

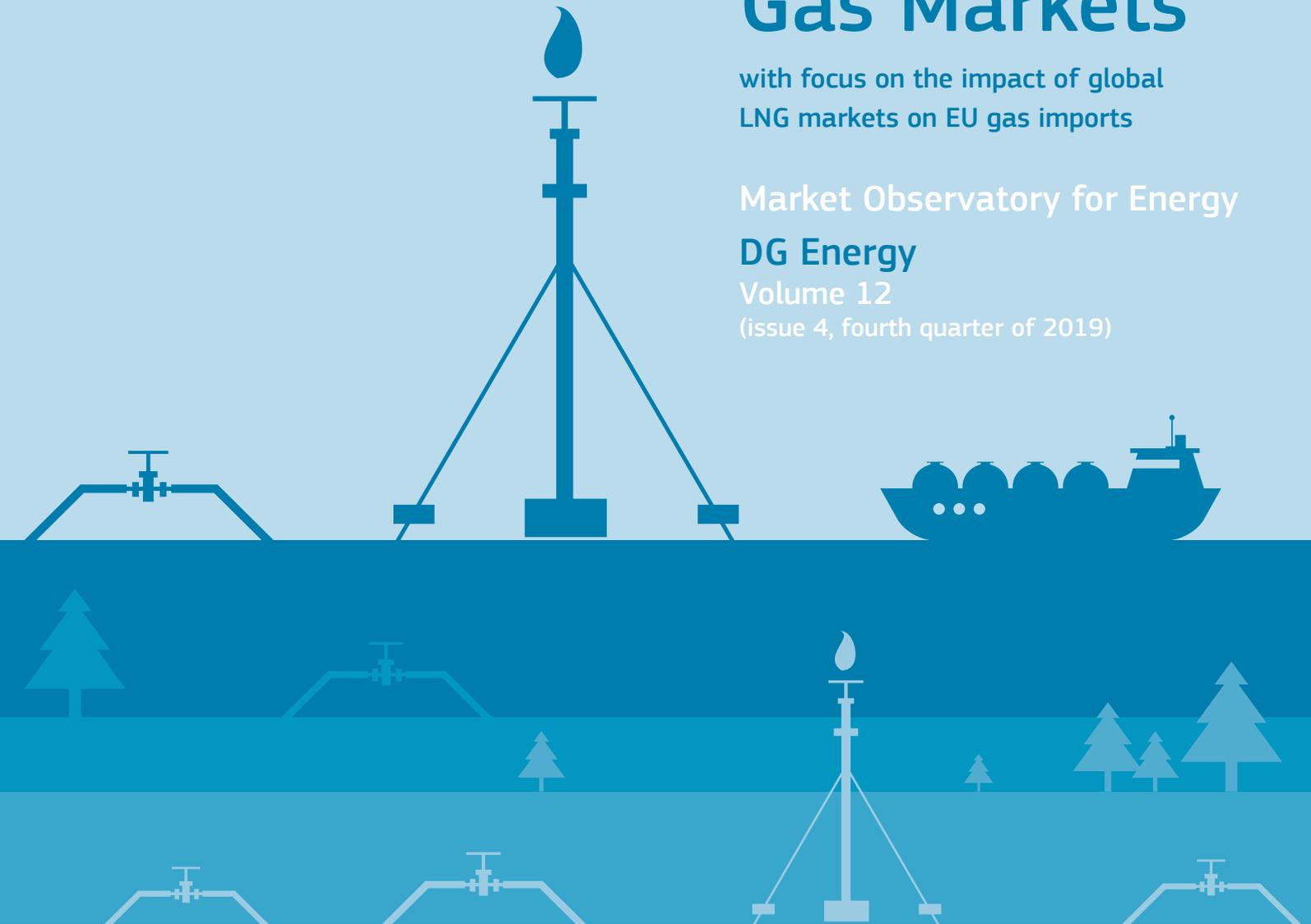


Quarterly Report

on European Gas Markets

with focus on the impact of global
LNG markets on EU gas imports

Market Observatory for Energy
DG Energy
Volume 12
(issue 4, fourth quarter of 2019)



