Quarterly Report

on European Gas Markets

Market Observatory for Energy

DG Energy

Volume 13
(issue 1, first quarter of 2020)
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HIGHLIGHTS OF THE REPORT

- **Lockdown measures related to the Covid-19 coronavirus**, which were introduced in Europe in March 2020, resulted in less energy consumption, which, coupled with other supply and demand side factors, led to steep falls in energy prices in Q1 2020, also impacting the natural gas market. Crude oil prices fell by more than 70% over the course of Q1 2020.

- In the first quarter of 2020 **EU gas consumption decreased by 5%** compared to Q1 2019, mainly impacted by limited heating needs owing to the mild winter weather, decreasing gas use in power generation and as of March the introduction of lockdown measures, leading to less gas demand in industry. Gas consumption in Q1 2020 was 131 bcm in the EU.

- **Indigenous gas production, amounting to 16 bcm in Q1 2020 in the EU, fell by 23%** (4.8 bcm) compared to Q1 2019. Netherlands produced 7.2 bcm of gas (down from 10.6 bcm in Q1 2019), Romania had a production of 2.5 bcm (down from 2.6 bcm in Q1 2019), followed by Germany (1.3 bcm, down from 1.5 bcm in Q1 2019) and Italy (1.1 bcm, down from 1.3 bcm, Q1 2019). Beyond subdued gas demand, production in the Netherlands and other EU countries was also impacted by competitive LNG imports.

- **EU net gas imports fell by 7% year-on-year** (6 bcm) in Q1 2020. Russian pipeline supplies covered 40% of extra-EU net gas imports. LNG covered 28% of the total EU imports. Norwegian pipeline gas was only the third biggest import source (24%), followed by pipeline imports from North Africa (6%). Net gas imports amounted to 81 bcm in Q1 2020.

- **Nord Stream became the most important supply route of Russian pipeline gas to the EU in Q1 2020** as the amount of gas through the Ukrainian transit fell by 49% in year-on-year comparison. The share of the Nord Stream reached 45%, the Ukrainian transit came to the second place, with 26%, followed by the Belarus route (25%), and TurkStream, operational as of 8 January 2020, had a share of 4% in the Russian pipeline gas imports.

- **Gas storage levels in the EU stood at 54% at the end of March 2020, which was the highest in the last nine years at this time of the year.** This implies less storage injection related demand for gas in the next two quarters.

- **EU LNG imports kept on increasing, up by 26% year-on-year** in Q1 2020. United States remained the most important LNG supplier to Europe, ensuring 30% of the total EU imports in Q1 2020, ahead of Russia (22%) and Qatar (15%). In Q1 2020 the EU imported 25 bcm of LNG, and the three biggest importer countries were: Spain (6 bcm), France (5 bcm and Belgium (4 bcm). Contrarily to most of 2019, in the first quarter of 2020 LNG imports from the US exceeded Russian imports in each month.

- **The EU’s estimated gas import bill fell to the lowest in the last six years, amounting to €9.8 billion in the Q1 2020**, down from €18.7 billion (by 48%) from Q1 2019, principally owing to falling import prices (~44%) and decreasing imports. The LNG import bill of the EU was estimated at €5.3 billion in Q1 2020, down from €4.8 billion in Q1 2019, reflecting the impact of falling LNG import prices, even if LNG imports grew in volume.

- **Traded volume on the European gas hubs recorded a 32% year-on-year increase in Q1 2020 (up to 5 010 TWh)**, principally owing to increasing hedging activity on the markets as prices became more volatile and contract price differences widened. The share of trade on the Dutch TTF, the most liquid hub in the EU, was 74% among the observed European hubs.

- **Spot prices underwent steep falls on European gas hubs in Q1 2020**. Oversupply on the gas market, resulting from abundant LNG send-outs and storage withdrawals, coupled with decreasing demand for gas, resulted in significant price falls on the markets. By the end of March 2020 the TTF fell to lows not seen since 2009. Gas premium of the Asian markets shrank to Europe and the TTF also decreased its price gap vis-à-vis the US Henry hub.

- **TTF is becoming a widely used benchmark in international LNG trade**, even in some Asian contracts Traders see several advantages of making reference to TTF in their contracts, as it is a well-regarded benchmark with long trade history. Furthermore, it is sufficiently liquid to ensure price accuracy and it has future contracts, enabling risk hedging activities.

- **Retail gas prices showed a decrease of 10% year-on-year for industrial customers in first quarter of 2020**, Industry with large annual consumption experienced bigger retail gas price falls. In most of the European capitals gas prices for households were lower in March 2020 compared to a year earlier.
EXECUTIVE SUMMARY

- Since the beginning of the year, Covid-19 coronavirus began to spread first in China, resulting in confinement measures, restricting the free movement of persons and leading to substantial decrease in economic activity. On 9 March 2020 strict nationwide lockdown measures were adopted in Italy, and within the course of the same month similar measures were introduced in almost all EU countries, which impacted also the energy market, significantly reducing the demand for energy products and leading to decrease in energy prices. GDP in the EU fell back by 2.6% in Q1 2020 year-on-year, signalling the worst performance of the European economy since Q3 2009. On the top of this, on the 6 March 2020 the OPEC+ countries failed to agree in production adjustment measures, which, in combination of the reduction in demand, led to an unprecedented fall in crude oil prices in Q1 2020 (from 66 USD/barrel to 18 USD/barrel). The general fall of energy commodity and stock market prices impacted the gas markets as well.

- In the first quarter of 2020 EU gas consumption decreased by 5% in year-on-year comparison, in contrast to the increases in the previous two quarters (7% and 2%). Gas-fired electricity generation slightly decreased (by 2%, year-on-year), and milder than usual weather reduced heating needs in most of the EU countries. In absolute numbers, gas consumption in Q1 2020 amounted to 131 bcm.

- EU gas production fell by 23% year-on-year in the first quarter of 2020; amounting to less than 16 bcm. Gas production decreased in the biggest EU gas producing countries, including the Netherlands (-33%, the steepest fall in the last six years) and in Romania (-5%). In Q1 2020 Netherlands produced 7.2 bcm of gas, Romania had a production of 2.5 bcm, followed by Germany (1.3 bcm) and Italy (1.1 bcm), respectively down from 10.6 bcm, 2.6 bcm, 1.5 bcm and 1.3 bcm measured in Q1 2019. Decreasing EU gas production points to increasing gas import dependency, which is expected to rise further after the withdrawal of the UK. In 2018 the EU external gas import dependency was 89% (whereas with the UK it was less, only 77%).

- EU net gas imports fell by 7% in the first quarter of 2020, compared to Q1 2019. In Q1 2020 the amount of net gas imports (81 bcm) and domestic gas production (16 bcm) did not fully cover the quarterly gas consumption of 131 bcm, in the heating season storages (net decrease by 34 bcm) were also used. Pipeline gas imports from Russia fell by 23% year-on-year in Q1 2020, whereas pipeline imports from Norway decreased by 4%. Algerian pipeline gas imports fell steeply, by 38% compared to Q1 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 15%.

- Russian pipeline supplies remained the main source of EU gas imports, covering 40% of extra-EU imports in Q1 2020, which represents the lowest share in the last six years. The share of LNG rose to the highest ever (28%) in extra-EU gas imports Norwegian pipeline imports was only the third most important source, with a share of 24%, followed by pipeline supplies from North Africa (6%). 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, signalling its increasing role in Europe's LNG supply, followed by Norway (25%), and the share of LNG sources other than from Russia, Norway and Algeria was 21%. In year-on-year comparison, decreasing share of Russia (-7 percentage points) and that of North Africa (-3%) was mainly complemented by the increasing share of LNG (+9%), whereas the share of Norwegian gas supply did not change substantially (+1 percentage point) in the EU gas supply mix. The EU's estimated gas import bill in Q1 2020 fell to €9.8 billion, 48% less than a year earlier, mainly as a result of falling import prices (by 44%), and decreasing gas imports.

- In the first quarter of 2020, Nord Stream became the main supply route of Russian gas to the EU, as transit through Ukraine fell substantially. Nord Stream covered 45% of the total Russian supplies (around 15 bcm), up by 10 percentage points compared to in Q1 2019. The share of the Ukrainian transit route fell to 26% (8 bcm) down by 14 percentage points in year-on-year comparison. In Q1 2020 the amount of gas transited through Ukraine fell by 49% year-on-year, especially steeply falling in January 2020, when the transit volume was only 1.4 bcm, compared to the 2019 monthly average of 5.7 bcm. Some traders indicated that Gazprom sold gas during this period from European storages, using the Electronic Sales Platform (ESP), rather using the Ukrainian transit route. On the top of this, the Trans Balkan pipeline is no longer supplied though the Ukrainian transit, rather through the TurkStream. With the inauguration of the EUWAL pipeline, linking the Baltic Sea region (Nord Stream) with German and Czech customers, the direction of gas flows in Central Europe might change, which also explains why the share of the Ukrainian transit went down in Q1 2020. However, according to the agreement on Ukrainian transit signed at the end of 2019, the minimum transit volume through Ukraine should reach 65 bcm this year. In Q1 2020 gas supplies transiting Belarus also fell by 22% compared to Q1 2019, and covered 25% (8 bcm) within the total EU imports from Russia. As of 8 January 2020 the TurkStream is operational, its share in the Russian gas transit was around 4% in Q1 2020, and around 1.2 bcm gas was shipped via this route to the EU.

