austria, and the one on the Hungarian-Ukrainian border (all of the three with slightly less than 1 bcm volume).

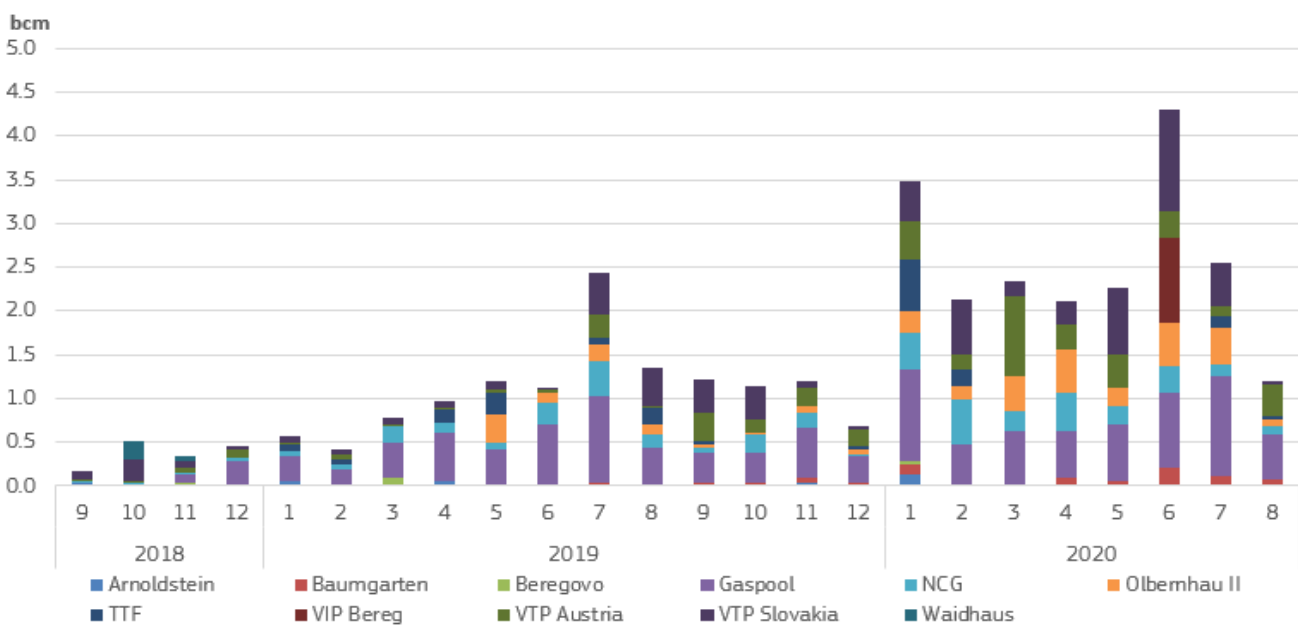
¹⁵ <https://energy.economictimes.indiatimes.com/news/oil-and-gas/russias-gazprom-expects-gas-exports-to-drop-by-16-per-cent-in-2020/75462367>

Figure 13 – Ukrainian pipeline gas imports from Poland, Slovakia and Hungary



Source: Based on data from the ENTSO-G Transparency Platform, data as of 8 September 2020

Figure 14 – Monthly sales on the Gazprom Electronic Sales Platform (ESP) with delivery points



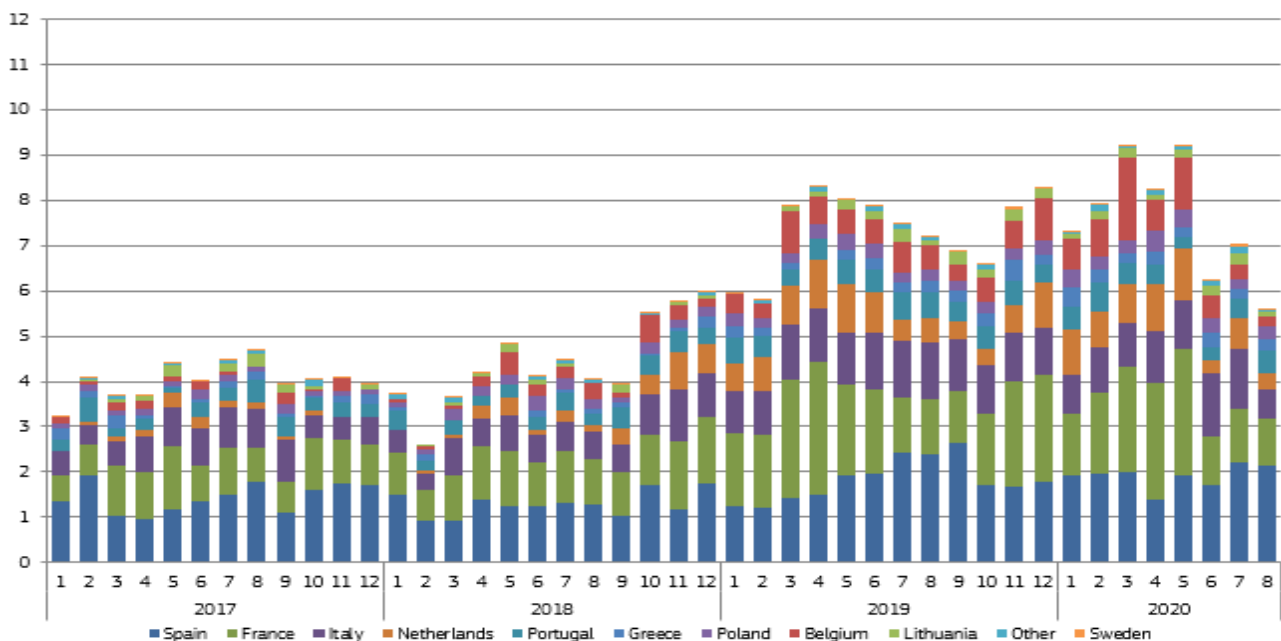
Source: Gazprom Electronic Sales Platform

1.3.2. LNG imports

After several quarters of dynamic growth, LNG imports in the EU fell by 3% in Q2 2020. Looking at the three months of the quarter, the change in EU LNG imports was respectively -1% April, +14% in May and -21% in June. As gas demand destruction began to impact the market as of April, more and more LNG shipments were cancelled, which can be seen on the numbers in June as LNG imports were down by more than a fifth compared to June 2019. The quarterly LNG import in Q2 2020 was 23.6 bcm, decreasing from 24.4 bcm in Q1 2020 and from 24.2 bcm in Q2 2019, as Figure 15 shows. LNG imports decreased in Spain, France, the Netherlands, Portugal and Sweden, however, in the remaining LNG importer countries (Greece, Poland, Belgium, Lithuania) LNG imports were still up in Q2 2020 year-on-year.

- In Q2 2020 France was the biggest importer (with a quarterly import of 6.5 bcm, down by 5% year-on-year). Spain came to the second place, importing 5 bcm, showing a year-on-year decrease of 7%. Italy was the third biggest importer, (3.6 bcm, practically unchanged year-on-year). LNG imports in Netherlands amounted to 2.4 bcm in Q1 2020, decreasing by 19% year-on-year, whereas in Belgium the quarterly import was 2.3 bcm, up by 37% compared to Q2 2019. The total EU LNG imports amounted to an estimated €1.4 billion in Q2 2020, down from €3.5 billion a year before, as the result of sharply decreasing LNG import gas prices (decreasing by 55% year-on-year), and decreasing import volumes in Q2 2020. In the first half of 2020 LNG import volumes in the EU amounted to 48 bcm (representing an estimated value of €4 billion), up from 44 bcm in the first half of 2019 (with a monetary value of €7.5 billion).
- In contrast to the continental Europe, LNG imports in the United Kingdom were still up, by 4% in Q2 2020, reaching almost 5.2 bcm. The UK is played an important role as berthing site of LNG vessels in Q2 2020 and a part of the shipments were transported to Europe via gas interconnectors with Belgium and the Netherlands. In the first half of 2020 UK LNG imports reached 11.1 bcm, up from 9.2 bcm in the first half of 2019.
- Similarly to the previous quarter, in Q2 2020 LNG market prices in Europe remained aligned with their East Asian peers (see Figure 25). This implied that Europe offered a competitive destination for LNG cargos, especially if shipment costs are also taken into account, for cargos from the Atlantic Basin, the Middle East and LNG of Russian origin (production at the Yamal Peninsula), as shipment costs were more favourable to Europe due to its geographical proximity. Due to the abundant supply and falling demand, LNG prices became lower and price differentials remained negligible across the main LNG consumer regions.

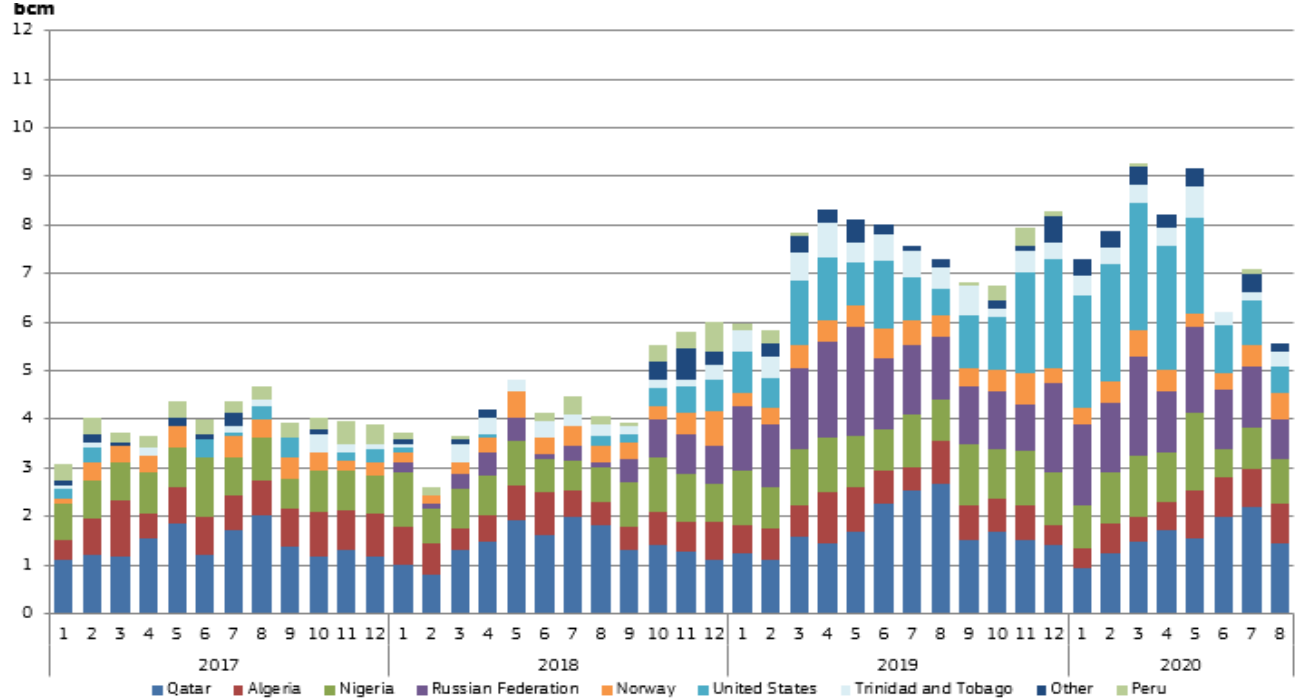
Figure 15 LNG imports to the EU by Member States
bcm



Source: Commission calculations based on tanker movements reported by Refinitiv
"Other" includes Finland, Malta

- In the second quarter of 2020, the United States preserved its biggest LNG supplier position to the EU, ensuring 23% of the total imports. However, the share of US fell by 7 percentage points compared to Q1 2020, and the long time biggest supplier Qatar came to the second place (after being only the third in Q1 2020), with a share of 22% within the total EU LNG imports. LNG imports from Qatar seemed to be more resilient to the general gas demand destruction, which might be related to the existence of long-term supply contracts with many European countries. Russia was the third LNG import source for the EU, with a share of 18% in Q2 2020 (down from 21% in Q1 2020). Nigeria was the fourth biggest import source in Q1 2020, (with a market share of 14%), followed by Algeria (10%), Norway and Trinidad and Tobago (both with a share of 5%) – See Figure 16.

Figure 16 LNG imports to the EU by supplier



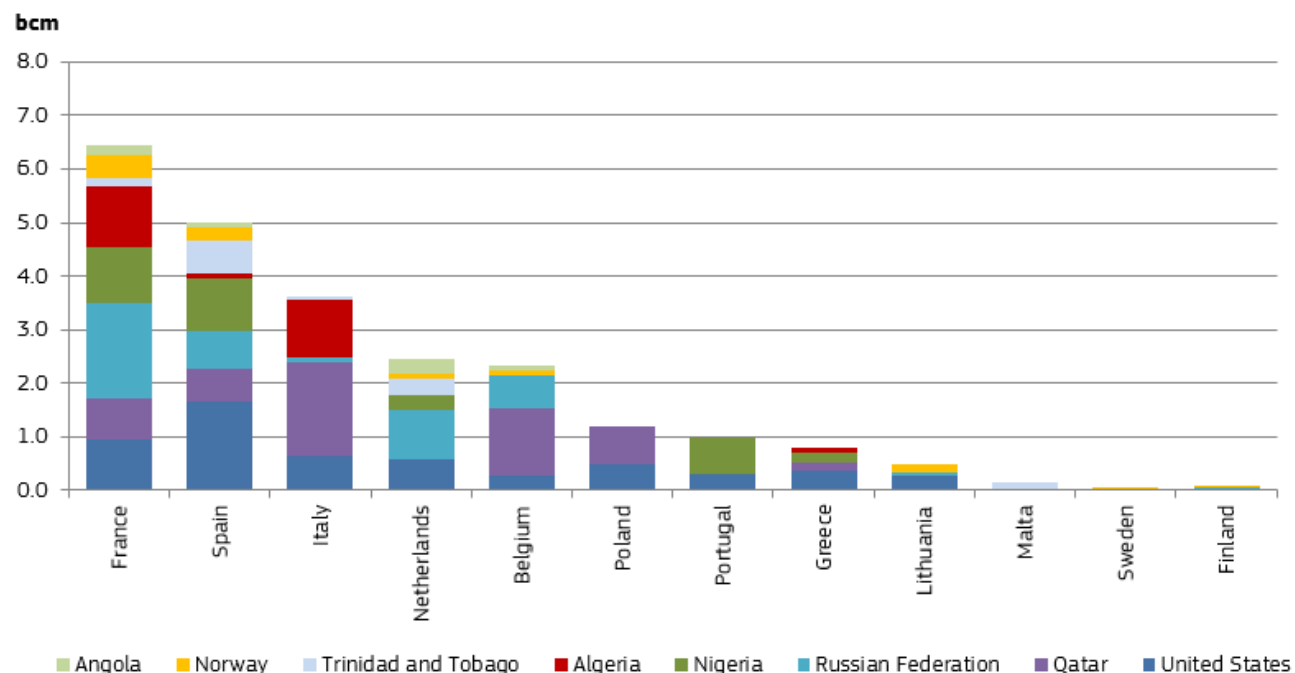
Source: Commission calculations based on tanker movements reported by Refinitiv

Imports coming from other EU Member States (re-exports) are excluded

"Other" includes Angola, Brazil, the Dominican Republic, Egypt, Equatorial Guinea, Oman, Singapore, the United Arab Emirates and Yemen

- In the second quarter of 2020, the United States were the biggest LNG supplier of Lithuania, Greece and Spain (ensuring respectively 52%, 47% and 33% of these countries' total LNG imports), and in Poland, Portugal and the Netherlands the US came to the second place (with respective shares of 39%, 30% and 24%). Qatar was the biggest supplier of Poland (61% of the total imports), Belgium (54%) and Italy (48%). Russia was the biggest supplier of Finland (82%), Sweden (52%), the Netherlands (37%) and France (27%), and it came to the second place in Belgium (25%), implying that Russian LNG has increasing importance in North-Western Europe, probably not independently from the dwindling domestic gas production in the Netherlands. Russia had a share of 14% in the Lithuanian LNG imports.
- Nigeria had a share of 70% in the Portuguese LNG imports, whereas its share was lower in Greece (24%), Spain (20%) and France (16%). Algeria had a share of 30% in Italy and ensured 17% of the French imports in Q2 2020. Norway was the second biggest LNG supplier in Sweden (48%), in Lithuania its share was 33% and in Finland the share of Norwegian import was 18%. At the same time, Trinidad and Tobago was the sole LNG supplier of Malta and ensured around 12% of LNG imports in Spain. Spain and France had the most diversified LNG import source structure in Q2 2020, receiving cargoes from eight different countries. On the other hand, Malta had a single supplier of LNG sources.
- In Q2 2020 the US exported more LNG (5.5 bcm) to the EU than Russia (4.2 bcm), implying that even though Russia made efforts to maintain its influence on the European gas market, increasing US liquefaction capacities provide good opportunities to the US to increase its market share in the EU. However, permanent low gas prices can put an obstacle in the way of LNG imports from the US, and as this quarter showed, Qatar is still a significant player on the EU LNG market, exporting 5.3 bcm.

