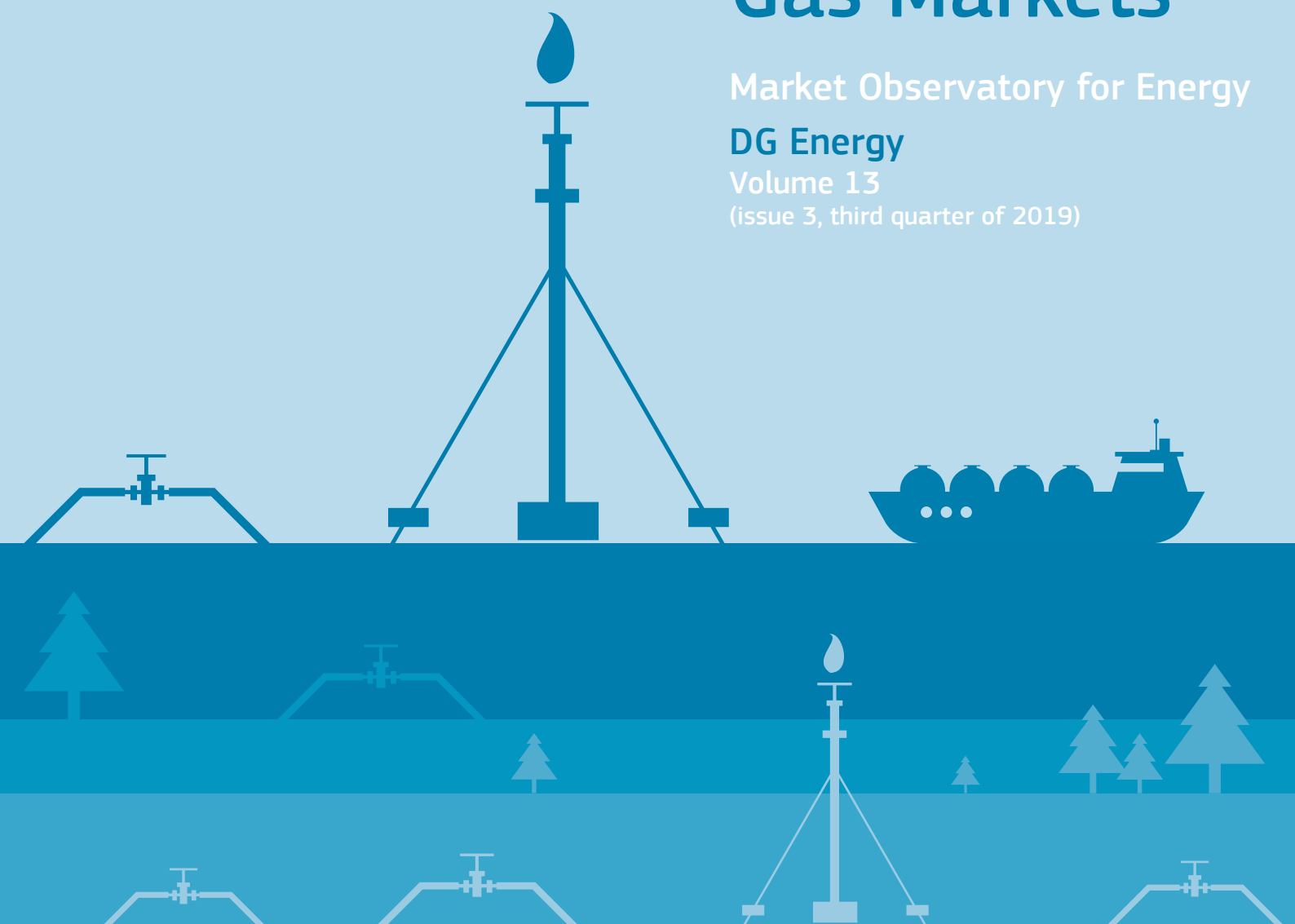




# Quarterly Report

## on European Gas Markets

Market Observatory for Energy  
**DG Energy**  
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## HIGHLIGHTS OF THE REPORT

- In the third quarter of 2019 **EU gas consumption increased by 7%** (5.3 bcm) in year-on-year comparison, mainly driven by increasing gas use in electricity generation (up by 20%). Gas consumption in Q3 2019 was 84 bcm in the EU, whereas in the first three quarters of 2019 it amounted to 343 bcm, up by 3% year-on-year.
- Indigenous **gas production, amounting to 25 bcm in Q3 2019 in the EU, fell by 9%** (2.6 bcm) compared to Q3 2018. Gas production decreased in the three biggest producers in the EU, the UK, the Netherlands and Romania. The biggest Dutch field, Groningen production was lower by 2 bcm compared to the objective set for the yearly period ending on 30 September 2019, and for the next year production cap was revised from 15.4 bcm to 11.8 bcm, as the end of regular production in 2022 gets closer.
- **Net gas imports increased only slightly, by 0.5% year-on-year** (0.4 bcm) in Q3 2019 in the EU. Russian pipeline supplies covered 45% of extra-EU gas imports, followed by Norway (26%), LNG imports (23%) and pipeline imports from North Africa (6%). In September LNG imports became the second gas import source behind Russia. Net gas imports amounted to 86 bcm in Q3 2019 and to 291 bcm in the first three quarters of 2019.
- **Gas storage levels in the EU stood at 97% at the end of September 2019, which was the highest in the last eight years in this period of the year**, at the beginning of the heating season in Europe, covering around one third of typical winter consumption in the EU. Due to higher fillings at the beginning of Q3 2019, in this quarter the total filling amounted to 9 percentage point less (9 bcm) compared to Q3 2018.
- **The EU's estimated gas import bill stood at 12 billion euros in the Q3 2019**, 47% less than a year earlier, owing to falling import prices, down by 54%, which resulted in the lowest gas import bill since Q3 2016.
- **EU LNG imports showed a huge increase, up by 75% year-on-year** in the third quarter of 2019. Global LNG supply glut enabled plentiful LNG influx to Europe. The most important LNG suppliers to Europe were Qatar (35% of all LNG imports), Russia (15%), Nigeria (14%) and the US (12%).
- **Traded volume on the European gas hubs increased by 40% in July-August 2019** in year-on-year comparison, also reinforcing the role of euro in the gas sector. The share of trade on the Dutch TTF, the most liquid hub in the EU, rose to 67% among the observed European hubs, while absolute amount also increased on most of the European hubs.
- **Spot prices at some European gas hubs (including the TTF) fell to ten year low in September 2019**. A significant premium could be observed for forward prices to the spot market. Some European LNG import prices showed a premium to the TTF, as it fell low, also shrinking its premium to Henry hub to six year low. In spite of slightly increasing Asian LNG price premiums, LNG imports remained strong in Europe.
- **Retail gas prices showed only a few-percent decrease in third quarter of 2019 year-on-year**, mostly in the case of household customers and for industry with large annual consumption.

## EXECUTIVE SUMMARY

- **In the third quarter of 2019 EU gas consumption was 7% higher than in same period of 2018**, a bit less than the year-on-year increase in Q2 2019 (13%). Gas-fired electricity generation was significantly up in the EU (by 20%), reducing the role of coal in power generation in several EU countries. The total EU gas consumption in Q3 2019 was slightly higher than the range of the last five years. In absolute numbers, gas consumption in Q3 2019 amounted to 84 bcm, up from 79 bcm a year earlier. In the first three quarters of 2019 gas consumption in the EU was 343 bcm, 3% higher than in the same period of 2018, when it was only 333 bcm.
- **EU gas production fell by 9%** year-on-year in the third quarter of 2019; amounting to 25 bcm. Gas production decreased in all major EU gas producing countries, including the Netherlands (-16%) and the UK and Romania (-4% each). In the 2018 gas year (ending on 30 September 2019) production at the Dutch Groningen field amounted to 17.5 bcm, much lower than the target set for this period (19.4 bcm). For the next gas year the production cap has been revised to 11.8 bcm from 15.4 bcm, and regular production at Groningen was announced to be terminated by mid-2022, by the Dutch government on 10 September 2019. In the first three quarters of 2019 gas production in the EU amounted to 83 bcm, down by 8% compared to the same period of 2018.
- **EU gas net imports rose only modestly, by 0.5% in the third quarter of 2019** compared to Q3 2018. In Q3 2019 the amount of net gas imports (86 bcm) and domestic gas production (25 bcm) covered a gas consumption of 84 bcm and an estimated increase of 27 bcm in gas storages in the EU. Pipeline gas imports from Russia increased by 3% year-on-year in Q3 2019 and those from Norway also increased slightly, by 1%. Algerian pipeline gas imports fell steeply, by 37% compared to Q3 2018, driven by uncompetitive oil price indexed contracts. Although its share remained marginal in the total EU gas imports, pipeline gas import from Libya rose by 11%. LNG imports in Q3 2019 increased by three quarters compared to Q3 2018 and ensured around 23% of the total extra-EU gas imports. In the first three quarters of the year EU gas net imports amounted to 291 bcm, up by almost 11% compared to the same period of 2018.
- **Russian pipeline supplies remained the main source of EU gas imports**, covering 45% of extra-EU imports in Q3 2019, followed by Norwegian pipeline imports (26%), LNG imports from various sources (around 23%) and pipeline supplies from North Africa (6%). The share of LNG within the total gas imports doubled compared to Q3 2018. In September 2019 LNG became again the second gas import source for the EU. Russia's share was 49% in the total extra-EU gas imports, looking at the combined share of pipeline and LNG imports, signalling its increasing role in Europe's LNG supply. The share of LNG imports other than from Russia, Norway and Algeria was only 16%. The EU's estimated gas import bill was around €12 billion in Q3 2019, 47% less than a year earlier, mainly as a result of falling import prices (by 54%). This was the lowest EU gas import bill since Q3 2016. LNG imports amounted to €2.6 billion in Q3 2019 in the EU.
- In the third quarter of 2019, **Ukraine was the main supply route of Russian pipeline gas to the EU**, covering 43% of the total Russian supplies (around 17 bcm), down by 3 percentage points compared to in Q3 2018. The share of Nord Stream was 37% (14 bcm) up by 6 percentage points compared to Q3 2018, while gas supplies transiting Belarus covered 20% (8 bcm) in Q3 2019 in the total EU imports from Russia. In the first three quarters of 2019 pipeline gas from Russia ensured 43% (around 126 bcm) of the total extra-EU imports. The Ukraine transit route represented 53 bcm, while Nord Stream and the Belarus transit route respectively supplied 47 bcm and 26 bcm. Russia maintained its market share as it adopted more competitive pricing.
- **EU LNG imports showed a strong increase in the third quarter of 2019, up by 75%** in year-on-year comparison. Prices in different regions (e.g.: between Europe and Asia) remained most of the time well-aligned amid global LNG supply glut, enabling plentiful LNG influx to Europe. The share of Qatar, the biggest LNG supplier to the EU, rose to 35% in the total imports in Q3 2019, followed by Russia (15%), Nigeria (14%) and the US (12%). Spain was the largest LNG importer in Q3 2019 within the EU (with 7.3 bcm), followed by France (3.7 bcm), Italy (3.5 bcm) and Belgium (1.8 bcm), Portugal and the United Kingdom (1.7 bcm each). The average EU LNG regasification terminal utilisation rate in the EU stood at 47% in September 2019, while in the first nine months of the year it was close to 50%, significantly up from 26% measured in 2018, showing the impact of rapid LNG import growth.
- **On 10 September 2019 the EU Court of Justice annulled the exemption of the Opal pipeline from EU rules**, aimed at preventing dominance of the supply infrastructure. The Opal pipeline, which carries gas of Russian origin from Nord Stream, runs parallel to the German-Polish border all the way to Czechia. Following the court decision, Opal will be constrained to take only 12.5 bcm per year from Nord Stream, half of the prior quantity. The court decision had immediate effect and resulted in temporary price spikes on gas hubs in Central and Eastern Europe.
- **On 19 September 2019 the third round of trilateral talks between the EU, Ukraine and Russia** took place, focussing on how EU energy rules should be reflected in the legal framework of a future contract (including duration, volumes, the tariff setting mechanism, etc.). As negotiations were not concluded, on 28 October the fourth round of trilateral talks were also held, and they continued even in December, ahead of the expiry of the gas transit contract on 31 December 2019.
- **Gas storage levels in the EU stood at 97% at the end of September 2019, which was highest in the last eight years in this period of the year.** Amid abundant LNG imports and steadily decreasing spot prices, gas filling in Q3 2019 amounted to 24% of the total storage capacity, as opposed to 33% in the third quarter of 2018. Storage fillings were helped by concerns on security of gas supply issues ahead of the winter period, also relating to the expiry of contract on the Russian gas supply through the Ukrainian transit route at the end of 2019.

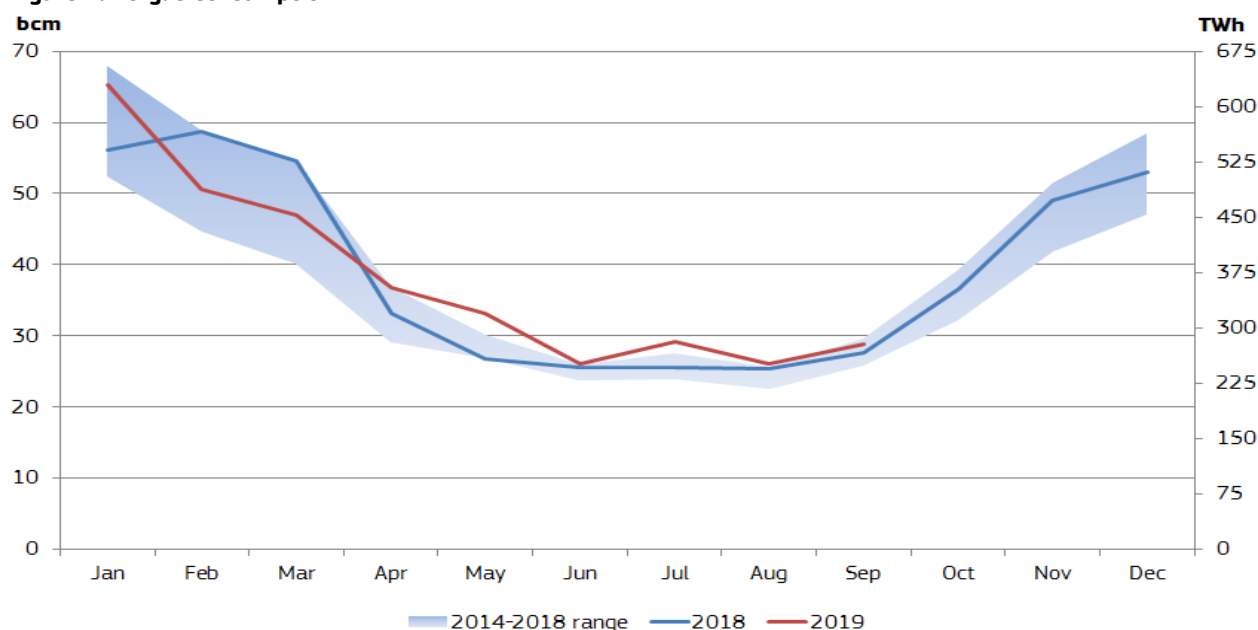
- **Spot prices at most of European gas hubs decreased and by September 2019 the TTF spot hub price fell to ten-year low.** Gas prices in Europe were mainly impacted by abundant LNG supply to Europe, and as consequence of high storage fillings, in spite of high demand in electricity generation. In Q3 2019 European hub prices were down by 50-60 % (more than half) in year-on-year comparison. At international level, Asian markets started to show a premium to the TTF but with the European LNG import prices they remained more aligned. The premium of the TTF to US Henry Hub fell to six year low in September 2019, and reached a quarterly price ratio of 1.4, halving compared to Q3 2018. In Q3 2019 forward contracts retained their premium over the spot prices, implying that the market is expecting higher spot prices in the future.
- In July-August 2019 **trade volume on the European gas hubs increased** by 40% in year-on-year comparison, and the total traded volume on the most liquid European hubs was more than 9 403 TWh (approximately 785 bcm). High traded volumes were the result of well supplied gas market and trading strategies building on the price differentials between spot and forward contracts. The share of the Dutch TTF hub in the total EU trade rose to 67%, reinforcing its leading role in Europe, due to its good connection to supply sources, seasonal storages and its euro denomination, attracting more and more hedging and financial trade, and gradually developing as a global gas benchmark.
- **Retail gas prices for household customers underwent a perceivable decrease (7%)** but industrial customers with average annual consumption showed only a minor decrease in the third quarter of 2019 in year-on-year comparison, implying that recent price falls on the wholesale gas markets only started to filter in retail price contracts. Price for industrial customers with larger annual consumption showed some decreased as well, and in some of the European capital cities household retail price falls could also be observed.

# 1. Gas market fundamentals

## 1.1 Consumption

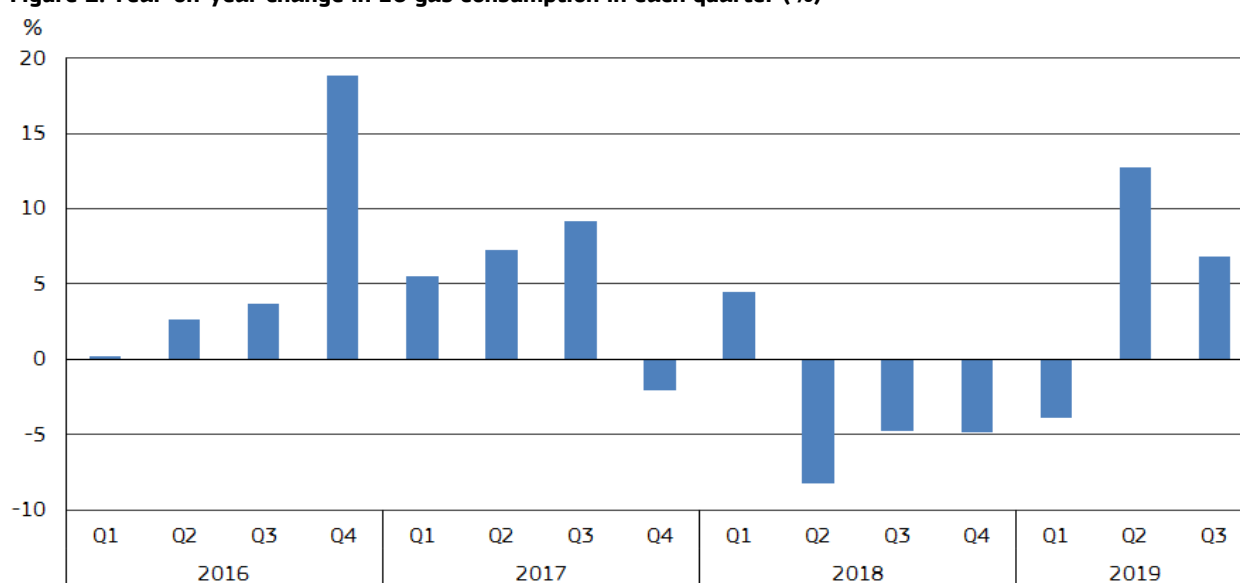
- EU gas consumption in the third quarter of 2019 was still up in year-on-year comparison, increasing by almost 7%, however, this increase was less than in the previous quarter (13%). In absolute numbers, the quarterly gas consumption in Q3 2019 amounted to an estimated 83.9 bcm, in comparison to 78.6 bcm in Q3 2018. Gas-fired electricity generation showed a measurable increase in Q3 2019 in many European countries in year-on-year comparison (increasing by 20%, or 28 TWh in Q3 2019); and was the main contributor to the increase in gas use in the EU. The weather across Europe was generally warmer in July and August 2019 compared to the seasonal average, resulting in higher cooling needs and gas consumption in electricity generation. In July and August 2019 gas consumption was above the range of 2014-2018, while in September it was close to the upper end of the range, as Figure 1 below shows.

**Figure 1. EU gas consumption**



Source: Eurostat, data as of 29 November 2019 from data series nrg\_103m. Data missing for the Netherlands in September 2019 are calculated by using short term monthly gas data (nrg\_ind\_343m,) as proxy. Therefore, in the next edition of this report numbers might change retrospectively.

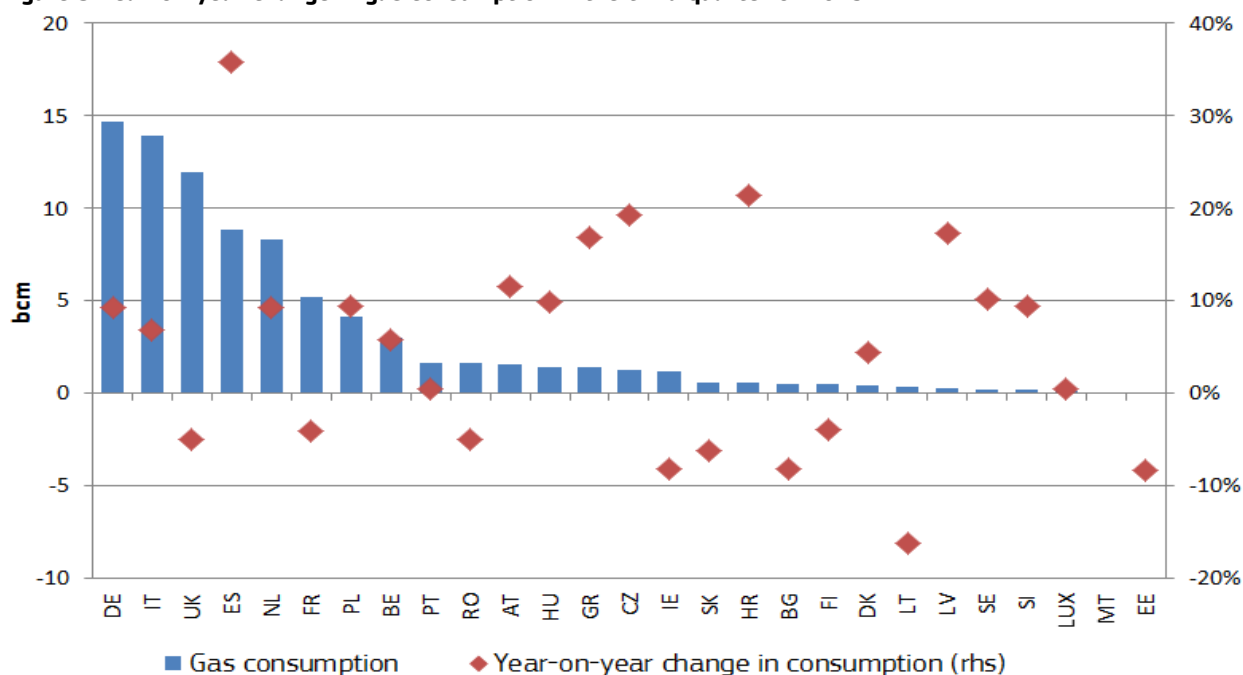
**Figure 2. Year-on-year change in EU gas consumption in each quarter (%)**



Source: Eurostat, data as of 29 November 2019 from data series nrg\_103m. Data missing for the Netherlands in September 2019 are calculated by using short term monthly gas data (nrg\_ind\_343m,) as proxy. Therefore, in the next edition of this report numbers might change retrospectively.