- On 30 March 2020 the Arbitral Tribunal in Stockholm has ruled in favour of the Polish oil and gas company PGNiG, thus ending a five-year long dispute between PGNiG and the Russian Gazprom concerning the price of gas. The Russian company was required to pay back to PGNiG an estimated USD 1.5 billion (around € 1.3 billion), which is the difference between the price calculated based on the new formula and the amounts actually paid by PGNiG between 1 November 2014 until 29 February 2020. In March 2020 Bulgaria achieved a 40% cut in the price of gas it imports under its long-term contract with Russia, after the European Commission finalised an antitrust investigation against Gazprom in 2018 by way of commitments. The price cut was achieved, after Gazprom agreed to link a significant part of the price to European gas hubs.

- EU LNG imports kept on increasing in the first quarter of 2020, up by 26% in year-on-year comparison. Price differentials among different regions (e.g.: between Europe and Asia) practically disappeared amid the decreasing price trend on
the well-supplied global LNG markets, enabling plentiful LNG influx to Europe. Europe could also profit from lower shipment costs, due to its geographic proximity to the main LNG supply sources, namely the US, Middle East and Russia. Some LNG cargos were redirected to Europe in February, owing to low demand in China after the introduction of the lockdown measures. In Q1 2020 the United States preserved its position as leading LNG supply source for the EU, ensuring 30% of the total imports, ahead of Russia (22%), signalling an intensive competition between these two countries for the EU LNG market. For the first time over the last five years, Qatar became the only third supply source for the EU (with a share of 15%), followed by Nigeria (13%). In Q1 2020 Spain became the biggest LNG importer in the EU (6 bcm), ahead of France (5 bcm) and Belgium (4 bcm). The average EU LNG regasification terminal utilisation rate was around 60% in Q1 2020, rising even to 67% in March 2020, however, in some important markets, such as Spain, it was barely 40% in Q1 2020.

- **Gas storage levels in the EU stood at 54% at the end of March 2020, which was highest in the last nine years at this time end of the year.** Gas withdrawals in Q1 2020 amounted to 34% of the total storage capacity, as opposed to 30% in the first quarter of 2019. Intensive storage withdrawal activity also contributed to the oversupply on many European gas markets. In many cases, traders anticipated lower prices for the near future, which prompted selling the gas from the storages. At the end March 2020, the EU average storage-filling rate was 13 percentage points higher than a year before, implying less injection needs in the following two quarters during the summer filling season.

- **After the temporary rebound in the previous quarter, spot gas prices in Q1 2020 underwent steep falls, and were in the range of 9-11 €/MWh on average in most of the European gas hubs.** The Dutch TTF spot gas price fell to 7.1 €/MWh by the end of March 2020, which was the lowest since August 2009. Gas prices in Europe were impacted by abundant LNG supply to Europe, and by the intensive storage withdrawal activity. On the demand side mild winter weather, reducing heating needs, high share of renewables in electricity generation across the EU, which reduced the need for gas in the power sector, and with the introduction of the lockdown measures in March 2020 industrial demand for gas fell as well. In Q1 2020 European hub prices were down by 40-50% in year-on-year comparison. At international level, price differentials among different regions decreased amid the falling price trend. The average price ratio of the Japanese LNG prices and the TTF was 1.2, down from 1.4 in Q4 2019, whereas the ratio between the TTF and the US Henry hub fell below 1.7. Forward gas contracts also fell during Q1 2020, though not so steeply as the spot prices, implying that the market anticipated a price recovery in the future. The gap between the 2020 summer-winter contract prices increased further in January and February, however, in March 2020 it slightly decreased.

- **In Q1 2020 traded volume on the European gas hubs increased by 32% in year-on-year comparison, and the total traded volume on the most liquid European hubs was 20 678 TWh (equivalent to around 1 726 bcm and representing 12 times the combined EU consumption of natural gas).** The significant increase in traded volumes was mainly the result of increasing hedging activities, helped by the summer-winter contract price differentials and higher price volatility on the gas hubs. The share of the Dutch TTF hub in the total European trade rose further and reached 74%, reinforcing its leading role in Europe, and gradually turning into a global gas benchmark.

- **Retail gas prices for industrial customers** with average annual consumption were down by an estimated 10% in Q1 2020 in year-on-year comparison, while customers with higher annual consumption benefited from bigger decreases (17-20% in different consumption bands), implying that recent price falls on the wholesale gas markets started to filter in industrial retail price contracts. In March 2020, with the exception of three EU capitals out of the observed 24, prices were lower compared to the same month of the previous year.

The withdrawal agreement between the United Kingdom and the EU entered into force on 1 February 2020. As of the current report, covering the first quarter of 2020, EU aggregates do not include the United Kingdom, and thus EU aggregate numbers in the current report might differ from the historical figures published in earlier editions, still including the UK. However, as the United Kingdom plays an important role in the European gas market, developments in the UK market are also analysed in the report, and the map on wholesale gas prices also includes the UK with numbers.
1. Gas market fundamentals

1.1 Consumption

- EU gas consumption\(^1\) in the first quarter of 2020 decreased by 5% in year-on-year comparison, after going up by respectively by 7% and 2% in the previous two quarters. In absolute numbers, the quarterly gas consumption in Q1 2020 amounted to an estimated 130.8 bcm, increasing from Q4 2019 (117.7 bcm), but down from (137.1 bcm) in Q1 2019. Gas-fired electricity generation showed a minor year-on-year decrease in Q1 2020 (decreasing by 1.8%, or 2.4 TWh), reversing the growing trend observed in earlier quarters in many European countries. Weather across Europe was generally warmer in January-March 2020 compared to the seasonal average, resulting in less heating-related demand for gas in the residential sector. The decrease in gas demand in the electricity generation sector was aggravated by the decreasing industrial demand induced by the Covid-19 lockdown measures in the last weeks of the quarter. However, during the whole Q1 2020 gas consumption was in the range of 2014-2019, as Figure 1 below shows, close to the lower end of the range.

![Figure 1. EU gas consumption](image)

Source: Eurostat, data as of 12 June 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 (%)](image)

Source: Eurostat, data as of 12 June 2020 from data series nrg_103m. In the next edition of this report numbers might change retrospectively.

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\(^1\) As of the current edition of the report, 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 first quarter of 2020, the biggest year-on-year increase in gas consumption could be observed in Malta (20%, though representing only a minor increase of 0.02 bcm). Gas consumption went up in Portugal (by 17%, 0.2 bcm) and in Hungary and Croatia (4% in both, and respectively by 0.2 bcm and 0.04 bcm) and the Netherlands (by 3% and 0.4 bcm, which latter represented the biggest increase in consumption volume in the EU). Gas consumption decreased Q1 2020 by more than 20% in Romania, Latvia, Finland and Slovakia, whereas in Estonia it also fell by 14% in year-on-year comparison. In the United Kingdom\(^2\) consumption of natural gas decreased by 4.5% (1.2 bcm) in Q1 2020 compared to the first quarter of 2019.

In absolute numbers, gas consumption in Q1 2020 decreased the most in Germany and Italy (both by 1.7 bcm), Romania (1.3 bcm), France (1.1 bcm), Slovakia (0.4 bcm), Spain (0.3 bcm), and Finland (0.2 bcm).

Besides the aforementioned mild weather conditions and decreasing use in electricity generation, natural gas demand also decreased in the industrial sector. Starting at the end of February in Italy, and by the end of March gradually expanding in whole Europe, confinement measures, severely impacting movement of persons and economic activity, were introduced in order to curb the spreading the Covid-19 coronavirus, which has already impacted other parts of the world (especially China in Asia) since the beginning of 2020. Looking at the year-on-year change in gas consumption in March 2020, in Italy and Spain, both heavily impacted by the confinement measures, a decrease of 4% and 6% could be observed.

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

Source: Eurostat, data as of 12 June 2020 from data series nrg_103m. In the next edition of this report numbers might change retrospectively.

In the first quarter of 2020, the biggest drop in economic activity in Europe since more than a decade (more precisely, since Q3 2009) could be observed, as GDP in the EU-27 decreased by 2.6% in year-on-year comparison\(^3\), signalling the beginning of the economic halt in the consequence of the coronavirus-related confinement measures. The rate of value-added growth in industrial sectors that consume significant amount of energy (for example, manufacturing) showed a steep decrease in Q1 2020 (-4.2%).

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\(^2\) 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

\(^3\) Source: Eurostat, data as of 9 June 2020 from data series namq_10_a10; seasonally and calendar adjusted data
Figure 4 EU GDP Q/Q-4 change (%)

![Graph showing EU GDP Q/Q-4 change (%)](image)

Source: Eurostat, data as of 9 June 2020 from data series namq_10_gdp - Seasonally and calendar adjusted data

- Figure 5 shows the deviation of actual heating degree days (HDDs) from the long-term average in individual EU Member States in the first quarter of 2020. Looking at this chart, it is the rare occasion that hardly any country can be seen where the temperatures were lower than the seasonal average (for example, Ireland in March 2020) during the whole winter period. Weather was especially mild during January and March 2020, implying higher temperatures and less heating related gas demand for households. The March 2020 HDD values were closer to the seasonal average, however, in most of the Nordic countries temperatures were higher than usual.