Figure 17 – LNG imports in the EU Member States from different sources in the second quarter of 2020



Source: Commission calculations based on tanker movements reported by Refinitiv

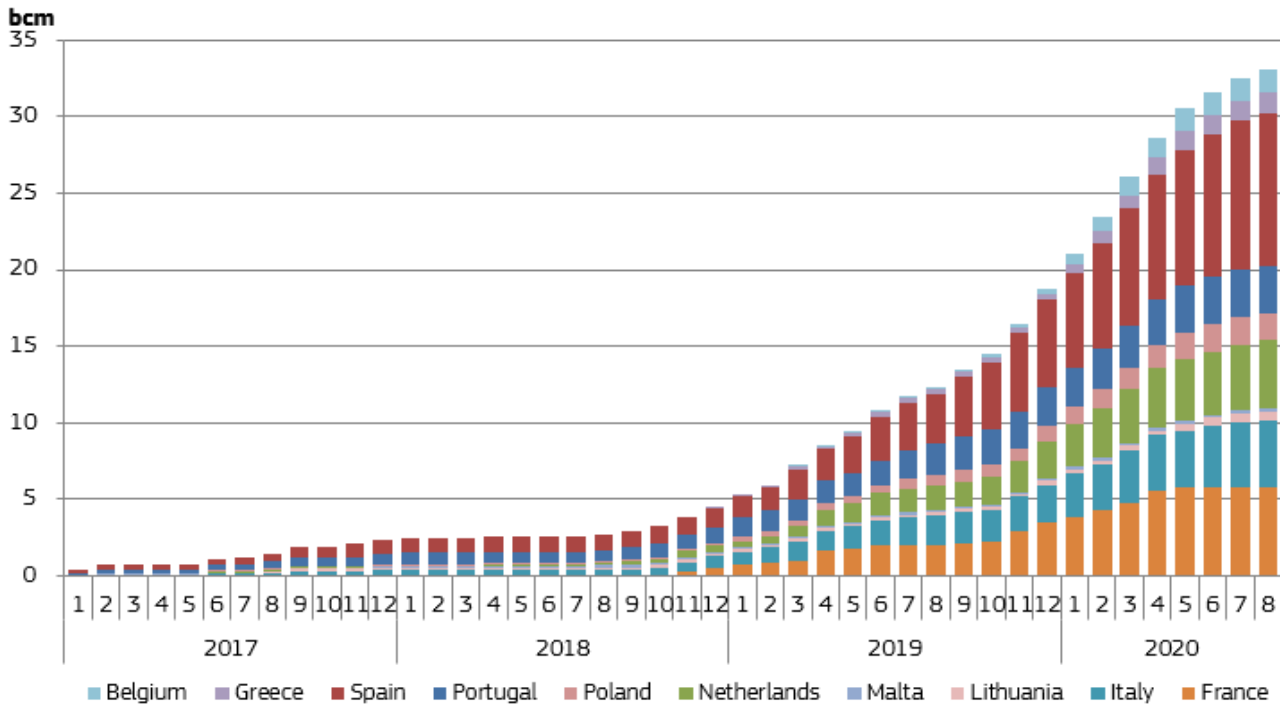
Imports coming from other EU Member States (re-exports) are excluded

"Other" includes Angola, Brazil, the Dominican Republic, Egypt, Equatorial Guinea, Oman, Singapore, the United Arab Emirates and Yemen

- In the second quarter of 2020 59 LNG cargoes arrived from the US, unloading more than 5.5 bcm of LNG (in re-gasified form), with an estimated monetary value of €0.3 billion. In the second quarter of 2019 only 38 US LNG cargoes arrived in the EU (with a total re-gasified volume of 3.6 bcm). However, before the Covid-19 related confinement measures, in Q1 2020 80 cargoes arrived, with a total volume of 7.4 bcm LNG. In the first half of 2020 the total number of US cargoes was 139, while the total imported volume of LNG amounted to 13 bcm in the EU.
- LNG exports to the Europe represented 39%¹⁶ of total US exports in Q2 2020, which, albeit lower than the share of 49% in the previous quarter, signals that Europe is still an important LNG market for the US, even amid lower gas demand. In the second quarter of 2020 the four most important EU destinations of the US LNG exports were Spain (1.6 bcm), France (0.9 bcm), the Netherlands and Italy (both 0.6 bcm). The United Kingdom imported less US LNG in Q2 2020 than in the previous quarter, only 0.4 bcm.
- In Q2 2020, Russia sent 61 cargoes of LNG to the EU, representing a volume of 4.2 bcm and an estimated monetary value of €0.25 billion. A year before, in Q2 2019 the number of Russia cargoes arriving in the EU was 84, transporting 5.7bcm LNG in re-gasified form. In Q1 2020 76 cargoes arrived with 5.2 bcm of LNG from Russia.

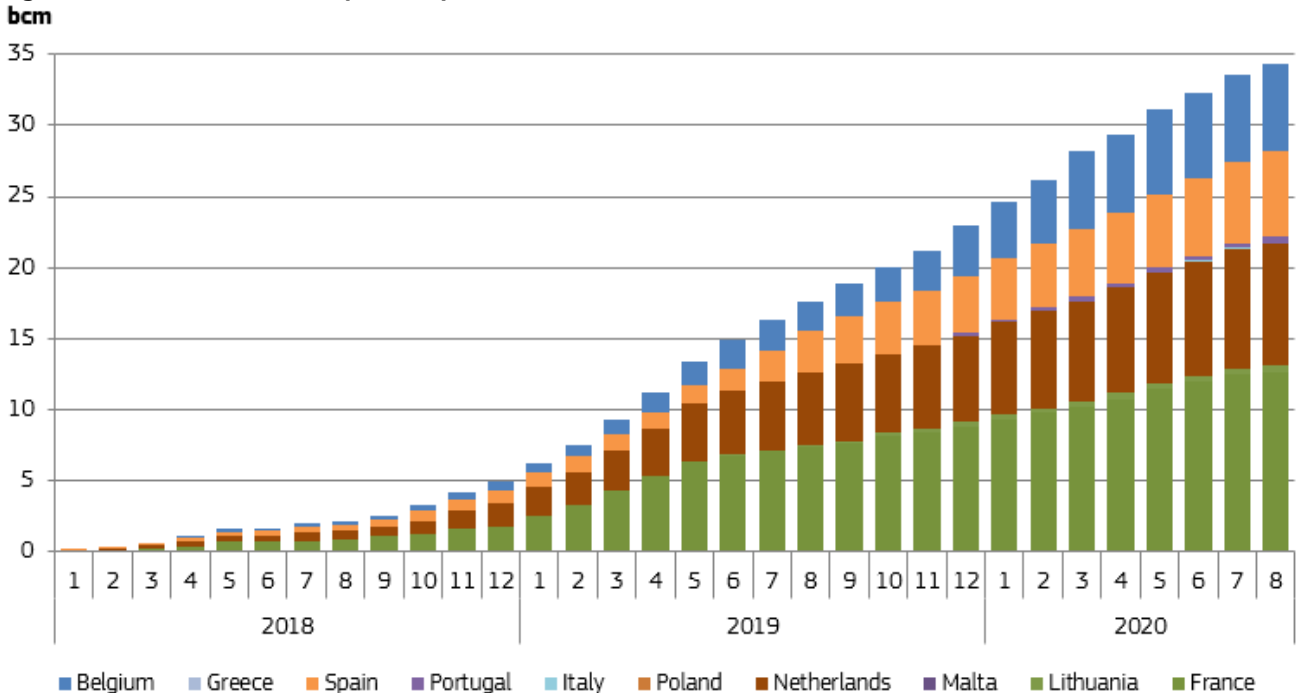
¹⁶ Europe here includes the EU and the UK

Figure 18 Cumulative monthly LNG imports from the US in the EU



Source: Commission calculations based on tanker movements reported by Refinitiv

Figure 19 – Cumulative monthly LNG imports from Russia in the EU

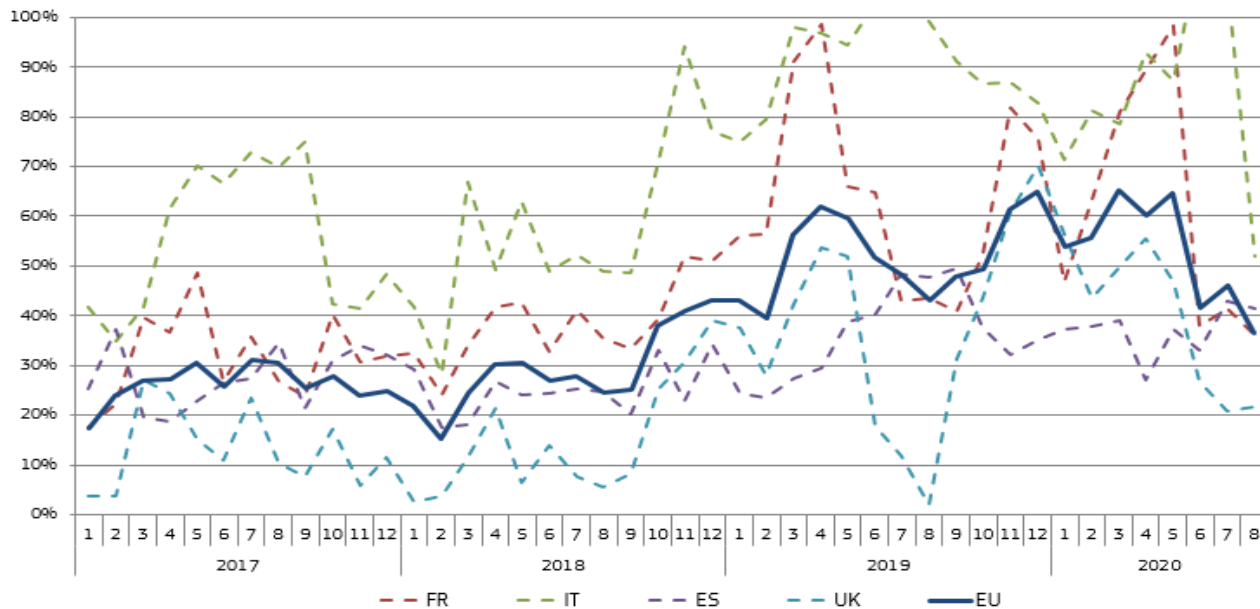


Source: Commission calculations based on tanker movements reported by Refinitiv

- The average monthly utilisation rates of terminals in the LNG importing EU Member States are presented on Figure 20 for some countries in the EU, the EU on average, and the UK. Whereas in April and May 2020, along with still significant LNG shipments, the average EU utilisation remained stable, around 60%, in June 2020, in parallel with falling LNG imports, the average EU utilisation rate fell to 41%, being the lowest since September 2018. At individual terminal or country level, monthly utilisation rates can be quite volatile, depending on the arrival of cargoes and the hourly regasification capacities. In France and Italy utilisation rates remained higher than the EU average in April and May, however, the difference decreased in June. On the other hand, in Spain

utilisation rates were below the EU average during the whole Q2 2020, and in the UK the situation was similar. Low terminal utilisation rates in Spain might provide further opportunities for LNG imports in the EU if interconnector infrastructure is reinforced with France.

Figure 20 – Average monthly regasification terminal utilisation rates in the EU and in some significant LNG importer countries



Source: Commission calculations for LNG imports based on tanker movements reported by Refinitiv. Regasification capacities are based on data from International Group of Liquefied Natural Gas Importers (GIINGL) and Gas Infrastructures Europe (GIE)

1.4 Policy developments

- On 1 April 2020 the new Spanish virtual LNG hub (TVB) was launched, resulting in banding the six LNG terminals of the country together in a single LNG balancing tank¹⁷. As a result, more vessels arrived at terminals that had been less frequently used in the past. Beyond this, in some instances this move would reduce the distance vessels need to travel, as cargoes arriving from the Atlantic basin do not need to go to the most frequently used Barcelona terminal, but the others can also be used. The implementation of the TVB is widely seen as an attempt to address a systemic underuse of the country's gas infrastructure, as most of LNG activities were concentrated on the half of the existing six terminals in the past.
- On 15 May 2020 the German regulator Bundesnetzagentur rejected the application of Nord Stream 2 AG for the derogation from EU internal gas market regulation for the section of the Nord Stream 2 pipeline located in German territory¹⁸. The section of a gas interconnector involving a third country located in German territory can be granted a derogation from certain regulatory requirements upon application and under certain conditions. For this, it would have been necessary that the gas interconnector was completed before 23 May 2019. Since the Nord Stream 2 pipeline had not been fully laid by 23 May 2019, the Bundesnetzagentur rejected the application for derogation made by Nord Stream 2 AG. When it is put into operation, therefore, Nord Stream 2 will be subject to German regulatory requirements and European rules on unbundling, network access and cost regulation.
- In contrast, on 20 May 2020 Bundesnetzagentur granted derogation from EU gas rules (third party access and unbundling rules) for the existing natural gas pipeline Nord Stream for another 20 years, implying that Gazprom can use the full capacity of the 55 bcm pipeline. According to the regulator, the pipeline is important from the EU security of gas supply angle and this derogation is not detrimental from the point of view of the effective functioning of the internal EU gas market.
- On 16 May 2020 the Prime Minister of Bulgaria announced that the Greece-Bulgaria gas interconnector will be operational by the first half of 2021¹⁹, delayed due to the coronavirus pandemic, compared to the originally planned operation as of the fourth quarter of 2020. The IGB gas pipeline will be connected with the Greek national gas transmission system in the area of Komotini and with the Bulgarian national gas transmission system in the area of Stara Zagora. The planned length of the pipeline is 182 km, the pipeline diameter will be 32 inches and the projected capacity will be up to 3 bcm per year in the direction from Greece to Bulgaria.
- On 17 May 2020 long term gas delivery contract on the Yamal pipeline expired, which, combined with low wholesale gas prices in Europe, led to a significant drop in shipments on this gas supply route thorough Belarus and Poland²⁰. However, albeit it was not attractive for Gazprom to book short term capacities, a long term capacity for the summer 2020 period was booked, ensuring summer deliveries to Germany via the Yamal pipeline.
- Further on Nord Stream 2, US senators announced a bill on 4 June 2020, expanding sanctions²¹ on Nord Stream 2 and Turkish Stream natural gas pipelines and Washington says targeting the projects will boost Russia's economic and political influence in Germany and other European countries. The new bipartisan legislation aims at the Nord Stream 2 project by expanding sanctions to include penalties on parties involved in pipe-laying activities and parties providing underwriting services, insurance or reinsurance on the project. Meanwhile on 6 July the Danish Energy Agency gave its permission to the Nord Stream 2 project to continue pipe-laying activities as of August 2020. On 15 July the US administration moved further with sanctions, targeting not only vessel, pipe-laying and asset insurance activities, but laying out measures that can include severing access to the US financial system and penalising German companies even on smaller investments.
- According to the media, following the poisoning of Alexei Navalny, German politicians did not rule out the abandon of Nord Stream 2, if Russia could not prove that poisoning of the opposition leader was not related to the Russian state administration²².