- In the third quarter of 2019, the biggest year-on-year increase in gas consumption could be observed in Spain (36%, representing a volume of 8.8 bcm in Q3 2019). Gas consumption increased in 17 EU Member States, whereas in 10 countries it decreased (in Cyprus there is still no data on natural gas consumption). In Croatia, Czechia, Latvia, Greece, Austria and Sweden the quarterly gas consumption increased by more than 10% in year-on-year comparison, while in Latvia and Malta it fell back by more than 10%. Among the biggest consumers, in Germany, Italy and the Netherlands gas consumption went up respectively by 9%, 7%, and 9%, whereas in the UK and France it decreased by 5% and 4%.
- In absolute numbers, gas consumption in Q3 2019 increased by in the Spain (2.3 bcm), Germany (1.2 bcm), Italy (0.9 bcm), the Netherlands (0.7 bcm), and Poland (0.4 bcm), whereas in the UK, it decreased by 0.7 bcm and in France by 0.2 bcm. In the remaining Member States the change in gas consumption was less than 0.2 bcm in Q3 2019 in year-on-year comparison.
- In the first three quarters of 2019 gas consumption in the EU went up by 2.9% (9.6 bcm) compared to the same period of 2018. The biggest increase in absolute numbers could be observed in Spain (3.8 bcm) and Germany (3.1 bcm), while in the UK consumption decreased by 3 bcm (5.3%)

**Figure 3 Year-on-year change in gas consumption in the third quarter of 2019**



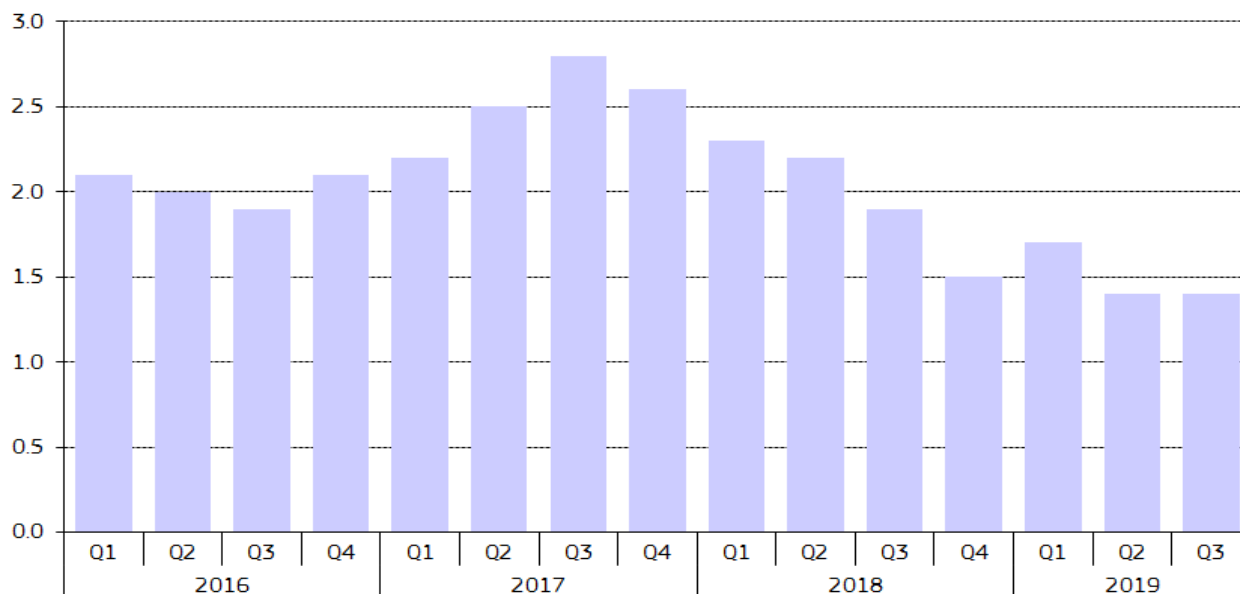
Source: Eurostat, data as of 29 November 2019 from data series nrg\_103m. Data missing for the Netherlands in September 2019 are calculated by using short term monthly gas data (nrg\_ind\_343m,) as proxy. Therefore, in the next edition of this report numbers might change retrospectively.

- Economic growth in the third quarter of 2019 in the EU was similar to the previous quarter (Q2 2019), as GDP grew in both quarters by 1.4% in year-on-year comparison<sup>1</sup>, signalling a halt in the slowdown of the economic growth, which could be observed since the end of 2017. The rate of value-added growth in industrial sectors that consume significant amount of energy (e.g.: manufacturing) turned to decrease in Q3 2019 (-0.8%). However, this had a relatively small impact on the consumption of natural gas in Q3 2019 in the EU, as the key driver in consumption growth, similarly to the previous quarter, was the electricity generation sector.

<sup>1</sup> Source: Eurostat, data as of 5 December 2019 from data series namq\_10\_a10; seasonally and calendar adjusted data



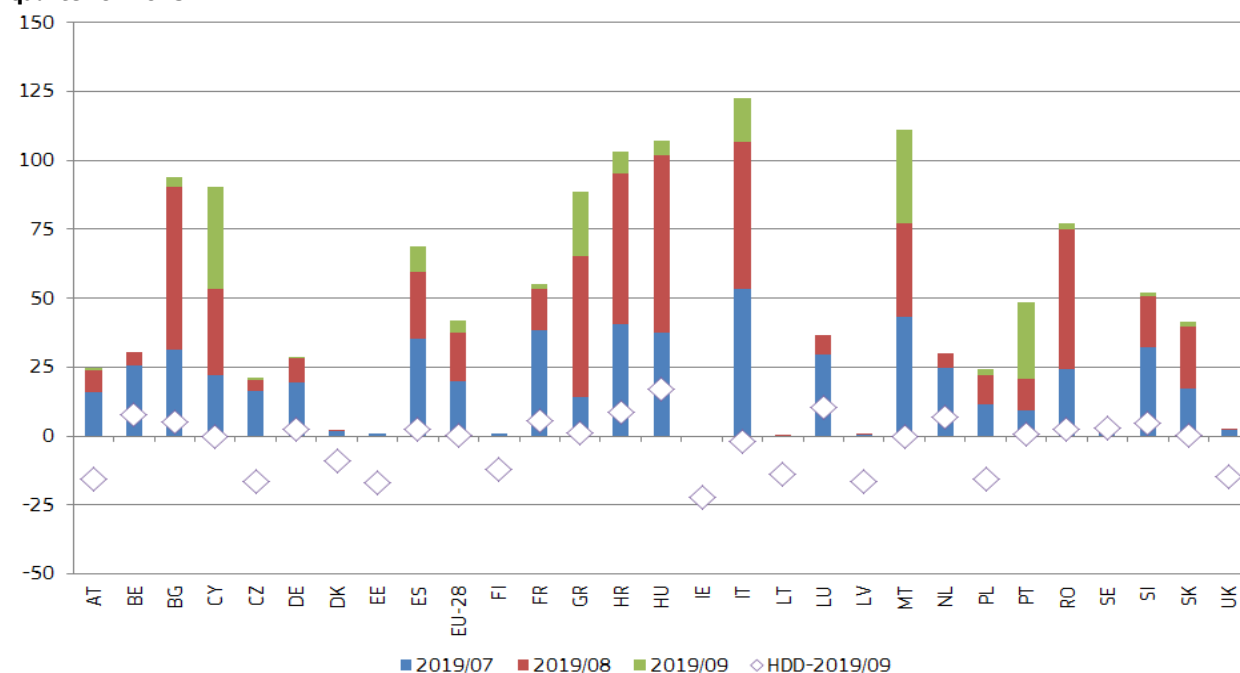
**Figure 4 EU GDP Q/Q-4 change (%)**



Source: Eurostat, data as of 5 December 2019 from data series namq\_10\_gdp - Seasonally and calendar adjusted data

- Figure 5 shows the deviation of actual cooling degree days (CDDs) from the long-term average<sup>2</sup> in individual EU Member States in the third quarter of 2019, and the deviation of heating degree days (HDDs) from the long term average for September 2019. July and August 2019 was generally warmer than usual in most of Europe, and this could especially be perceived in the southern and south-eastern EU Member States. This has impacted residential electricity consumption driven up by increasing cooling needs, and gave a boost to natural gas use in power generation. In the Mediterranean countries, where CDDs have still relevance in September, temperatures were also higher than usual. September 2019 brought a milder weather in most of Europe (of HDD relevance), implying that early heating needs did not occur in these countries, reducing gas consumption ahead of the heating season.

**Figure 5 Deviation of actual heating degree days and cooling degree days from the long-term average in the third quarter of 2019**

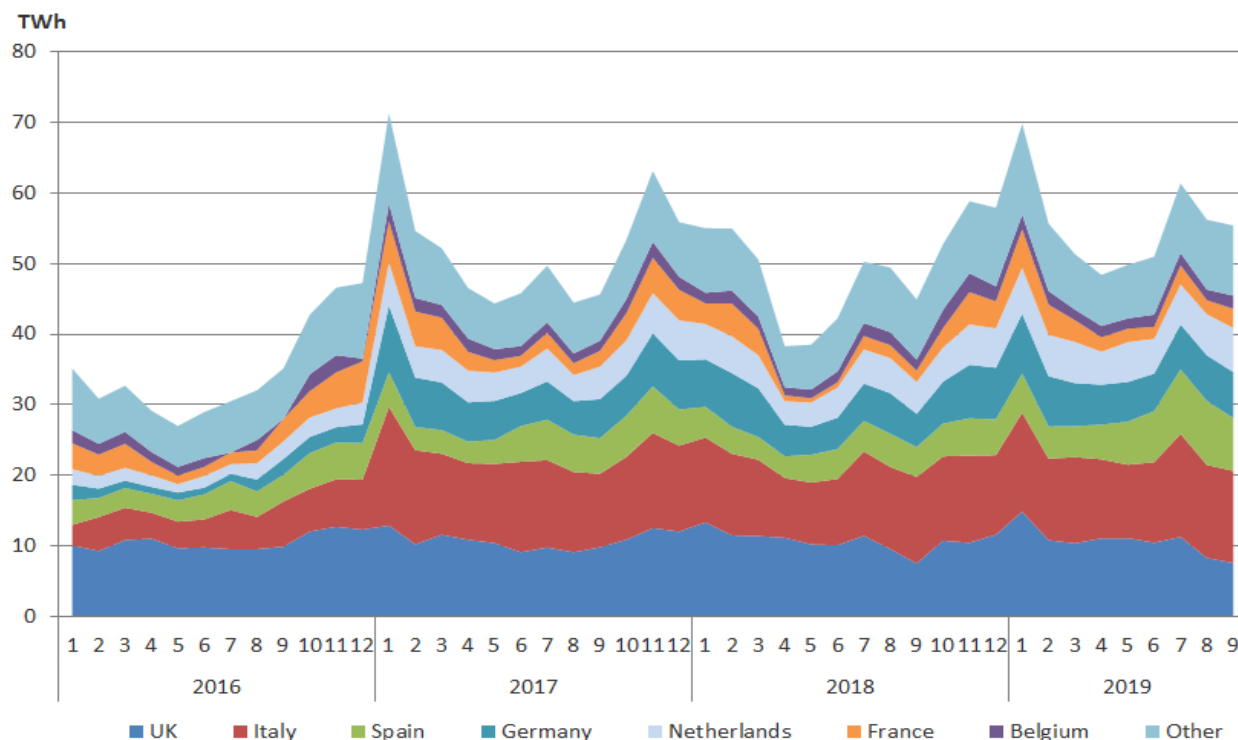


Source: Joint Research Centre (JRC), European Commission

<sup>2</sup> Long term average temperatures, heating and cooling degree days refer to the period between 1975 and 2016

- Based on data from ENTSO-E, gas-fired power generation was up by 20% in the third quarter of 2019 compared to the same period of 2018. In absolute terms, electricity generated from gas increased by 28 TWh in year-on-year comparison. As Figure 6 shows, gas-fired generation remained strong in Q3 2019, and in July 2019 alone it amounted to 61 TWh, which was unusually high in this period of the year. At the same time, coal and lignite-fired generation continued to decline (by 35% together in the EU, compared to Q3 2018), whereas solar and wind generation was up, implying that gas and renewables kept on replacing solid fuels in the European electricity generation mix<sup>3</sup>. Natural gas prices falling to ten-year low at the EU markets, coupled with high carbon prices, reaching almost 28 €/tCO<sub>2e</sub>, in July 2019, further improved the competitiveness of gas-fired electricity generation vis-à-vis coal<sup>4</sup>.
- In Spain, France, the Netherlands, and Germany the amount of electricity generated from gas respectively increased by 94%, 38%, 24%, and 23% in Q3 2019 in year-on-year comparison, owing to changes in the local power generation mixes. In Spain hydro generation showed a significant fall beside solid fuels, which could not be compensated alone by increasing wind generation, leaving a bigger room for gas. In France nuclear generation decreased slightly amid falling coal-fired generation, replaced by increasing gas and wind generation. In the Netherlands coal-fired generation and biomass and wind decreased as well. In Germany gas-fired generation went up in parallel with increasing wind and hydro, replacing dwindling coal and decreasing nuclear and solar. In the UK and Belgium gas-fired generation decreased slightly in Q3 2019 (respectively by 5% and 2%). In Belgium nuclear and wind generation went up measurably, whereas in the UK increasing wind power and electricity imports filled the gap, stemming from lower fossil fuel and nuclear generation.

**Figure 6 Gas-fuelled power generation in the EU**



Source: Based on data from the ENTSO-E Transparency Platform and national data sources, data as of 16 December 2019.

- UK clean spark spreads – measuring the profitability of gas-fired generation by taking into account variable costs – averaged 5.5 €/MWh, in Q3 2019, which was quite similar to the previous two quarters (respectively 6.5 €/MWh and 5.8 €/MWh), providing evidence for the profitability of gas-fired generation in the UK (see Figure 7). However, the amount of electricity generated from gas decreased slightly in Q3 2019 in year-on-year comparison, as renewable sources (mainly wind) and electricity imports were more competitive alternatives to gas, even amid low gas prices. The share of gas in power generation was 43.2% in the UK in the third quarter of 2019, slightly higher than compared to Q3 2018 (41.5%). This can mainly be explained by increasing imports, replacing domestic electricity generation, which mainly impacted generation sources other than gas (e.g.: coal, nuclear, biomass).
- Clean spark spreads in Germany averaged 10 €/MWh in the third quarter of 2019, the highest quarterly average since the first quarter of 2010, which signalled ongoing profitability<sup>5</sup> of gas-fired generation since a decade (with the exception of short-lived

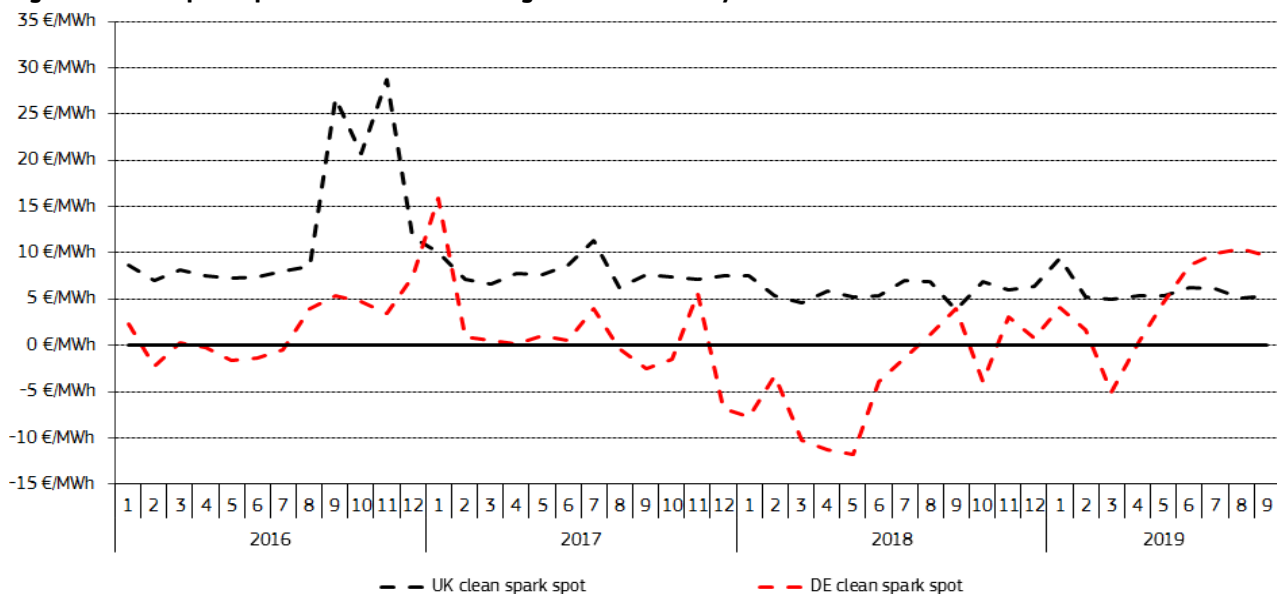
<sup>3</sup> See more information in Quarterly Report on the European Electricity Markets, Vol. 13, Issue 3

<sup>4</sup> As electricity generation from gas is less carbon intensive than from coal

<sup>5</sup> Assuming an average gas power plant efficiency, see more in the Glossary

periods over this time) in the country, after negative or close-to-zero ranges in the previous quarters and years. This was mainly due to competitive natural gas prices, falling to ten-year low at most of the European markets, amid stable wholesale electricity price in the Germany<sup>6</sup> over the whole Q3 2019.

**Figure 7 Clean spark spreads in the United Kingdom and Germany**



Source: S&P Platts Global

## 1.2 Production

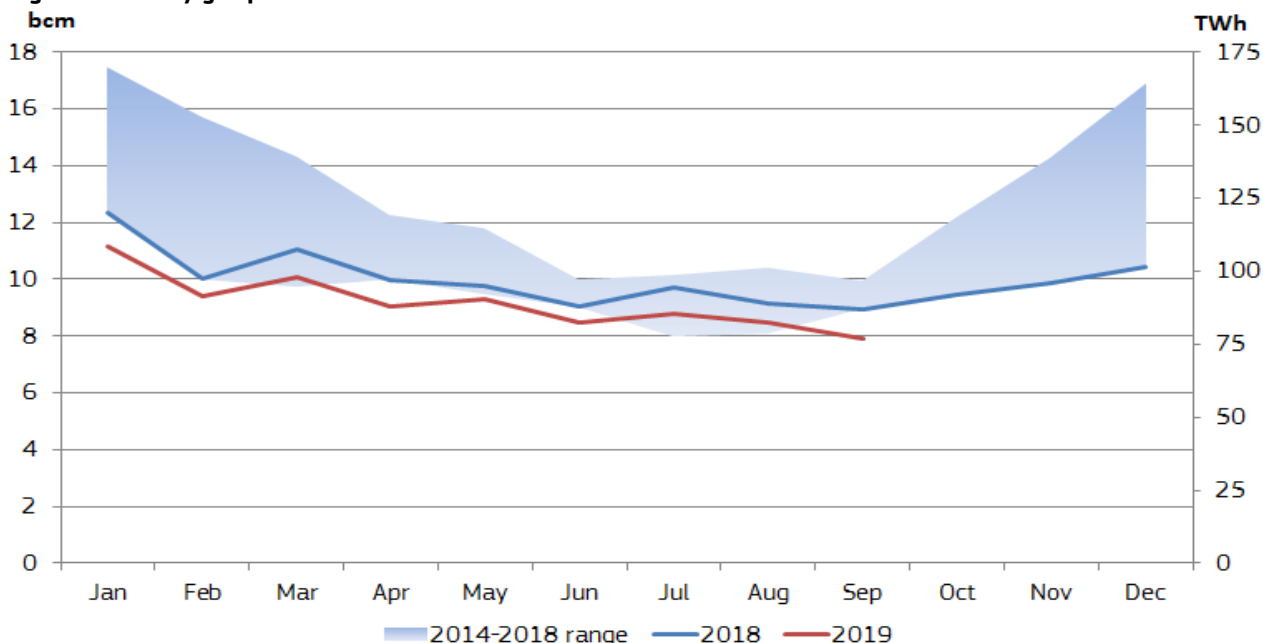
- In the third quarter of 2019 EU gas production was approximately 25.2 bcm<sup>7</sup>, 9% (2.6 bcm) less than in the same quarter of 2018 (See Figure 8). While in July and August 2019 gas output was in the 2014–2018 range, in September the monthly production was lower than in any September month in the last five years. In the Netherlands natural gas production in Q3 2019 decreased by 16% (1.5 bcm) and in the UK it decreased by 4% (0.4 bcm) in year-on-year comparison. Gas output decreased by 4% in Romania and Germany (by 0.1 bcm in both countries), in Italy it went down by 11% (by 0.2 bcm) and in Denmark by 25% (0.3 bcm). In Poland however, production increased by 8%, (0.1 bcm). Norway produced 24.1 bcm gas in Q3 2019, 8% (by 2.1 bcm) less compared to Q3 2018, primarily owing to maintenance works on some important gas producing field infrastructure, for example, the biggest Troll field and the Kollsnes processing plant.
- In the first three quarters of 2019 natural gas production in the EU amounted to 82.7 bcm, 8.2% less than in the same period of 2018, which meant in absolute numbers a decline in production of 7.4 bcm. The six biggest EU gas producers were the UK (28.8 bcm), the Netherlands (26.2 bcm), Romania (7.5 bcm), Germany (4.3 bcm), Italy (3.7 bcm) and Denmark (2.7 bcm), having a combined share of 88% in the total EU gas production.
- On 10 September 2019 the Dutch economic minister announced that by mid-2022 gas production from Europe's largest onshore field (Groningen) will be finished<sup>8</sup>. In the entire gas year (ending on 30 September 2019) gas production amounted to 17.5 bcm, which was less than the production cap initially set by the government (19.4 bcm). Moreover, the production for the 2019 gas year (the period from 1 October 2019 to 30 September 2020) was revised to 11.8 bcm, significantly down from the previously set target for this period (15.4 bcm). Operation would completely stop only in 2026, as during exceptionally cold winters some withdrawals might be needed from the Groningen field. Beside the Groningen field producing low calorific gas (L-gas), the production on other Dutch fields (producing high calorific or H-gas) also shows a decreasing trend, implying that once the biggest gas producer country in the EU will have to rely on imports, mainly in the form of LNG and pipeline gas from Norway and Russia. Since 2018 the Netherlands is already a net gas importer.