Figure 5 Deviation of actual heating degree days from the long-term average in the first quarter of 2020

![Graph showing deviation of actual heating degree days from the long-term average in the first quarter of 2020](image)

Source: Joint Research Centre (JRC), European Commission

4 Long term average temperatures, heating and cooling degree days refer to the period between 1978 and 2018
Based on data from ENTSO-E, gas-fired power generation was down by 1.8% in the first quarter of 2020, compared to the same period of 2019. In absolute terms, electricity generated from gas decreased by 2.8 TWh year-on-year, as Figure 6 shows. In Q1 2020 gas wholesale prices turned down again in Europe, which could have been beneficial for gas use in power generation. However, besides the demand related impact, stemming from mild weather conditions and limited demand for gas in the industry, in Q1 2020 the role of renewables in the EU power generation mix was particularly strong, leaving not too much room for gas in spite of decreasing fuel costs. Solar and wind generation in the EU was up, respectively by 84% and 19% in Q1 2020, compared to the first quarter of 2019, and solid fuels continued their falling trend, decreasing by 30% over the same period. Although carbon prices decreased measurably in Q1 2020, reaching 22.8 €/tCO2e on average, this could not improve the competitiveness of fossil fuels, especially that of coal and lignite in power generation in the EU.

In Q1 2020 the amount of electricity generated from gas went down by 6% in year-on-year comparison in Spain, Italy and France, in Germany it decreased by 2%, whereas in the Netherlands it rose by 3%, owing to changes in the local power generation mixes. Rise in electricity generation from hydro contributed to the replacement of gas in the local mixes in Spain, Italy and France. At the same time, increasing wind power generation in France and Germany had an important role, and increasing solar power generation in Germany and Spain helped in reducing the role of natural gas, too. Generation from solid fuels showed a double-digit fall in each of these aforementioned countries, and generation from nuclear decreased as well in France and Germany. In Portugal gas-fired generation was up by 51%, and along with significantly increasing hydro it compensated the fall of coal-fired generation, practically disappearing from the local power mix. In Italy and Spain generation from gas was respectively down by 19% and 20% in March 2020 year-on-year, showing the impact of the economic downturn and confinement measures related to the lockdown.

Figure 6 Gas-fuelled power generation in the EU

![Graph showing gas-fuelled power generation in the EU](image)

Source: Based on data from the ENTSO-E Transparency Platform and national data sources, data as of 8 June 2020.

- Clean spark spreads – measuring the profitability of gas-fired generation by taking into account variable costs – remained in the negative range in Q1 2020 in Germany, averaging -1.8 €/MWh, implying that gas-fired generation was not profitable in the country (See Figure 7). Although gas prices decreased in Q1 2020, in parallel with lower emission allowance prices, the decrease in wholesale electricity prices in Germany vanished the benefits from decreasing variable costs of gas-fired generation.
- At the same time, clean spark spreads remained during most of Q1 2020 in the positive range in Italy (reaching 10 €/MWh on average in Q1 2020) and Spain (6.9 €/MWh in Q1 2020), probably owing to higher wholesale electricity prices in these countries, pointing to a better position of gas-fired electricity generation than in Germany.

5 See more information in Quarterly Report on the European Electricity Markets, Vol. 13, Issue 1
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. Data on the share of gas in electricity generation come from the database of ENTSO-E
In the United Kingdom, also having relevance for the European gas market, clean spark spreads averaged 1.5 €/MWh, in Q1 2020, around half of the 2019 average, implying a slight profitability of gas-fired generation in the country. However, increasing renewable generation, like in many other markets, rendered the position of gas difficult in Q1 2020 in the UK.

Figure 7 Clean spark spreads in Germany, Spain, Italy and the United Kingdom

1.2 Production

In the first quarter of 2020 EU gas production reached approximately 15.6 bcm, 23% (4.8 bcm) less than in the same quarter of 2019 (See Figure 8). During the whole Q1 2020 gas output was below the 2015-2019 range, reflecting the dwindling trend of gas production in the EU. Five years before, in Q1 2015 the total gas production in the EU was still 36.6 bcm, more than twice as high as in the first quarter of 2020, implying the rapidly decreasing gas production in the block of 27, and increasing import dependency in natural gas.

In the biggest EU producer Netherlands natural gas production in Q1 2020 decreased by 33% (3.5 bcm). The production gap for the biggest Groningen gas field was set to 11.8 bcm for the gas year 2019 (started in last October), which is significantly down from the actual production of the preceding gas year (17.5 bcm, which was also less than the allowed maximum). Beyond the decrease from Groningen field, smaller gas fields produced 2 bcm less gas in 2019 than a year before, indicating the rapid fall in Dutch domestic gas production.

In Romania, being the second biggest gas producer in the EU, production went down by 5% (0.1 bcm). Gas output in Denmark showed a very strong decrease (by 57%, 0.5 bcm year-on-year, principally owing to the suspension of production at the Tyra fields in the Danish North Sea, ahead of the redevelopment9 until 2022), and in Germany, Italy and Ireland production went down by 0.2 bcm each (in percentage change respectively by 13%, 17% and 20%). Looking at the biggest EU gas producers, in Q1 2020 Netherlands produced 7.2 bcm, Romania had a production of 2.5 bcm, followed by Germany (1.3 bcm) and Italy (1.1 bcm).

The United Kingdom managed to slightly increase (by 1%, 0.1 bcm) its gas production in Q1 2020 to 10.4 bcm, whereas in Norway gas production decreased by 3.4%, from 32.1 bcm in Q1 2019 to 31.1 bcm in Q1 2020.

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

- According to Eurostat\(^{10}\), net imports decreased by 6% in the first quarter of 2020 (year-on-year), mainly driven by 5% reduction (year-on-year) of the EU gas demand. Net imports in different EU countries showed a high variation in Q1 2020, ranging from a decrease of 46% (in Austria) to an increase of 217% (in Malta, though by marginal value, 0.1 bcm) in year-on-year comparison. Among big gas consumer countries net imports decreased in the France (by 25%), Poland (12%), in Italy (9%), Germany (8%) and Spain (4%). Net imports increased slightly in Greece (by 4%) and Romania (1%).

- In the first quarter of 2020, the total net extra-EU gas imports reached 80.9 bcm, down by 7% from 86.9 bcm in the same period of 2019. The five biggest importers in the EU in Q1 2020 were Germany (24 bcm), Italy (16 bcm), France and Spain (both 8 bcm) and Belgium (6 bcm), representing together close to 80% of the total EU net gas imports in Q1 2020. After the United Kingdom left the European Union, the gas import dependency of the EU-27 increased further. In 2018 import dependency stood at 83.2% (with the UK, being a significant gas producer, the import dependency was 77.4% in 2018, as Eurostat data show).

- According to ENSTO-G data, imports amounted to 881 TWh in the first quarter of 2020, of which 72% through pipelines and 28% through LNG terminals. Pipeline gas imports from Russia fell significantly, by 23% in year-on-year comparison, principally owing to the big decrease in January through the Ukrainian transit route. Pipeline gas imports from Algeria fell further in Q1 2020 (by 38%), imports from Norway decreased only by 4% in Q1 2020, whereas from Libya it went down by 15% in year-on-year comparison. At the same time, LNG imports, though in a slower pace than in 2019, increased further year-on-year, and reached 248 TWh in Q1 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 40% in the first quarter of 2020, which was the lowest in the last six years\(^{11}\). In Q1 2019 the share of Russian pipeline gas imports was almost 49%.

- As pipeline gas imports from Norway decreased only by 4% year-on-year in the first quarter of 2020, which was slightly less than the total gas decrease (5%), the country’s share in extra-EU gas imports remained practically the same, 24%\(^{12}\), compared to Q1 2019. In the first quarter of 2020 Norwegian gas production\(^{13}\) amounted to 31.1 bcm in Q1 2020, decreasing by 3.4% year-on-

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10 Net imports equal imports minus exports and do not account for stock changes.
11 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.
12 Note that Norway to UK flows reported by ENSTO-G includes some gas from UK offshore fields, resulting in an overestimation of Norwegian imports.
year. However, Norwegian gas production has relatively low costs (estimated to be around 2 USD/mmBTU, around 6-6.5 €/MWh in Q1 2020), which still ensured profitability for exporting gas to Europe.

- In the first quarter of 2020 pipeline gas imports from Algeria continued to fall, decreasing by 38% year-on-year, which resulted in a falling share within the total extra-EU imports (5% in Q1 2020 vs. 7.5% in Q1 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 turned down again (-15% in Q1 2020 compared to the same period of the previous year), and its share was only 1.3% in the total EU gas imports.

- In Q1 2020, similarly to the preceding three quarters, LNG confirmed its second place in EU external import gas sources, ensuring around 28% of the total imports, 8 percentage points up compared to Q1 2019. The share of LNG in the total extra-EU gas imports, as multiple sources (ENTSO-G, Refinitiv) show, was the highest in Q1 2020 in the last six years.

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

<table>
<thead>
<tr>
<th>TWh</th>
</tr>
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<tbody>
<tr>
<td>1,200</td>
</tr>
<tr>
<td>1,000</td>
</tr>
<tr>
<td>800</td>
</tr>
<tr>
<td>600</td>
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</tr>
<tr>
<td>0</td>
</tr>
<tr>
<td>-200</td>
</tr>
</tbody>
</table>

Source: Based on data from the ENTSO-G Transparency Platform, data as of 5 May 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 or LNG imports from the UK, etc.).