¹⁷ <https://subscriber.icis.com/news/energy/news-article-00110513498>

¹⁸ https://www.bundesnetzagentur.de/SharedDocs/Pressemitteilungen/EN/2020/20200515_NordStream2.html

¹⁹ <https://www.azernews.az/region/165199.html>

²⁰ <https://www.euractiv.com/section/energy/news/russian-gas-transit-via-poland-has-almost-halted/>

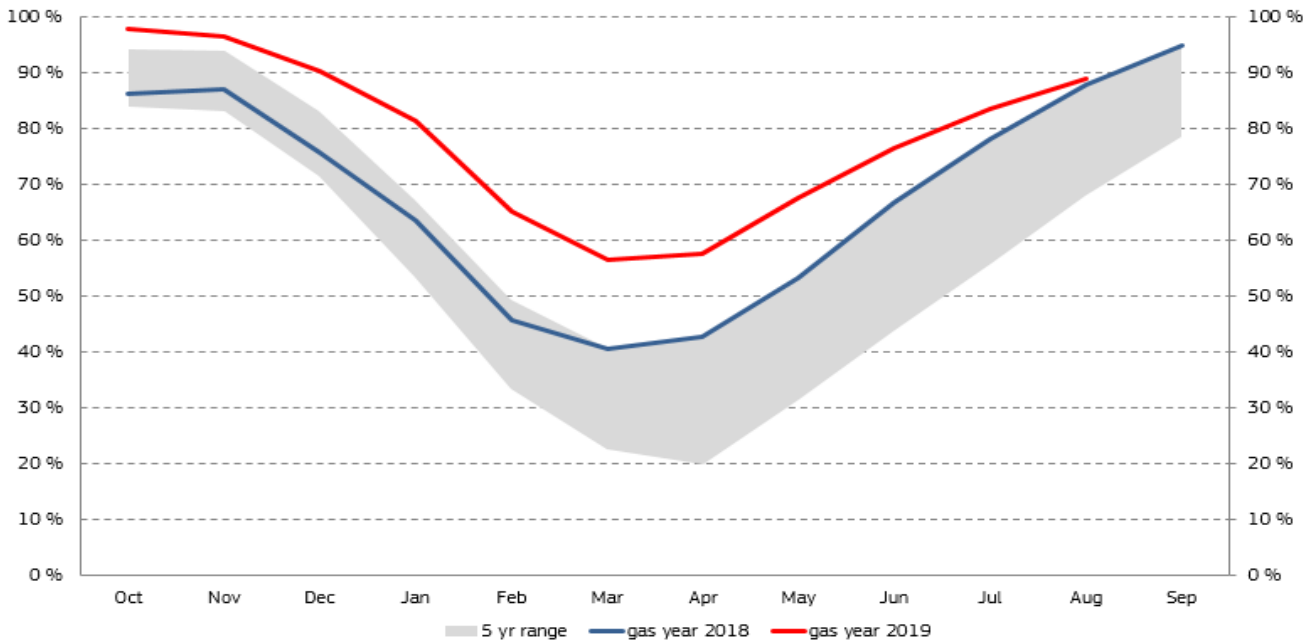
²¹ <https://www.euractiv.com/section/energy/news/us-senators-move-to-tighten-sanctions-on-nord-stream-2-and-turkish-stream>

²² <https://www.euractiv.com/section/energy-environment/news/merkel-doesnt-rule-out-nord-stream-fallout-over-navalny>

1.5 Storage

- Figure 21 shows EU stock levels as the percentage of storage capacity in gas years²³ 2018 and 2019, compared to the 5-year range of gas years 2014-2018. According to figures published by Gas Infrastructure Europe, operational EU storage capacity amounted to 1,131 TWh (roughly 100 bcm) by the end of 2018²⁴, plus 177 TWh capacity planned or already under construction (adding potentially another 16 bcm).
- The second quarter of the year is the end of the heating season and the period when withdrawal of storages switches to injection, and thus filling rates start to increase. Owing to the relatively mild winter, decreasing demand for gas in industry and power generation and low spot prices owing to abundant LNG imports, the average EU storage filling rate was higher on 31 March 2020 than a year before (53.9% vs. 40.4%), implying less demand for natural gas in Q2 2020 stemming from storage refilling. On EU average, net storage injections made during the second quarter of 2020 were equivalent to 26.4% of storage capacity, which was a lower than that of 32.6% in the same period of 2019. However, on 30 June 2020 the average filling rate was 7.3% higher than a year before (80.3% vs 73%). The average filling rate on 30 June 2020 in the EU was the highest end-of-June value in the last nine years. More than 80% average EU filling rate is rather typical for the end of August, but in this year the end of August filling rate was more than 91%.
- Owing to the Covid-19 related demand destruction on the gas market, and high storage levels throughout 2020 so far, less import of natural gas, including LNG, was not only due to the generally low demand in various economic sectors, but lower refilling needs might also have played an important role. The last month of the heating season, April was also milder than usual in most of the EU countries, further reducing demand for gas in the residential sector.

Figure 21 Gas storage levels as percentage of maximum gas storage capacity in the EU in the middle of the month



Source: Gas Storage Europe AGSI+ Aggregated Gas Storage Inventory, extracted on 10 September 2020. See explanations on data coverage at <https://agsi.gie.eu/#/faq>.

The 5-year range reflects stock levels in gas years 2014-2018. The graph shows stock levels on the 15th day of the given month.

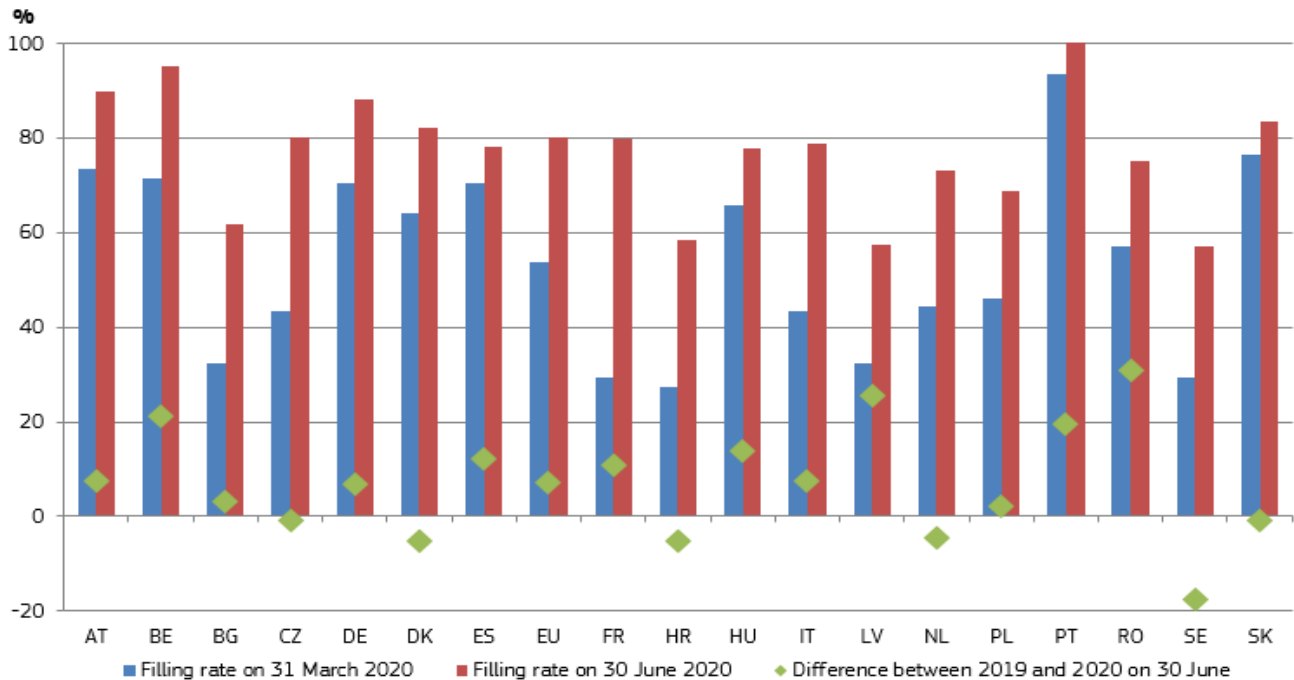
- However, as Figure 22 shows, there was significant variation among Member States in terms of both the starting position (the filling rate at the end of March 2020) and the pace of injections. Although the change in the filling rate over Q2 2020 was 26.4% on EU average, in France, Czechia and Italy filling rates respectively increased by 51%, 36% and 35%, and above the average filling rate changes were seen in Croatia (31%), the Netherlands and Bulgaria (both 29%) over this period. At the same time filling rates rose only by 7-8% in Spain and Portugal. At the end of June 2020 storage filling rates were above 80% in Austria, Belgium, Germany, Portugal and Slovakia, whereas in Croatia, Latvia and Sweden they were still below 60% of their total capacities.

²³ Gas year always starts on the 1 October of a given year, for example, gas year 2019 started on 1 October 2019 and ends on 30 September 2020

²⁴ https://www.gie.eu/maps_data/downloads/2018/Storage_DB_Dec2018.xlsx

- Figure 22 also shows the difference between storage filling rates in the EU Member States on 30 June of 2019 and 2020. In Sweden the storage filling rate was 17 percentage point lower on 30 June 2020 than a year before, whereas in Denmark, Croatia and the Netherlands the filling rate was down by 4-5 percentage points year-on-year. For the other countries, storage filling rates on 30 June 2020 were similar or higher than on the same day in 2019, the biggest differences could be observed in Romania (+31%), Latvia (+25%) and Belgium (+21%). On EU average, the difference was more than 7%, as the second quarter of 2020 started with higher filling rates than usual.

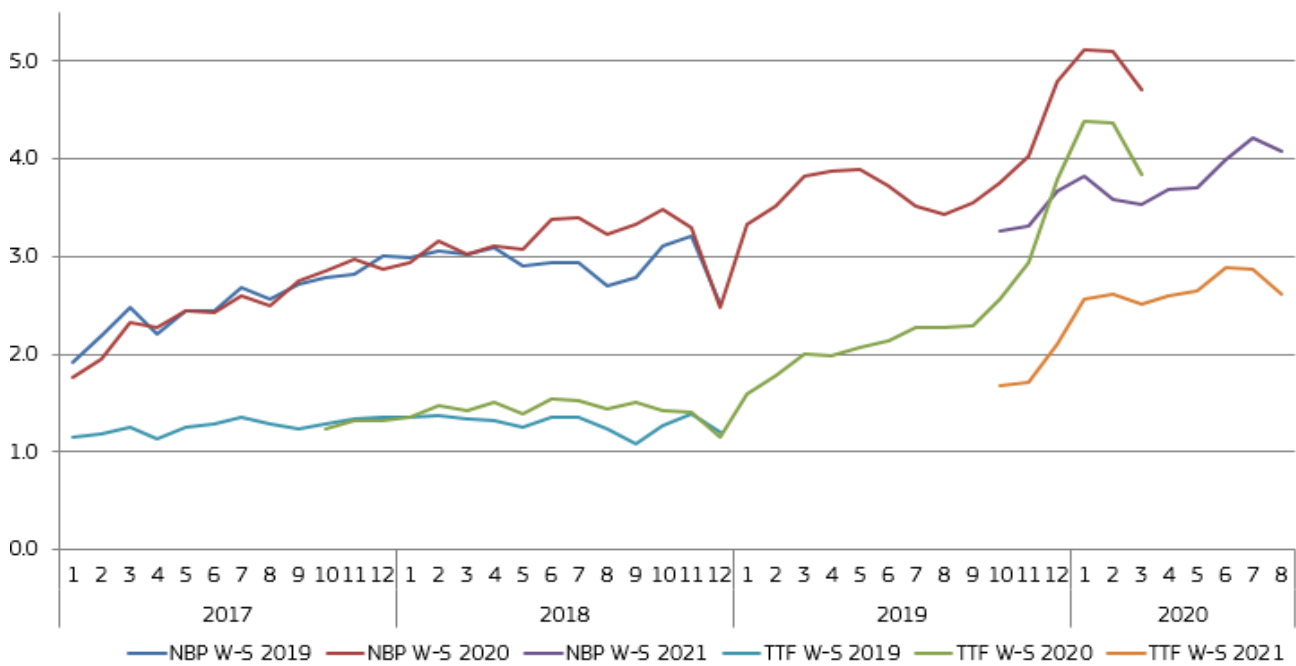
Figure 22 Gas storage levels as percentage of maximum gas storage capacity, and the change in storage levels over the first quarter of 2020 by Member State



Source: Gas Storage Europe AGSI+ Aggregated Gas Storage Inventory, extracted on 10 September 2020. See explanations on data coverage at <https://agsi.gie.eu/#/faq>. Injection level data in Sweden changed significantly for the first time since the first data reporting period in March 2017. Nevertheless, the Swedish storage facility has a limited capacity (10 mcm), mainly used for LNG storage.

- As of April 2020 the winter-summer spreads are depicted by the difference in the 2021 summer and winter contracts. The 2021 seasonal spread on the TTF rose from 2.5€/MWh to 2.8€/MWh between March and June 2020 and reached 2.7 €/MWh on quarterly average in Q2 2020.
- On the NBP, 2021 seasonal spreads rose from 3.5 €/MWh to 4 €/MWh between March 2020 and June 2020, whereas on quarterly average it reached 3.8 €/MWh in Q2 2020.
- Although prompt market developments, such as falling demand for gas, still abundant supply that accommodated slower to the falling demand, leading to decreasing spot and forward prices on the near end of the price curve, impacted more the 2020 contracts than the 2021 ones, it seems that the market anticipates a slower recovery in prices, resulting in an increasing spread between the summer and winter contracts in 2021. High storage filling rates reduced the demand not only for 2020, but with an average winter weather filling rates in 2021 are also expected to be higher than usual, reducing the demand for the summer 2021 contracts, thus lowering its price.
- UK exhibits a structural gas oversupply during the summer and tighter market during the winter, owing to less storage capacities in comparison to continental Europe. The UK seasonal (winter-summer) spreads developed a perceivable premium to the continental spreads (in this case: TTF) over the last few years (amounting to 1.1 €/MWh for the 2021 spreads in Q2 2020).

**Figure 23 Winter-summer spreads in the Dutch and British gas hubs
Euro/MWh**



Source: S&P Global Platts

W-S 2019 refers to the difference between the winter 2019-20 price and the summer 2019 price, W-S 2020 refers to the difference between the winter 2020-21 price and the summer 2020 price, W-S 2021 refers to the difference between the winter 2021-22 price and the summer 2021 price.

1.6 Focus on: The role of hydrogen in the future EU energy mix

- On 8 July 2020 the European Commission has adopted its hydrogen strategy for a climate neutral Europe²⁵. This strategy will explore how clean hydrogen can help reduce the EU economy's carbon emissions, and make the EU climate-neutral by 2050. Continuous research and development is required to ensure that hydrogen technologies are technically improved, highly efficient, and as competitive as possible. The EU framework programmes have supported research and innovation on clean hydrogen for many years, and it is intended that support continues in the future.
- Hydrogen is enjoying a renewed and rapidly growing attention in Europe and around the world. Hydrogen can be used as a feedstock, a fuel or an energy carrier and storage, and has many possible applications across industry, transport, power and buildings sectors. Most importantly, it does not emit CO₂ and almost no air pollution when used. It thus offers a solution to decarbonise industrial processes and economic sectors where reducing carbon emissions is both urgent and hard to achieve.
- Renewable electricity is expected to decarbonise a large share of the EU energy consumption by 2050, but not all of it. Hydrogen has a strong potential to bridge some of this gap, as a vector for renewable energy storage, alongside batteries, and transport, ensuring back up for seasonal variations and connecting production locations to more distant demand centres. Furthermore, hydrogen can replace fossil fuels in some carbon intensive industrial processes, such as in the steel or chemical sectors, lowering greenhouse gas emissions and further strengthening global competitiveness for those industries. It can offer solutions for hard to abate parts of the transport system, in addition to what can be achieved through electrification and other renewable and low-carbon fuels.
- According to the recently adopted Commission strategy 'Stepping up Europe's 2030 climate ambition - Investing in a climate-neutral future for the benefit of our people'²⁶, the share of the hydrogen is expected to reach around 9% in different policy scenarios by 2050. The policy scenarios considered see a ramp up of the installed electrolyser capacity between 37-66 GW by 2035, responsible for a production of up to approximately 8 Mt of hydrogen in 2035.
- Investment in hydrogen will foster sustainable growth and jobs, which will be critical in the context of recovery from the COVID-19 crisis. Europe is highly competitive in clean hydrogen technologies manufacturing and is well positioned to benefit from a global development of clean hydrogen as an energy carrier. Therefore, the priority for the EU is to develop renewable hydrogen, produced using mainly wind and solar energy. According to market analysts, cumulative investments in renewable hydrogen in Europe could be up to EUR 180-470 billion by 2050, and in the range of €3-18 billion for low-carbon fossil-based hydrogen. Clean hydrogen could meet 24% of energy world demand by 2050²⁷.
- For broader deployment of hydrogen, production costs need to decrease, as today generating green hydrogen has an estimated costs of 3..3 €/kg, which is about six times higher than the price of natural gas. According to current estimations, costs reductions in hydrogen generation and the costs of electricity used for producing hydrogen will fall below 1 €/kg by 2050, which would make green hydrogen competitive vis-à-vis natural gas. However, some estimations²⁸ reckon with a cost falling to 1.5-1.6 €/kg even by 2030. The costs of hydrogen is different across countries, highly depending on the costs of energy used for producing (e.g.: in Germany it is highly probable that offshore wind energy will largely be used to produce hydrogen).
- Different Member States in the EU announced different plans on deployment of hydrogen. Germany, the Netherlands and Portugal announced plans to build out electrolyser capacities, resulting in 10 GW additional capacities by 2030 and 16 GW by 2040²⁹. France wants to focus on achieving a given share of clean hydrogen in its energy mix instead of setting electrolyser capacity targets. In October 2020, Spain presented a roadmap aiming at electrolyser capacities of 4 GW by 2030³⁰.
- Currently hydrogen price assessment by some agencies (e.g. S&P Platts) already exist in the Netherlands. However, creating a liquid market for hydrogen, also involving cross-border trade, will be gradual with broader deployment of hydrogen in various sectors and the necessary infrastructure.