<sup>6</sup> Charts of clean spark spreads in Germany and the UK 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

<sup>7</sup> Given that in some countries data for some periods are based on estimation, this number might retrospectively change

<sup>8</sup> <https://www.reuters.com/article/us-netherlands-gas/netherlands-to-halt-groningen-gas-production-by-2022-idUSKCN1VV1KE>

**Figure 8 Monthly gas production in the EU**



Source: Eurostat, data as of 29 November 2019 from data series nrg\_103m. Data missing for the Netherlands in September 2019 are calculated by using short term monthly gas data (nrg\_ind\_343m,) as proxy. Therefore, in the next edition of this report numbers might change retrospectively.

### 1.3 Imports

- Although gas consumption in the EU increased in the third quarter of 2019 in year-on-year comparison (by almost 7%), net imports remained stable over the same period, increasing by only 0.5%, as Eurostat data show.<sup>9</sup> However, net imports in different EU countries showed a high variation in Q3 2019, ranging from an increase of 50% to a decrease of 24% in year-on-year comparison. Among big gas consumer countries net imports decreased in Germany (by 13%), in the UK and it remained stable, in Italy it rose by 6% and in Spain it went up measurably, by 50%.
- In the third quarter of 2019 the total net EU gas imports reached 86 bcm, slightly up from 85.6 bcm in the same period of 2018. The five biggest importers in the EU in Q3 2019 were Italy, Germany, Spain, France and the Netherlands and respectively with net imports of 18 bcm, 17 bcm, 10 bcm, 10 bcm and 4 bcm, representing together around two thirds of the total EU net gas imports in this quarter. In the first three quarters of 2019 the total net EU gas imports in the EU amounted to 291 bcm, which was 11% more than in the same period of 2018, amid increasing consumption (+2.9%) and decreasing domestic production (-7.4%), implying a further increase in gas import dependency in the EU.
- According to ENTSO-G data, imports amounted to 1 044 TWh in the third quarter of 2019. Imports from both Russia and Norway increased slightly (by 3% and 1%, respectively), and imports from Libya also went up measurably (by 11% in Q3 2019 in year-on-year comparison). In contrast, imports from Algeria fell significantly, by 37% in the same period, primarily owing to uncompetitive oil-price indexation contracts. At the same time, LNG imports, though in a slower pace than in the previous two quarters, increased further year-on-year and reached 243 TWh in Q3 2019.
- Russia remained the top pipeline gas supplier of the EU, covering 45% of total extra-EU gas imports in the third quarter of 2019, which was close to the average share of Russia within the total pipeline imports over the last five years<sup>10</sup>.
- As imports from Norway, the EU's second largest gas supplier, increased by only 1% year-on-year in the third quarter of 2019, the country's share in extra-EU gas imports amounted to 26%<sup>11</sup>. In September 2019, similarly to what happened in April and May this year, LNG imports in the EU were higher than pipeline gas imports from Norway, implying that LNG replaced again Norway in this

<sup>9</sup> Net imports equal imports minus exports and do not account for stock changes.

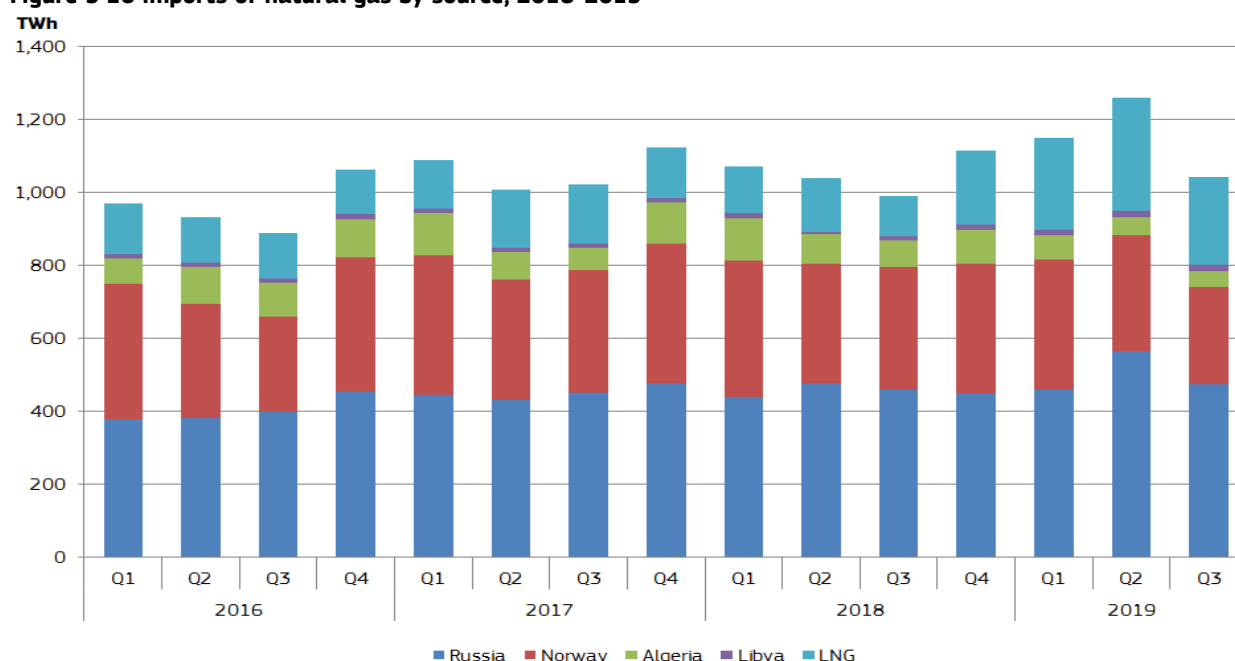
<sup>10</sup> It is worth to note that Russia increased its importance in the EU LNG imports as well over the last year, numbers presented in this section, with the exception of LNG or unless otherwise indicated, refer to pipeline imports

<sup>11</sup> Note that Norway to UK flows reported by ENTSO-G includes some gas from UK offshore fields, resulting in an overestimation of Norwegian imports.

month as the second biggest extra-EU gas supplier. In the third quarter of 2019 Norwegian gas production<sup>12</sup> amounted to 24.1 bcm, down by 8% year-on-year, partially owing to maintenance works on some infrastructure elements, between 23 August and 5 September 2019. This helped in competitively priced LNG to fill the gap of missing imports from Norway in this period.

- Pipeline gas imports from Algeria did not manage to break the dwindling trend and in Q3 2019, and were lower by 37% in year-on-year comparison, falling to the lowest since the beginning of the available time series (2014). The share of Algerian pipeline imports within the total extra-EU gas imports practically halved since the beginning of 2018 it was around 4%. Although imports from Libya continued to grow in Q3 2019 compared to the same period of the previous year, its share was only 1.5% in the total EU gas imports. Imports from both Algeria and Libya showed a great volatility over the last few years, reflecting the issue of the competitiveness of import prices and supply availabilities in these two countries.
- According to several data sources, including ENTSO-G and Refinitiv data, imports of LNG increased significantly in the third quarter of 2019 in year-on-year comparison, and covered almost 23% of total extra-EU gas imports, slightly less than in the previous quarter, but almost twice as high as in Q3 2018., when the share of LNG was less than 12% in the total extra-EU gas imports.

**Figure 9 EU imports of natural gas by source, 2016-2019**



Source: Based on data from the ENTSO-G Transparency Platform, data as of 7 November 2019.

Russian deliveries to Estonia and Latvia were reported only for a limited period (Narva from 15 June 2015 to 10 December 2015, Värskä and Misso Izborsk from 26 May 2015). Therefore currently exports to the Baltic-states and Finland are not included in the chart

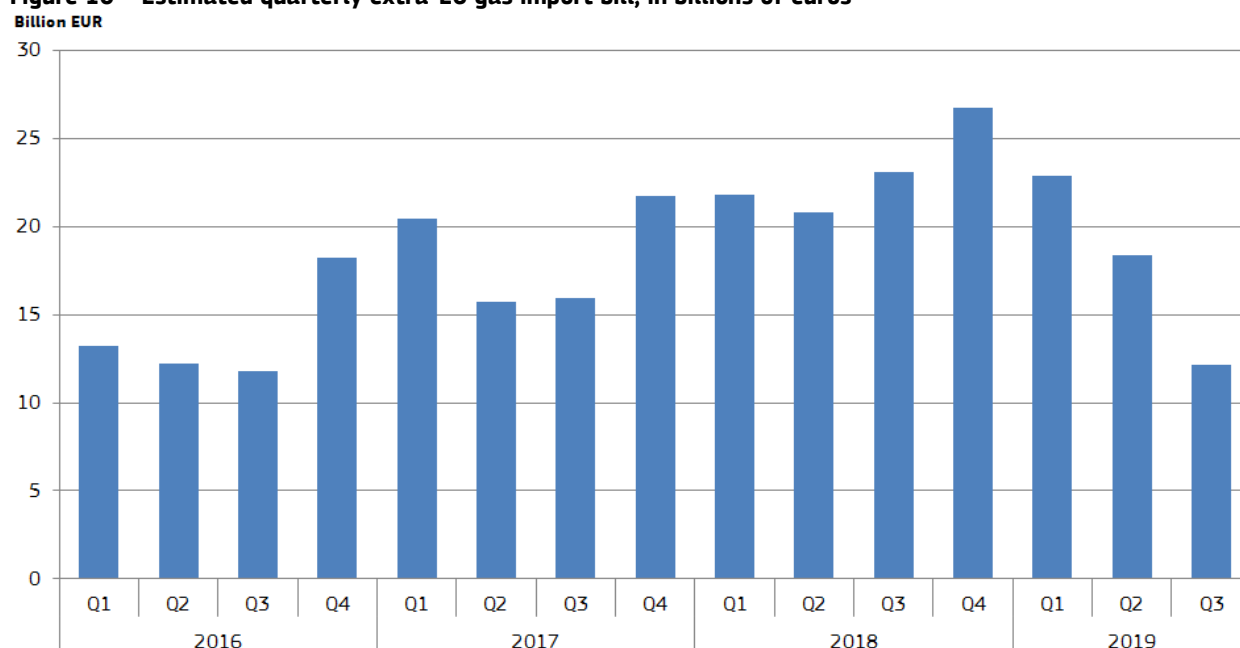
Russia, Norway, Algeria and Libya include pipeline imports only; LNG imports coming from these countries are reported in the LNG category.

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

- In spite of slightly increasing import volumes in the third quarter of 2019 compared to the same period of 2018, the estimated gas import bill decreased. Over the same period, the estimated average import price fell measurably, by 54%, from 25.1 €/MWh to 11.6 €/MWh. As a result, the EU's estimated gas import bill also decreased, by 47% year-on-year, reaching around 12.1 billion euros in the third quarter of 2019. This was the lowest import bill since Q3 2016.

<sup>12</sup> [https://www.npd.no/globalassets/1-npd/fakta/nyheter/produksjonstall/2019/juli-2019/prod\\_data\\_pressemedling-2019.xlsx](https://www.npd.no/globalassets/1-npd/fakta/nyheter/produksjonstall/2019/juli-2019/prod_data_pressemedling-2019.xlsx)

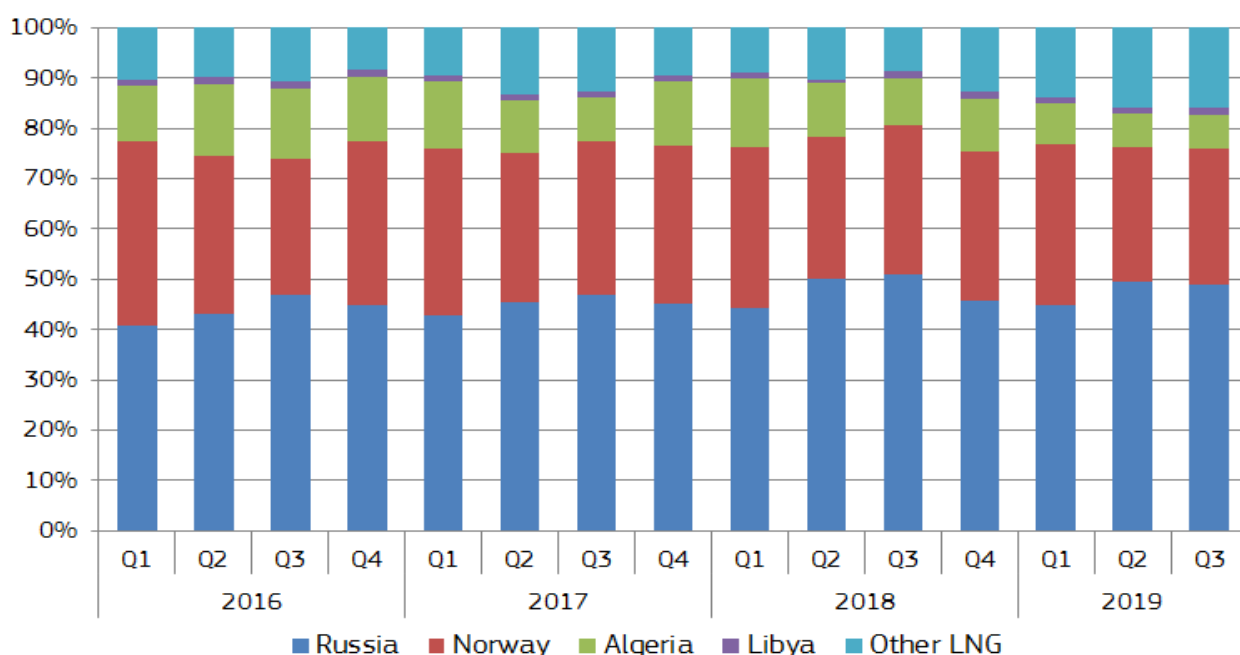
**Figure 10 – Estimated quarterly extra-EU gas import bill, in billions of euros**



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

- Given that Russia, Norway and Algeria are also active on the LNG market, and 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. As Figure 11 shows, the share of Russia within total extra-EU gas imports (pipeline and LNG together) amounted to 49% in Q3 2019, split by 45% of pipeline imports and 4% of LNG, indicating that Russia is becoming a more and more important actor in the European LNG imports, not only in the traditional pipeline gas supply.
- Similarly, the share of Norway was 27% in Q3 2019 (vs. the aforementioned share of 26% for pipeline only), and the share of Algeria is 6.6% with LNG (as opposed to 4.4% only including pipeline gas). The share of LNG in the total extra-EU imports was 16%, if LNG shipments from Russia, Norway and Algeria are not accounted in the LNG category. However, the import share of LNG is still significantly growing (up from 8% to 16% between the third quarter of 2018 and 2019), and the share of LNG within the total gas imports was the highest in Q3 2019 in the last five years. Russia is maintaining its market share by switching to a more competitive import strategy.

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



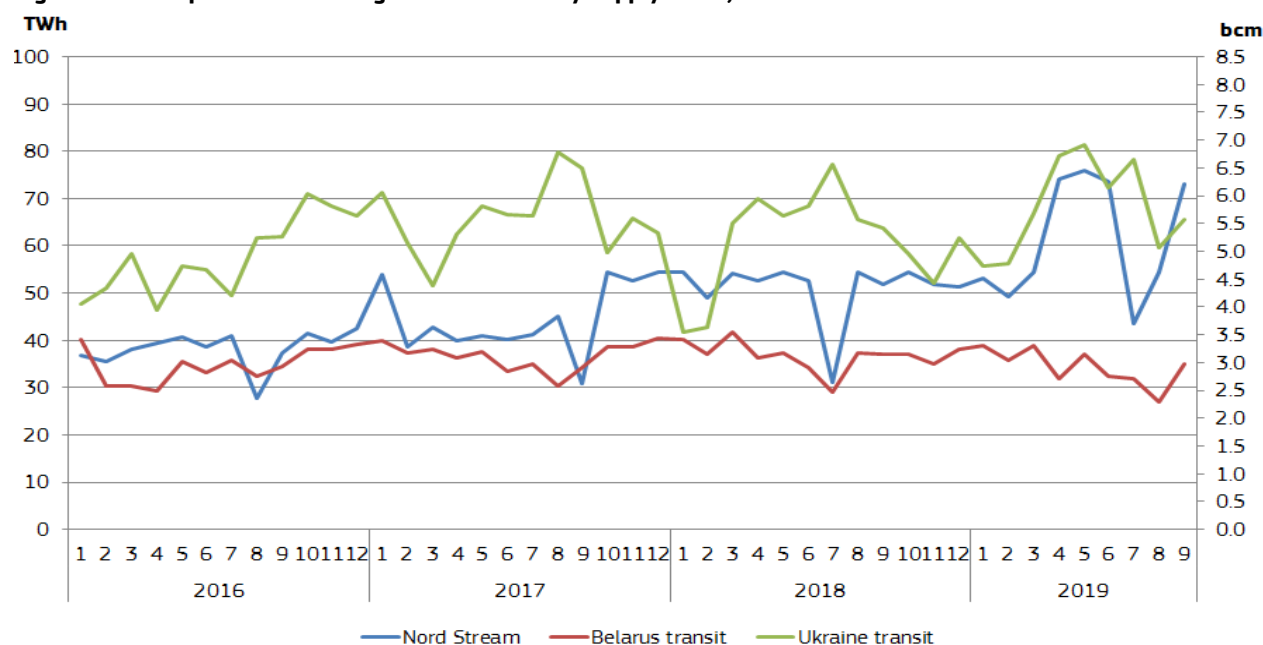
Source: Based on data from the ENTSO-G Transparency Platform, data as of 7 November 2019.

- Figure 12 shows the breakdown of EU gas imports from Russia to the three main pipeline supply routes: Ukraine (which includes the Brotherhood Pipeline and the Balkan route), Belarus (mainly the Yamal pipeline) and Nord Stream.
- In the third quarter of 2019, the volume of Russian imports went up by 3%, if compared with the same period of 2018. Gas flows transiting Ukraine were almost 9% lower than in Q3 2018, while flows through Belarus decreased by 2% over the same period. In contrast, gas flows through the Nord Stream were still significantly up (24%) in Q3 2019 in year-on-year comparison. However, as Figure 12 shows, in July 2019 imports through Nord Stream fell back measurably, owing to the summer maintenance works that started on 16 July 2019. In August imported volumes picked up again and in September imported volumes were above 6 bcm.
- As a result, the share of the transit through Ukraine, still being the main supply route of Russian gas to the EU, reached 43% within the total Russian pipeline gas imports to Europe, slightly lower than in Q3 2018, when it was 46%. The share of pipeline gas transit through the Nord Stream was 37% in Q3 2019 (after 31% in Q3 2018 and again the highest since the beginning of 2014), and the Belarus transit route represented 20%, falling from 23% measured in Q3 2018. This implies that increasing pipeline gas imports from Russia was mainly satisfied by transit through Ukraine and the Nord Stream, whereas the utilisation of the Yamal pipeline decreased.
- Recalling that in Q3 2019 that Russian pipeline gas imports represented around 45% in the total net extra-EU gas imports and at the same time the total net gas imports in the EU amounted to 86 bcm, it can be estimated that the Ukraine transit route represented 19% (17 bcm), the Nord Stream had a share of 17% (14 bcm), and the Belarus transit route ensured 9% (8 bcm) of the total net extra-EU gas imports in Q3 2019. In the first three quarters of 2019 the total net extra-EU gas imports amounted to 291 bcm, of which Russia supplied 43% (around 126 bcm). The Ukraine transit route represented 53 bcm, while Nord Stream and the Belarus transit route supplied respectively 47 bcm and 26 bcm.
- In the third quarter of 2019 natural gas imports in Ukraine from EU countries continued to grow and in August and September 2019 it reached the highest since the beginning of available data sets, 2 bcm per month. In Q3 2019 Ukraine imported almost 6 bcm natural gas from Poland, Slovakia and Hungary, and in the first nine months of 2019 the total imports from these countries amounted to 11 bcm<sup>13</sup>. The main reason behind this was the increasing activity of gas storage operators in the western part of Ukraine to build up stocks, regarding the security of supply risks ahead of the expiry of the gas transit agreement with Russia at the end of 2019. During Q3 2019, the share of Slovakia in Ukrainian imports from the EU was 65%, while the share of Hungary was 28%, and that of Poland was lower, 7%. The shares of the three countries in Q3 2018 respectively were 56%, 39% and 5%.
- Poland's state-owned PGNiG oil and gas company announced on 29 August 2019 that it will supply natural gas to Ukraine, stemming from US LNG sources, in November and December 2019<sup>14</sup>. Meanwhile, Hungary applies a uniform export tariff for yearly capacity at all of its border points as of 1 October 2019, which in this case means an increase (by 42%) in the case of the tariff towards Ukraine. Monthly and quarterly capacity fees were also revised, in most cases resulting in increases.

<sup>13</sup> Based on data from the ENTSO-G Transparency Platform, data as of 7 November 2019.