- Due decreasing import volumes and falling average import prices, in the first quarter of 2020 the estimated gas import bill fell below €10 billion for the first time in the last six years (amounting to €9.8 bn in Q1 2020, down from €14.4 billion in Q4 2019 and from €18.7 billion in Q1 2019, falling by 48% year-on-year).
Figure 10 – Estimated quarterly extra-EU gas import bill, in billions of euros

<table>
<thead>
<tr>
<th>Quarter</th>
<th>2017</th>
<th>2018</th>
<th>2019</th>
<th>2020</th>
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</thead>
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<td>20</td>
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</tr>
<tr>
<td>Q2</td>
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<td>17.5</td>
<td>16</td>
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<tr>
<td>Q3</td>
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<tr>
<td>Q4</td>
<td>17</td>
<td>24</td>
<td>20</td>
<td>18</td>
</tr>
</tbody>
</table>

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 LNG imports are increasing in the EU, 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 Q1 2020, split by 40% of pipeline imports and 6% of LNG, indicating that Russia is becoming a more and more 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 49% to 40% within the total extra-EU gas imports, by taking into account LNG the share of Russia decreased less steeply, from 53% to 46%.

- The share of Norway was 25% in Q1 2020 (vs. the aforementioned share of 24% for the pipeline imports only), and the share of Algeria is 6.3% with LNG (as opposed to 5% only including pipeline gas). The share of LNG in the total extra-EU imports was 21%, (on the top of LNG accounted in shipments from Russia, Norway and Algeria. The import share of LNG is significantly growing, up by 9 percentage points compared to Q1 2019 and reaching the highest in Q1 2020 in the last six years. It seems that the decrease in the share of Russia and Algeria was replaced by the increasing share of LNG, while the share of Norway remained practically the same over the last year.
1.3.1. Pipeline imports from Russia and EU supply to Ukraine

- Figure 12 shows the breakdown of EU gas imports from Russia to the four main pipeline supply routes: Ukraine (which includes the Brotherhood Pipeline and the Balkan route), Belarus (mainly the Yamal pipeline), Nord Stream and the recently inaugurated TurkStream.

- In the first quarter of 2020 the volume of Russian imports fell by 23%, if compared with the same quarter of 2019. The steepest fall could observed in January 2020, when Russian pipeline imports fell by 29% year-on-year. As shown on Figure 12, gas flows transiting Ukraine were almost 49% lower than in Q1 2019. In January 2020 only 1.4 bcm gas of Russian origin was transited through Ukraine, whereas in 2019 the average monthly transit volume was 5.7 bcm. Some market traders indicated that Gazprom might have sold gas volumes stored in EU countries to serve European customers rather than using the Ukrainian transit route, albeit the five-year transit agreement was concluded at the end of 2019. In February and March 2020, albeit slightly recovering, gas imports through the Ukrainian transit route was still down by 35-40% in year-on-year comparison.

- Flows through Belarus were also down significantly, by 22% in Q1 2020 compared to the same quarter of 2019. In contrast, gas flows through the Nord Stream managed to rise slightly, by 2% in Q1 2020 in year-on-year comparison.

- As a result, in Q1 2020 the share of the transit through Ukraine fell measurably, and reached only 26%, compared to 40% in Q1 2019. Nordstream became the main supply route of Russian gas to Europe, as its share reached 45% of the total Russian pipeline gas imports in Q1 2020 in the EU, up from 35% a year earlier. The Belarus transit route represented 25% in Q1 2020, practically the same as in Q1 2019. As of 8 January 2020 the TurkStream is operational, its share was around 4% in Q1 2020, and around 1.2 bcm gas was shipped via this transit route to the EU.

- In Q1 2020 Nord Stream represented 18% (15 bcm) in the total net extra-EU imports, the Ukraine had a share of 10% (8 bcm), and the Belarus transit route ensured 10% (8 bcm), whereas 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 Q1 2020.

- This implies that decreasing pipeline imports from Russia, which was partly due to the increasing share of LNG in the European gas market, was less transited through Ukraine, 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.
Figure 12 EU imports of natural gas from Russia by supply route, 2017-2020

- In the first quarter of 2020, similarly to the preceding years, Ukrainian natural gas imports from EU countries started to recover after dropping close to zero during the autumn months at the end of the storage injection season. However, it seems than in the first three months of 2020 gas imports in Ukraine increased more rapidly than in the preceding years. In Q1 2020 total gas imports from Poland, Slovakia and Hungary amounted to 2.2 bcm, up from 0.9 bcm in Q1 2019. In Q1 2020 1.7 bcm natural gas came from Slovakia, while amounts from Hungary and Poland were respectively 0.4 bcm and 0.1 bcm.

- Higher amounts of Ukrainian imports were probably due to low spot market prices and mild winter conditions, implying that it was more profitable to import gas from EU countries than relying on withdrawals from underground gas storages.

- Meanwhile Gazprom sold an amount of 3.8 bcm natural gas in January 2020 through its Electronic Sales Platform (ESP), which was the highest since the creation of the platform in September 2018. Around 11% of Gazprom’s European sales were executed in this month though the ESP or hub trading, mainly selling the gas stored in European storages, with principal delivery points on the German Gaspool market, on the delivery point Arnoldstein at the border of Austria and Italy and on the delivery point Beregovo on the Hungarian-Ukrainian border. In February 2020 The ESP traded volumes were still significant, amounting to 2.4 bcm, concentrating principally on month-ahead and season-ahead contracts, whereas the bulk of sales in January was linked to spot contracts.

Source: Based on data from the ENTSO-G Transparency Platform, data as of 5 May 2020. Deliveries to Estonia, Finland and Latvia are not included; transit volumes to the Former Yugoslav Republic of Macedonia, Serbia and Turkey are excluded.
1.3.2. LNG imports

The year-on-year increase in EU-27 LNG imports was 26% in Q1 2020, being definitely lower than in 2019 (65%). The quarterly LNG import reached 25.1 bcm however, the highest quarterly amount in the last five years, up from 23.4 bcm in Q4 2019. Although steadily increasing over the last one and half years, LNG import market in the EU shows the sign of saturation as the pace of the increase slows down, as Figure 14 shows. With the exception of France and Italy, where LNG imports in Q1 2020 respectively showed a decrease of 8% and 10% year-on-year, all LNG importing countries in the EU showed measurable (in most cases double or triple digit) increases in per cent compared to Q1 2019.

- Spain became the biggest importer in Q1 2020 (with a quarterly import of 6 bcm) showing an increase of 56% in year-on-year comparison, while France came to the second place, importing 5.4 bcm, albeit showing a year-on-year increase of 8%, and Belgium was the third biggest importer, (4.1 bcm), where imports rose by a remarkable 111% compared to Q1 2020. LNG imports in Italy, amounted to 2.8 bcm in Q1 2020, decreasing by 10% year-on-year, whereas in the Netherlands and Portugal LNG imports respectively reached 2.5 bcm (up by 13%) and 1.6 bcm (up by 17%). The total EU LNG imports amounted to an estimated €3.3 billion in Q1 2020, down from €4.8 billion a year before, as the result of sharply decreasing LNG import gas prices (practically halving year-on-year), in spite of increasing import volumes in Q1 2020.

- LNG imports in the United Kingdom were up by 38% in Q1 2020, reaching almost 6 bcm. Given that this country has low storage capacities, LNG imports can play an important role and alternative to gas imports from the continental Europe in ensuring gas consumption needs.

- In the first quarter of 2020, LNG market prices in Europe remained aligned with their East Asian peers (see Figure 26), and even the small premium visible in Q4 2019 disappeared. 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 and the Middle East. On the top of this, small Asian premiums increased the competitiveness of LNG of Russian origin (production at the Yamal Peninsula), as shipment costs were more favourable to Europe due to is geographical proximity. This was at least the sixth quarter when global LNG prices remained well aligned, primarily owing to the abundant global LNG supply, and subdued demand due to the introduction of confinement measures due to the Covid-19 coronavirus. In January and February 2020 some cargoes with original destination to China were redirected to Europe due to the lack of Chinese demand, owing to lower economic activity following the lockdown measures.
In the first quarter of 2020, the United States preserved its biggest LNG supplier position to the EU and it increased its share in EU-27 LNG imports, reaching 30%. Russia became the second biggest LNG import source for the EU, with a share of 22% in Q1 2020. For the first time since the beginning of the available time series, Qatar came only to the third place and its market share fell to 15% (in Q1 2019 it was still 24%), which was the lowest over the last five years. Nigeria was the fourth biggest import source in Q1 2020, (with a market share of 13%), followed by Algeria (6%), Norway and Trinidad and Tobago (both with a share of 5%) – See Figure 15.

In the first quarter of 2020, the United States were the biggest LNG supplier of Greece (ensuring 59% of the country’s total LNG imports), the Netherlands (41%), Poland (37%, equalling the share of Qatar), Spain (with a share of 34%), and was the single LNG supplier of Malta. Russia was the biggest supplier to Belgium (63%) and was the second biggest supplier to the Netherlands (37%), implying that Russian LNG has increasing importance in North-Western Europe, probably not independently from the dwindling domestic gas production in the Netherlands. Russia was also the single supplier of Finland (though in a small quantity). Russia had a share of 16% in the Lithuanian LNG imports. Qatar was the biggest import source for Italy (49% of the total). Nigeria supplied around 60% of Portugal’s LNG imports, and its share in France was 26%.