²⁵ The current chapter largely relies on the adopted strategy text, see more: https://ec.europa.eu/energy/sites/ener/files/hydrogen_strategy.pdf

²⁶ The impact assessment of the Climate Target Plan can be found here: https://eur-lex.europa.eu/resource.html?uri=cellar:749e04bb-f8c5-11ea-991b-01aa75ed71a1.0001.02/DOC_2&format=PDF

²⁷ BNEF (2020) Hydrogen Economy Outlook: <https://data.bloomberglp.com/professional/sites/24/BNEF-Hydrogen-Economy-Outlook-Key-Messages-30-Mar-2020.pdf>

²⁸ Bloomberg New Energy Finance, EU Power Weekly: Member States hydrogen strategies

²⁹ Bloomberg New Energy Finance, EU Power Weekly: Member States hydrogen strategies

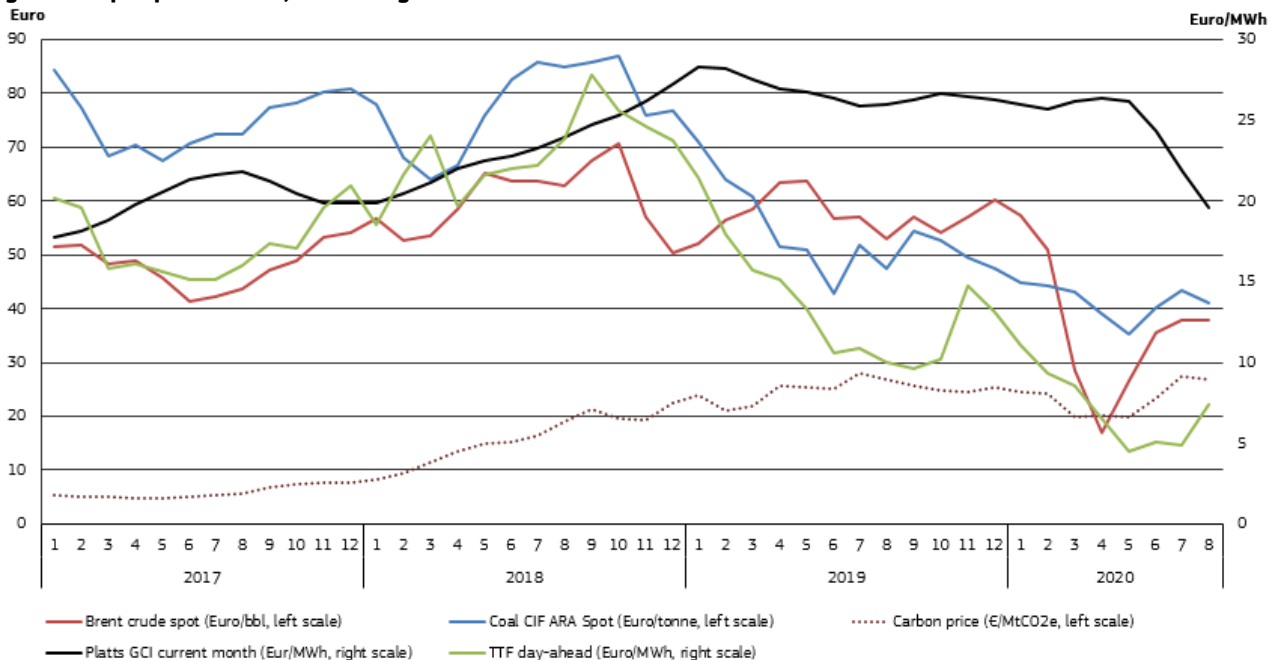
³⁰ <https://www.bloomberq.com/news/articles/2020-10-05/green-hydrogen-industry-in-spain-set-to-be-on-par-with-france-and-germany>

2. Wholesale gas markets

2.1 EU energy commodity markets

- After the significant fall in Q1 2020 the dated Brent crude daily average oil price continued to decrease in April 2020 and by the end of the month it fell as low as 13-14 USD/bbl (12 €/bbl), a low level not seen since the end of the 1990ies. After reaching these lows, the Brent crude price started to recover and by 30 June 2020 it rose to 42 USD/bbl (37 €/bbl). Looking at the forward contracts, the fall in the daily price was not so significant, as the year-ahead Brent fell from 38 USD/bbl (35 €/bbl) to 34-35 USD/bbl (32 €/bbl) in April 2020 and then it recovered by the end of June, reaching 43 USD/bbl (38 €/bbl). The significant discount of the dated Brent to the year-ahead contract disappeared by the end of Q2 2020. At the beginning of Q2 2020 the oil market suffered a significant oversupply owing to the Covid-19 related demand destruction (lockdowns). On 12 April the OPEC+ countries managed to agree in significant production cuts³¹ (in May 2020 the production target was -9.7 million barrel per day compared to May 2019), which gave a support to the oil market. Although the link between oil and gas prices has substantially weakened over the last few years, general commodity and stock price falls in the first half of Q2 2020 impacted most of the energy products.
- The Dutch TTF spot gas price started April 2020 at 6.5 €/MWh (down from 11.8 €/MWh at the beginning of 2020), and on 22 May 2020 it fell as low as 3.5 €/MWh, which was the lowest since the beginning of available time series on the TTF trade. After that, in parallel with lifting of the lockdown measures and with the rebound of energy prices, by the end of June the spot TTF price rose to 5.8 €/MWh. On the demand side, the general demand destruction for energy products, including gas, resulted in falling prices as gas supply could not accommodate so rapidly to the falling demand. Furthermore, good renewable availability in most of the EU during practically the whole quarter reduced need for gas-fired power generation. On the supply side, from the end of April news appeared on cancellation of LNG shipments from the US, but it only impacted the gas market as of June. LNG shipment cancellations were sparked by TTF wholesale prices falling below the level of US Henry hub, which resulted in disappearing profitability of US LNG export to Europe.
- As it was described above, crude oil prices showed a steep fall between January and April 2020, which interestingly started to appear in the oil-indexed gas contracts in June 2020. Normally crude oil price changes only appear in the oil-indexed with a time lag of 6-9 months, but looking at the summer prices, oil price fall seemed to filter in the oil linked gas contracts. In Q1 2020 Platt's North West Europe Gas Contract Indicator (GCI), a theoretical index showing what a gas price, linked 100% to oil, would be, was above 26 €/MWh in April and May 2020, whereas in June it started to decrease, reaching 24.4 €/MWh. This was more than four times as high as the TTF in the same month (5 €/MWh). This underlines the increasingly uncompetitive nature of oil-indexed contracts in recent quarters.

Figure 24 Spot prices of oil, coal and gas in the EU



Source: S&P Global Platts

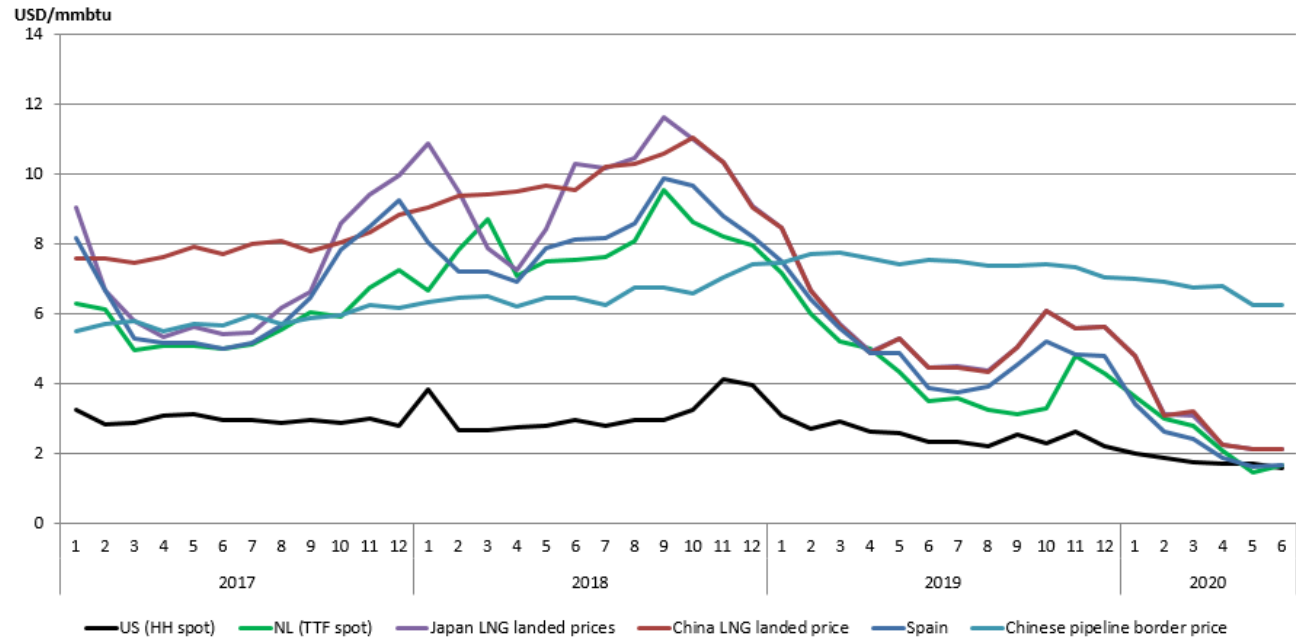
³¹ <https://edition.cnn.com/2020/04/12/energy/opec-deal-production-cut/index.html>

- Spot coal prices started April 2020 at 43 €/Mt, and, in parallel with energy prices reaching lows at the end of April, they fell to 34-35 €/Mt by that time. However, they recovered and by the end of June they reached 45 €/Mt. The resilience of coal prices against generally falling energy and commodity prices could be explained by the fact that demand for coal is constantly decreasing in power generation, as it is gradually being squeezed out from the European electricity generation mix (down by a third in Q2 2020 year-on-year) and the already low demand for coal, even before the economic crisis, was therefore not really impacted by decreasing demand for electricity.
- Carbon prices, beginning Q2 2020 slightly below 17 €/MtCO_{2e}, showed a gradual recovery over the quarter and rose as high as 27 €/MtCO_{2e} by the end of June 2020, which was even higher than the level of the beginning of 2020. It seems that the market strongly believes the intention of European policy makers on continuing the energy transition, even amid the economic crisis, which reinforces the role of the Emission Trading System.

2.2 LNG and international gas markets

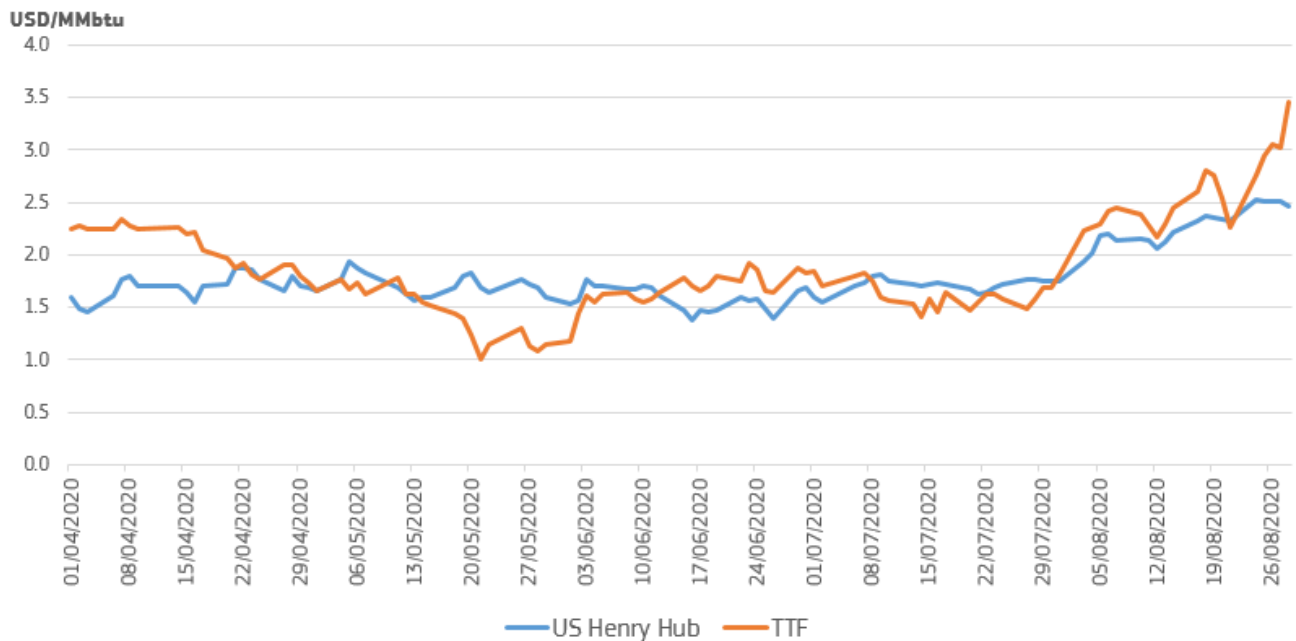
- Figure 25 displays the international comparison of wholesale gas prices. In Q2 2020 prices of European, Japanese and Chinese landed LNG became well-aligned amid a general price fall in April-May 2020. Although transportation costs of LNG exporters in the Atlantic Basin, Russia and the Middle East to Europe were lower than to Asia, owing to the low demand and wholesale gas prices in Europe, a number of LNG cargoes to Europe, mainly from the US, was cancelled in Q2 2020.
- The average Japanese LNG price was 2.2 USD/mmbtu in Q2 2020, down from 3.6 USD/mmbtu in Q1 2020, and down from 4.9 USD/mmbtu in the second quarter of 2019, implying a price fall of 41% year-on-year. The Japanese premium above the Dutch TTF hub was on average 0.4 USD/mmbtu in the second quarter of 2020, slightly decreasing from 0.5 USD/mmbtu in Q1 2020, and down from 0.6 USD/mmbtu in Q2 2019. On quarterly average, LNG import prices in China were comparable with their Japanese peers (2.2 USD/mmbtu in Q2 2020). These numbers show that price differentials between European and Asian LNG contracts practically disappeared in Q2 2020; however, amid the general fall in demand for gas this did not help Europe's position on the global LNG market.
- The average price of Chinese pipeline gas imports, albeit slightly decreasing in Q2 2020, remained high (6.4 USD/mmbtu), being well above the Asian LNG reference prices, by more than 4 USD/mmbtu. In Q1 2020 this contract reached 6.8 USD/mmbtu, whereas in Q2 2019 it was still 7.5 USD/mmbtu, heavily influenced by the evolution of crude oil prices in Asian gas import contracts.
- The Henry Hub price moved downwards in a narrow range in Q2 2020 (1.6-1.7 USD/mmbtu between April and June. At the same time the euro-dollar exchange rate slightly appreciate from 1.08 to 1.12, implying that Henry Hub prices decreased when measured in euros. In year-on-year comparison the euro did not change against the dollar (1.12 in both June 2019 and June 2020), implying that changes in the gas price over the last twelve months preceding June 2020 was equal measured in euros and dollars.
- In the second quarter of 2020, TTF averaged at 1.7 USD/mmbtu (5.3 €/MWh). The average German border price was around 25% higher (3.1 USD/mmbtu or 9.6 €/MWh), reflecting the impact of still existing oil-indexed contracts in the German gas import mix, dragging up this contract compared to hub prices.
- Over the course of the second quarter of 2020, differentials in international price contracts showed measurable decreases, amid the generally downward price trend. The ratio of the Japanese LNG price and US Henry Hub was 1.3 in the second quarter of 2020, down from 1.9 in Q1 2020, which equalled the ratio in Q2 2019. However, the average price ratio of the Japanese LNG prices and the TTF was 1.3, slightly up from 1.1 - 1.2 in Q1 2020 and Q2 2019.
- The average TTF/Henry Hub ratio, for the first time over the last decade fell close to 1 on quarterly average in Q2 2020, after reaching around 1.7 in both Q1 2020 and in Q2 2019. However, in May the TTF prices fell below the Henry hub contracts (and daily average TTF prices were below the Henry hub, between early May and mid-June as well), which fundamentally impacted US LNG exports to Europe, resulting in shipment cancellations during the summer of 2020. In absolute terms, the price spread between Henry Hub and TTF was 0.4 USD/mmbtu in April 2020, it fell below zero (-0.3/mmbtu) in May and came back to the positive range in June (0.1/mmbtu).
- In the second quarter of 2020, spot prices averaged 1.7 USD/mmbtu in the Netherlands and Spain, 2.2 USD/mmbtu in China and Japan, implying that the Asian price premium to the TTF was around 0.5 USD/mmbtu in Q2 2020.
- The JCC (Japanese Crude Cocktail) contracts reached 9.6 USD/mmbtu on average in Q2 2020, more than four times as high as the average spot price (2.2 USD/mmbtu), reflecting the slow responsiveness (time-lag in the oil indexation) to the spot market prices of this oil-indexed contract. However, during the summer the JCC index started to decrease slowly, implying that the fall of crude oil prices started to filter in this contract.