<sup>14</sup> <http://en.pgnig.pl/news/-/news-list/id/pgnig-and-eru-signed-an-agreement-american-natural-gas-sold-from-poland-to-ukraine/newsGroupId/1910852?changeYear=2019&currentPage=2/>

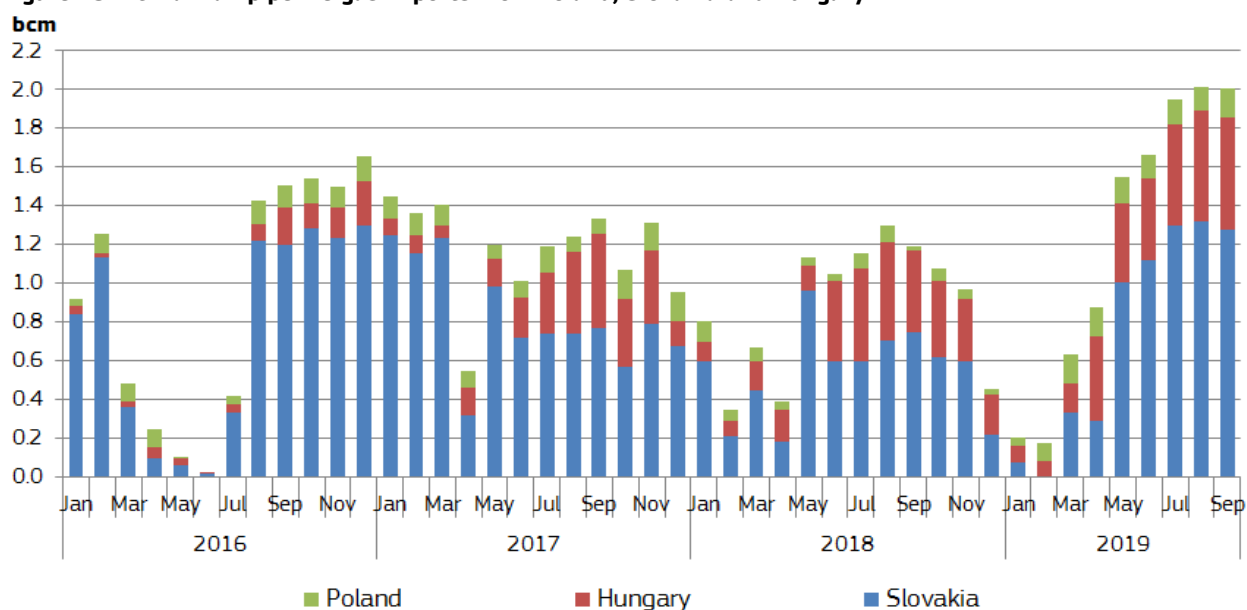
**Figure 12 EU imports of natural gas from Russia by supply route, 2016-2019**



Source: Based on data from the ENTSO-G Transparency Platform, data as of 7 November 2019.

Deliveries to Estonia, Finland and Latvia are not included; transit volumes to the Former Yugoslav Republic of Macedonia, Serbia and Turkey are excluded

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



Source: Based on data from the ENTSO-G Transparency Platform, data as of 7 November 2019

- On 22 August 2019 the chairman of the Polish state owned oil and gas company's (PGNiG) announced<sup>15</sup> that besides the expansion of the existing Swinoujscie LNG terminal, from an annual regasification capacity of 5 bcm to 7.5 bcm in 2023, Poland intends to build a second, floating storage and regasification (FSRU) terminal to be located in the Gulf of Gdansk and to be operational as of 2024/2025. This could turn the country into a regional gas hub (the so-called North Gate), also supplying gas through the Baltic pipe to the three Baltic countries and diversify the import sources, relying mostly on imports from Norway and LNG cargos. Later, on 15 November PGNiG announced<sup>16</sup>, three years ahead of the expiry of the long term gas purchase contract with Russia's

<sup>15</sup> <https://www.spglobal.com/platts/en/market-insights/latest-news/natural-gas/042419-poland-sets-plan-to-install-new-lng-import-terminal-in-2024-2025>

<sup>16</sup> <http://en.pgnig.pl/news/-/news-list/id/declaration-of-will-to-terminate-yamal-contract-effective-december-31-2022/newsGroupId/1910852>



Gazprom, that it will intend to terminate contractual relationship with Gazprom and will no longer purchase natural gas from Russia.

- On 10 September 2019 The EU Court of Justice annulled a Commission decision from October 2016 to exempt the Opal pipeline from EU rules, aimed at preventing dominance of the supply infrastructure<sup>17</sup>. The Opal pipeline, which carries gas from Nord Stream, runs parallel to the German-Polish border all the way to the Czechia, over 480 km. The plans are that Nord Stream 2 would also tap in Opal. Following the court decision, Opal will be constrained to take only 12.5 bcm per year. The court decision has immediate effect. The decision resulted in a short-lived wholesale price spike on most of the European gas hubs, especially in Central and Eastern Europe.
- On 19 September 2019 the third round of trilateral talks<sup>18</sup> between the EU, Ukraine and Russia took place, focussing on how EU energy rules should be reflected in the legal framework of a future contract, including the issues of the appropriate duration of such contract, the necessary volumes and their flexibility, the tariff setting mechanism, and the Stockholm arbitration process. As negotiations were not concluded, on 28 October the fourth round of trilateral talks were also held, and they continued even in December<sup>19</sup>, just ahead of the expiry of the gas transit contract on 31 December 2019. On 28 November the Court of Appeal of Sweden has rejected an appeal filed by Russian gas giant Gazprom against a 2017 decision made by the Arbitration Institute of the Stockholm Chamber of Commerce (SCC) in a bilateral legal dispute concerning gas contracts between the two countries. Based on the findings, Gazprom still has to settle a debt of USD 3 billion for Ukraine which might be repaid with gas supplies<sup>20</sup>.
- On 10 October 2019 the European Investment Bank (EIB) announced that it will provide a €110 million loan to state-owned Bulgarian Energy Holding (BEH) to fund part of the Gas Interconnector Greece-Bulgaria (IGCB) project, which will also help establish a link with the Trans Adriatic Gas Pipeline (TAP)<sup>21</sup>. The project is supported and co-financed by the EU. The IGCB is included in the list of Projects of Common Interest (PCI), which includes key cross border infrastructure projects that link the energy systems of EU countries. The planned length of the gas pipeline is 182 km and the projected capacity will be up to 3 bcm per year in the direction from Greece to Bulgaria (later can be upgraded to 5 bcm). The project is a key part of the strategy for greater integration of European energy markets focusing on the Bulgaria-Greece, Bulgaria-Romania and Romania-Hungary interconnections.
- On 31 October 2019 the Danish Energy Agency granted a construction permit to Nord Stream 2 to build a gas pipeline south-east of Bornholm, proposed in May 2019. It was the preferred path on the basis of environmental and safety considerations. The route is within the Danish exclusive economic zone, outside of Danish territorial waters: consequently, it did not require the approval from the Ministry for Foreign Affairs. The gas pipeline project has been approved before in Finland, Sweden, Germany and Russia. The €9.5 billion Nord Stream 2 project is aimed at doubling the throughput of the current Nord Stream route between Vyborg (Russia) and Greifswald (Germany), from 55 bcm per year to 110 bcm per year.
- EU LNG imports still showed huge increase in Q3 2019, reaching 23.2 bcm, up by 75% compared to the third quarter of 2018, though the amount of imported LNG was lower than in the previous quarter and the year-on-year increase rate was also down, compared to the rates over 100% in the first half of 2019. The total EU LNG imports amounted to an estimated €2.6 billion in Q3 2019. With the exception of Sweden, where small scale imports practically halved, all LNG importing countries in the EU showed measurable (double or triple digit) increases in per cent compared to Q3 2018 (See Figure 14). In the biggest importer Spain imports (7.3 bcm) more than doubled in year-on-year comparison in Q3 2019, similarly to the UK, Belgium, Greece and Lithuania. In Italy imports went up by 90% over the same period, while in the other countries the increase varied between 11% and 51%. Following Spain, in Q3 2019 the biggest importers were France (3.7 bcm), Italy (3.5 bcm), Belgium (1.8 bcm), Portugal and the United Kingdom (1.7 bcm each).
- In the third quarter of 2019, LNG market prices in Europe remained closely aligned with their East Asian peers (see Figure 23), implying that Europe offered a competitive destination for LNG cargos, especially if shipment costs are also taken into account (in the case of cargos from the Atlantic Basin and the Middle East). As liquidity of the Dutch TTF grows, this hub is gradually becoming a global LNG reference price (though temporarily diverging from TTF), which might have a more important impact on the Europe-Asia price relations than weather conditions or other one-off events resulting in temporary price divergence between the two regions.

<sup>17</sup> <https://curia.europa.eu/jcms/upload/docs/application/pdf/2019-09/cp190107en.pdf>

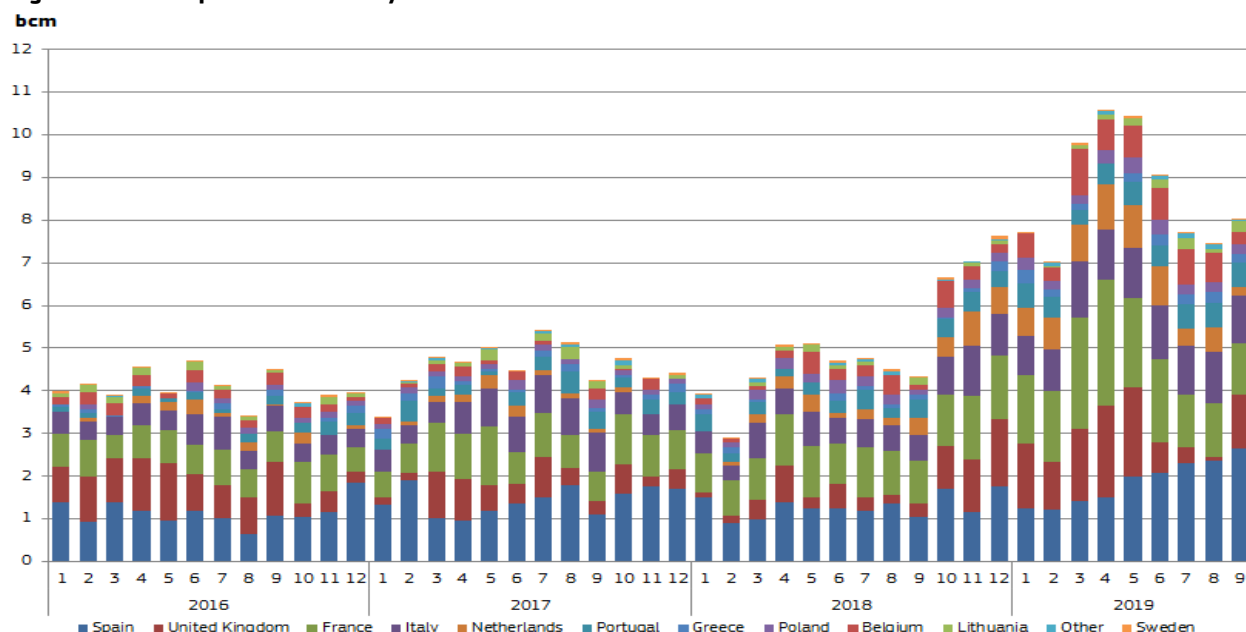
<sup>18</sup> [https://ec.europa.eu/commission/presscorner/detail/en/STATEMENT\\_19\\_5689](https://ec.europa.eu/commission/presscorner/detail/en/STATEMENT_19_5689)

<sup>19</sup> On 19 December 2019 an 'in principle agreement' was reached, according to media sources: <https://www.spglobal.com/platts/en/market-insights/latest-news/natural-gas/121919-russia-ukraine-agree-in-principle-new-gas-transit-deal-ec>

<sup>20</sup> <https://emerging-europe.com/news/naftogaz-wins-lawsuit-against-gazproms-appeal-in-stockholm-arbitration-court/>

<sup>21</sup> <https://www.reuters.com/article/bulgaria-greece-gas/eib-agrees-110-mln-euro-loan-for-bulgaria-greece-gas-link-idUSL5N26T466>

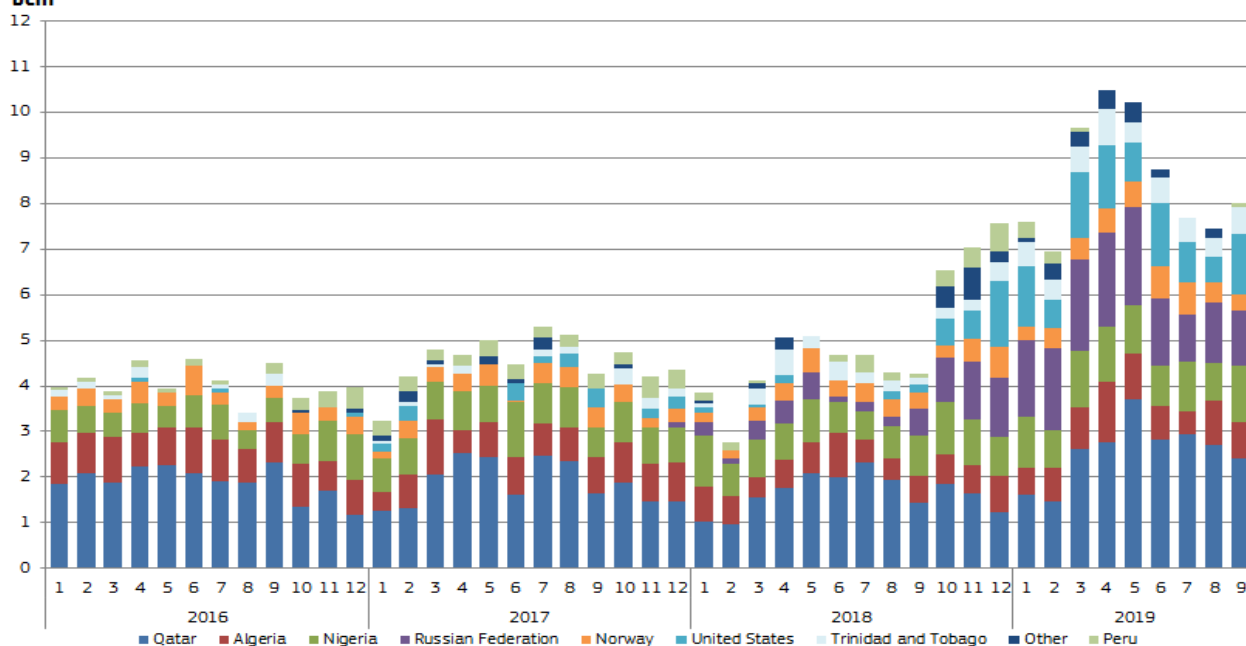
**Figure 14 LNG imports to the EU by Member States**



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

- In the third quarter of 2019, Qatar remained the largest LNG supplier of the EU, raising its market share further to 35%, which was the highest since Q3 2018. In this quarter Russia remained the second most important source, with a share of 15% within the total EU LNG imports (down from 19% in Q2 2019), ahead of Nigeria (14%, as opposed to 11% in Q2 2019) and the United States (12%, remaining constant since the last quarter). The share of Algeria remained around 10% in Q3 2019, while that of Norway and Trinidad and Tobago did not change too much either (both around 6-7% within the total EU LNG imports – See Figure 15).
- In the third quarter of 2019, Qatar was the biggest import source for Belgium (89% of the country's total LNG imports) and Poland (71% of the total imports), the United Kingdom (68%) and its share was close to 50% in Italy. Russia was the biggest supplier to Finland (90%, albeit with marginal quantities), the Netherlands (52%), and interestingly, it even had a 24% share in the Lithuanian LNG imports. Nigeria supplied around half of Portugal's LNG imports, and its share in France and Greece was close to one quarter. The US ensured 39% of the LNG imports in Portugal and 29% of Poland's total LNG imports.
- Norway remained a dominant LNG supplier of Lithuania (76%), it had a share of 51% in Malta and a share of 25% in Greece. Trinidad and Tobago ensured with Norway in the LNG supply of Malta in Q3 2019, albeit exporting only 80 million cubic metre gas. Spain and France had the most diversified LNG import source structure in Q3 2019, receiving cargoes respectively from nine and seven countries; on the other hand, Lithuania and with small quantities, Malta, Finland and Sweden had to rely on only two LNG supply sources.

**Figure 15 LNG imports to the EU by supplier**  
bcm

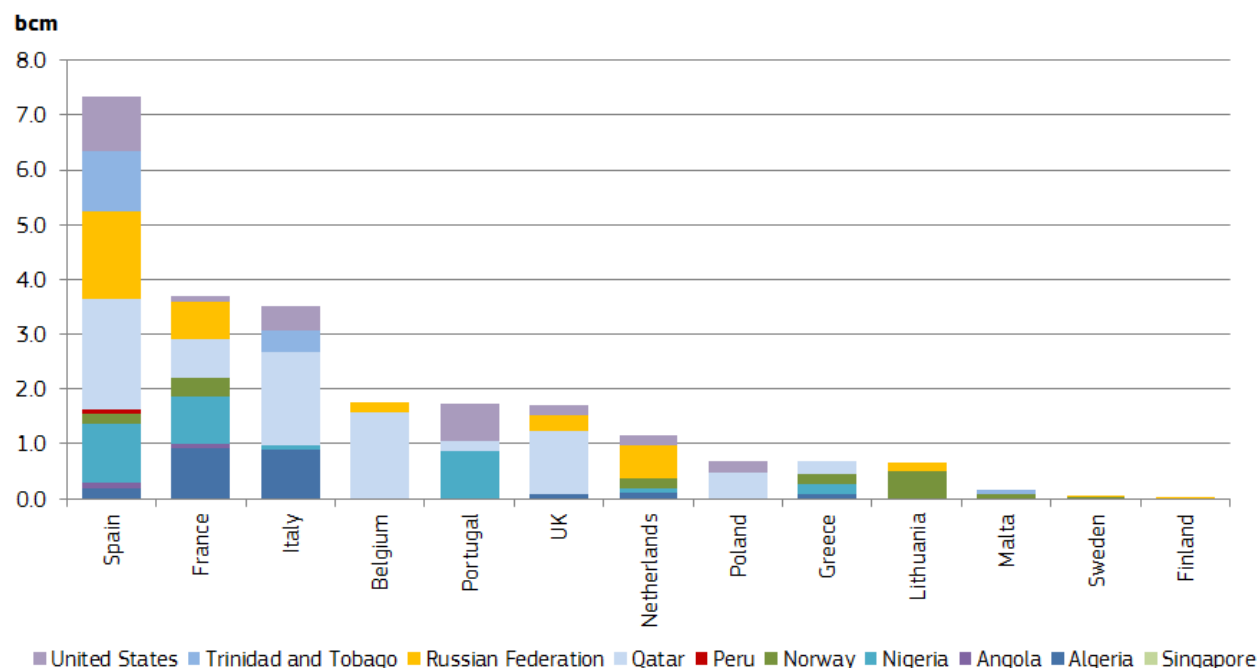


Source: Commission calculations based on tanker movements reported by Thomson Reuters

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 third quarter of 2019**  
bcm



Source: Commission calculations based on tanker movements reported by Thomson Reuters

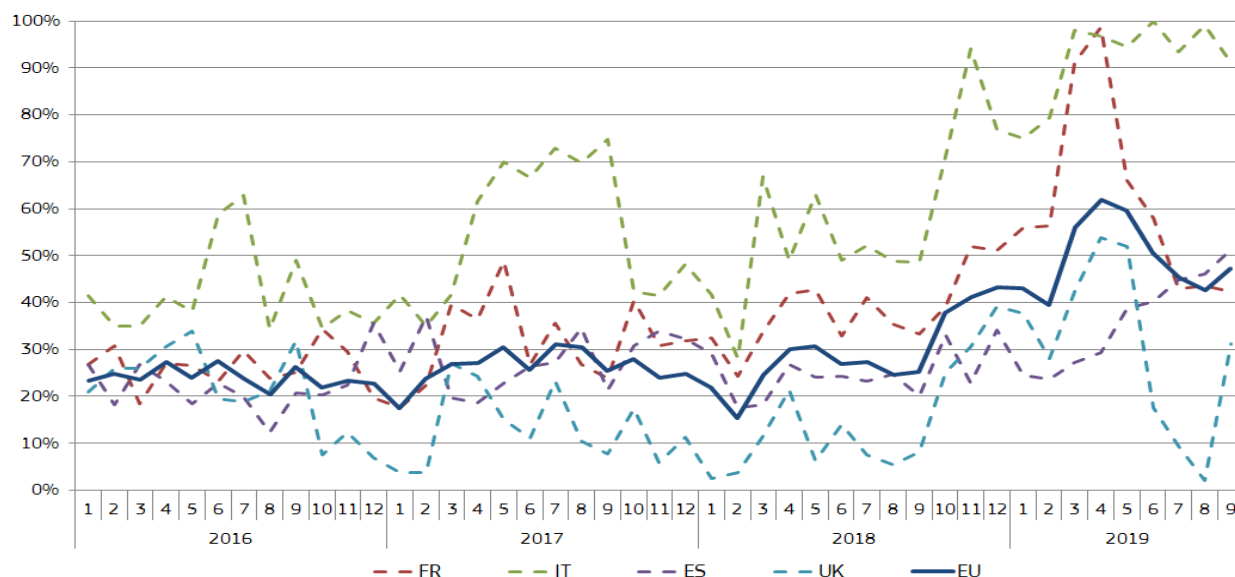
Imports coming from other EU Member States (re-exports) are excluded

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

- As a novelty in the current report, average monthly utilisation rates of terminals in the LNG importing EU Member States have been calculated and presented for some countries as well as the EU average on Figure 17. The key story of the last two years, the rapidly increasing LNG imports in many EU markets can be clearly tracked on this chart, showing high utilisation rates. At individual terminal or country level, monthly utilisation rates can be quite volatile, depending on the arrival or cargos and the hourly regasification capacities. At EU level, the average utilisation rate, ranging for several years between 20% and 30%, rose above 60% in April 2019, but in September 2019 it was still 47%. In the first nine months of 2019 the average EU utilisation rate was

close to 50%, and given that most recently available data show that EU Member States have a total re-gasification capacity of 220 bcm<sup>22</sup>, the total EU LNG imports in 2019, assuming a 50% utilisation rate could reach 110 bcm.