Algeria had a share of 15-20% in Q1 2020 in France, Italy and Greece. Norway remained a dominant LNG supplier of Lithuania (84%); it had a share around 70% in Sweden, and ensured 18% of the Polish LNG imports. At the same time, Trinidad and Tobago ensured around 16% of LNG imports in Spain. Spain also had the most diversified LNG import source structure in Q1 2020, receiving cargoes from twelve different countries, followed by France (seven different sources). On the other hand, Malta and Finland had a single supplier of LNG sources.

Contrarily to the first ten months of 2019, the US exported more LNG to the EU than Russia in January-March 2020 in each month, 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.

Source: Commission calculations based on tanker movements reported by Refinitiv
*Other* includes Finland, Malta
Figure 15 LNG imports to the EU by supplier

bcn

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

Figure 16 – LNG imports in the EU Member States from different sources in the first quarter of 2020

bcn

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

- The average monthly utilisation rates of terminals in the LNG importing EU Member States are presented on Figure 17 for some countries in the EU, the EU on average and the UK. In the first three months of 2020 the average EU utilisation rate kept the increasing trend, which could be observed in 2018 and 2019 and reached almost 67% in March 2020. At individual terminal or country level, monthly utilisation rates can be quite volatile, depending on the arrival of cargos and the hourly regasification capacities. Similarly to the previous quarters, utilisation rate in Spain remained below the EU average (around 40% in Q1 2020),
whereas in France and Italy it was above the EU average during most of the time in Q1 2020. Low terminal utilisation rates in Spain might provide further opportunities for LNG imports in the EU if interconnector infrastructure is reinforced with France.

**Figure 17 – Average monthly regasification terminal utilisation rates in the EU and in some significant LNG importer countries**

- In the first quarter of 2020 105 LNG cargoes arrived from the US, unloading more than 9.6 bcm of LNG (in re-gasified form), with an estimated monetary value of €1 billion. In the first quarter of 2019 only 35 US LNG cargoes arrived in the EU (with a total re-gasified volume of 3.4 bcm).

- LNG exports to the EU represented 49% of total US exports in Q1 2020, which was the highest quarterly ratio since 2016, the beginning of LNG exports from the US. In the first quarter of 2020 the four most important EU destinations of the US LNG exports were the Spain (2 bcm), France (1.3 bcm), the Netherlands (1 bcm) and Italy (0.95 bcm). The United Kingdom is also an important US LNG absorber country, receiving 2.2 bcm in Q1 2020.

- Behind the US, Russia was the second most important LNG supplier to the EU in Q1 2020. In this quarter, Russia sent 89 cargoes of LNG to the EU, representing a volume of 6.5 bcm and an estimated monetary value of €0.7 billion. However, in Q1 2020 the US accelerated its exports to the EU, increasing it by 167% year-on-year, whereas in the case of Russia the increase rate over the same period was only 29%.

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)
**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
1.4 Policy developments

- As of January 2020 the new European Gas Pipeline Link (EUGAL)\(^{14}\) has become operational, built to bring natural gas from the Baltic Sea area (related to NordStream) to Germany and to the border of Czechia. The pipeline is composed of two strings of 27.5 bcm each. According to current plans EUGAL would transport up to 10 bcm gas per year to Germany and 21 bcm to Czechia, which will fundamentally change the gas flows in Central Europe, as Czechia will receive the bulk of its gas needs though Germany and it will also be able to supply Slovakia. This might also explain the decreasing Slovak imports in the first months of 2020 via the pipeline through Ukraine.

- At the start of 2020 the Finnish gas market was liberalised, the bidirectional Estonian-Finnish pipeline opened (inaugurated in December 2019) and Finnish products were launched at the Get Baltic gas exchange\(^{15}\). The completed new gas pipeline enables the connection of the Finnish and Estonian gas markets and integrates the countries in the EU’s common energy market. The pipeline improves the reliability of regional gas supply and enables decentralised gas supply as well. This interconnector has also broken Russia’s monopoly on gas supply to Finland.

- As of 16 January 2020 Croatia’s isolation from neighbouring markets ended, as gas transmission system operator Plinacro finished the construction of a compressor station on the Croatian-Hungarian border, which enables firm export flows along the now bidirectional Drávaszerdahelye border point\(^{16}\). The launch of export capacity on the Croatian-Hungarian border was the part of the set of infrastructure development projects in accordance with EU regulations, which require interconnectors to be bidirectional. This interconnector is expected to play important role after the Krk floating LNG terminal, with an annual re-gasification capacity of 2.6 bcm, will be operational as of 2021, also allowing LNG shipments to the Hungarian gas market.

- On 21 February 2020 Hungary and Slovakia signed a memorandum of understanding on expanding gas interconnector capacity\(^{17}\). Both countries want to boost the bidirectional capacity of the interconnector between the gas networks of the two countries to an annual 5.3 bcm. A capacity contracting procedure will be launched in this summer. The interconnector, which started commercial operation in 2015, now has an annual firm transmission capacity of 4.5 bcm from Slovakia to Hungary and an interruptible capacity of 1.8 bcm cubic meters in reverse mode.

- On 28 February 2020 the European Commission launched an in-depth investigation\(^{18}\) to determine whether the regulation mechanism for the storage of natural gas implemented by France complies with EU rules on State aid. In December 2017, France introduced a regulation mechanism for the storage of natural gas, which is intended to keep in operation the storage capacity deemed necessary to ensure the security of the country's natural gas supply. The mechanism involves auctioning all the storage capacity in France and covering the storage operators’ costs. To this end, where the operators’ revenue is below the revenue threshold set by the French independent energy regulatory authority, storage operators receive compensation. The compensation is financed by means of the tariffs for use of the transmission network that are collected by the network operators from gas shippers. The Commission takes the preliminary view that the regulation mechanism constitutes State aid and it is currently conducting a formal investigation to assess its compatibility with the internal market.

- On 3 March 2020 Bulgaria achieved a 40% cut in the price of gas it imports under its long-term contract with Russia, its dominant gas supplier\(^{19}\). Bulgaria, which relies on Russian imports for more than 80% of its gas needs, achieved a price cut after the European Commission finalised an antitrust investigation against Gazprom in 2018 by way of commitments concerning eight east European countries. The price cut was achieved on the basis of the price revision clause set out by the commitments and after Gazprom agreed to link a significant part of the Bulgarian price to European gas hubs. The price partly remains linked to oil prices. The new agreement is retroactively valid as of August 2019, and gas customers are to be reimbursed on price differential up to March 2020.

- On 6 March 2020 the European Commission made commitments offered by Romanian gas TSO Transgaz legally binding under EU antitrust rules\(^{20}\). The company will make available to the market significant firm capacities for natural gas exports from Romania to neighbouring Member States, in particular Hungary and Bulgaria. Transgaz has committed to make available minimum export capacities of 1.75 bcm per year at the interconnection point between Romania and Hungary and to make available minimum export capacities totalling 3.7 bcm per year at two interconnection points between Romania and Bulgaria. On the top of this, Transgaz committed to ensure that its tariff proposals to the Romanian national energy regulator will not discriminate between export and domestic tariffs and it will refrain from using any other means of hindering exports.

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14 https://www.eugal.de/en/eugal-pipeline/
16 https://bil.hu/energy-environment/hungary-slovakia-sign-mou-on-gas-interconnector-expansion_178628
17 https://bbj.hu/energy环境/hungary-slovakia-sign-mou-on-gas-interconnector-expansion_178628
On 30 March 2020 the Arbitral Tribunal in Stockholm has ruled in favour of the Polish oil and gas company PGNiG, thus ending a five-year long dispute between PGNiG and the Russian Gazprom concerning the price of gas. The award is binding on both parties from the moment it was announced. The price that PGNiG will pay to Gazprom for natural gas will be based on the new price calculation formula, which is very closely and directly tied to the gas price level on the Western European market. The tribunal’s ruling applies as of 1 November 2014, when PGNiG submitted a request for price review to Gazprom. The Russian company was required to pay back to PGNiG an estimated USD 1.5 billion (around € 1.3 billion), which is the difference between the price calculated based on the new formula and the amounts actually paid by PGNiG between 1 November 2014 until 29 February 2020.

Over most recent period, TTF is becoming a widely used benchmark, even in some Asian contracts. The Chinese major oil and gas company Sinopec is considering to restart LNG imports from the US, and analysed options of contractual price linking to the US Henry Hub, northeast Asian markers and TTF. In their view Henry Hub shows too little correlation with the global LNG price movements. TTF has several advantages in Sinopec’s view over northeast Asian markers, as it is a well-regarded benchmark with long trade history. Furthermore, it is sufficiently liquid to ensure price accuracy and it has future contracts to manage risks and for hedging. By choosing TTF the Chinese company also bears lower risks if they choose to finally resell LNG shipments in Europe. This example perfectly shows the increasing importance of TTF as global gas benchmark.

1.5 Storage

Figure 21 shows EU stock levels as the percentage of storage capacity in gas years 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 2018, plus 177 TWh capacity planned or already under construction (adding potentially another 16 bcm).