Figure 25 International comparison of wholesale gas prices



Sources: S&P Global Platts, Refinitiv, BAFA, CEIC

Figure 26 – Daily average prices on the TTF and the US Henry hub

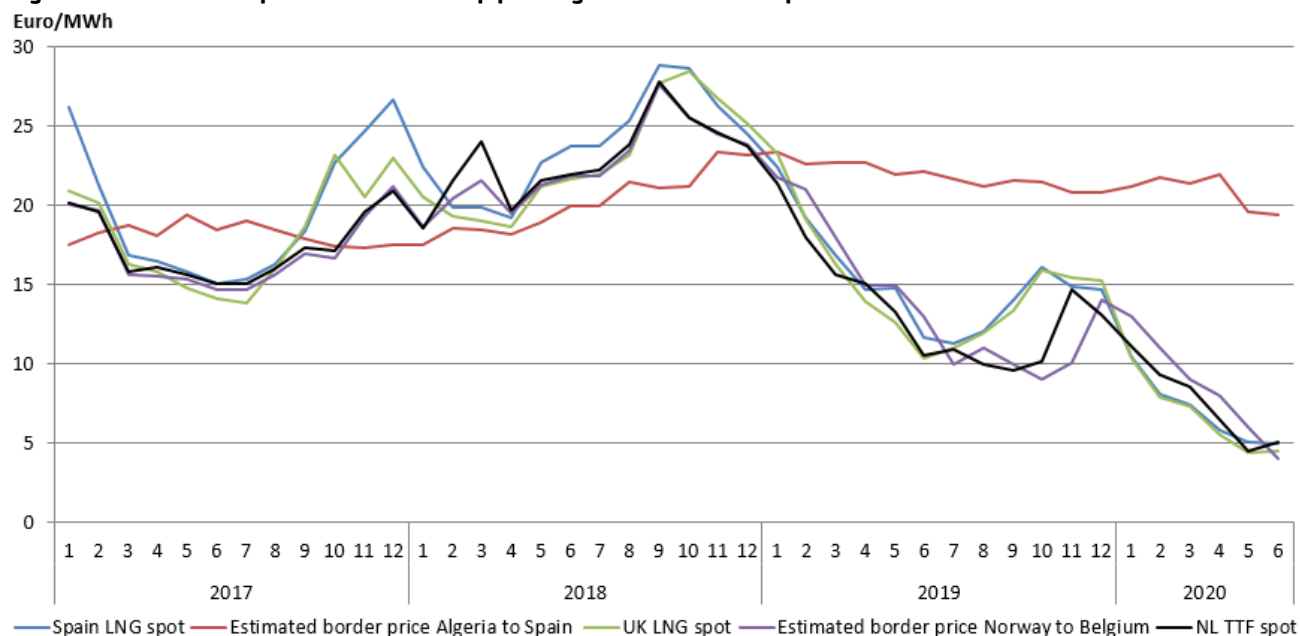


Sources: S&P Global Platts

- Figure 27 displays the evolution of spot LNG prices paid in the UK and Spain and estimated border prices for pipeline imports from Norway and Algeria, which account for important part of pipeline imports in the Belgium and Spain, respectively. The evolution of the day-ahead prices on the Dutch TTF hub can also be followed.
- In the second quarter of 2020, the estimated Algerian pipeline import price in Spain decreased slightly (by 5%), compared to the previous quarter, averaging around 20.3 €/MWh, and was down by 9% compared to Q2 2019. In May and June 2020 the monthly average Algerian import price fell below 20 €/MWh for the first time since mid-2018, partly reflecting decreasing crude oil prices. However, in June 2020 the average estimated Algerian import price in Spain was almost four times as high as the Spanish LNG import price. This is a highly probable explanation why pipeline gas imports from Algeria fell by 37% in the EU in Q2 2020 in year-on-year comparison (See Chapter 1.3 Imports). As oil indexed prices are likely to decrease in the second half of 2020, imports from Algeria might pick up again, as before the end of the year annual take-or-pay obligations can be fulfilled at lower prices.

- In the second quarter of 2020 hub prices and hub-based import price contracts in western Europe remained well aligned, and in June 2020 the differentials between these prices were barely 1 €/MWh (between 4 €/MWh and 5 €/MWh). The quarterly average prices showed a decrease of 35-45% compared to the previous quarter, Q1 2020, reflecting the significant price decrease on wholesale gas markets and import contracts. In year-on-year comparison, these contracts were down by 50-60% in Q2 2020.

Figure 27. Price developments of LNG and pipeline gas in the UK and Spain



Note: Landed prices for LNG. Source: S&P Global Platts, Refinitiv, European Commission estimates based on Eurostat COMEXT data, retrieved on 10 September 2020.

2.3 European gas markets

2.3.1. Gas trade on the EU hubs

- As Figure 28 shows, the increase in liquidity on the main European gas hubs slowed down in the second quarter of 2020: the total traded volume amounted to around 15 8080 TWh (equivalent to around 1 320 bcm and in monetary terms representing €84 billion³²), 7% more in volume than in Q2 2019. In Q1 2020 the year-on-year increase in traded volumes were 32%, pointing to a considerable deceleration of the volume growth rate. The Q2 2020 traded volume however was around 24 times more than the gas consumption in the seven Member States³³ covered by the analysis in April-June 2020.
- Traded volumes in Q2 2020 increased by 17% year-on-year on the most-liquid European hub Dutch TTF. On two German hubs (Gaspool and NGC) together traded volumes were up by 4% over the same period. In Italy (PSV) volume rose by 5%, and in Austria on the VTP hub traded volumes rose by the biggest among the observed hubs, 33%. The traded volume on the French TRF hub rose only slightly, by 1% and on the Belgian Zeebrugge hub traded volumes were up by 15% in Q2 2020 year-on-year, in contrast to the preceding quarters. At the same time, traded volumes on British NBP hub, still the second biggest hub on the broader European market, registered a fall of 23% compared to Q2 2019.
- Similarly to the previous quarters, the significant increase on the TTF hub further reinforced its leading role in Europe, in Q2 2020, pooling 72% (up from 66% in Q2 2019) of the total European gas trade alone (and if looking at the EU countries, its share is even bigger, 86%). TTF has emerged to a liquid continental benchmark, having the advantage of euro-denomination, and benefiting from its good connection to various supply sources and access to seasonal storage as well. On the other hand, further decrease on the NBP hub signalled a shift from once Europe's most liquid market. The traded volume in Q2 2020 fell by 23% compared to the

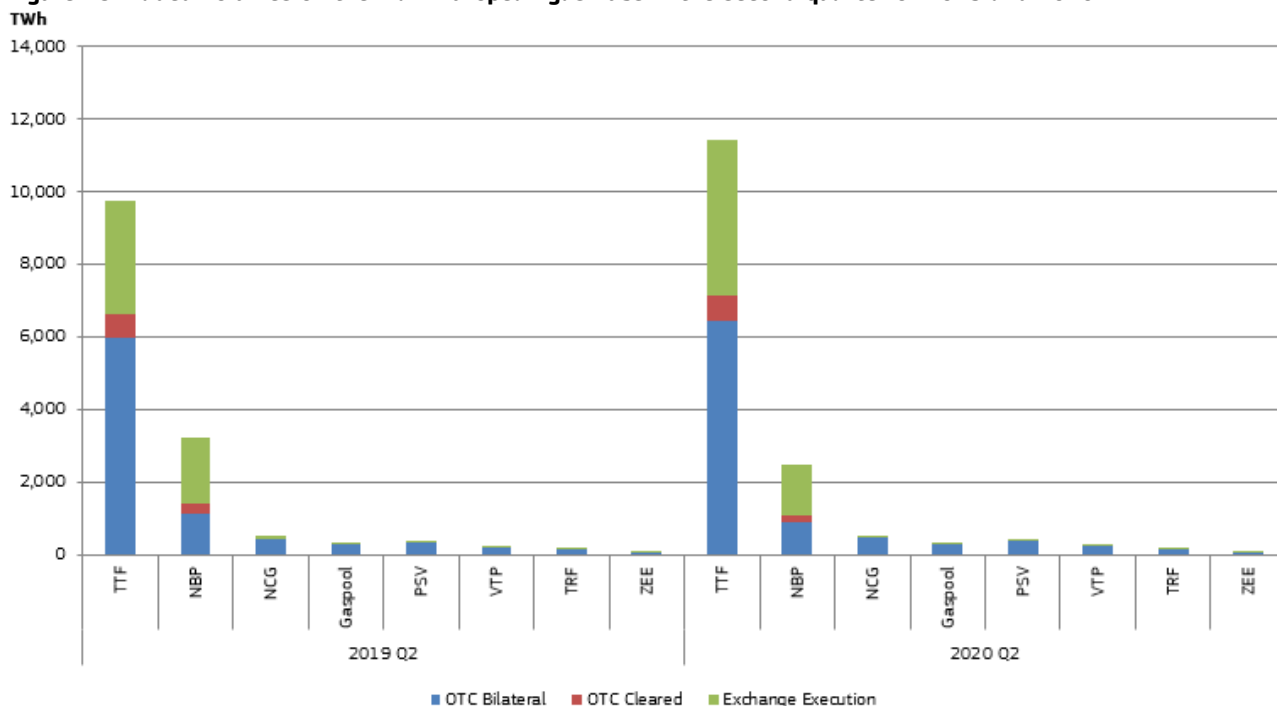
³² Assuming that all trade was carried out on the quarterly average spot price

³³ Netherlands, UK, Germany, France, Italy, Belgium, Austria The ratio of the quarterly traded volume and gas consumption can show a big volatility across different quarters, as gas consumption has a high seasonality, whereas gas trade depends on market factors, which are albeit linked to consumption but have less seasonality. Comparing to the EU as a whole, traded volume in Q2 2020 represents 17 times the total EU gas consumption in this period.

same period of 2019, and the share of NBP in Q1 2020 fell below 16% in the total European observed trade, down from 22% in Q2 2019.

- Other markets had lower shares: Germany (NGC and Gaspool together) had a share of 5.6%, while the Italian PSV only had 2.4%, whereas VTP, TRF and Zeebrugge respectively had shares of 1.9%, 1.4% and 0.5% in Q2 2020.
- In the second quarter of 2020 LNG imports, in parallel with gas demand destruction, decreased by 3% in the EU year-on-year, which, combined with the decrease of overall gas imports, reduced the growth rate in traded volumes on most of the European hubs. Moreover, in March 2020 traders anticipated the lockdown impacts of the Covid-19 pandemic, and exited from prompt contracts or adjusted their long term hedging positions, which drove up trade in that month and reduced traded volumes in Q2 2020. Furthermore, high storage filling rates across the EU reduced demand for natural gas trade, which also contributed to less intensive trading on the markets. In June 2020 as gas wholesale prices started to increase, trading on hubs also accelerated and traded volume on the back end (longer term contracts) of the curve increased compared to April and May, as traders anticipated recovery in gas consumption and trade, in parallel with lifting of the Covid-19 related restrictions in transport and the economy.
- The share of exchange executed contracts on the Dutch TTF hub was 37% in Q2 2020, which was the highest among the observed EU countries, and was up by 5 percentage points compared to Q2 2019. On the French TRF it amounted to 19%, similarly to Q2 2019. On the VTP hub in Austria this share was 14%, equalling that in the same period of 2019, and was 12% on the two German hubs together, down by 4 percentage points year-on-year. On Zeebrugge the share of exchange-executed contracts was much lower, only 4%, whereas it was the lowest on the Italian PSV, amounting to barely 1%. On the NBP hub in the UK, the share of exchange trade was still the highest among all observed markets, amounting to 57% in Q2 2020, similarly to Q2 2019.

Figure 28 Traded volumes on the main European gas hubs in the second quarter of 2019 and 2020

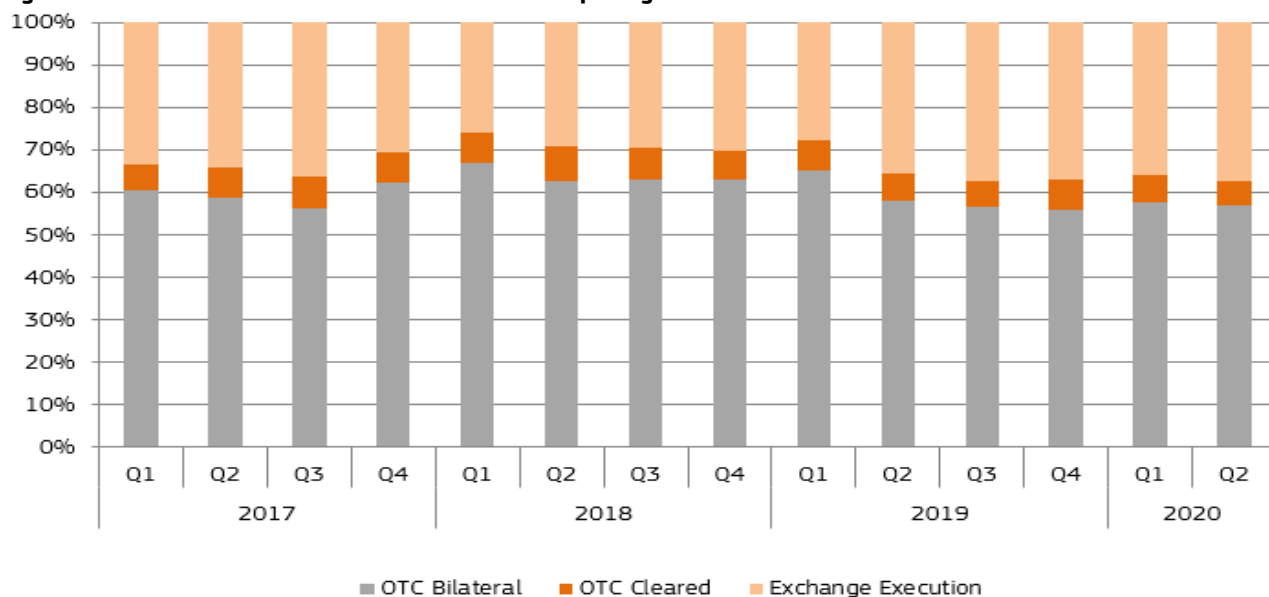


The chart covers the following trading hubs: Netherlands: TTF (Title Transfer Facility); Germany: NCG (NetConnect Germany) and Gaspool; France: TRF (Trading Region France); Italy: PSV (Punto di Scambio Virtuale); Belgium: Zeebrugge beach, Austria: Virtual Trading Point (VTP); UK: NBP (National Balancing Point)

Source: Trayport Euro Commodities Market Dynamics Report

- On the European hubs as whole, in Q2 2020 57% of the total trade was OTC bilateral, 6% was OTC cleared, whereas the share of exchange-executed contracts was a 37%. The share of exchange-executed contracts went up by 2 percentage points year-on-year in Q2 2020, whereas the share of OTC bilateral went down by more than 1 percentage point, and that of OTC cleared showed only minor changes.
- Exchange executed volumes in Q2 2020 showed a significant increase (15%) in year-on-year comparison on the observed European markets. In the same period, the total OTC traded volume (bilateral and cleared together) also went up by close to 7%. Over the last year, increase in liquidity was mainly driven by exchange-executed contracts, whereas OTC volumes showed a slower, though still measurable increase.