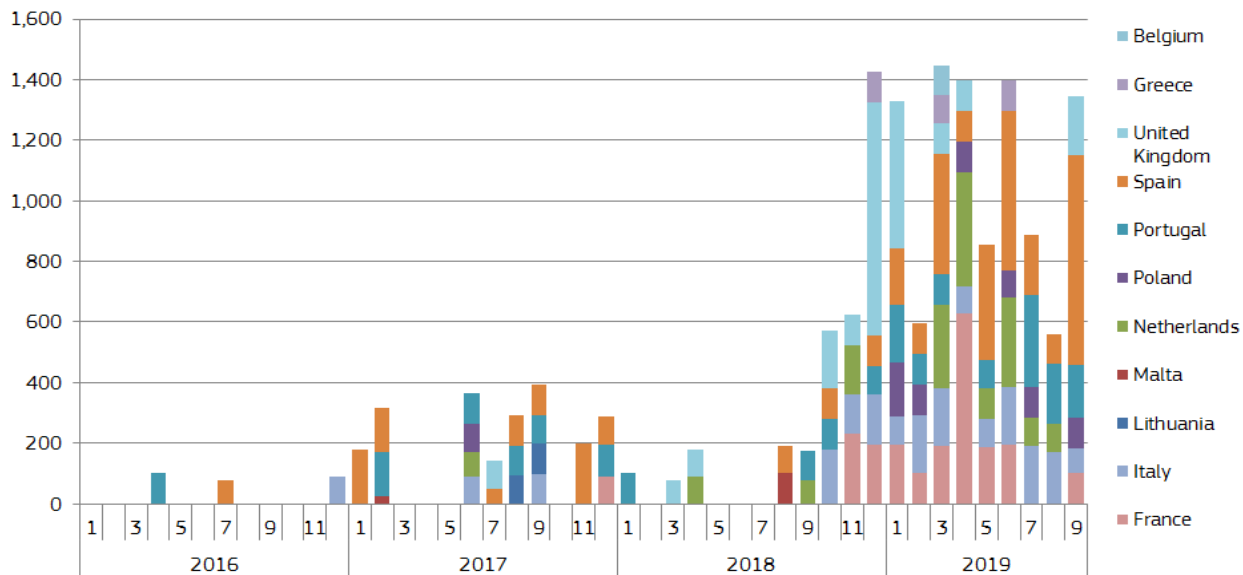
**Figure 17 – Average monthly regasification terminal utilisation rates in the EU and in some significant LNG importer countries**



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

- In the third quarter of 2019 29 LNG cargoes arrived from the US, unloading more than 2.8 bcm of LNG (in re-gasified form), amounting to an estimated €0.3 billion. In July and August 2019 the monthly volumes showed a big drop compared to the months of Q2 2019, however, in September the volumes rose again. Nevertheless, both the number of cargoes and LNG import volumes were up compared to Q3 2018 (in that quarter only 4 cargoes arrived, carrying only 0.4 bcm LNG). LNG exports to the EU represented 25% of total US LNG exports in Q3 2019. In the third quarter of 2019 the five most important EU destinations of the US LNG exports were Spain (slightly below 1 bcm), Portugal (0.7 bcm), Italy (0.5 bcm) Poland, the Netherlands and the UK (all around 0.2 bcm).

**Figure 18 EU LNG imports from the US**  
mcm



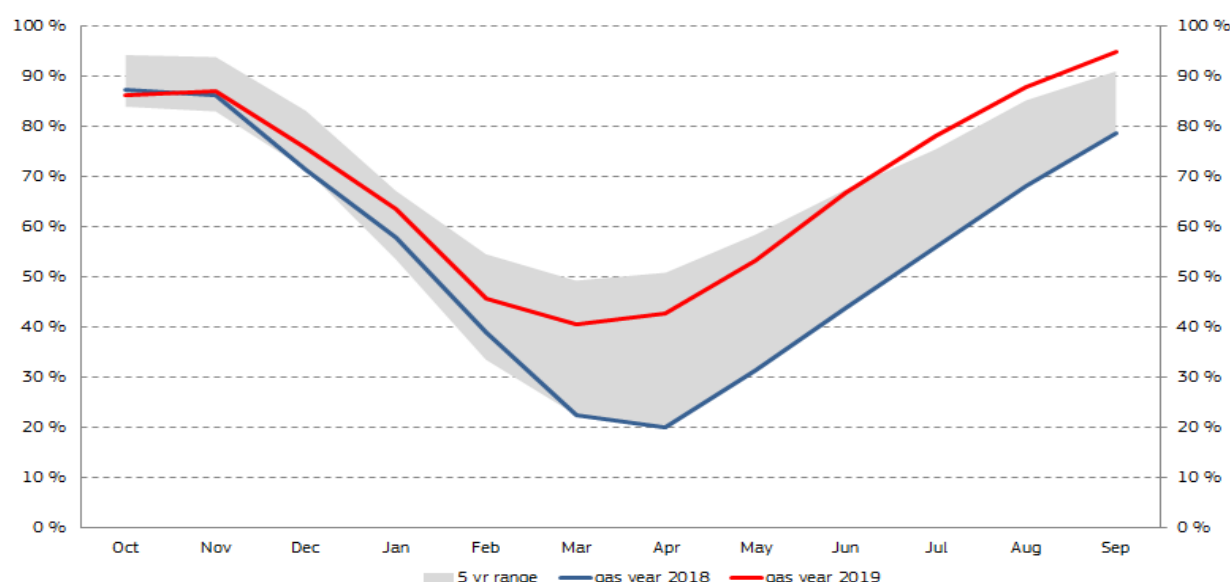
Source: Commission calculations based on tanker movements reported by Refinitiv

<sup>22</sup> Source: Gas Infrastructures Europe LNG database: [https://www.gie.eu/maps\\_data/downloads/2019/GIE\\_LNG\\_Map\\_Database\\_May\\_2019.xlsx](https://www.gie.eu/maps_data/downloads/2019/GIE_LNG_Map_Database_May_2019.xlsx)

## 1.4 Storage

- Figure 19 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<sup>23</sup>, plus 177 TWh capacity planned or already under construction (adding potentially another 16 bcm).
- On average, net storage re-fillings made during the third quarter of 2019 were equivalent to 23.9% of storage capacity, which was measurably lower than that of 33% in the same period of 2018): the average filling rate increased from 73% on 30 June 2019 to 97% on 30 September 2019. As result, at the end of September 2019 the average filling rate in the EU was more than 14% higher than a year before, and was the highest end-of-September value in the last eight years.
- Significantly increasing LNG imports in Europe, up by three quarters compared to Q3 2018, and high send-outs to the gas grid in many countries resulted in competitive gas prices (falling to ten-year low) across the EU and provided for opportunities for gas storage operators to inject gas in the storages, at favourable costs. On the top of this, measurable winter-summer spreads gave an incentive to market operators to intensify storage fillings during Q3 2019.
- On the other hand, it has been well known that the Russian gas transit agreement with Ukraine, representing a principal supply route to the EU, will expire at the end of 2019, resulting in a risk averse behaviour for storage operators giving strong incentives to fill the storages. As it was mentioned, on 30 September 2019 the average EU gas storage filling rate stood at 97%, which was the highest in the last eight years in this period of the year.

**Figure 19 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 31 October 2019. See explanations on data coverage at <https://agsi.gie.eu/#/faq>.

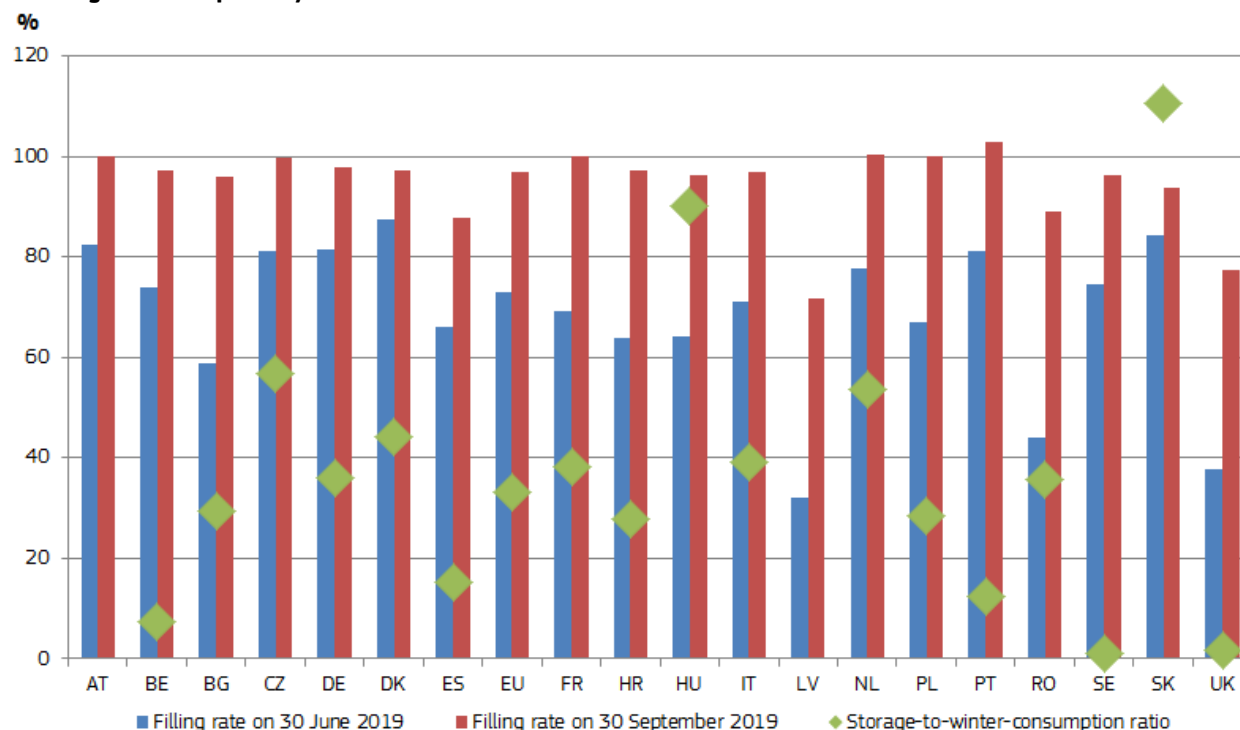
The 5-year range reflects stock levels in gas years 2014-2018. The graph shows stock levels on the 15<sup>th</sup> day of the given month.

- However, as Figure 20 shows, there was a significant variation among Member States in terms of both the starting position (the filling rate at the end of June 2019) and the pace of fillings. Although the change in the filling rate over Q3 2019 was 23.9% on EU average, in Romania the amount of gas stored practically doubled over Q3 2019, as 45% of the total storage capacity was injected within the quarter, in UK, Latvia, France, Croatia and Hungary the change in the filling rate in Q3 2019 was in the range of 30-40%, whereas in Denmark only 9% of the total capacity was injected (already at very high level at the end of Q2 2019). At the end of Q3 2019 with the exception of Latvia and the UK storage filling rates were above 90%, and in some countries (Austria, Czechia, France, the Netherlands and Portugal), they reached the technical capacity.
- However, it is worth to look at how storage fillings in different countries at the beginning of the heating season could cover the average winter gas consumption. Figure 20 also shows the ratio of the gas stored in each country on 30 September 2019 and the average gas consumption between October and March for the period of 2014-2048. In Austria the end-of-September storage level could have covered almost 1.5 times the average winter consumption, while in Slovakia this ratio was 110%, whereas in Hungary it

<sup>23</sup> [https://www.gie.eu/maps\\_data/downloads/2018/Storage\\_DB\\_Dec2018.xlsx](https://www.gie.eu/maps_data/downloads/2018/Storage_DB_Dec2018.xlsx)

was 90%. At EU level the storages would cover only one third of the average winter consumption, while in some countries (Belgium, Sweden and the UK this coverage ratio was less than 10%). Cross-country comparison of gas storage filling rates only really makes sense if we take into account the local gas consumption as well.

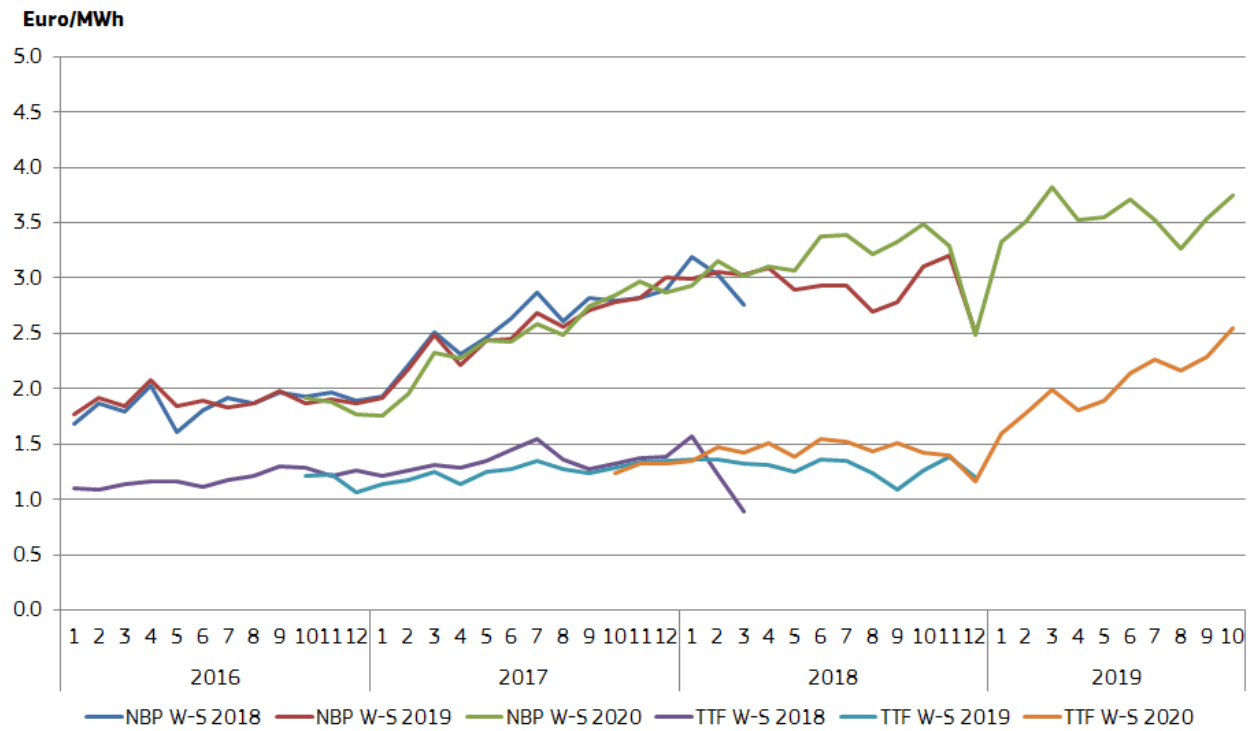
**Figure 20 Gas storage levels as percentage of maximum gas storage capacity, and storage coverage of average winter gas consumption by Member State**



Source: Gas Storage Europe AGSI+ Aggregated Gas Storage Inventory, extracted on 31 October 2019; calculations of DG Energy. See explanations on data coverage at <https://agsi.gie.eu/#faq>. Injection level data in Sweden changed significantly for the first time since the first data reporting period in March 2017. Nevertheless, the Swedish storage facility has a limited capacity (10 mcm), mainly used for LNG storage. Gas consumption data are taken from Eurostat data series nrg\_103m.

- On the NBP, seasonal spreads (the difference between summer and winter 2020 contracts) stabilised in relatively high ranges over the third quarter of 2019 (3.4 €/MWh on quarterly average, slightly lower in Q2 2019, 3.6 €/MWh). At the same time the average 2020 seasonal spread on the TTF increased slightly and by September 2019 it rose to 2.3 €/MWh, whereas the quarterly average went up from 2 €/MWh to 2.2 €/MWh.
- Increasing 2020 summer-winter spreads over Q3 2019 could be observed in many other European gas markets, as spot prices showed a huge decrease, owing to abundant LNG send-outs to the gird. Spot prices were also pushed down in consequence of the less demand on the spot market, owing to unusually high storage filling rates and despite increasing demand from power generation. However, contracts on the curve were less influenced by current market conditions, further widening the spread with spot prices. Well supplied markets in Q3 2019 pushed down spot contracts, however, uncertainties prevail over the future evolution of the LNG price premium in Asia to Europe, resulting in potential shipment redirecting incentives, away from Europe, and supply concerns during wintertime on Russian pipeline sources though Ukraine. These factors all contributed to the widening spread of winter contracts compared to the spot prices.
- As in the UK there is 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 continent over the last few years (amounting to 1.2 €/MWh in Q3 2019), which was reinforced by the decommissioning of some storage facilities (e.g.: Rough) in the country.

**Figure 21 Winter-summer spreads in the Dutch and British gas hubs**



Source: S&P Global Platts

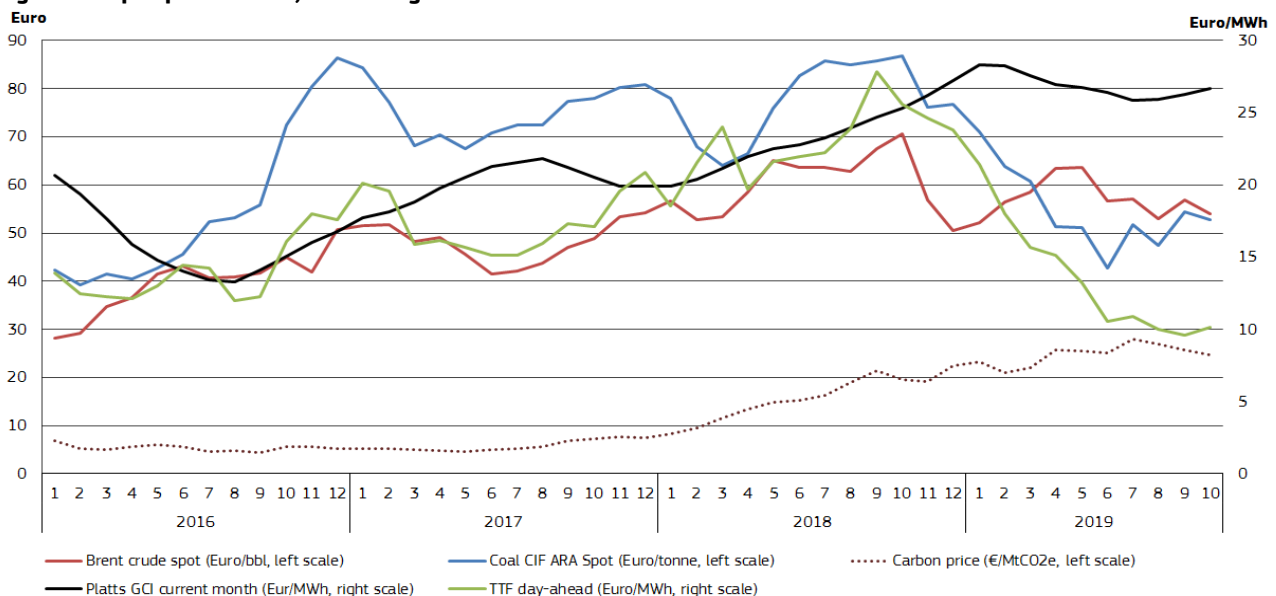
W-S 2018 refers to the difference between the winter 2018-19 price and the summer 2018 price; W-S 2019 refers to the difference between the winter 2019-20 price and the summer 2019 price, W-S 2020 refers to the difference between the winter 2020-21 price and the summer 2020 price.

## 2. Wholesale gas markets

### 2.1 EU energy commodity markets

- By merely looking at monthly averages, the Brent crude oil price did not experience big variations over Q3 2019: In July 2019 it stood at 64 USD/bbl (57 €/bbl), in August it fell back to 59 USD/bbl (53 €/bbl), and in September it rose back to 60 USD/bbl (54 €/bbl). However, looking at the daily prices, we can see that in August it fell almost as low as in the beginning of 2019 (55 USD/bbl, 50 €/bbl), owing to demand side factor impacts, namely lower economic growth expectations amid global trade tensions. Similarly to the previous quarter, incidents impacting oil supply had an important role in Q3 2019. Especially the missile attack on the Abqaiq oil field and refinery installations in Saudi Arabia on 14 September, impacting almost 5% of the global oil refinery capacity, which increased the tension in the oil markets. On the following trading day, Monday, 16 September, the Brent crude price jumped from 60 USD/bbl to 72 USD/bbl at the beginning of the trading hours. However, as later it turned out that there are sufficient underutilized capacities in the Saudi oil refining system and the country could release emergency stocks to supply its clients, oil prices began to decrease and by the end of September 2019 they returned to the pre-attack levels, as repair works started on the installation.
- By September 2019 the Dutch TTF spot gas price, continuing the downward trend started in the fourth quarter of 2018, fell to 9.6 €/MWh, which was the lowest since September 2009, implying an exactly ten year low (and in the early days of September 2019 the daily average spot fell even to 7.5 €/MWh, which was the lowest since October 2006). This was primarily owing to the abundant gas supply on the market, as LNG imports in the EU rose by 75% in Q3 2019 in year-on-year comparison. Unusually high storage filling rates did not result in extra demand for gas on the spot market either, in contrast to Q3 2018. On the demand side however, owing to low gas prices and high carbon emission prices, gas use increased in electricity generation, squeezing out coal from the power generation mix in many European countries. Nevertheless, the price fall was driven by huge increase in LNG with competitive prices, which growth in gas supply could not be counter-balanced by any demand side factor.
- Although crude oil prices in Q3 2019 did not show big difference at the beginning and the end of the period, the oil price increase in the first half of 2019, with the usual time lag of 6-9 month, might start to filter in the oil-indexed gas contracts in the next quarter. It is likely that oil-indexed contracts will go up again in the forthcoming period. In Q3 2019 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 as high as the TTF (10 €/MWh).
- Spot coal prices went up from 43 €/Mt in June 2019 to 54 €/Mt in September 2019. Although the coal market in Europe was still fundamentally weak (as low gas prices made gas-fired generation more competitive, demand for coal in electricity generation fell substantially, which was coupled with high coal stocks in Europe and weaker Asian demand for power generation), there were some market speculations propelling up coal prices in some periods in Q3 2019, for example during summer heat waves and in the September period of the aforementioned Saudi refinery incidents, when energy market prices rose generally). Carbon prices reached almost 28 €/MtCO<sub>2e</sub> in July 2019, and averaged 26.9 €/MtCO<sub>2e</sub> in Q3 2019, implying a further rise in Q3 2019 (5 percent increase on quarterly average).