The first quarter of the year is the peak of the heating season and usually it is an intensive withdrawal period, with decreasing storage filling rates. On average, net storage withdrawals made during the first quarter of 2020 were equivalent to 34.3% of storage capacity, which was a little higher than that of 29.9% in the same period of 2019: the average filling rate decreased from 88.3% on 31 December 2019 to 53.9% on 31 December 2019. In spite more intensive withdrawal activity, given that January 2020 started with significantly higher filling rates than 2019 (88.3% vs. 70.3%), thus, at the end of March 2020, the average filling rate in the EU was more than 13% higher than a year before (53.5% vs. 40.4%), being the highest end-of-March value in the last nine years.

LNG imports were still significantly up in the EU, increasing by 26% year-on-year in the first quarter of 2020, which ensured an abundant gas supply and high send-outs to the grid in this period. The first three months of 2020 were unusually mild through whole Europe, which reduced heating related demand, and as of March with the arrival of the economic downturn and confinement measures demand for gas in industry and electricity generation also decreased, implying that lower stocks were also sufficient to satisfy gas needs and taking into account security of supply aspects.

High gas storage levels at the end of 2019 were probably also owing to the uncertainties around the future of Russian gas transit agreement with Ukraine. However, as the agreement was concluded at the end of the last year, this has brought to a calmer period to the European gas markets, pricing out the security of supply related uncertainties and enabling operating at lower storage levels.

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22 See more in Gas in Focus, 27.05 16 March 2020, page 6.
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 5 May 2020. See explanations on data coverage at https://agsi.gie.eu/#/faq.

The 5-year range reflects stock levels in gas years 2014-2018. Gas years always begin on 1 October. The graph shows stock levels on the 15th day of the given month.

- However, as Figure 22 shows, there was a significant variation among Member States in terms of both the starting position (the filling rate at the end of December 2019) and the pace of withdrawals. Although the change in the filling rate over Q1 2020 was 34.3% on EU average, in Sweden and France filling rates decreased by more than 50% over this period. At the same time filling rates decreased only by 12% in Belgium and by 20% in Spain and Slovakia. At the end of March 2020 storage filling rates were above 70% in Slovakia, Austria, Belgium and Germany, whereas in Croatia, France and Sweden they were below 30% of their total capacities.

- Figure 22 also shows the difference between storage filling rates in the EU Member States on 31 March of 2019 and 2020. With the exception of the Netherlands, storage filling rates on 31 March 2020 were higher than on the same day in 2019. In Slovakia, Romania and Hungary filling rates were more than 40% higher at the end of Q1 2020 than a year before, whereas in France, Croatia and Poland the difference was less than 5%. On EU average, the difference was more than 13%, implying that the second quarter of 2020 started with higher filling rates than usual and in the following two quarters (summer injection season) injection related demand for gas will be lower than usual, also exerting a downward pressure on spot and near-curve wholesale prices.
The monthly average 2020 seasonal spread (the difference between summer and winter 2020 contracts) on the TTF increased further in Q1 2020 and in January and February it was around 4.4 €/MWh, slightly decreasing in March 2020 to 3.8 €/MWh. The 2021 seasonal spread reached on monthly average 2.5-2.6 €/MWh in each month of Q1 2020. On quarterly average in Q1 2020 the 2020 seasonal spread on the TTF was 4.2 €/MWh, while the 2021 reached 2.6 €/MWh.

On the NBP, 2020 seasonal spreads rose above 5 €/MWh in January and February 2020, whereas in March they decreased slightly, to 4.7 €/MWh. On quarterly average in Q1 2020 the 2020 seasonal spread on the NBP was 5 €/MWh, while the 2021 reached 3.6 €/MWh.

Subdued demand stemming from mild weather conditions, coupled with abundant LNG supplies and decreasing demand for gas in industry and power generation in the late weeks of Q1 2020 all contributed to low spot gas prices, which were not fully reflected in forward contracts, contributing to widening summer-winter spreads. Moreover, high storage filling rates reduced the demand for 2020 summer contracts, as there might be less injection needs than usual in Q2 and Q3 2020. 2021 summer-winter spreads were lower than their 2020 peers on both TTF and NBP hubs, which might signal that for the next year the market does not price such low spot and few months-ahead prices as in Q1 2020 they were. As in March 2020 practically all stocks and commodities were falling to several year lows, contracts on the curve followed this trend, which was reflected in shrinking 2020 and 2021 summer-winter spreads, compared to numbers seen in the first two months of 2020.

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 0.7-0.8 €/MWh for the 2020 spreads and to 1-1.2 €/MWh for the 2021 spreads in Q1 2020).
Figure 23 Winter-summer spreads in the Dutch and British gas hubs

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 Biogases in electricity and heat generation and blending with natural gas

In 2018 the total indigenous biogas production amounted to more than 580 thousand TJ (approximately 161 TWh). Out of this, the share of ‘other gases from anaerobic fermentation was 82%, amounting to 131 TWh. The share of landfilled gas was around 9% (15 TWh), while that of sewage sludge gas was 8% (13 TWh). The remaining 1% was represented by biogases from thermal processes, with less than 2 TWh volume. In 2019, according to preliminary Eurostat data, the total biogas production increased further and reached 590 thousand TJ (164 TWh). The biggest biogas producer in the EU was Germany (producing around 55% of the total EU production in 2018, around 90 TWh of biogas), followed by Italy (13%, around 21 TWh) and France (7%, 11 TWh).

As the next chart shows, over the last decade there was a dynamic increase in biogas production in the EU, reaching more than 160 TWh in 2018, whereas ten years earlier the total amount of produced biogas was barely 60 TWh. In 2018 around 81% of the biogas consumed were used for energy purposes, while 18% was used for other industrial purposes (and distribution losses accounted for 1%). Around 75% (121 TWh) was used in electricity and heat generation as fuel, while around 2.5% (4 TWh) was injected in the gas grids for blending natural gas.
Figure 20 – Biogas in electricity and heat generation and biogas blending for natural gas

Source: Eurostat
2. Wholesale gas markets

2.1 EU energy commodity markets

- The dated Brent crude daily average oil price showed the biggest quarterly fall in the last decades over Q1 2020. While at the beginning of January 2020 it stood at 66 USD/bbl (59 €/bbl), by the end of March 2020 it fell below 18 USD/bbl (16 €/bbl), a low level not seen since 2002. Looking at the forward contract, the fall in the daily price was also significant, though not so steep as in the case of the dated Brent crude. Over Q1 2020 the year-ahead Brent fell from 61 USD/bbl to 39 USD/bbl (54 €/bbl to 36 €/bbl), reflecting the general market expectation of price recovery in the next year. In Q1 2020 the oil market underwent a supply and demand side price shock while on the supply side the failure of OPEC+ agreement (6 March 2020) on production adjustments resulted in huge oversupply, on the demand side confinement measures related to Covid-19 coronavirus, resulting in fall in transport and industrial activities, contributed to steep price falls. Although the link between oil and gas prices has substantially weakened over the last few years, general commodity and stock price falls in February and March 2020 impacted most of the energy products.

- The Dutch TTF spot gas price started January 2020 at 11.8 €/MWh, and by the end of March it fell to 7.1 €/MWh, which was the lowest since August 2009. The price decrease was practically continuous over Q1 2020, with some exceptions in February (there were rumors on cancellation of some LNG shipments to Europe, which proved to be later false). On the demand side, the generally mild weather conditions reduced heating related gas needs, good renewable availability in most of the EU during practically the whole quarter reduced need for gas-fired power generation, and demand in industry decreased with the introduction of the confinement measures, all supported the decrease in wholesale market prices. On the supply side increasing LNG send-outs to the grid in the EU, and withdrawals from storages after less storing needs with the conclusion of the negotiations on Russian gas transits through Ukraine ensured abundant commodity and stock price falls in February and March 2020 impacted most of the energy products.

- Although crude oil prices in Q1 2020 showed a steep fall, oil prices in the spring and summer months of 2019 were relatively stable, and taking into account of the usual time lag of 6-9 month, this might have had a little impact on the oil-indexed gas contracts in Q1 2020. The current price fall will only appear in the oil-indexed contracts as of autumn 2020, and until then no significant changes are expected. 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, averaged 26 €/MWh, being two-and-half times as high as the TTF 9.7 €/MWh. This underlines the uncompetitive nature of oil-indexed contracts in recent quarters.

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

![Spot prices of oil, coal and gas in the EU](image)

Source: S&P Global Platts

- Spot coal prices started January 2020 at 46 €/Mt, and interestingly finished March 2020 at a similar level, at 45 €/Mt, though between 9-11 March they fell below 40 €/Mt. In contrast to the significant fall in crude oil and natural gas wholesale prices, it could be assumed that coal prices were relatively resilient to the general energy and commodity price fall in March 2020. However, this resilience reflects the constantly decreasing demand for coal, as its share in power generation had already been falling before the economic crisis arrived, and it was gradually squeezed out from the electricity mixes in most of Europe, implying that the recent decreasing demand for electricity did not really impact coal, owing to its less and less significance. Carbon prices were above 24 €/tCO2e at the beginning of January 2020 and finished Q1 2020 below 18 €/tCO2e, generally following the trend of the energy
market. On the top of the general market sentiment, the share of renewables in the EU electricity generation mix increased in Q1 2020, resulting in less fossil fuel generation and less demand for emission allowances.