Figure 29 Share of traded volumes on the main European gas hubs



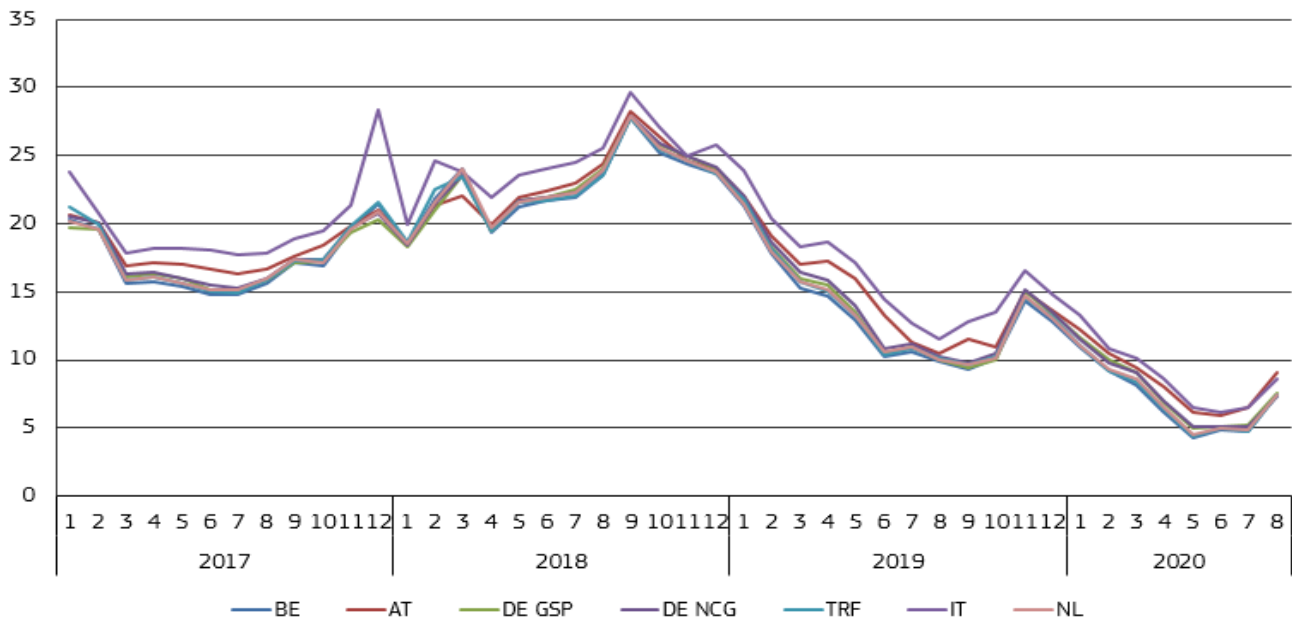
The chart covers the following trading hubs: Netherlands: TTF (Title Transfer Facility); Germany: NCG (NetConnect Germany) and Gaspool; France: PEG (Point d'Echange Gaz); Italy: PSV (Punto di Scambio Virtuale); Belgium: Zeebrugge beach, Austria: Virtual Trading Point (VTP); UK: NBP (National Balancing Point).

Source: Trayport Euro Commodities Market Dynamics Report

2.3.2. Wholesale price developments in the EU

- European hub prices were averaging around 4.9–7.1€/MWh in the second quarter of 2020, being significantly lower than in the previous quarter, Q1 2020 (9.4-11.4 €/MWh) and the range in Q2 2019 (12.3-16.8 €/MWh). To put it in percentage change, in the second quarter of 2020 hub prices in Europe were down by 37-50% compared to Q1 2020 and fell by 50-60% in year-on-year comparison. The average TTF hub price, averaging at 5.3 €/MWh in Q2 2020, fell by 45% in year-on-year comparison, and in the fourth week of the month of May it fell as low as 3.5 €/MWh. In June, July and August 2020 wholesale gas prices started to slowly recover, in consequence of increasing demand and decreasing oversupply on the gas market (partly owing to cancellation of LNG shipments).
- Wholesale gas prices in the second quarter of 2020 were largely impacted by the general demand destruction, owing to the halt of the economy amid lockdowns relating to the Covid-19 pandemic, decreasing demand in electricity generation owing to abundant renewable availability, high level of gas storages reducing refilling needs and the milder than usual weather in April, implying less heating related needs at the end of the heating season. The supply side could only slowly react to falling demand, but both pipeline suppliers (e.g.: Russia and Norway), both LNG shippers reviewed their shipment target numbers in Europe for 2020. As wholesale gas prices on the TTF hub fell below the Henry hub prices in the US in a period in May and June, it was not any more profitable to ship as many LNG cargoes to Europe as it could be foreseen even few month before.

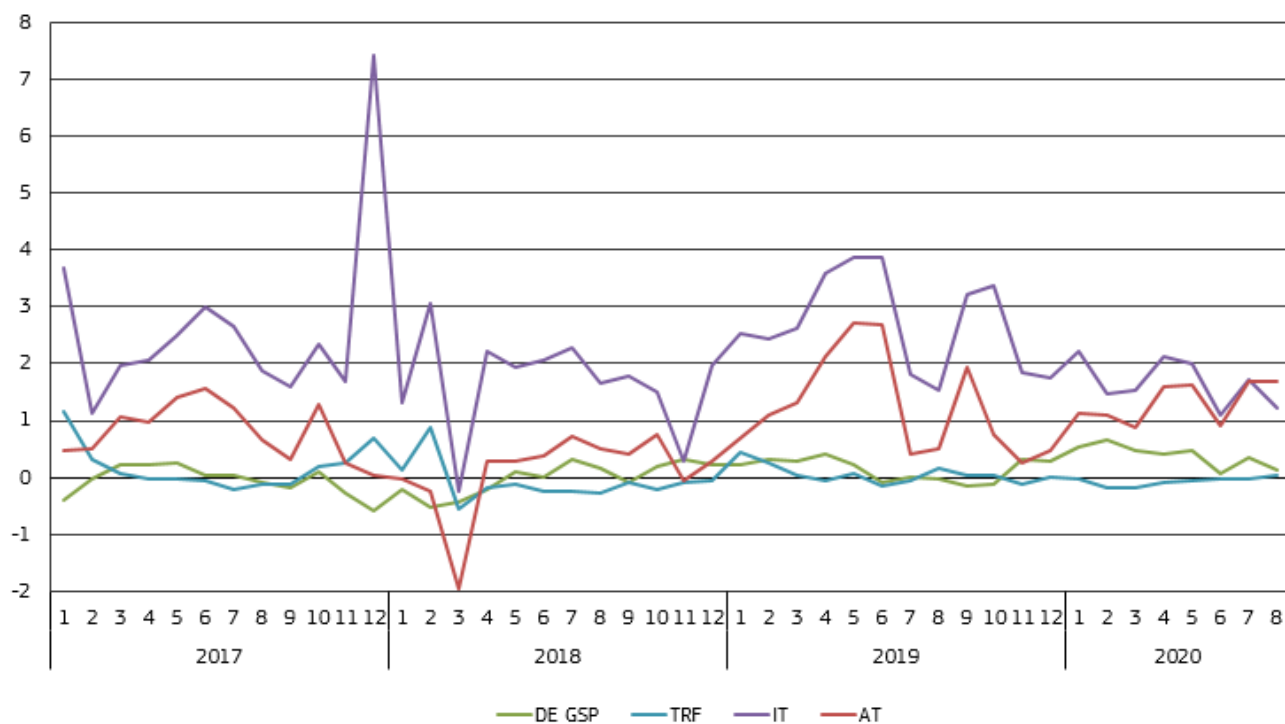
Figure 30 Wholesale day-ahead gas prices on gas hubs in the EU
Euro/MWh



Source: S&P Global Platts

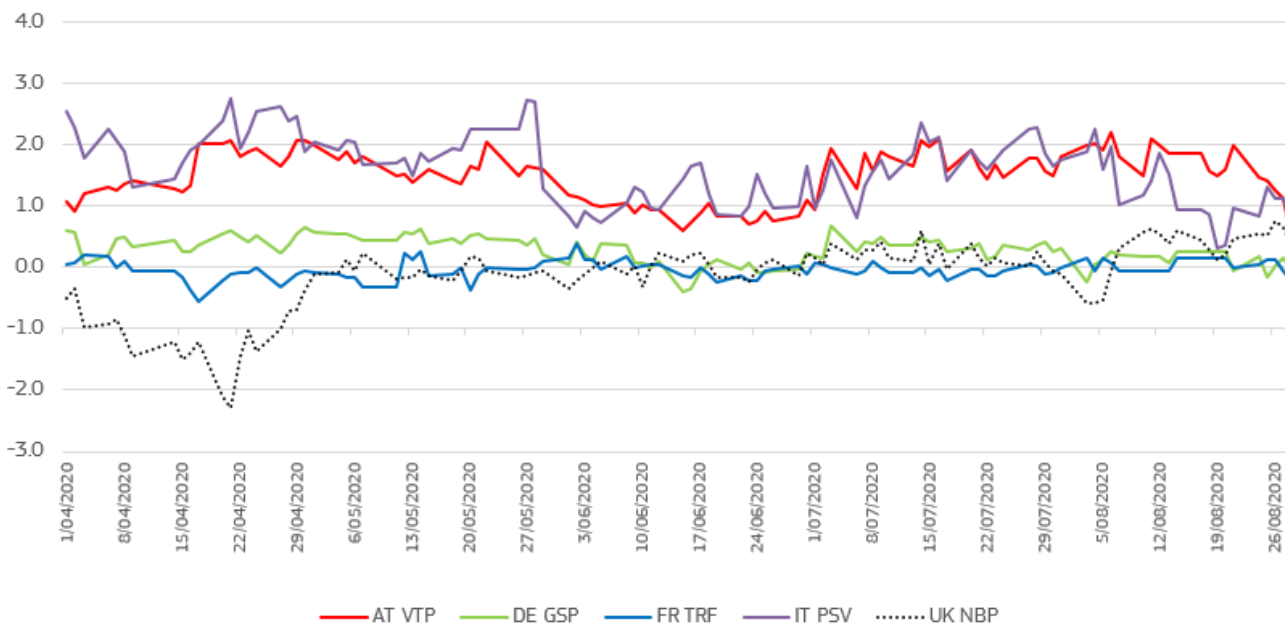
- As Figure 31 and Figure 32 show, the French TRF market was closely aligned with the TTF market during Q2 2020, in some cases even showing a discount, whereas the German Gaspool had a slight premium in April and May 2020, and the Austrian and Italian hubs showed a measurable price premium to the TTF during most of the time.
- The discount on the TRF hub to the TTF in some periods of April was mainly due to the arrival of significant amount of LNG cargoes that resulted in a general gas oversupply on the French gas market. Nuclear availability in France was in many periods lower in Q2 2020 comparable with the long-term seasonal average, which supported natural gas prices, however, and renewable generation was abundant. In May and June 2020 TRF remained well aligned with the TTF.
- The German Gaspool had a slight premium over TTF in April and May (0.4 €/MWh in both months), which practically disappeared by June 2020. This might have been related to the fact that Germany does not have direct LNG regasification capacities and therefore additional LNG cargoes could not drag down the price level as happened in France or in the UK in early spring. On the other hand, Germany exported gas to Austria and Italy, having both measurable premium to TTF.
- The price premium of the Italian hub to the TTF was above 2 €/MWh in April and May 2020, whereas in June it fell to 1.1 €/MWh. As the second half of April as announcements on easing the lockdown measures were made, the price premium started to widen. In May Italian premium was impacted by injection obligations imposed on storage operators, however, storage levels were much higher than the long-term average in this part of the year. At the end of June maintenance works on the TAG (Arnoldstein-Tarvisio border point) pipeline from Austria also added to the upward pressure on Italian wholesale gas prices, along with temperatures higher than the seasonal average (increasing residential cooling needs), however, amid generally increasing wholesale gas prices in Europe the Italian premium vis-à-vis the TTF managed to decrease.
- The Austrian premium to the TTF was around 1.6 €/MWh in April and May 2020, whereas in June 2020 it dropped below 1 €/MWh. During most of Q2 2020 Austrian wholesale gas prices remained closely aligned with Italy, both markets having measurable premium over the TTF (in some cases above 2 €/MWh), in case of significant oversupply in western European markets.
- In April 2020 the NBP hub showed a measurable discount to the European continental hubs, (in some periods even amounting to 2 €/MWh) as there was a general oversupply on the market, aggravated by the arrival of some Qatari LNG cargoes diverted from Asia. In this period the UK-Belgium interconnector was used to ship LNG to the continent, and this helped to increase traded volumes on the Zeebrugge hub as well. However, as of early May the oversupply situation improved and in the remaining part of Q2 2020 the NBP spot price was well-aligned with the TTF.

Figure 31 Premium of monthly average wholesale day-ahead gas prices at selected hubs compared to TTF Euro/MWh



Source: S&P Global Platts, European Commission computations

Figure 32 Premium of daily average wholesale day-ahead gas prices at selected hubs compared to TTF Euro/MWh

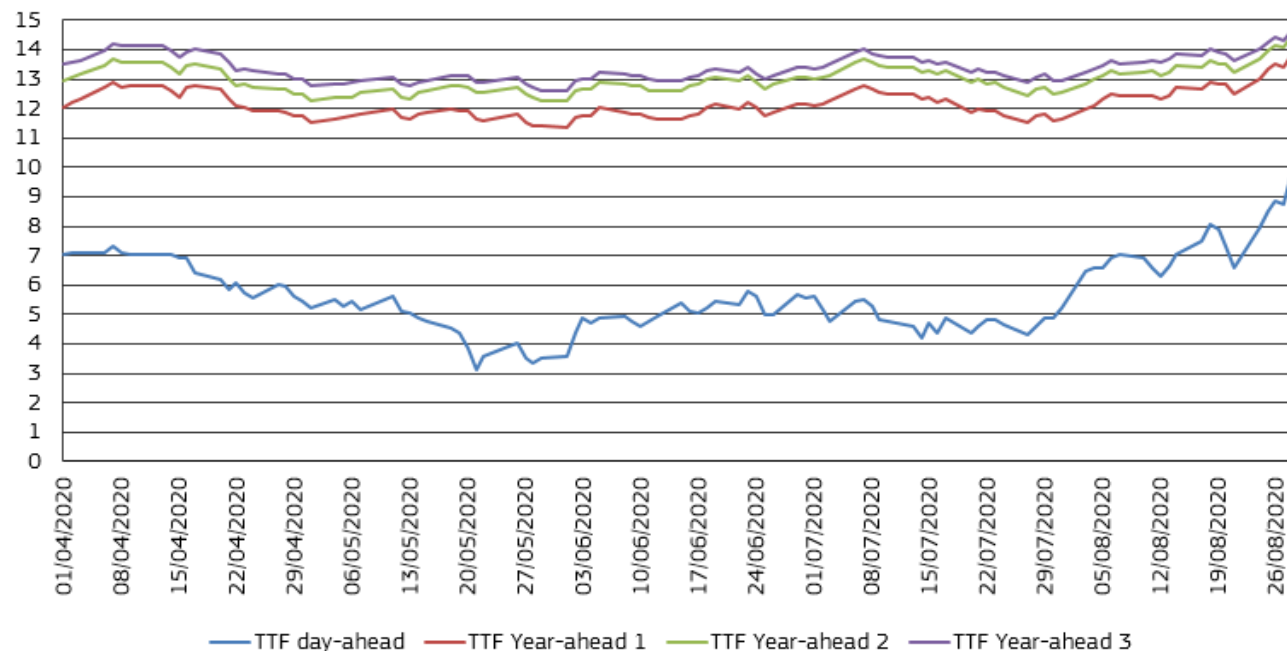


Source: S&P Global Platts, European Commission computations

- Figure 33 looks at the development of forward prices of one-year, two-year and three-year ahead contracts in comparison to the development of the day-ahead price on the Dutch TTF.
- Daily spot prices on the TTF started the second quarter of 2020 just above 7€/MWh, whereas by the end of May they practically halved. From this point, until the end of June 2020 a solid recovery in prices followed and on 30 June the average spot price reached 5.6 €/MWh. At the same time, one-year, two-year and three-year ahead contracts remained more stable, starting the

quarter in the range of 12-13.5 €/MWh, decreasing by 0.6-0.7 €/MWh until the end of May 2020 and recovering until the end of Q2 2020, reaching practically the same level as they started the quarter. Extremely low spot prices had a discount of 8-10 €/MWh at the end of May 2020, however, this decreased a bit to 7-8 €/MWh by the end of Q2 2020. It seems that in the forward contracts the market priced in a recovery for the spot prices, which already started in July and August, however, the developments on Covid-19 pandemic and its impact on the economic situation can result in further volatile periods in the future..