**Figure 22 Spot prices of oil, coal and gas in the EU**



Source: S&P Global Platts



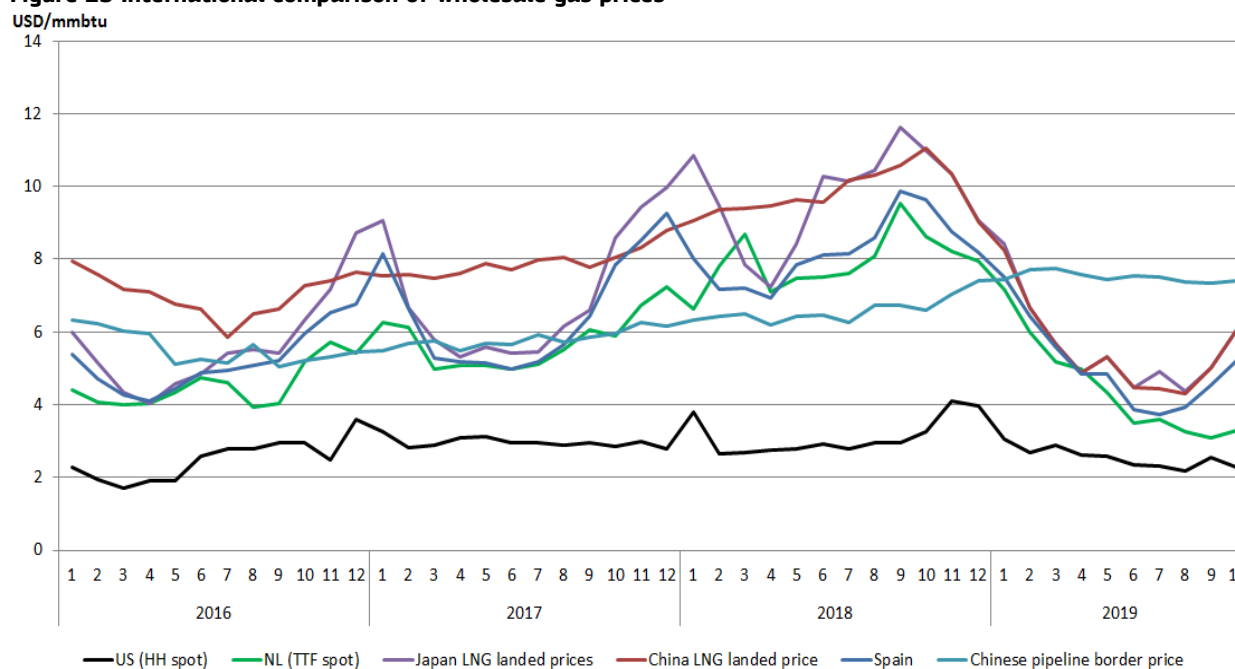
## 2.2 LNG and international gas markets

- Figure 23 displays the international comparison of wholesale gas prices. In Q3 2019 European, Japanese and Chinese landed LNG contracts remained still well aligned, even amid a small upturn in September 2019. However, the TTF contract fell so low by September 2019 that even Spanish LNG landed prices had a premium to it. Bearing also in mind lower transportation costs to Europe than to Asia, this meant a great opportunity to LNG exporters in the Atlantic Basin and the Middle East to continue to ship cargos towards the European markets in Q3 2019, even if LNG imports in Europe decreased compared to Q2 2019. With the increasing liquidity the TTF price is acting more and more as benchmark, and not only in Europe.
- The average Japanese LNG price was 4.8 USD/mmbtu in Q3 2019, down from 4.9 USD/mmbtu in Q2 2019 and by 56% compared to same quarter of 2018, when it stood at 10.7 USD/mmbtu. The Japanese premium above the Dutch TTF hub was on average 1.5 USD/mmbtu in the third quarter of 2019, up from 0.6 USD/mmbtu in Q2 2019, but down from 2.3 USD/mmbtu in Q3 2018. On quarterly average, LNG import prices in China were comparable with their Japanese peers (4.6 USD/mmbtu in Q3 2019). These numbers show a measurable price convergence between European and Asian LNG prices over the last year, even if in Q3 2019 low TTF prices resulted in slightly higher Asian price premiums.
- The average price of Chinese pipeline gas imports in Q3 2019 was 7.4 USD/mmbtu, which was well above the Asian LNG reference prices by 2.5-3 USD/mmbtu, and showed a slightly decrease compared to Q2 2019, reflecting the time-lag impact of oil price escalation, which is still dominant in pipeline gas contracts in Asia.
- The Henry Hub price remained fairly stable in Q3 2019 remaining in the range of 2.2-2.5 USD/mmbtu., close to the average in June 2019<sup>24</sup>, 2.3 USD/mmbtu. In August 2019 the monthly average price was 2.2 USD/mmbtu, which was the lowest since May 2016. The euro-dollar exchange rate did not change too much in Q3 2019 over time, (1.13 in June 2019 vs. 1.10 in September 2019), but since September 2018 the euro depreciated against the dollar (1.16 in September 2018), implying that changes in the gas price in euro over the last twelve months preceding September 2019 was partly cushioned by the depreciating euro.
- In the third quarter of 2019, TTF averaged at 3.3 USD/mmbtu (10.2 €/MWh). The average German border price was somewhat higher (4.1 USD/mmbtu or 12.7 €/MWh), reflecting the impact of still existing oil-indexed contracts in the German gas import mix.
- Over the course of the third quarter of 2019 differentials in international price contracts remained stable, as traditionally lower US prices stagnated and European and Asian contracts first decreased, then in September 2019 went up again. The ratio of the Japanese LNG price and US Henry Hub was 2.0 in the third quarter of 2019, slightly up from 1.9 in the Q2 2019 but down from 3.7 in Q3 2018.
- The average TTF/Henry Hub ratio decreased to 1.4 in the third quarter of 2019 from 2.9 in the same period of 2018. In absolute terms, the price spread between Henry Hub and TTF was 1.0 USD/mmbtu in the third quarter of 2019, which compares to an average of 5.5 USD/mmbtu in the same period of 2018. By September 2019 the price differential between Henry Hub in the US and the TTF in the Netherlands (0.6 USD/mmbtu) was the lowest in the last six years.
- In the third quarter of 2019, spot prices averaged 3.3 USD/mmbtu in the Netherlands, 4.1 USD/mmbtu in Spain, 4.6 USD/mmbtu in China and 4.8 USD/mmbtu in Japan, implying that the Asian price premium to the TTF rose to 1.3-1.5 USD/mmbtu, whereas in Q2 2019 it was 0.6 USD/mmbtu.
- JCC (Japanese Crude Cocktail), the Japanese benchmark of oil-indexed LNG prices, averaged around 10.1 USD/mmbtu in the third quarter of 2019, which was more than twice as high as the average spot price (4.8 USD/mmbtu), reflecting the slow responsiveness (time-lag in the oil indexation) to the spot market price decrease of this oil-indexed contract.
- LNG imports in the third quarter of 2019 increased measurably in China (+14% year-on-year), reaching almost 19.6 bcm<sup>25</sup>. However, in this quarter Japan was still the biggest LNG importer, importing 25.5 bcm, which however was 5% less than in Q3 2018. South Korea imported 12.1bcm LNG in Q3 2019, 1.6% less in year-on-year comparison. India imported 7.5 bcm, also down by 1.7% compared to Q3 2018. Taiwan (having an individual LNG market) imported 5.8 bcm LNG in Q3 2019, up by 3% in year-on-year comparison. These five markets imported more than 70 bcm LNG in Q3 2019, practically three times as much as the EU, reflecting the importance of the Asian markets in the global LNG trade.
- Global LNG supply continued to expand in the third quarter of 2019: and LNG trade amounted to 118 bcm, 11% more than in the same quarter of 2018 (107 bcm). In Europe alone the demand for LNG increased by almost 10 bcm in Q3 2019 year-on-year.

<sup>24</sup> Due to infrastructure bottlenecks in some shale gas producing regions of the US, resulting in inability to transport gas to other regions to be consumed, in some periods even negative spot prices occur in regional gas markets.

<sup>25</sup> Source: Commission calculations based on tanker movements reported by Thomson Reuters

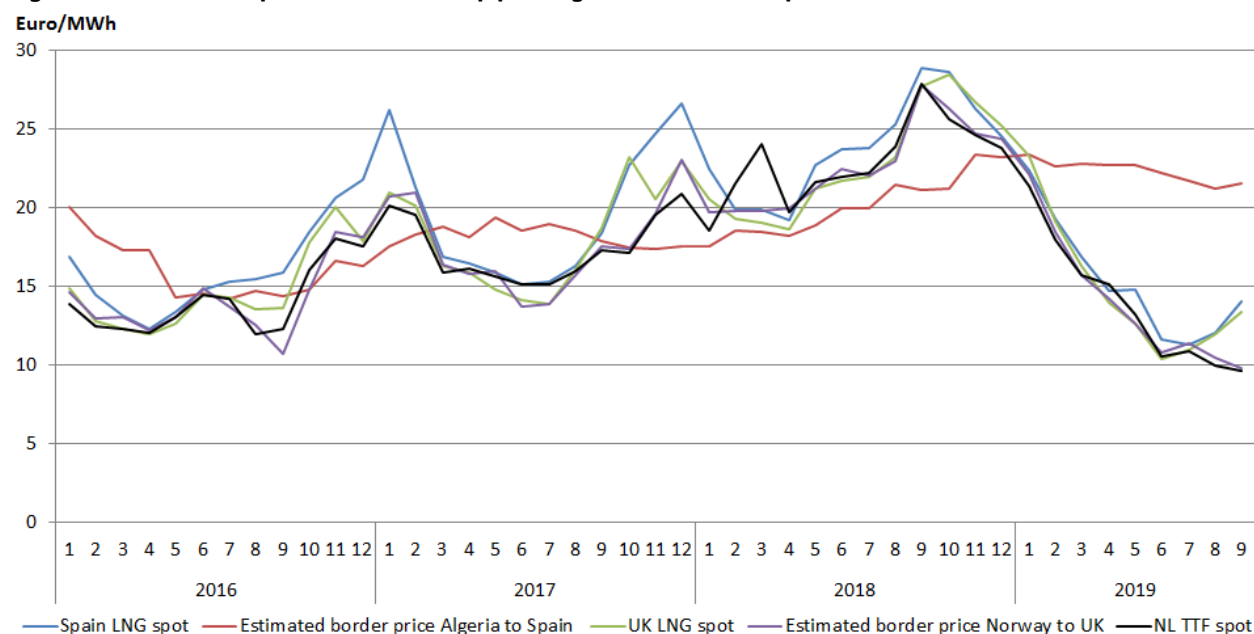
**Figure 23 International comparison of wholesale gas prices**



Sources: S&P Global Platts, Thomson-Reuters, BAFA, CEIC

- Figure 24 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 the major part of pipeline imports in the UK and Spain, respectively. The evolution of the day-ahead prices on the Dutch TTF hub is also presented.
- In the third quarter of 2019, the estimated Algerian pipeline import price in Spain decreased slightly (by 5%), compared to the previous quarter, and averaged around 21.5 €/MWh, which was however still 3% higher than in Q3 2018. It seems that the time lag impact of the decrease in crude oil prices at the end of 2018 only slowly filters in the Algerian oil indexed contracts. However, in September 2019 the average estimated Algerian import price in Spain was more than 70% higher than the Spanish LNG import price and more than twice as high as the TTF benchmark, giving a highly probable explanation why pipeline gas imports from Algeria fell by 37% in the EU (and in Spain by even more, 44%) in Q3 2019 in year-on-year comparison (See Chapter 1.3 Imports).
- In contrast, the estimated Norwegian import price contract in the UK, similarly to the TTF hub price, continued to decrease and by September 2019 it fell below 10 €/MWh, the lowest since December 2009. In the third quarter of 2019 UK and Spanish LNG import contracts on Figure 20 started to show a measurable (around 4 €/MWh in September) premium to the TTF, as it seems that the TTF price fell so deep that not all LNG import contracts followed. Monthly import prices in September 2019 (with the exception of the Algerian import) fell in the range of 9.5-14 €/MWh. The quarterly average prices in Q3 2019 showed a huge decrease, in the range of 50-60% compared to the third quarter of 2018.

**Figure 24. Price developments of LNG and pipeline gas in the UK and Spain**



Note: Landed prices for LNG. Source: S&P Global Platts, Thomson Reuters, European Commission estimates based on Eurostat COMEXT data, retrieved on 25 November 2019.

## 2.3 European gas markets

### 2.3.1. Gas trade on the EU hubs

- As Figure 25 and Figure 26 show, liquidity on the main European gas hubs increased in the July-August 2019<sup>26</sup>: total traded volumes amounted to around 9 403 TWh (equivalent to around 785 bcm, and in monetary terms representing €96 billion<sup>27</sup>), 40% more than in July-August 2018. This was around 6 times more than the gas consumption in the seven Member States<sup>28</sup> covered by the analysis in July-August 2019. In July 2019 the year-on-year increase in gas traded volume on the observed European trading platforms was outstandingly high, 71%, whereas in August the pace of increase was lower, only 14%.
- Traded volumes in July-August 2019 increased year-on-year by the most on the Dutch TTF hub (68%), which in itself had the highest traded volume in Europe. The second biggest growth could be observed on VTP in Austria, where the traded volume went up by 55%. In Germany the traded volume on Gaspool and NGC together went up by 46% over the same period. In France the TRF hub volume was up by 44%, in Italy (PSV) volume was up by 37%, whereas Belgium's Zeebrugge volumes grew modestly, by 11% in July-August 2019 in year-on-year comparison. At the same time the NBP hub in the UK registered a decline of 9% compared to July-August 2018.
- The significant increase on the TTF hub further reinforced its leading role in Europe, in July-August 2019 pooling more than 67% of the total European gas trade alone. 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 July-August 2019 was down by 9% compared to the same period of 2018, and the share of NBP in this period of 2019 was only 21% in the total European observed trade, down from 32% in July-August 2018.
- Other markets had lower shares: Germany (NGC and Gaspool together) had a share of 6%, while the Italian PSV only had 2.4%, whereas VTP, TRF and Zeebrugge respectively had 1.6%, 1.4% and 0.9%.
- Rapidly increasing LNG imports in Europe, resulting in high LNG send-outs and contributing to low spot prices, played an important role in increasing traded volumes on the European gas hubs. Low prices were beneficial to storage operators during the filling

<sup>26</sup> Due to non-availability of data for September 2019 at the time of drafting this report, only July and August 2019 data are analysed.

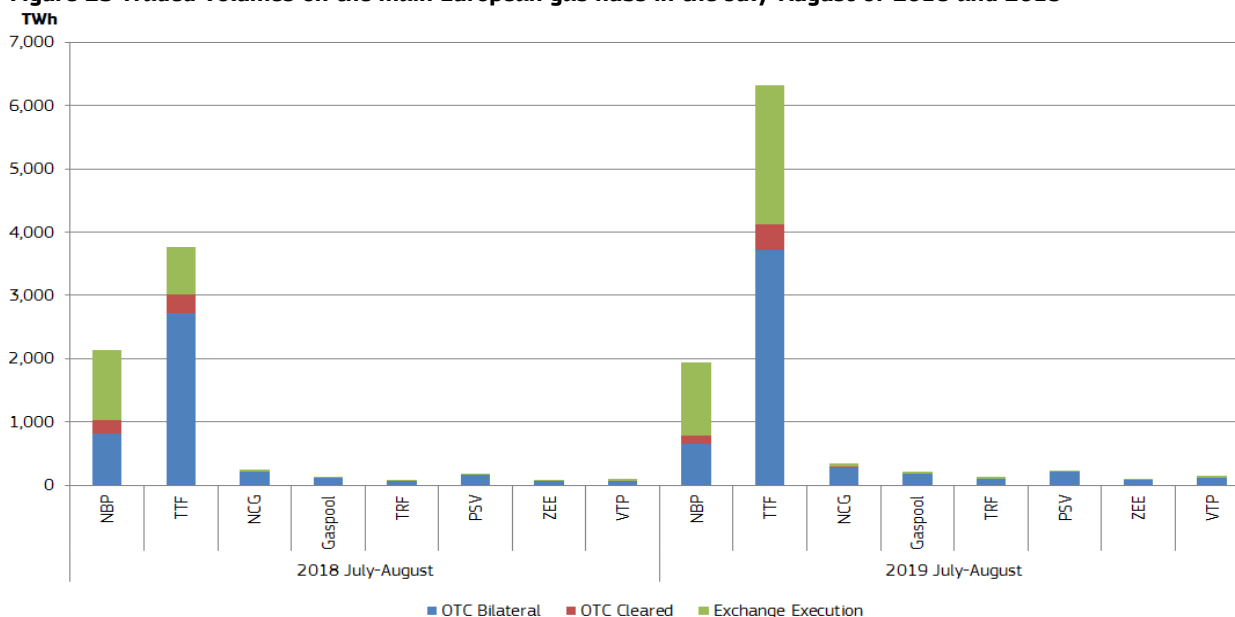
<sup>27</sup> Assuming that all trade was carried out on the quarterly average spot price

<sup>28</sup> 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.

season. As curve contracts had a measurable premium to spot contracts, market actors were given incentives to conclude contracts on the spot market, either for hedging (e.g.: storage-backed hedging) or for speculative trade strategies.

- High LNG send-outs and refilling needs resulted in the increase in the traded volume on less liquid European hubs as well. On the top of this, in France increasing volume of trade was partially owing to increasing need for gas in power generation during summer heat waves in July and August 2019. Volume increase in the German market was helped by risk hedging strategies, stemming from the expiry of the Ukrainian gas transit contract.
- On the UK NBP hub, 59% of the total traded volumes were executed directly on the exchange in the July-August 2019, which was the highest share in Europe, and were up by 7 percentage points compared to the same period of 2018. This share was lower, 35% on the Dutch TTF hub, however, compared to July-August 2018 the share of exchange executed contracts within the total trade was up by 15 percentage points. On the VTP hub in Austria this share was 21%, on the French TRF it amounted to 17% and was 16% on the two German hubs together, whereas on the Italian PSV and on Zeebrugge in Belgium it was only 1-2%. On the two German hubs the share of exchange trade slightly went up, by 1 percentage point, while on the French TRF it decreased by 12 percentage points and on the Austrian VTP hub by 5 percentage points in comparison to July-August 2018.

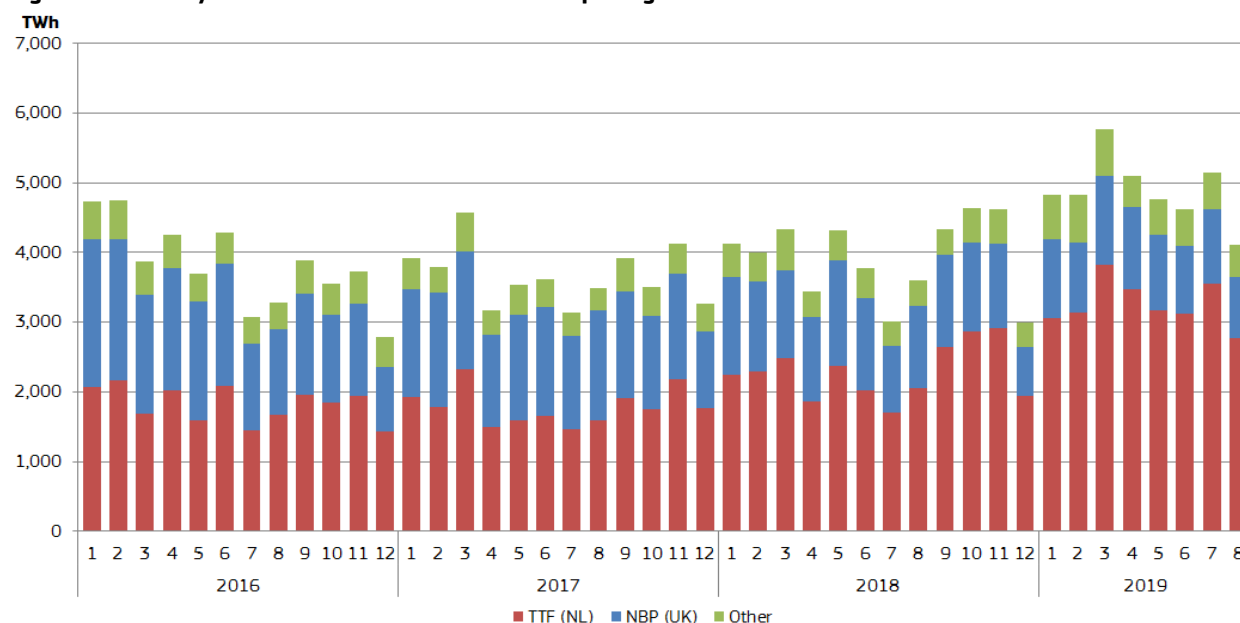
**Figure 25 Traded volumes on the main European gas hubs in the July-August of 2018 and 2019**



The chart covers the following trading hubs: UK: NBP (National Balancing Point); 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).

Source: Trayport Euro Commodities Market Dynamics Report

**Figure 26 Monthly traded volumes on the main European gas hubs**

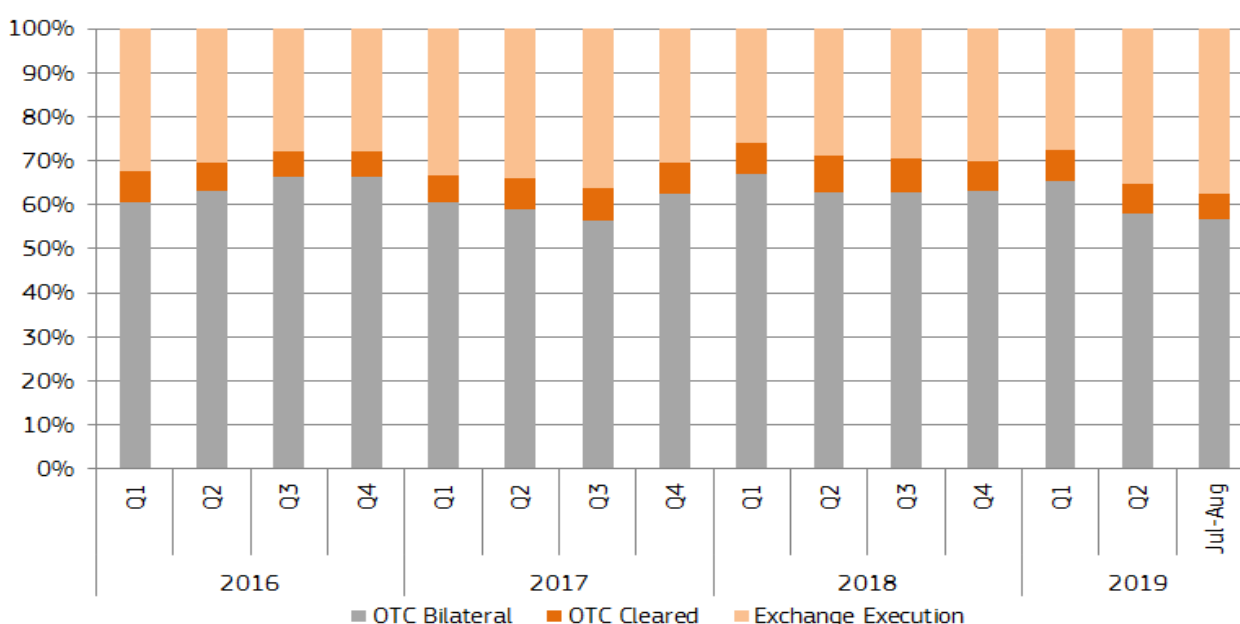


"Other" includes the following trading hubs: Germany: NCG (NetConnect Germany) and Gaspool; France: TRF (Trading Region France); Italy: PSV (Punto di Scambio Virtuale); Belgium: Zeebrugge beach. 1 bcm is equivalent to 9.71 TWh.