### 2.2 LNG and international gas markets

- Figure 25 displays the international comparison of wholesale gas prices. In Q1 2020 prices of European, Japanese and Chinese landed LNG, after temporary minor divergences, became more aligned and amid general price fall in March 2020 the differentials decreased measurably. Bearing also in mind lower transportation costs to Europe than to Asia, this meant a great opportunity to LNG exporters in the Atlantic Basin, Russia and the Middle East to continue to ship cargos towards the European markets. In March 2020 LNG imports in the EU-27, after minor setback in January, picked up again and in reached more than 9 bcm, which was the highest monthly ever.

- The average Japanese LNG price was 3.6 USD/mmbtu in Q1 2020, down from 5.8 USD/mmbtu in Q4 2019, and down from 6.9 USD/mmbtu in the first quarter of 2019, implying a price fall of 47% year-on-year. The Japanese premium above the Dutch TTF hub was on average 0.5 USD/mmbtu in the first quarter of 2020, down from 1.6 USD/mmbtu in Q4 2019, and down from 0.8 USD/mmbtu in Q1 2019. On quarterly average, LNG import prices in China were comparable with their Japanese peers (3.7 USD/mmbtu in Q1 2020). These numbers show that price differentials between European and Asian LNG contracts practically disappeared in Q1 2020, helping LNG to find the way in competitively priced Europe.

- The average price of Chinese pipeline gas imports in Q1 2020 was 6.9 USD/mmbtu, which was well above the Asian LNG reference prices, by more than 3 USD/mmbtu. This contract showed a slightly decrease compared to Q4 2019 (7.3 USD/mmbtu) and to Q1 2019 as well (7.6 USD/mmbtu), still 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 Q1 2020 (from 2 USD/mmbtu to 1.75 USD/mmbtu between January and March). At the same time the euro-dollar exchange rate remained practically unchanged, around 1.10 in Q1 2020. In year-on-year comparison the euro depreciated against the dollar (1.13 in March 2019 and 1.106 in March 2020), implying that changes in the gas price in euro over the last twelve months preceding March 2019 was partly absorbed by the depreciating euro.

- In the first quarter of 2020, TTF averaged at 3.1 USD/mmbtu (9.7 €/MWh). The average German border price was around 30% higher (4.4 USD/mmbtu or 13.5 €/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 first 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 1.9 in the first quarter of 2020, down from 2.4 in Q4 2019, which equalled the ratio in Q1 2019. The average price ratio of the Japanese LNG prices and the TTF was 1.2, down from 1.4 in Q4 2019, and was close to that in Q1 2019.

- The average TTF/Henry Hub ratio remained around 1.7 in the first quarter of 2020, but it was down from 2.1 in the same period of 2019. In absolute terms, the price spread between Henry Hub and TTF was 1.2 USD/mmbtu in the first quarter of 2020, which compares to an average of 3.2 USD/mmbtu in the same quarter of 2019. By March 2020 the price differential between US Henry Hub and the TTF shrunk to 1 USD/mmbtu.

- In the first quarter of 2020, spot prices averaged 3.1 USD/mmbtu in the Netherlands, 2.8 USD/mmbtu in Spain, 3.6-3.7 USD/mmbtu in China and Japan, implying that the Asian price premium to the TTF fell to 0.5 USD/mmbtu in Q1 2020, whereas it was 1.6 USD/mmbtu in Q4 2019.

- JCC (Japanese Crude Cocktail), the Japanese benchmark of oil-indexed LNG prices, averaged around 10 USD/mmbtu in the first quarter of 2020, which was almost three times as high as the average spot price (3.6 USD/mmbtu), reflecting the slow responsiveness (time-lag in the oil indexation) to the spot market prices of this oil-indexed contract.
Figure 25 International comparison of wholesale gas prices

- Figure 26 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 first quarter of 2020, the estimated Algerian pipeline import price in Spain increased slightly (by 2%), compared to the previous quarter, averaging around 21.5 €/MWh, and was down by 6% compared to Q1 2019. However, in March 2020 the average estimated Algerian import price in Spain was two-and-half times as high as the Spanish LNG import price and more than twice as high as the TTF benchmark. This is a highly probable explanation why pipeline gas imports from Algeria fell by 38% in the EU in Q1 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 first quarter of 2020 hub prices and hub-based import price contracts in western Europe remained well aligned, and in March 2020 the differentials between these prices were barely 1 €/MWh. The quarterly average prices showed a decrease of 20-45% compared to the previous quarter, Q4 2019, reflecting the significant price decrease on wholesale gas markets and import contracts. In year-on-year comparison, these contracts were down by 40-55% in Q1 2020.

Sources: S&P Global Platts, Refinitiv, BAFA, CEIC
Figure 26. Price developments of LNG and pipeline gas in the UK and Spain


2.3 European gas markets

2.3.1. Gas trade on the EU hubs

- As Figure 27 shows, liquidity on the main European gas hubs increased in the first quarter of 2020: the total traded volume amounted to around 20 678 TWh (equivalent to around 1 726 bcm, and in monetary terms representing €200 billion). 32% more in volume than in Q1 2019. This was around 16 times more than the gas consumption in the seven Member States covered by the analysis in January-March 2020.

- Traded volumes in Q1 2020 increased by 52% year-on-year on the most-liquid European hub Dutch TTF. In Italy (PSV) volume was up by 25%, and in Austria on the VTP hub traded volumes rose by 8%. In contrast, the traded volume on the French TRF hub decreased by 4% and on two German hubs (Gaspool and NGC) together it went down by 8% over the same period. On the Belgian Zeebrugge hub traded volumes continued their fall and went down by 18% in Q1 2020 year-on-year. At the same time, traded volumes on British NBP hub, still the second biggest hub on the broader European market, registered a decline of 5% compared to Q1 2019.

- The significant increase on the TTF hub further reinforced its leading role in Europe, in Q1 2020, pooling almost 74% of the total European gas trade alone (and if looking at the EU countries, its share is even bigger, 87%). 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 Q1 2020 fell by 5% compared to the 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 Q1 2019.

- Other markets had lower shares: Germany (NGC and Gaspool together) had a share of 5.2%, while the Italian PSV only had 2.4%, whereas TRF, VTP and Zeebrugge respectively had 1.7%, 1% and 0.5% in Q1 2020.

- In the first quarter of 2020 LNG imports in the EU still showed a robust increase (+26% year-on-year), which helped to drive up gas traded volumes and liquidity, especially on the most liquid TTF hub. Another important issue in understanding the dynamics of trade is hedging activity, which was impacted by the increasing difference between summer and winter gas price contracts, and

24 Assuming that all trade was carried out on the quarterly average spot price
25 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 this period represents 12 times the total EU gas consumption in this period.
with the onset of the economic consequences of the coronavirus crisis the price volatility also increased on the wholesale gas markets, which gave further room for hedging activities for traders. Increasing liquidity is also beneficial from the perspective of the TTF as widely used benchmark in international gas trade, as buyers and sellers prefer to adopt liquid benchmarks in their trade contracts.

- The share of exchange executed contracts on the Dutch TTF hub was 36% in Q1 2020, which was the highest among the observed EU countries, and was up by 11 percentage points compared to Q1 2019. On the French TRF it amounted to 16%, up by 4 percentage points compared to Q1 2019. On the VTP hub in Austria this share was also 16%, however down by 2 percentage points compared to the same period of 2019, and was 13% on the two German hubs together, practically unchanged year-on-year. On the Italian PSV and on Zeebruge in Belgium the share of exchange-executed contracts was much lower, only 1-2%. On the NBP hub in the UK, the share of exchange trade was still the highest among all observed markets, amounting to 54% in Q1 2020, up by 8 percentage points compared to Q1 2019.

Figure 27 Traded volumes on the main European gas hubs in the first 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 Q1 2020 58% of the total trade was OTC bilateral, 6% was OTC cleared, whereas the share of exchange-executed contracts was a 36%, which one percentage point lower than in Q4 2019, but was close to the highest in the last five years. The share of exchange-executed contracts went up by 8 percentage points year-on-year in Q1 2020, whereas the share of OTC bilateral went down by more than 7 percentage points, and that of OTC cleared showed only minor changes.

- Exchange executed volumes in Q1 2020 showed a significant increase (75%) 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 19%. Over the last year, increase in liquidity was mainly driven by exchange-executed contracts, whereas OTC volumes showed a slower, though still measurable increase.
2.3.2. Wholesale price developments in the EU

- European hub prices were averaging around 9.4-11.4 €/MWh in the first quarter of 2020, which was lower than the range in Q4 2019 (12.4-15 €/MWh), and significantly lower than the range in Q1 2019 (18-21 €/MWh). In fact, in the first quarter of 2020 hub prices in Europe were down by 40-50% in year-on-year comparison. The average TTF hub price fell by 47% in year-on-year comparison, and after a short-lived recovery in Q4 2019, fell even below the ten-year low measured in Q3 2019.