Figure 33 Forward gas prices on the TTF hub
Euro/MWh

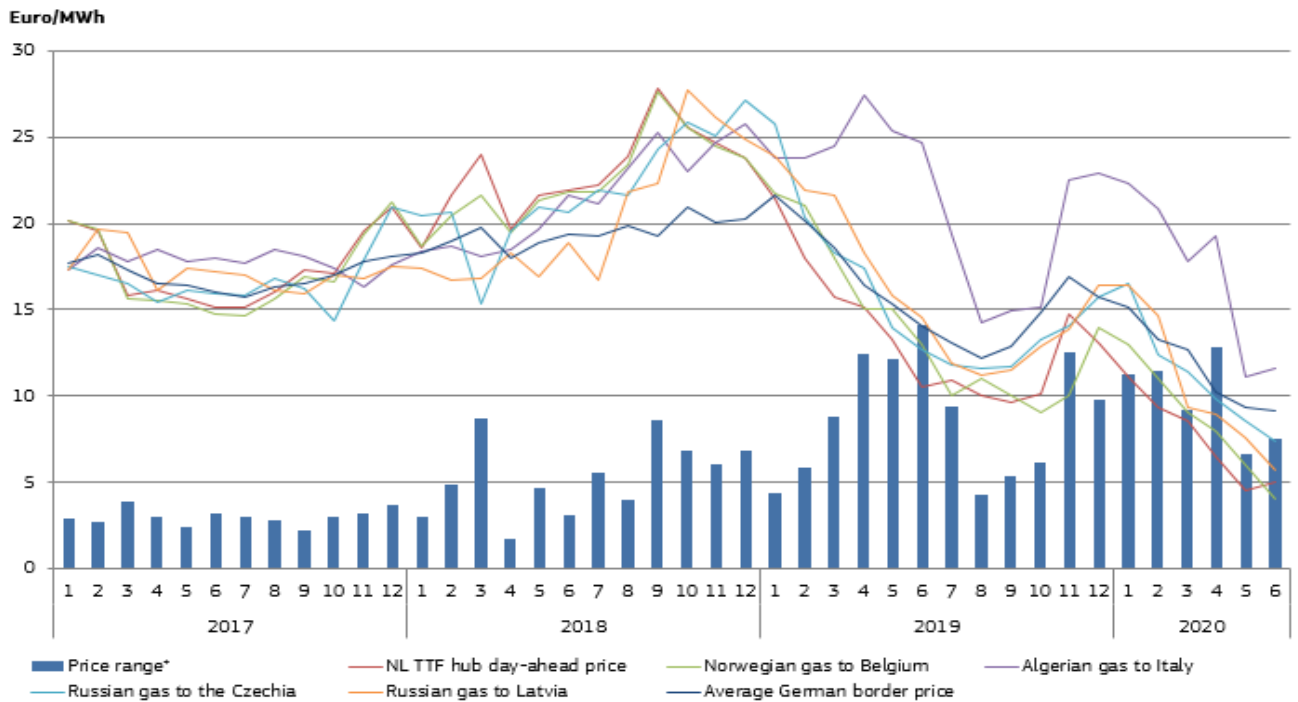


Source: S&P Global Platts

2.3.3. Prices of different contracts for gas in the EU

- Figure 34 compares a selection of estimated border prices of gas deliveries from the main exporters to the EU: Russia, Norway, and Algeria. For comparison, the evolution of the day-ahead prices on the Dutch TTF hub is also presented on the chart.
- Prices of European gas contracts showed signs of slight convergence in Q2 2020, as the difference between the cheapest and most expensive contract decreased again, from 9.2 €/MWh measured in March to 7.6 €/MWh in June 2020. Looking at the price differential without the most expensive Algerian gas import price to Italy, it would be less, 5.2 €/MWh in June 2020. However, the price differential increased since March 2020, when it was only 3.7 €/MWh, primarily owing to deep fall in Norwegian gas import prices in Q2 2020, falling as low as 4 €/MWh in June 2020, whereas the average German import price was still 9.2 €/MWh.
- Hub based contracts, such as the Norwegian import, or hub prices themselves, took a sharp downturn in the second quarter of 2020, extending the fall already occurred in Q1 2020. Reported German border prices also decreased, similarly to most of the hub-based contracts, however the decrease was less steep than in the case of hub prices, probably owing to the existence of oil-indexation in some import sources to Germany.
- In the second quarter of 2020, according to data from Eurostat, gas prices of Algerian import of origin in Italy decreased again, to 14 €/MWh in Q2 2020 from 20.3 €/MWh in the previous quarter and from 25.8 €/MWh in Q2 2019, in contrast to Algerian import prices in Spain that decreased only slightly over these periods. Russian gas imports prices in Latvia and the Czechia followed practically the same path as the other decreasing gas hub prices in Europe, remaining well-aligned with other European peers, implying an increasing role of hub-based price formation in these contracts to the detriment of the formally exclusive pure oil-indexation.

Figure 34 Comparison of EU wholesale gas price estimations



Source: Eurostat COMEXT and European Commission estimations, BAFA, S&P Global Platts

*The difference between the highest and lowest price depicted on the graph

Note: Border prices are estimations of prices of piped gas imports paid at the border of the importing country, based on information collected by customs agencies, and are deemed to be representative of long-term contracts.

Map 1. Comparison of EU wholesale gas prices in the second quarter of 2020

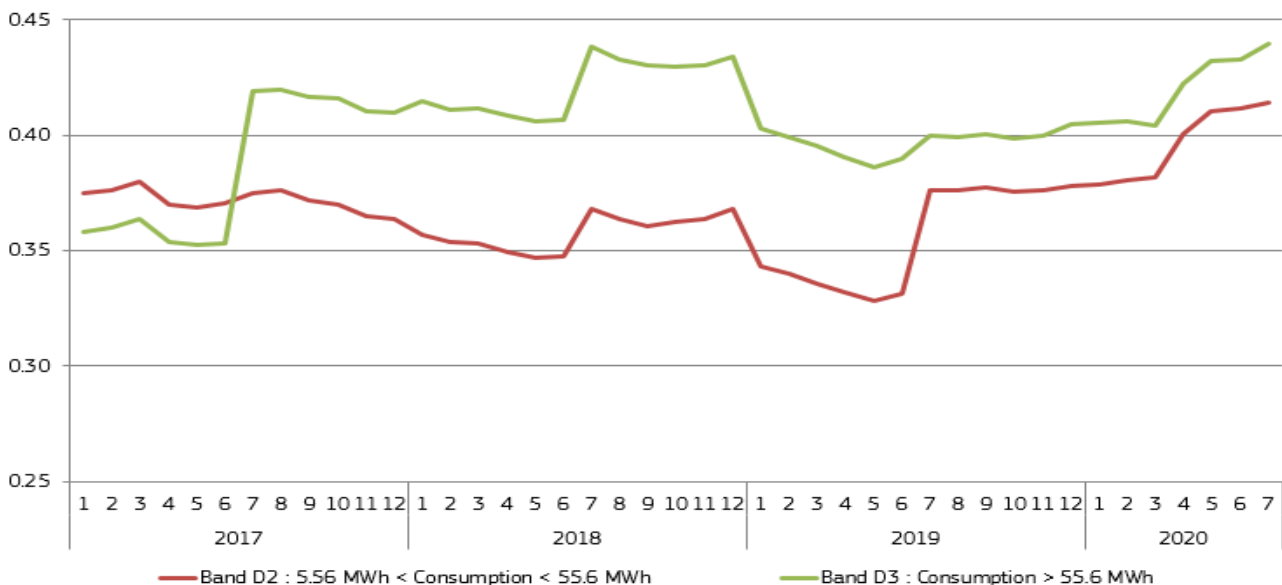


Note: Border prices are estimations of prices of piped gas imports paid at the border of the importing country, based on information collected by customs agencies, and are deemed to be representative of long-term gas contracts.

3. Retail gas markets in the EU and outside Europe

- Figure 35 and Figure 37 show the degree of convergence (or divergence) of retail gas prices for household and industrial customers, using as metric the relative standard deviation of the prices in individual Member States. Monthly retail prices are estimated by using half-yearly prices from Eurostat (with the latest available figures relating to the second half of 2019) and Harmonised Consumer Price Indices (HICP) for both the household prices and industrial consumers.
- For household consumers, the estimated average retail price in the EU (including all taxes) remained stable after minor increase at the beginning of the second half of 2019. In the most typical consumption band, D2, in the second quarter of 2020 the estimated average price (including all taxes) was 7.02 Eurocents/kWh, still up by 6% compared to 6.62 Eurocents/kWh in Q2 2019 (See the estimated household prices on Map 2).
- Retail prices for households showed an improving convergence until the second half of 2019, however, since then the relative standard deviation of prices in consumption band D2 rose again, even above the level last seen in 2017, implying that prices started to slightly diverge, as Figure 35 shows. Moreover, Band D3 retail prices show higher standard deviation than Band D2. Observed price differences are normally higher for the consumers with lower annual consumption, primarily owing to the higher share of fixed elements (not related to the actual consumption) in the final consumer bills.
- In the second quarter of 2020, there were still significant differences in retail gas prices across the EU. The lowest estimated household prices in consumption band D2 could be observed in Hungary (3.0 Eurocent/kWh), Latvia and Romania (both 3.3 Eurocent/kWh), and Luxembourg (3.5 Eurocent/kWh), whereas the highest prices could be measured in Sweden (11.7 Eurocent/kWh), Spain (10.1 Eurocent/kWh) and in the Netherlands (9.7 Eurocent/kWh). The price differential ratio between the cheapest and the most expensive Member State was 3.9. Until recently the ratio showed a gradual decrease over time: while in the second quarter of 2012 it was still 4.8, since the third quarter of 2017 it stabilised around 3.4-3.6, but in Q2 2020 it rose to 3.9.

Figure 35 Relative standard deviation of gas prices paid by household customers in EU Member States



Note: all taxes included.

Source: European Commission estimates based on Eurostat data on consumer prices adjusted by the HICP

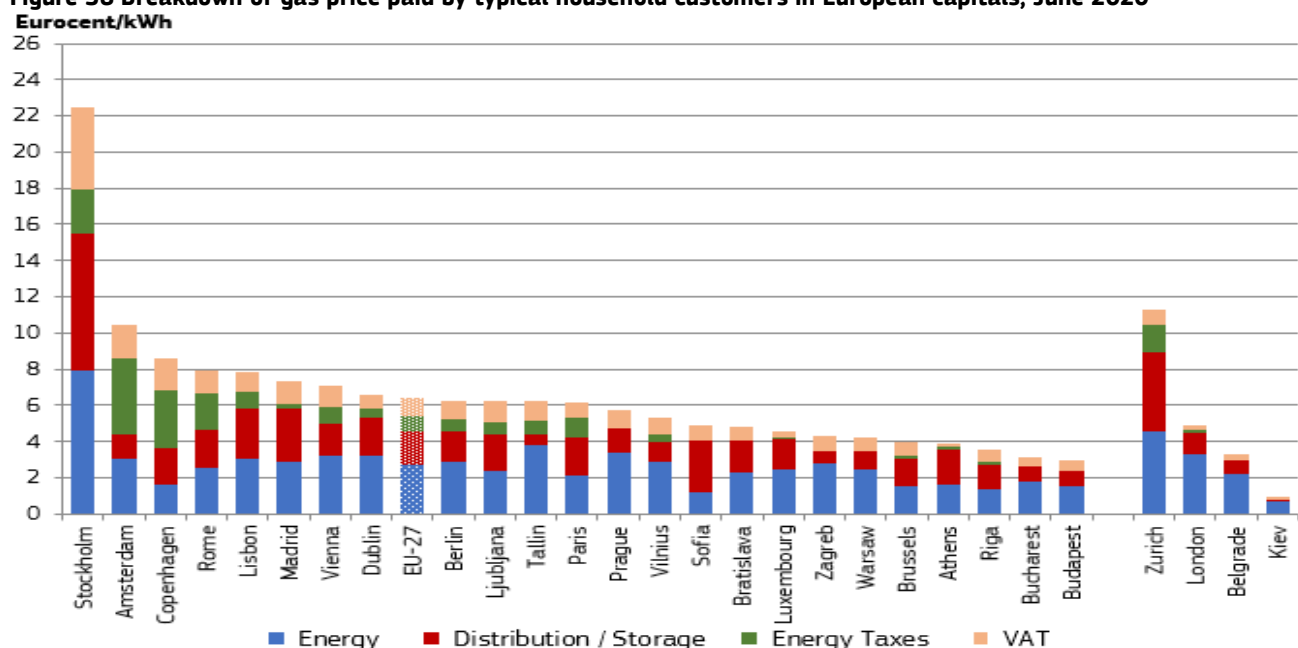
- Figure 36 shows the level and the breakdown of residential end-user gas prices paid by typical households in European capitals in June 2020. On average, 42% of the price covered the energy component, while the rest covered distribution/storage costs (30%), energy taxes (12%) and VAT (17%).³⁴
- There were significant differences in March 2020 in the share of energy costs, distribution costs and taxes within the total prices across Member States. The share of energy costs ranged from 19% (Copenhagen) and Amsterdam (30%) to Zagreb (64%) and Tallinn (61%). The share of distribution/storage costs ranged from 10% (Tallinn) and Amsterdam (13%) to 58% (Sofia) and Athens (50%). The share of energy taxes ranged from 2% (Luxembourg) and 3% (Madrid) to 40% (Amsterdam) and 37% (Copenhagen).

³⁴ Note that these are arithmetic averages. No data are available for Helsinki (Finland), Nicosia (Cyprus), and Valetta (Malta).

For 7 of the 24 capitals covered, the price does not include an energy tax component. VAT content in the total gas price also varied a lot across the EU – from 6% in Athens to 21% in Budapest.

- Figure 36 also shows that even the energy component is very variable in absolute terms: it was 6.5 times higher in Stockholm than in Sofia in June 2020. There were also considerable differences across Member States in the relative share of network costs and taxes. The ratio of highest and lowest network components across the EU was 12 (between Tallinn and Stockholm), and highest-lowest tax component ratio (taking energy taxes and VAT together) was 19 (Athens and Stockholm) in June 2020.
- With the exception of two EU capitals out of the observed 24, prices were lower in June 2020 compared to the same month of the previous year. The biggest decrease occurred in Athens (32%), Brussels (28%) and Riga (27%), driven mainly by the decrease in energy costs and network costs. On the other hand, the biggest increase could be observed in Amsterdam (8%), driven by the growth in network costs and the energy taxes component. In Bratislava the retail price was slightly up (0.3%) compared to the same month of the previous year. It seems that price falls on wholesale gas markets started to filter in the final retail household prices in more and more capital cities. In June 2020 Budapest remained the cheapest capital in the EU in terms of gas prices for household consumers, followed by Bucharest and Riga, whereas Stockholm, Amsterdam and Copenhagen were the three most expensive capital cities.

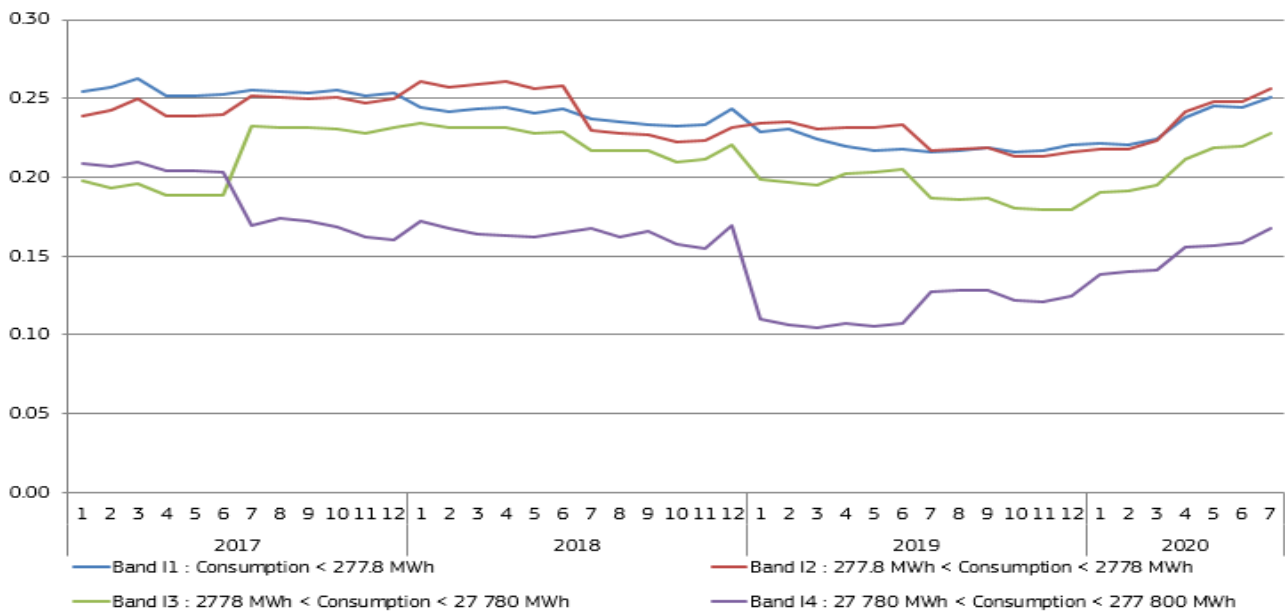
Figure 36 Breakdown of gas price paid by typical household customers in European capitals, June 2020



Source: VaasaETT

- After being stable until mid-2019, retail gas prices for industrial customers started to gradually decrease as of the second half of 2019 and in Q2 2020 this downward trend continued in the EU on average. The average estimated price (VAT and other recoverable taxes excluded) in consumption band I4 was 2.38 Eurocent/kWh in the second quarter of 2020, down from 2.46 in Q1 2020 and down from 2.67 in Q2 2019, implying a decrease of 10.8% year-on-year. (See the estimated industrial prices on Map 3.) There was not any country in the EU where industrial gas prices showed increase in year-on-year comparison in Q2 2020, while in the 24 observed countries (data were not available for Cyprus, Finland and Malta) decreases could be observed. It seems that at EU level recent price decreases on the wholesale gas markets already appeared in retail prices for industrial customers, having average consumption. Decreases could also be observed for industrials having larger annual gas consumption (for example Band I5: 18%, band I6: 21% decrease in Q2 2020 year-on-year).
- Figure 37 shows that in the case of industrial customers the relative standard deviation was lower than for private households, indicating smaller price differences across Member States. In the price bands with smaller annual consumption (I1, I2 and I3) the relative standard deviation decreased in 2018 and 2019, implying better price convergence across the EU, however, in the first and second quarters of 2020 this came to a halt and the decreasing trend reversed. In band I4 prices showed a slightly higher divergence since the second half of 2019, and this trend was confirmed in the first half 2020.
- In the second quarter of 2020 Belgium and Luxembourg had the lowest estimated industrial price in consumption band I4 (respectively 1.6 Eurocent/kWh and 1.7 Eurocent/kWh), while the highest prices could be observed in Estonia (3.2 Eurocent/kWh) and Sweden (3.1 Eurocent/kWh). In Q2 2020 the price ratio of the cheapest and the most expensive country in the EU was 2.0. This price differential is lower compared to the first quarter of 2017, when it was 2.8, but higher compared to the second quarter of 2019, when it was 1.7.