Source: Trayport Euro Commodities Market Dynamics Report

- On the European hubs as whole, in July-August 2019 57% of the total trade was OTC bilateral, 6% was OTC cleared, whereas the share of exchange executed contracts was above 37%, which was the highest in the last five years. The share of exchange executed contracts went up by 8% year-on-year in July-August 2019, whereas the share of OTC bilateral and OTC cleared went respectively down by 6.5 and 1.5 percentage points.
- Exchange executed volumes in July-August 2019 showed a huge increase, 75% in year-on-year comparison on the observed European markets, which was the highest increase since the second quarter of 2016. The total OTC traded volume (bilateral and cleared together) rose by 22% in the same period. In this quarter liquidity was driven by exchange executed contracts, whereas OTC volumes showed a slower increase.

**Figure 27 Share of traded volumes on the main European gas hubs**



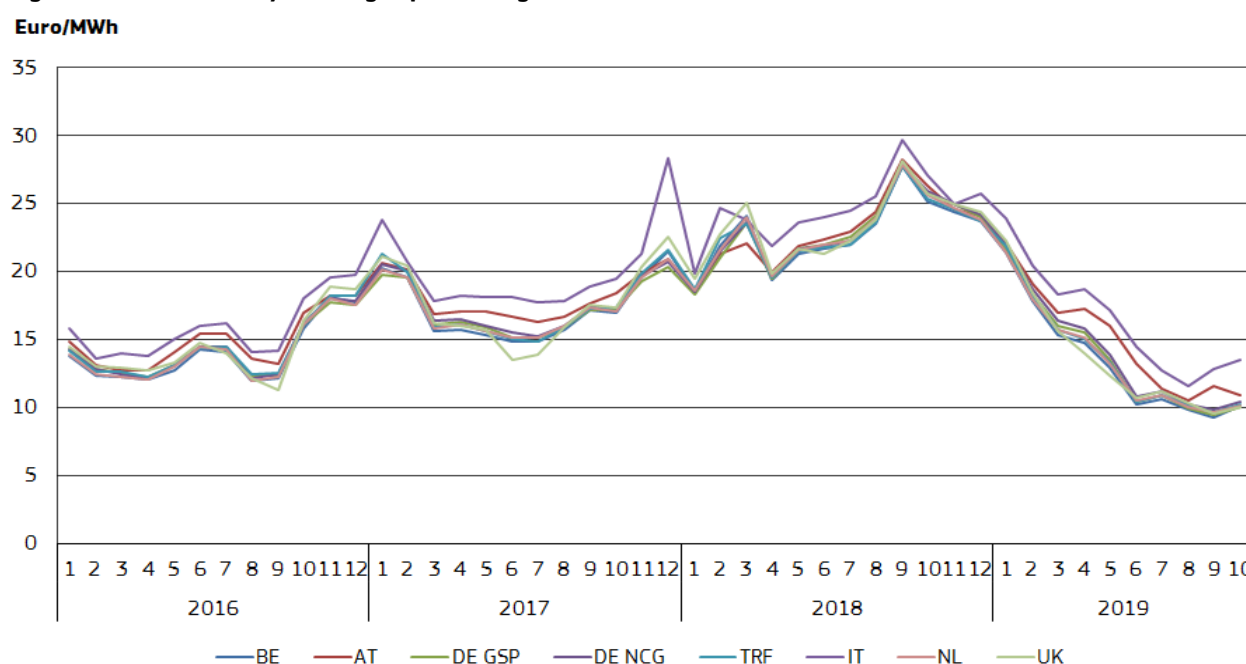
The chart covers the following trading hubs: UK: NBP (National Balancing Point); Netherlands: TTF (Title Transfer Facility); Germany: NCG (NetConnect Germany) and Gaspool; France: PEG (Point d'Echange Gaz); Italy: PSV (Punto di Scambio Virtuale); Belgium: Zeebrugge beach, Austria: Virtual Trading Point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

Source: Trayport Euro Commodities Market Dynamics Report

### 2.3.2. Wholesale price developments in the EU

- European hub prices were averaging around 9-12 €/MWh in the third quarter of 2019, which was lower than the range in Q2 2019 (12-17 €/MWh), as well as the range in Q3 2018 (24-27 €/MWh). In fact, in the third quarter of 2019 hub prices in Europe were down by 50-60% in year-on-year comparison, falling to several year lows, some hub prices reached the lowest over the last decade. The average TTF hub price fell by 59% in year-on-year comparison.
- Wholesale gas prices in the third quarter of 2019 were still driven by the abundant LNG inflows to the European markets, which were up by 75% in Q3 2019 in year-on-year comparison. Although at the end of Q3 2019 LNG prices in Asia showed higher premiums again, this attracted mainly LNG cargos from the Middle East, however, Europe could still benefit from LNG trade in the Atlantic basin. High filling rates of gas storages across Europe also decreased the demand for spot gas purchases. Temporary oil price spikes (e.g.: in September 2019) could only result in short-lived upturns in wholesale gas market prices, and even increasing gas demand in power generation was unable to give support to low gas prices.

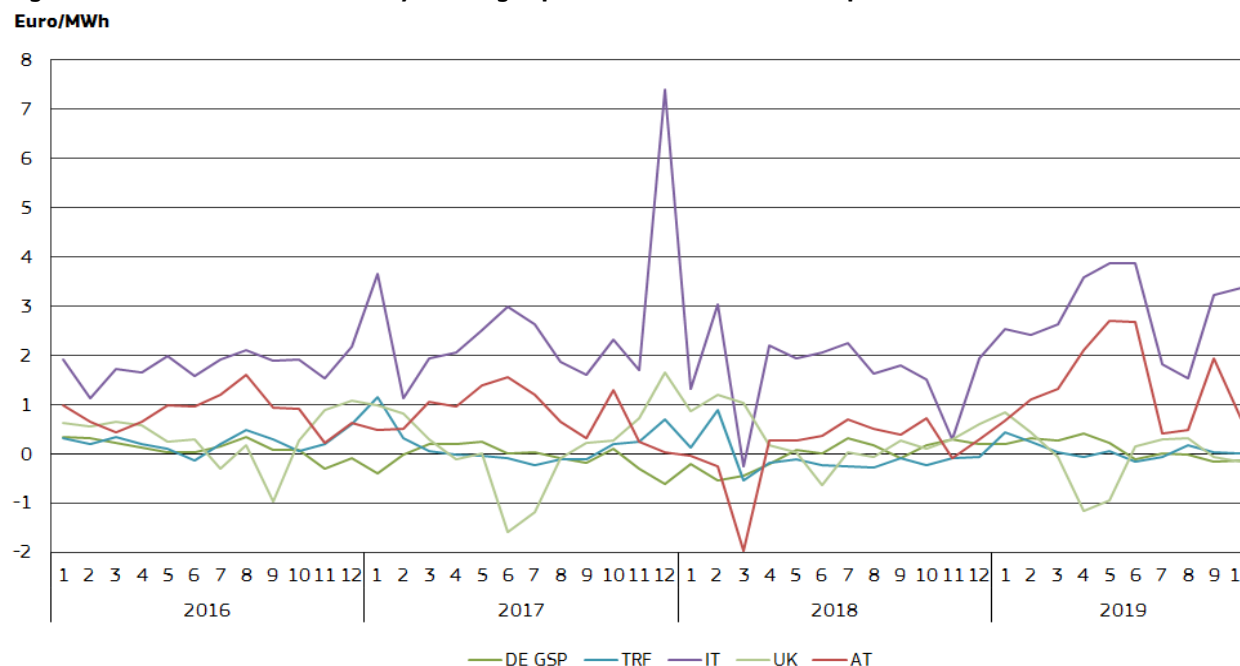
**Figure 28 Wholesale day-ahead gas prices on gas hubs in the EU**



Source: S&P Global Platts

- In July and August 2019, the UK spot price showed only a minor premium to the Dutch TTF hub (0.3 €/MWh), while in September it turned again to a small discount (0.1 €/MWh). German benchmarks had an average premium (0–0.2 €/MWh) in Q3 2019 on average. The UK premium compared to the continent, which is rather unusual, was due to more demand for gas in continental Europe, enabling less gas flows to the UK on British-Belgian interconnector.
- The price premium of the Italian hub to the TTF fell to 1.8 €/MWh and 1.5 €/MWh in June and July respectively, whereas in September it rose as high as 3.2 €/MWh. In the two summer months abundant LNG inflows and less demand for storage refilling (beyond the obligation for certain operators to inject a certain amount of gas in each month during the summer) and less demand from industry helped to keep a lid on the Italian wholesale gas price. In September prices rose, as ahead the ten-day long (4-14 October) on the TAG pipeline (between Austria and Italy) were priced in and import demand rose beforehand.
- The Austrian gas hub also showed an increasing premium to TTF in September 2019, after two months of lower prices, and reached and 2 €/MWh. The Austria-Hungary (HAG) pipeline was not available due to maintenance between 19 and 29 of August 2019, which decreased, in the absence of export flow opportunities, the price in Austria and increased those in Hungary, Slovakia and Czechia. Prices in Central and Eastern Europe were also impacted by the decision of the EU Court of Justice on the access to the OPAL gas line, resulting in temporary price spikes until alternative route imports ramped up. Throughout Q3 2019 the Belgian hub prices remained in a minor price discount (0.3 €/MWh on average) to the TTF. The French TRS hub prices remained well-aligned to the TTF over the whole Q3 2019, while the average of NCG and Gaspool in Germany showed a minor premium of 0.1 €/MWh.

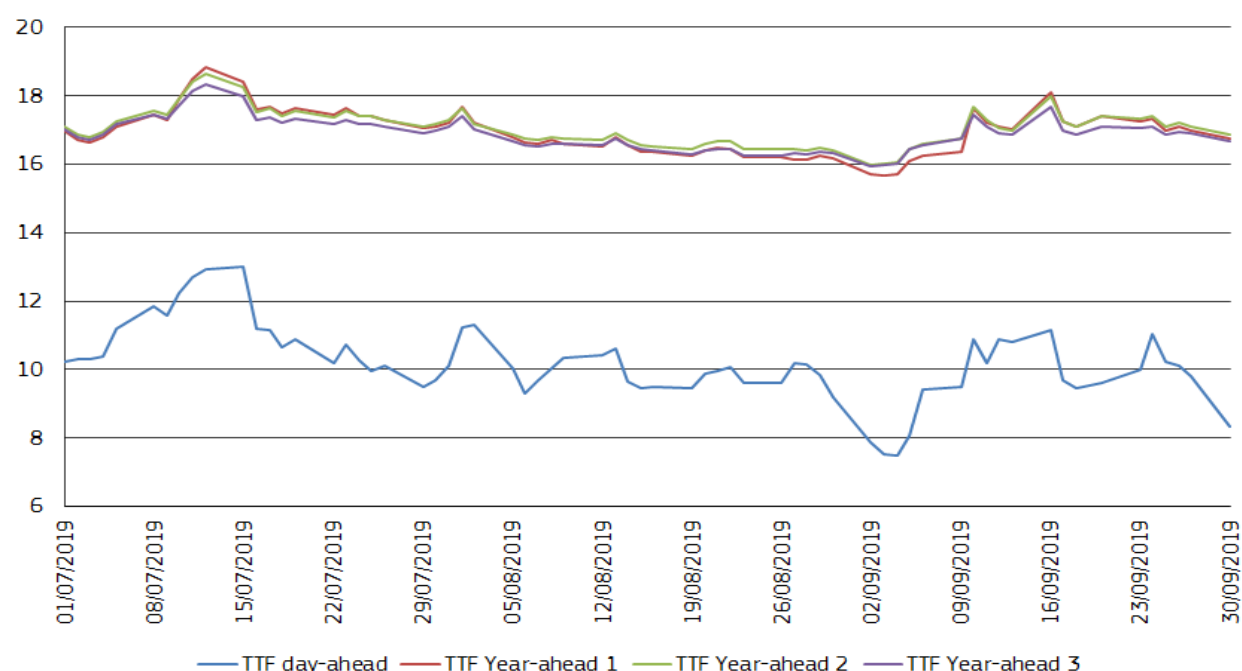
**Figure 29 Premium of wholesale day-ahead gas prices at selected hubs compared to TTF**



Source: S&P Global Platts

- Figure 30 looks at the development of forward prices of one, two and three years ahead contracts in comparison to the development of the day-ahead price on the Dutch TTF.
- In the third quarter of 2019 daily spot prices on the TTF hub showed a significant decrease: whereas in the first half of July 2019 they rose from 10 €/MWh to 13 €/MWh, by early September they fell below 8 €/MWh, which was the lowest in the last thirteen years. Since then they picked up again but overall in September 2019 they remained below 10 €/MWh. However, the trajectory of the forward contracts did not show such a big decrease, in Q3 2019 they moved between 16 €/MWh and 18 €/MWh during most of the time. In consequence, forward price premium to the spot continued to widen and reached 8-9 €/MWh by the end of September 2019.
- This significant difference signals that the market still anticipates a recovery in spot gas prices. The current abundant LNG influx to Europe might take a reverse in the coming months, however, ongoing investment projects in big LNG producer countries, such as Qatar, United States and Australia signal further increase in global LNG trade in the forthcoming years. However, this wide spot-forward margin might narrow in the forthcoming months, as in Europe security of supply issues related to gas transit of Russian origin might also add to the upward pressure on gas prices.

**Figure 30 Forward gas prices on the Dutch gas hub**  
Euro/MWh



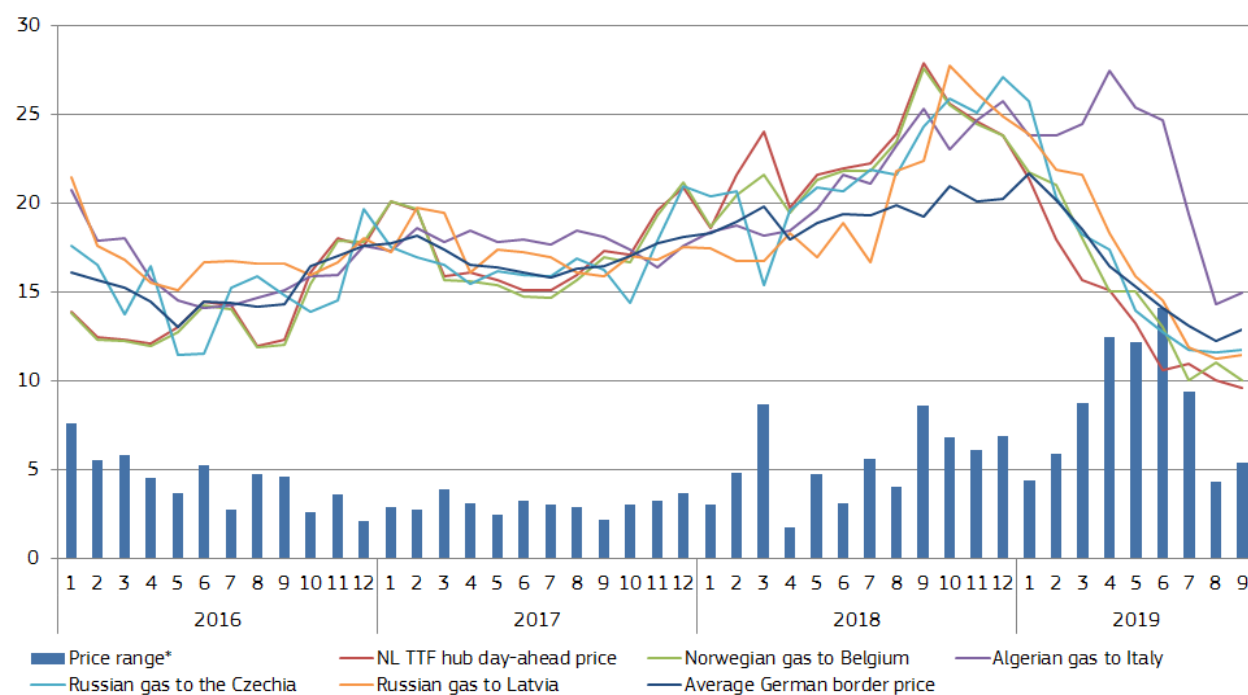
Source: S&P Global Platts

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

- Figure 31 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.
- Prices of European gas contracts showed signs of re-convergence in Q3 2019, as the difference between the cheapest and most expensive contract decreased from more than 14 €/MWh measured in June to 5.3 €/MWh in September 2019. Looking at the price differential without the most expensive Algerian gas import price to Italy, price differential would be even less, only 3.3 €/MWh.
- Hub based contracts, such as the Norwegian import, or hub prices themselves, continued their downward path in the third quarter of 2019, bottoming at several year lows in September 2019. Reported German border prices also fell, similarly to most of the hub-based and oil-indexed contracts, however they remained the second most expensive contract, probably owing the existence of oil-indexation in some import sources to Germany.
- Contrary to the price in Algerian gas imports to Spain, in the third quarter of 2019 gas prices of Algerian import of origin in Italy underwent a significant fall. This could imply two different assumptions: either spot market price evolutions are also included in the Italian contract, as opposed to Spain, or the impact of oil price falls at the end of 2018 (and later maybe that of the recovery in 2019) appears with a shorter time lag in the oil-price indexation in the Italian contract. 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 31 Comparison of EU wholesale gas price estimations**  
Euro/MWh

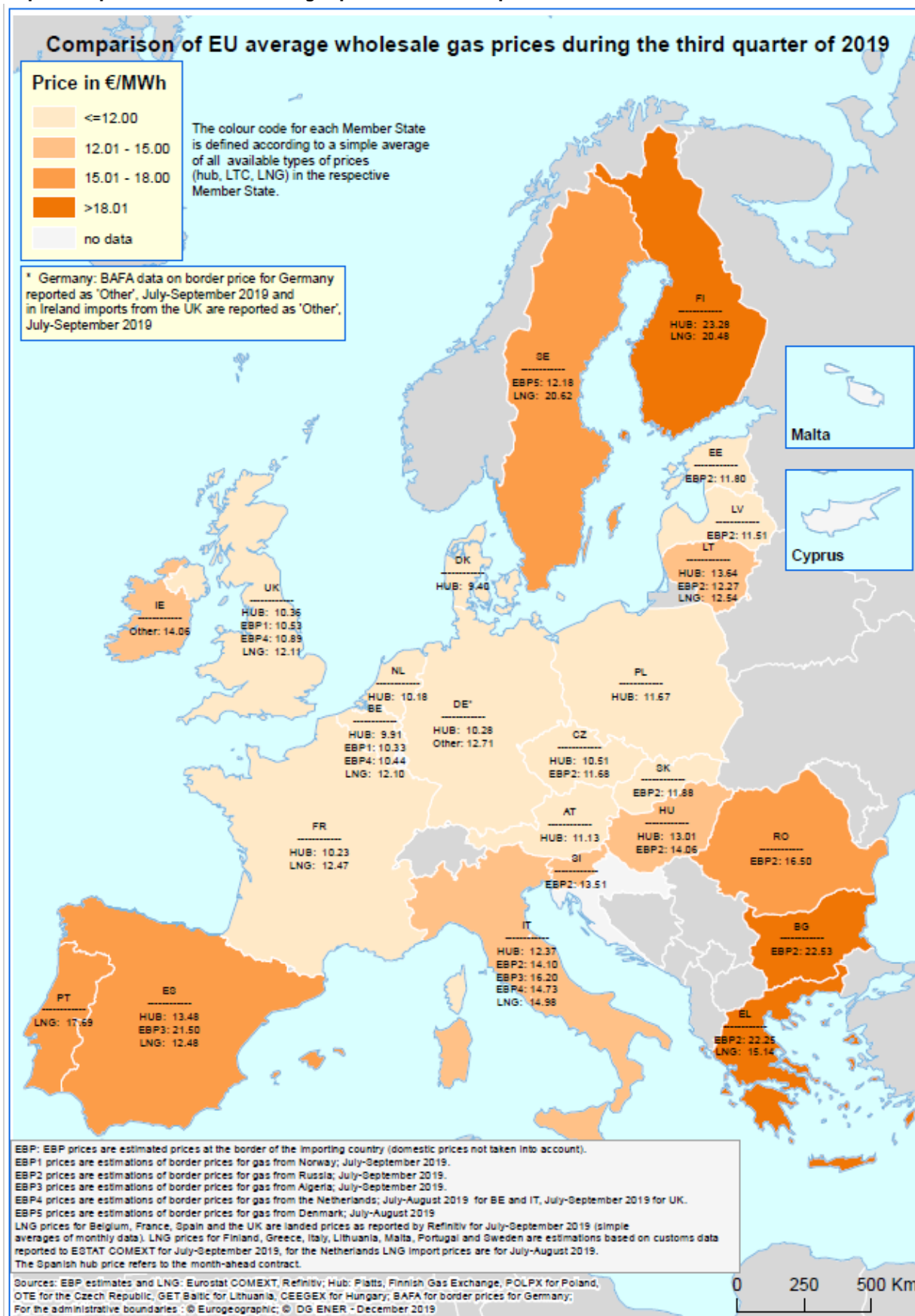


Source: Eurostat COMEXT and European Commission estimations, BAFA, S&P Global Platts

\*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.