- Wholesale gas prices in the first quarter of 2020 were largely impacted on the supply side of the market by the influx of LNG shipments, and withdrawal activities during the winter heating season. On the demand side, mild winter weather, decreasing demand in electricity generation owing to abundant renewable availability and decreasing demand in the industry in consequence of the economic downturn as of February-March, all pointed to lower wholesale gas prices. In the second half of February, as there were some rumors on cancellation of LNG shipments from the US, and in the consequence of stormy weather some LNG shipments could not berth in north-western Europe, there were some temporary price hikes, however, these could not break the overall decreasing trend of wholesale gas prices in Q1 2020.
As Figure 30 and Figure 31 show, the French TRF market was closely aligned with the TTF market during Q1 2020, many times even showing a discount, whereas the German Gaspool, and the Austrian and Italian hubs showed a price premium to the TTF during most of the time.

The discount on the TRF hub to the TTF was due to several factors that resulted in a general gas oversupply on the French gas market. LNG imports and send-outs to the grid was abundant, storage withdrawals ramped up as traders wanted to sell gas on the spot market, anticipating lower prices in the forthcoming period, and generally mild weather and abundant wind power generation that reduced the need for gas-fired generation in the country. On the other hand, low nuclear availability supported gas prices, but the aforementioned factors were stronger. Demand for gas was in March 2020 further subdued by strict confinement measures to cope with the coronavirus.

The price premium of the Italian hub to the TTF was around 2.2 €/MWh in January 2020, but later it started to decrease as high withdrawals from storages, increasing LNG shipments resulted in less reliance on pipeline gas imports from north-western Europe. Italy was particularly hard hit by the coronavirus, and confinement measures were first imposed in the northern regions of the country with industrial focus and high gas consumption. By March 2020 the Italian premium to the TTF decreased to 1.5 €/MWh.

The Austrian premium to the TTF was relatively stable over Q1 2020, amounting to 1 €/MWh, whereas the German premium, also being stable throughout the quarter, was around 0.6 €/MWh.

During wintertime the UK NBP hub normally shows a measurable premium to the European continental hubs, as owing to the limited storage capacities the country needs to import significant amount of gas to satisfy domestic heating needs. However, during Q1 2020 the NBP spot price was well-aligned with the TTF, principally owing to mild weather conditions and abundant LNG shipments that supplied the UK gas market. In some trading days the NBP even showed discount to TTF and the UK exported gas to the continent. The highest price premium to the TTF could be observed in the second half of February, when some LNG shipments could not be unloaded due to the stormy weather conditions.
Figure 30 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 31 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 32 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 hub showed a gradual and continuous decrease over the first quarter of 2020, starting the year at 11.8 €/MWh, and finishing March at 7.1 €/MWh. At the same time, one-year, two-year and three-year ahead contracts fell less sharply, by 2-3 €/MWh over Q1 2020, resulting in a wide premium (5-7 €/MWh) of the forward gas prices to the spot contracts, implying that the market anticipates a price recovery on the spot market in the future. The current low level of prices is largely due to the demand side factors, especially to the coronavirus related confinement measures, that is to be gradually lifted in the future,
as the economic and societal situation normalises. On the other hand, too low wholesale market prices might prompt the cancellation of some overseas LNG shipments and might result in less pipeline imports in the EU, which would eliminate the current oversupply from the wholesale gas market.

**Figure 32** Forward gas prices on the Dutch gas hub

*Source: S&P Global Platts*

**2.3.3. Prices of different contracts for gas in the EU**

- Figure 33 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 re-convergence in Q1 2020 after two quarters of increasing divergence, as the difference between the cheapest and most expensive contract decreased again, from 9.8 €/MWh measured in December to 9.2 €/MWh in March 2020. Looking at the price differential without the most expensive Algerian gas import price to Italy, this would be less, only 3.5 €/MWh in March 2020, showing only a little change compared to December 2019.

- Hub based contracts, such as the Norwegian import, or hub prices themselves, took a sharp downturn in the first quarter of 2020, after edging up in Q4 2019. 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 the existence of oil-indexation in some import sources to Germany.

- In the first quarter of 2020, according to data from Eurostat, gas prices of Algerian import of origin in Italy decreased again after measurable increases in the previous two quarters, in contrast to Algerian import prices in Spain that remained stable and high. 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 33 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 first 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 34 and Figure 36 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 first quarter of 2020 the estimated average price (including all taxes) was 7.26 Eurocents/kWh, up by 7% compared to 6.81 Eurocents/kWh in Q1 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 retail household gas prices in consumption band D2 rose again, to the level seen in 2017, implying that prices started to slightly diverge again, as Figure 34 shows. Moreover, Band D3 retail prices show higher standard deviation than Band D2, however, over the last two years their convergence improved. 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 first 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 Romania (3.3 Eurocent/kWh), Hungary (3.4 Eurocent/kWh) and Luxembourg (3.7 Eurocent/kWh), whereas the highest prices could be measured in Sweden (11.7 Eurocent/kWh), Spain (10.1 Eurocent/kWh) and in the Netherlands (9.6 Eurocent/kWh). The price differential ratio between the cheapest and the most expensive Member State was 3.6. 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.

![Figure 34 Relative standard deviation of gas prices paid by household customers in EU Member States](image)

Note: all taxes included.
Source: European Commission estimates based on Eurostat data on consumer prices adjusted by the HICP

- Figure 35 shows the level and the breakdown of residential end-user gas prices paid by typical households in European capitals in March 2020. On average, 43% of the price covered the energy component, while the rest covered distribution/storage costs (29%), energy taxes (12%) and VAT (17%).\(^{26}\)

\(^{26}\) Note that these are arithmetic averages. No data are available for Helsinki (Finland), Nicosia (Cyprus), and Valetta (Malta).
• 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 21% (Copenhagen) and Amsterdam (30%) to Zagreb (64%) and Tallinn (61%). The share of distribution/storage costs ranged from 10% (Tallinn) and Amsterdam (13%) to 45% (Sofia) and Madrid (59%). The share of energy taxes ranged from 2% (Luxembourg) and 3% (Madrid) to 40% (Amsterdam) and 36% (Copenhagen). 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 35 also shows that even the energy component is very variable in absolute terms: it was 5.8 times higher in Stockholm than in Riga in March 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 15 (Athens and Stockholm) in March 2020.

• With the exception of three EU capitals out of the observed 24, prices were lower in March 2020 compared to the same month of the previous year. The biggest decrease occurred in Riga (27%), Athens and Brussels (25% both), driven mainly by the decrease in energy costs and network costs. On the other hand, the biggest increase could be observed in Amsterdam (9%) and Zagreb (7%), driven by the growth of the energy taxes component and network costs in the case of Amsterdam (whereas energy costs decreased) and by energy costs and network costs in the case of Zagreb. It seems that price falls on wholesale gas markets in 2019 in Europe started to filter in the final retail household prices in more and more capital cities. In March 2020, Budapest remained the cheapest capital in the EU in terms of gas prices for household consumers, followed by Bucharest and Riga, while Stockholm, Amsterdam and Copenhagen were the three most expensive capital cities.

Figure 35 Breakdown of gas price paid by typical household customers in European capitals, March 2020

Source: VaasaETT

• After being stable in the first half of 2019, retail gas prices for industrial customers started to gradually decrease as of the second half of 2019 and in Q1 2020 they still followed a downward trend in the EU on average. The average estimated price (VAT and other recoverable taxes excluded) in consumption band I4 was 2.46 Eurocent/kWh in the first quarter of 2020, down from 2.73 in Q1 2019, by 9.9% year-on-year. (See the estimated industrial prices on Map 3.) There were only one country where gas prices showed increase in year-on-year comparison, while in the other 24 countries (data were not available for Cyprus and Malta) decreases could be observed. It seems that at EU level recent price decreases on the wholesale gas markets tend to appear 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: 17%, Band I6: 20% decrease).

• Figure 36 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 Q1 2020 this came to a halt. In band I4 prices showed a slightly higher divergence since the second half of 2019, and this trend did not change either in Q1 2020.

• In the first quarter of 2020, Belgium and Luxembourg had the lowest estimated industrial price in consumption band I4 (1.8 Eurocent/kWh), while the highest prices could be observed in Latvia (3.3 Eurocent/kWh) and Sweden (3.1 Eurocent/kWh).
Q1 2020 the price ratio of the cheapest and the most expensive in the EU country was 1.9. This price differential is lower compared to the first quarter of 2017, when it was 2.8.

Figure 36 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 first quarter of 2020, retail gas prices for industrial customers were almost twice as high in Brazil, whereas China and Korea had a price premium of 50-55% to the EU average. On the other hand, retail gas prices in the United States were 60% less than in the EU and in Russia gas prices were the third of the EU average. Indonesia also had a small discount (7%) to the EU retail gas prices. Compared to Q1 2019, the biggest increase could be observed in Russia (6%), while industrial retail gas prices fell the most in the US (22%), in parallel with decreasing prices on Henry hub.

Figure 37 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, Brazil, Korea and Indonesia 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 first quarter of 2020.
Map 2. Retail gas price estimates for households in the EU – First quarter of 2020

**GAS PRICES FOR DOMESTIC CONSUMERS**

Estimates for the first quarter of 2020

Including all taxes and levies

Band D: 6.55 MWh < Consumption < 55.6 MWh

Sources: © European Commission estimates based on Eurostat data on consumer prices for the second half of 2019, adjusted by HCR data.

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EU Average: 7.26 c€/kWh (27 countries)

Source: Eurostat
Map 3. Retail gas price estimates for industrial consumers in the EU – First 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 biannual retail energy price data from Eurostat.