Figure 37 Relative standard deviation of gas prices paid by industrial customers in EU Member States

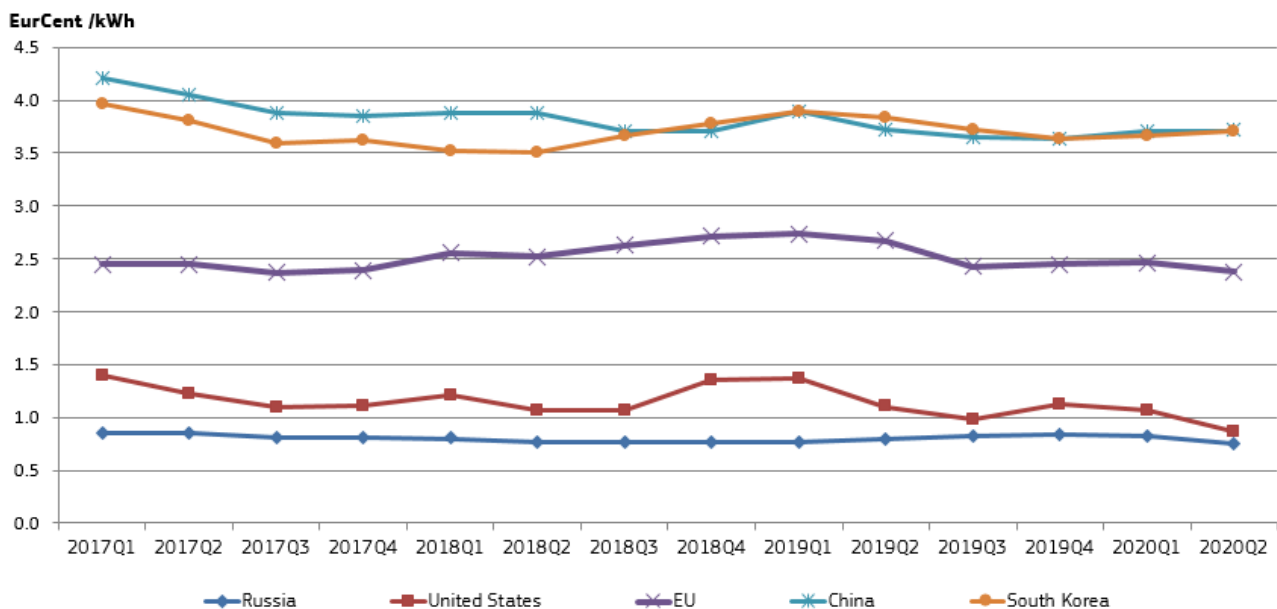


Note: Excluding VAT and other recoverable taxes.

Source of data: European Commission estimates based on Eurostat data on industrial prices adjusted by the HICP

- The next Figure shows the evolution of industrial retail gas prices in the EU, compared with some important trade partners of the European economy. In the second quarter of 2020, retail gas prices for industrial customers in China and Korea had a price premium of 55-60% to the EU average. On the other hand, retail gas prices in the United States were 63% less than in the EU and in Russia gas prices were less than the third of the EU average. Compared to Q2 2019, the biggest decrease in industrial gas retail prices could be observed in the United States (22%), while prices in Russia went down by 6%, in Korea prices decreased by 3% and in China they remained practically the same (-0.3%).

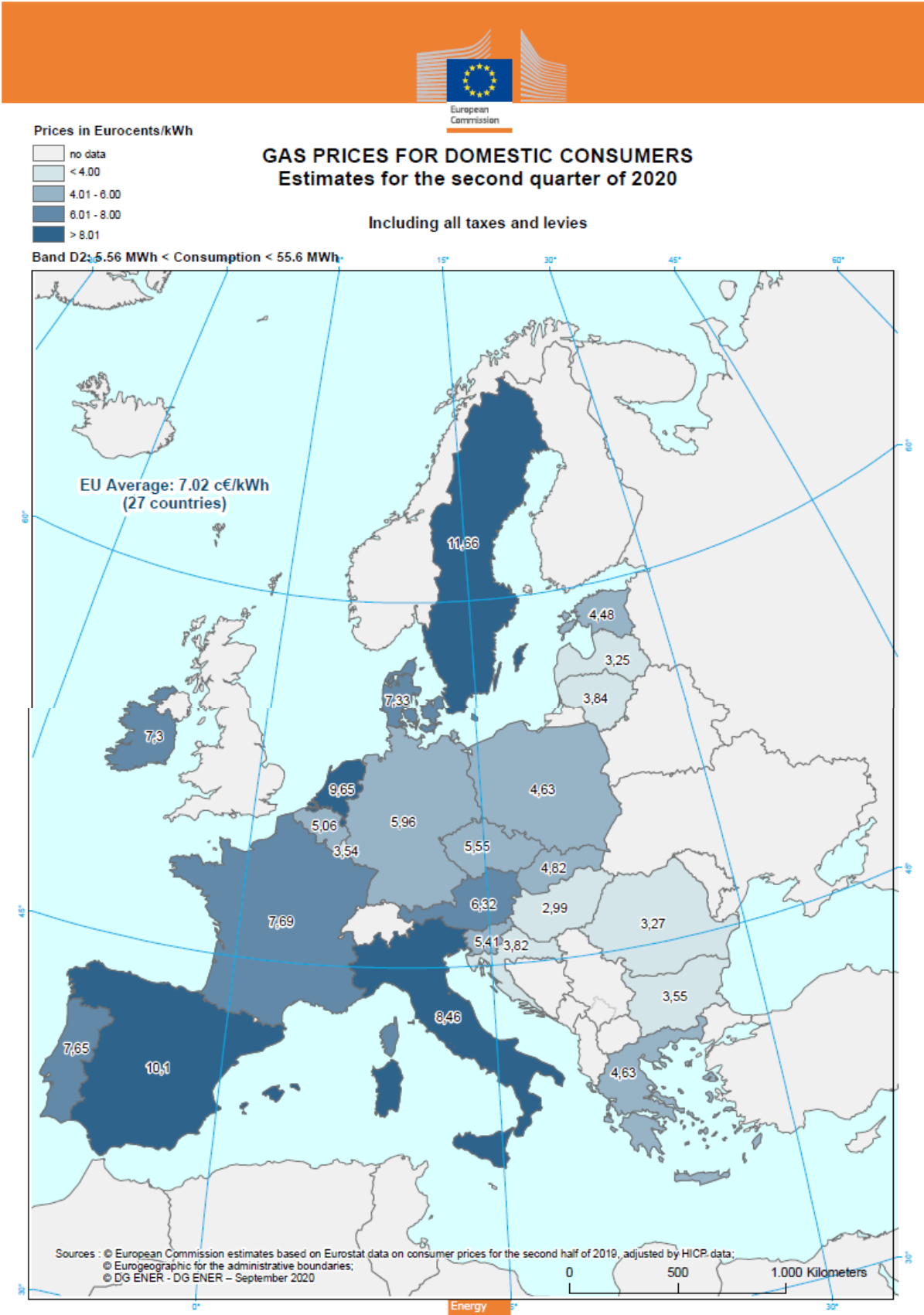
Figure 38 The EU average industrial retail gas price in comparison with the prices of some important trade partners of the EU



Source: Eurostat (EU average, for industrial consumption band I4) and CEIC. Data of the United States, China, Russia and Korea were taken into account. EU prices are without VAT and other recoverable taxes

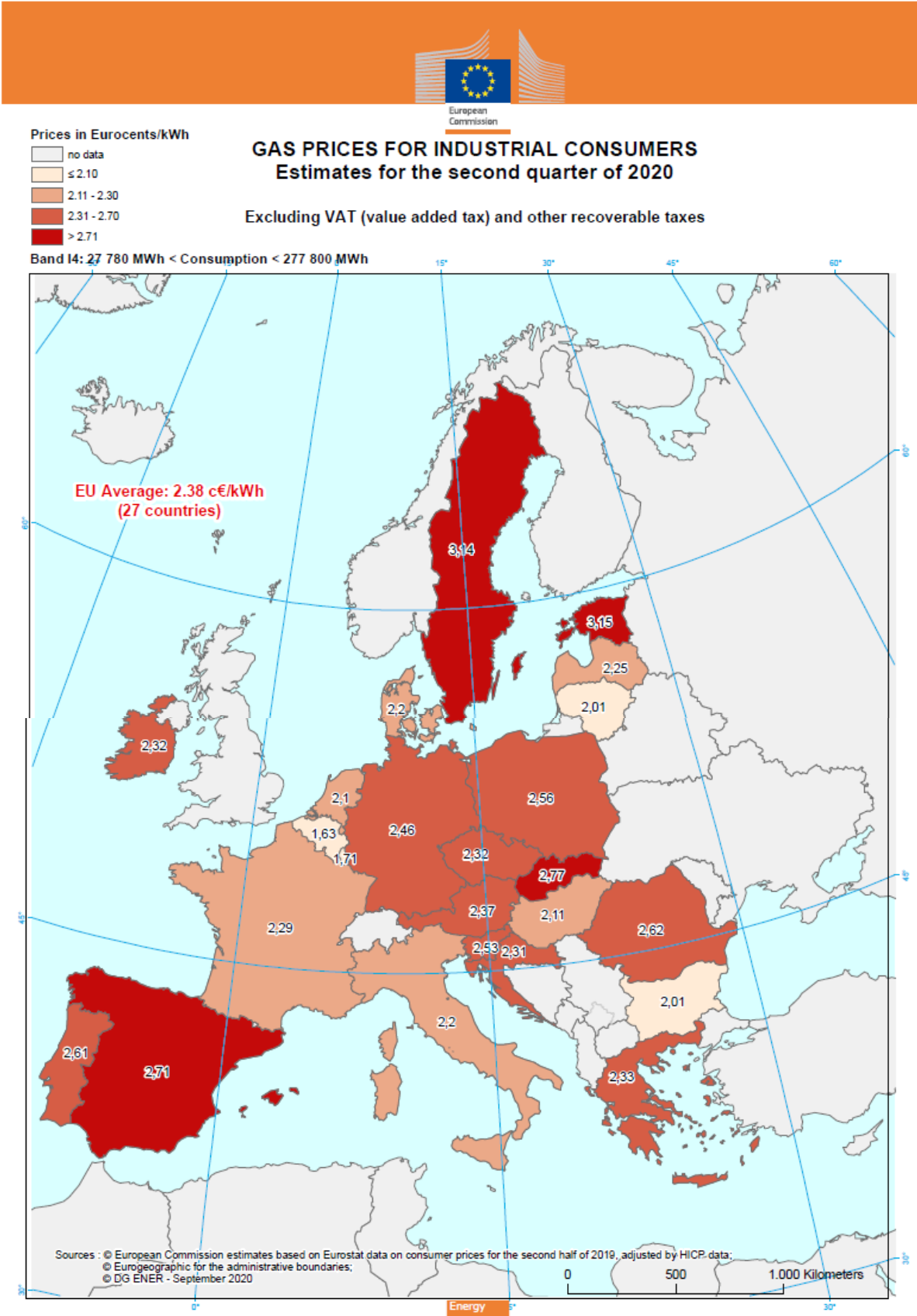
- Maps 2 and 3 on the next two pages show the estimated retail gas prices paid by households and industrial customers in the second quarter of 2020.

Map 2. Retail gas price estimates for households in the EU – Second quarter of 2020



Source: Eurostat

Map 3. Retail gas price estimates for industrial consumers in the EU – Second quarter of 2020



Source: Eurostat

4. Glossary

Backwardation occurs when the closer-to-maturity contract is priced higher than the contract which matures at a later stage.

Clean dark spreads are defined as the average difference between the price of coal and carbon emission, and the equivalent price of electricity. Dark spreads are reported as indicative prices giving the average difference between the cost of coal delivered ex-ship and the power price. As such, they do not include operation, maintenance or transport costs. Spreads are defined for a coal-fired plant with 35 % efficiency. Dark spreads are given for UK and Germany, with the coal and power reference price as reported by S&P Global Platts.

Clean spark spreads are defined as the average difference between the cost of gas and emissions, and the equivalent price of electricity. Spark spreads are indicative prices showing the average difference between the cost of gas delivered on the gas transmission system and the power price. As such, they do not include operation, maintenance or transport costs. The spark spreads are calculated for gas-fired plants with standard efficiencies of 50% and 60%. This report uses the 50% efficiency. Spreads are quoted for the UK, German and Benelux markets.

Contango: A situation of contango arises in the when the closer to maturity contract has a lower price than the contract which is longer to maturity on the forward curve.

Cooling degree days (CDDs) are defined in a similar manner as Heating Degree Days (HDDs); the higher the outdoor temperature is, the higher is the number of CDDs. On those days, when the daily average outdoor temperature is higher than 21°C, CDD values are in the range of positive numbers, otherwise CDD equals zero.

Flow against price differentials (FAPDs): By combining daily price and flow data, Flow Against Price Differentials (FAPDs) are designed to give a measure of the consistency of economic decisions of market participants in the context of close to real time operation of natural gas systems. With the closure of the day-ahead markets (D-1), the price for delivering gas in a given hub on day D is known by market participants. Based on price information for adjacent areas, market participants can establish price differentials. Later in D-1, market participants also nominate commercial schedules for day D. An event labelled as an FAPD occurs when commercial nominations for cross border capacities are such that gas is set to flow from a higher price area to a lower price area. The FAPD event is defined by the minimum threshold of price difference under which no FAPD is recorded. The minimum threshold for gas is set at 0.5 €/MWh. After the day ahead market closes, market participants still have the opportunity to level off their positions on the balancing market. That is why a high level of FAPD does not necessarily equate to irrational behaviour. In addition, it should be noted that close-to real time transactions represent only a fractional amount of the total trade on gas contracts.

Heating degree days (HDDs) express the severity of a meteorological condition for a given area and in a specific time period. HDDs are defined relative to the outdoor temperature and to what is considered as comfortable room temperature. The colder is the weather, the higher is the number of HDDs. These quantitative indices are designed to reflect the demand for energy needed to heat a building.

LNG sendout expresses the amount of gas flowing out of LNG terminals into pipelines.

Long-term average for HDD and CDD comparisons: In the case of both cooling and heating degree days, actual temperature conditions are expressed as the deviation from the long-term temperature values (average of 1975-2016) in a given period.

Monthly estimated retail gas prices: Twice-yearly Eurostat retail gas price data and the gas component of the monthly Harmonised Index for Consumer Prices (HICP) for each EU Member States to estimate monthly retail gas prices for each consumption band. The estimated quarterly average retail gas prices on the maps for households and industrial customers are computed as the simple arithmetic mean of the three months in each quarter.

Relative standard deviation is the ratio of standard deviation (measuring the dispersion within a statistical set of values from the mean) and the mean (statistical average) of the given set of values. It measures in percentage how the data points of the dataset are close to the mean (the higher is the standard deviation, the higher is the dispersion). Relative standard deviation enables to compare the dispersion of values of different magnitudes, as by dividing the standard deviation by the average the impact of absolute values is eliminated, making possible the comparison of different time series on a single chart.

Retail prices paid by households include all taxes, levies, fees and charges. Prices paid by industrial customers exclude VAT and recoverable taxes. Monthly retail electricity prices are estimated by using Harmonised Consumer Price Indices (HICP) based on bi-annual retail energy price data from Eurostat.