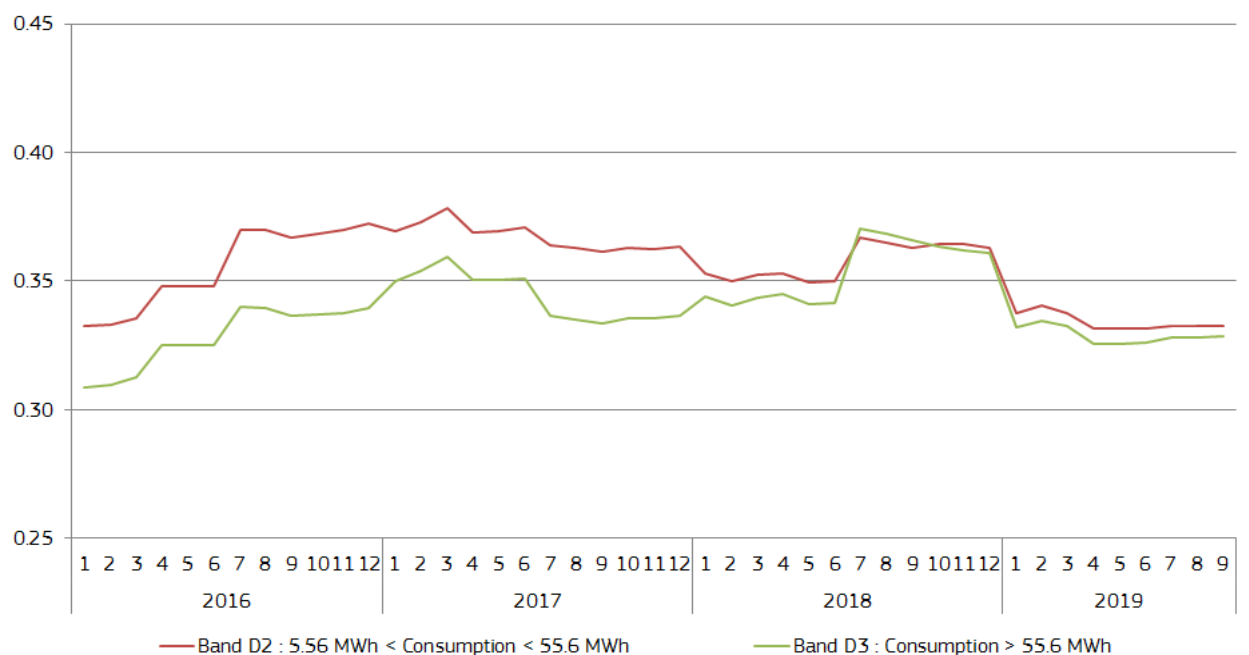
**Map 1. Comparison of EU wholesale gas prices in the third quarter of 2019**



### 3. Retail gas markets in the EU and outside Europe

- Figure 32 and Figure 34 show the degree of convergence (or divergence) of retail gas prices for household and industrial consumers, 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 first 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) showed an overall increasing trend in 2017 and 2018. However, as of the beginning of 2019 retail gas prices for household customers in the EU started to decrease. In the most typical consumption band, D2, the estimated average price (including all taxes) in the third quarter of 2019 was 6.12 Eurocents/kWh, down by 7% compared to 6.28 Eurocents/kWh in Q3 2018 (See the estimated household prices on Map 2).
- Retail prices for households showed a better convergence in 2019 than in most of the preceding three years, as shown by lower relative standard deviation in Figure 32. Moreover, Band D3 retail prices show lower standard deviation than Band D2. Observed price differences are normally higher for the consumers with lower annual consumption, primarily owing to the higher share of fixed elements (not related to the actual consumption) in the final consumer bills.
- There were still significant differences in retail gas prices across the EU: in the third quarter of 2019, the lowest estimated household prices in consumption band D2 could be observed in Romania (3.4 Eurocent/kWh), Hungary (3.5 Eurocent/kWh) and Croatia (4.0 Eurocent/kWh), whereas the highest prices could be measured in Sweden (11.8 Eurocent/kWh) and in the Netherlands (8.8 Eurocent/kWh). The price differential ratio between the cheapest and the most expensive Member State was 3.5. 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 2014 it stabilised around 3.6.

**Figure 32 Relative standard deviation of gas prices paid by household customers in EU Member States**



Note: all taxes included.

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

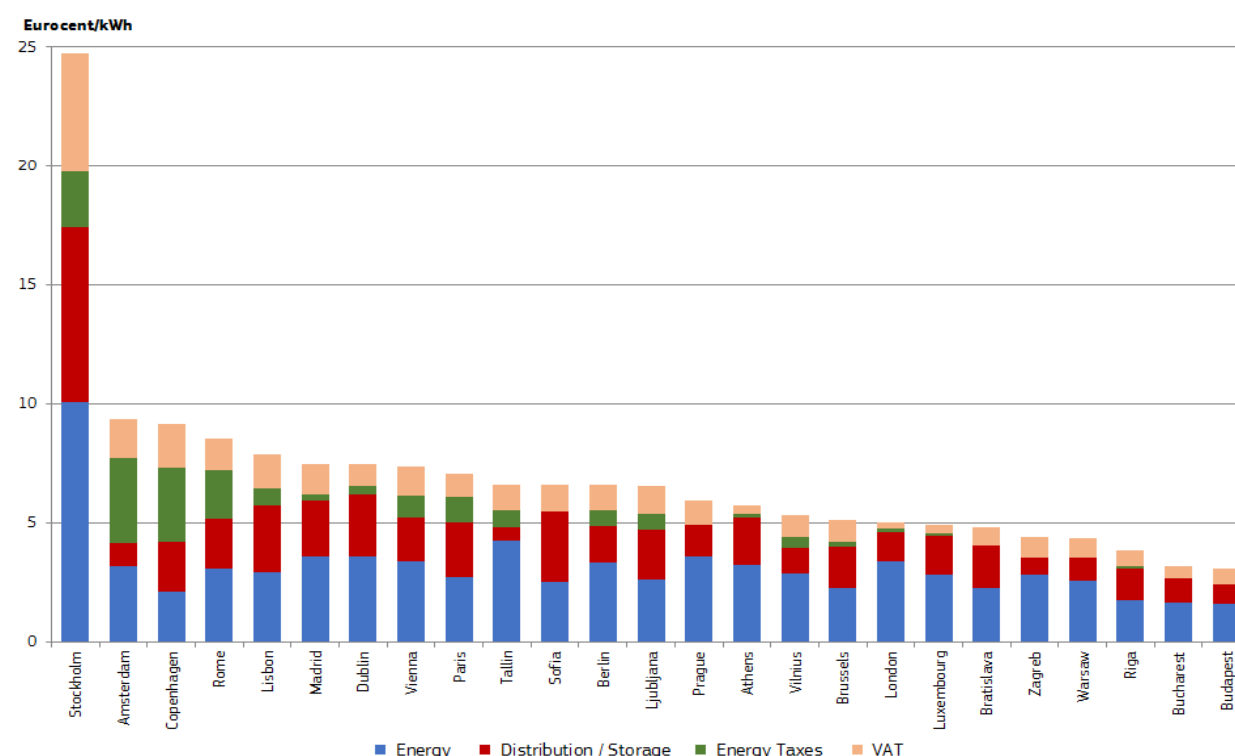
- Figure 33 shows the level and the breakdown of residential end-user gas prices paid by typical households in 25 European capitals in September 2019. On average, 46% of the price covered the energy component, while the rest covered distribution/storage costs (27%), energy taxes (10%) and VAT (16%).<sup>29</sup>
- There were significant differences across Member States, with the share of energy cost ranging from 23% (Copenhagen) and Amsterdam (34%) to 68% (London) and Zagreb (64%), the share of distribution/storage costs ranging from 8% (Tallinn) and

<sup>29</sup> Note that these are arithmetic averages. No data are available for Helsinki (Finland), Nicosia (Cyprus), and Valetta (Malta).

Amsterdam (11%) to 45% (Sofia – the share might be even higher in the future owing to ongoing development of grid infrastructure) and Bratislava (36%) and the share of taxes ranging from 2% (Riga) and 3% (Madrid, Athens, London) to 38% (Amsterdam) and 34% (Copenhagen). For 7 of the 25 capitals covered, the price does not include an energy tax component. There were considerable differences across Member States in the relative share of network costs and taxes. Figure 33 also shows that even the energy component is very variable in absolute terms: it was more than six times higher in Stockholm than in Budapest in September 2019. However the ratio of highest and lowest network components across the EU was 13 and highest-lowest tax component ratio (taking energy taxes and VAT together) was 19 in September 2019.

- In 11 out of the 25 capitals prices were lower in September 2019 compared to the same month of the previous year, with the biggest decrease in Copenhagen (17%) and in Riga and Brussels (15%), driven mainly by the decrease in energy costs (and in the case of Riga, network costs and taxes as well). On the other hand, the biggest increase could be observed in Amsterdam (21%), driven by a 34% growth of the energy taxes component and to a lesser extent, energy costs and network components. It seems that recent falls on wholesale gas markets in Europe did not filter in yet in final retail household prices in all capital cities. In September 2019 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.

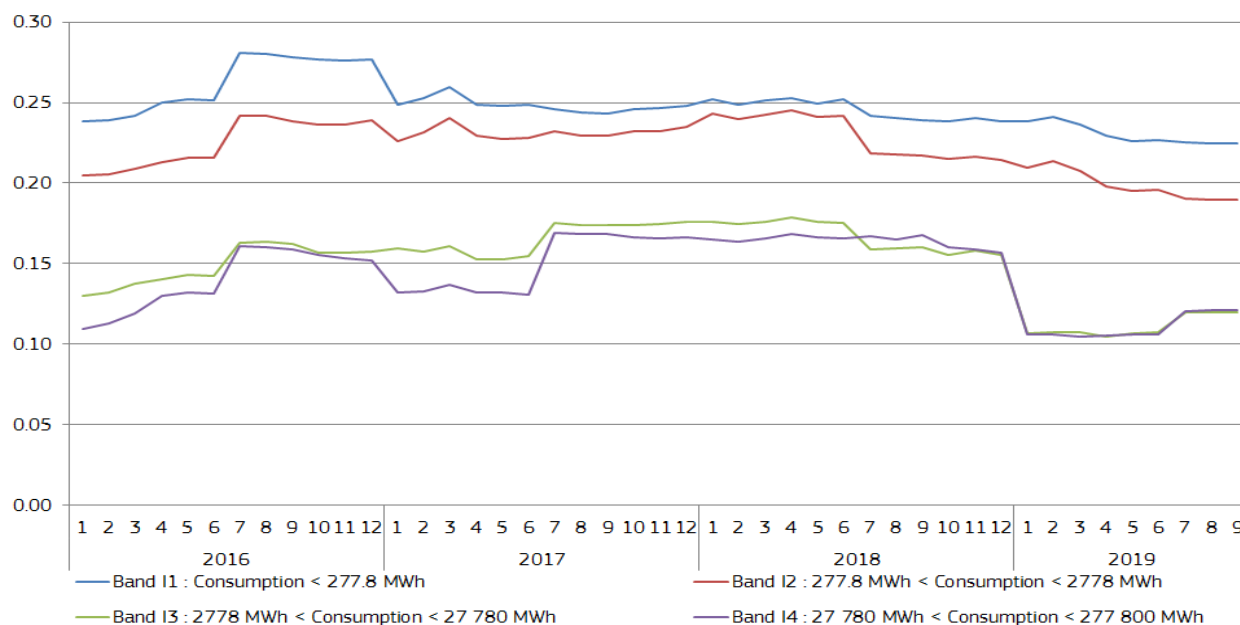
**Figure 33 Breakdown of gas price paid by typical household customers in European capitals, September 2019**



Source: VaasaETT

- After being stable in the first half of 2019, retail gas prices for industrial customers decreased only slightly in Q3 2019 on EU average. The average estimated price (VAT and other recoverable taxes excluded) in consumption band I4 was 2.56 Eurocent/kWh in the third quarter of 2019, slightly down from 2.63 in Q2 2018 but still at the same level as in Q3 2018. (See the estimated industrial prices on Map 3.) Prices increases and decreases varied across the Member States in Q3 2019 in year-on-year comparison, however, at EU level prices remained stable, implying that recent price decreases on the wholesale gas markets only partially appeared in retail prices in the case of industrial customers, having average consumption. However, decreases already could be observed for household customers and industrials having larger annual gas consumption.
- Figure 34 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 and I2) the relative standard deviation decreased in the first three quarters of 2019, implying better price convergence across the EU. In the remaining two bands (I3, I4) price convergence did not change significantly over the last three quarters.
- In the third quarter of 2019, Belgium had the lowest estimated industrial prices in consumption band I4 (1.8 Eurocent/kWh), while the highest prices could be observed in Sweden (3.4 Eurocent/kWh). In Q3 2019 the price ratio of the cheapest and the most expensive in the EU country was 1.9. This price differential ratio has been fluctuating between 1.6 and 2.4 since the beginning of 2008.

**Figure 34 Relative standard deviation of gas prices paid by industrial customers in EU Member States**



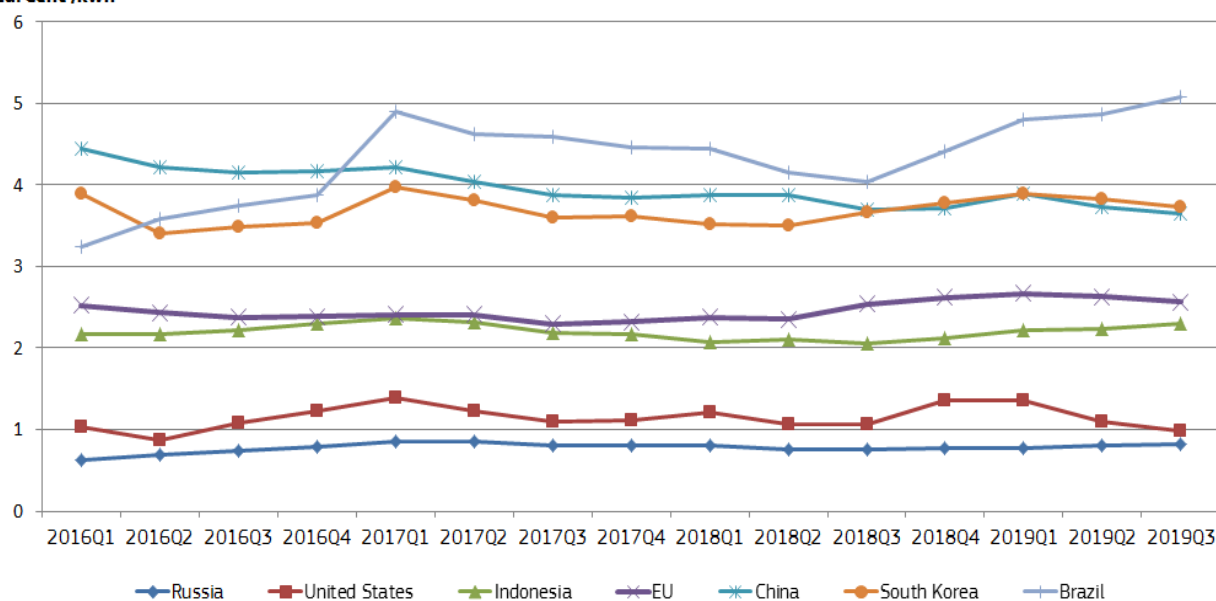
Note: Excluding VAT and other recoverable taxes.

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 third quarter of 2019 retail gas prices for industrial customers were higher in Brazil, China and Korea compared to the EU average, however, in the United States, Russia and Indonesia retail gas prices were lower. Compared to Q3 2018 the biggest increase could be observed in Brazil, while industrial retail gas prices fell the most in the US, in parallel with decreasing prices on Henry hub.

**Figure 35 The EU average industrial retail gas price in comparison with the prices of some important trade partners of the EU**

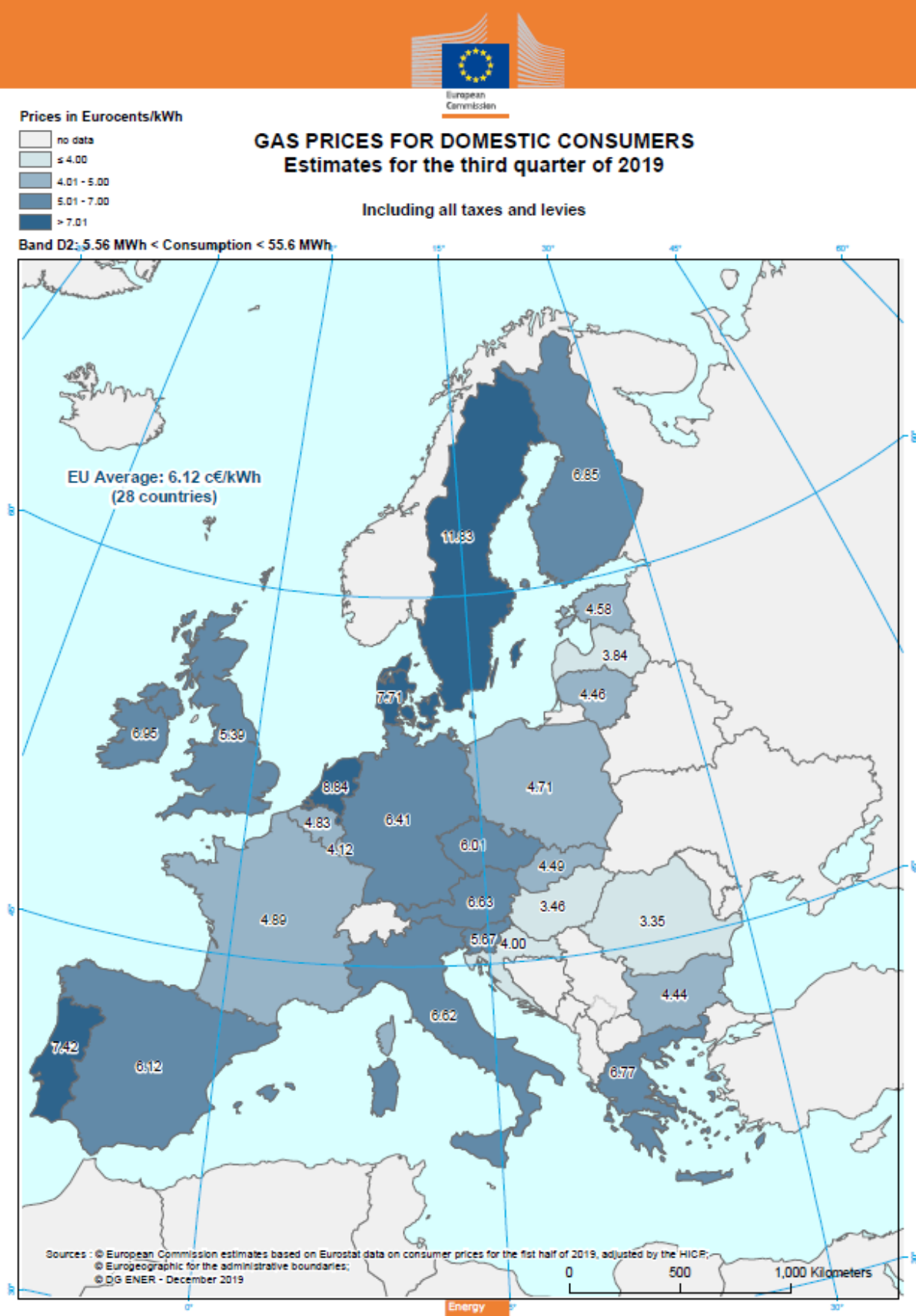
EurCent /kWh



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 third quarter of 2019.

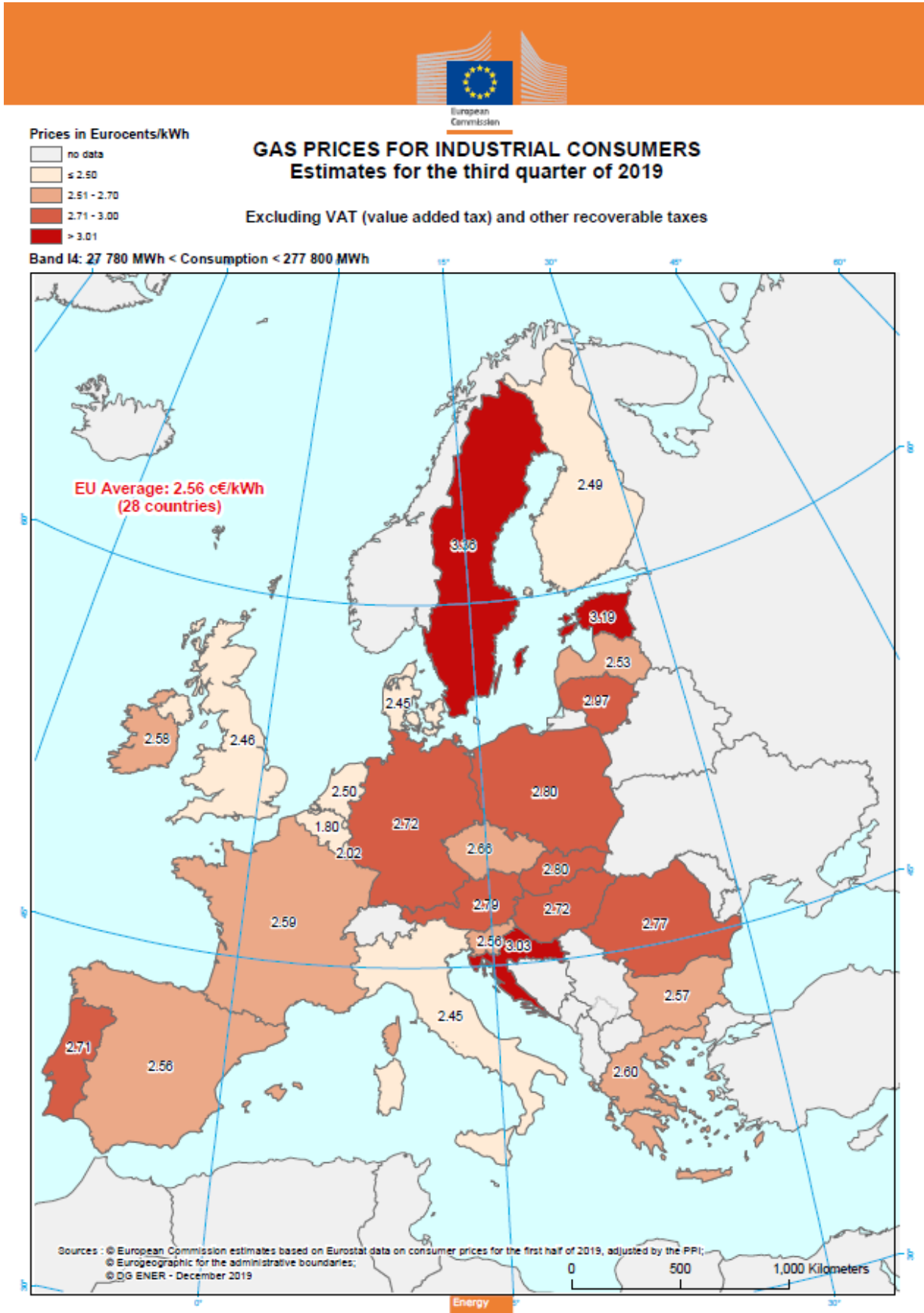
Map 2. Retail gas price estimates for households in the EU – Third quarter of 2019



Source: Eurostat



Map 3. Retail gas price estimates for industrial consumers in the EU – Third quarter of 2019



Source: Eurostat

## 4. Glossary

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

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

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

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

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

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

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

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

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

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

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

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