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HIGHLIGHTS OF THE REPORT

- In the fourth quarter of 2019 **EU gas consumption remained stable** compared to Q4 2018, mainly impacted by an increase of gas use in electricity generation (up by 6%), and lower heating needs due to mild weather at the beginning of the heating season. Gas consumption in Q4 2019 was 139 bcm in the EU, and in 2019 it amounted to 482 bcm, up by 2% (10 bcm) compared to 2018.
- Indigenous **gas production, amounting to 26 bcm in Q4 2019 in the EU, fell by 12%** (3.7 bcm) compared to Q4 2018. Gas production amounted to 109 bcm in 2019 in the EU, decreasing by 9% compared to 2018. Gas production decreased in 2019 in all major producers, including the Netherlands, Romania, UK.
- **Net gas imports increased by 8% year-on-year** (8.1 bcm) in Q4 2019 in the EU. Russian pipeline supplies covered 39% of extra-EU net gas imports. For the first time, in Q4 2019 LNG became the second source of gas to the EU, covering 28% of the total imports. Norwegian pipeline gas was only the third biggest import source (26%), followed by pipeline imports from North Africa (6%). Net gas imports amounted to 107 bcm in Q4 2019 and to 398 bcm in the whole year. After the withdrawal of the UK from the EU, gas import dependency is expected to increase further.
- **In December 2019, after several rounds of negotiations, the EU, Ukraine and Russia managed to reach an agreement on the future of gas imports of Russian origin through Ukraine**, and later in that month Ukraine and Russia concluded a package of agreements, amongst others on transit volumes thorough Ukraine for the years 2020-2024. Meanwhile, in 2019 EU gas imports from Russia via the pipeline thorough Ukraine increased by 10 bcm.
- **Gas storage levels in the EU stood at 88% at the end of December 2019, which was the highest in the last eight years at the end of the year.** At EU level, storages would cover around 60% of the typical consumption of the first quarter of the year, by the end of the heating season.
- **The EU's estimated gas import bill stood at €17 billion in the Q4 2019**, down from €28.2 billion (by 39%) from year earlier, as falling import prices (-45%) more than compensated for the increasing amounts of import. In 2019 the estimated gas import bill was €69 billion, down from €98 billion in 2018, as average gas import prices were down by a third. The LNG import bill of the EU was estimated at €16.3 billion in 2019 for 108 bcm, up from €15.4 billion for 60 bcm in 2018, also reflecting the impact of falling LNG import prices.
- **EU LNG imports showed a significant increase, up by 42% year-on-year** in Q4 2019. United States became the most important LNG supplier to Europe in Q4 2019, ensuring one quarter of the total EU imports in Q4 2019. In 2019 the EU imported 108 bcm of LNG, the highest ever, ensuring 27% of the total gas imports and 22% of the EU gas consumption. In 2019 Qatar supplied 30 bcm of LNG to the EU, followed by Russia (21 bcm) and the US (17 bcm). In 2019 an increasing competition could be observed between the US and Russia in LNG supply to the EU.
- **Traded volume on the European gas hubs increased by 7.5% (1 260 TWh) in September-December 2019** year-on-year, slower than in earlier periods, possibly owing to less trade in forward contracts as market actors anticipated new wave of LNG shipments for 2020. The share of trade on the Dutch TTF, the most liquid hub in the EU, was 67% among the observed European hubs.
- **Spot prices rebounded on European gas hubs in Q4 2019** from the lows in the previous quarter. In November cold spells and wintry weather expectations, in parallel with the uncertainties around the outcome of the negotiations on the future of Russian gas shipments to Europe resulted in price increases, which reversed in December. Gas premium of the Asian markets shrunk to Europe by the end of the year, but the TTF increased its price gap vis-à-vis the US Henry hub. Amid anticipation of significant LNG imports in 2020, the 2020 summer-winter gas price gap widened and year-ahead prices also decreased at the end of 2019.
- **Retail gas prices showed a decrease of 10% year-on-year for households in fourth quarter of 2019**, and 4-5% for industrial customers. Industry with large annual consumption experienced bigger retail gas price falls.

EXECUTIVE SUMMARY

- **In the fourth quarter of 2019 EU gas consumption was practically the same (+0.1%) as in Q4 of 2018**, in contrast to the increases in the previous two quarters (13% and 7%). Gas-fired electricity generation grew slower than before (by 6%, year-on-year), and milder than usual weather reduced heating needs in several EU countries. In absolute numbers, gas consumption in Q4 2019 amounted to 139 bcm. In 2019 gas consumption in the EU was 482 bcm, 2% higher than in 2018, when it reached 472 bcm.
- **EU gas production fell by 12%** year-on-year in the fourth quarter of 2019; amounting to 26 bcm. Gas production decreased in the major EU gas producing countries, including the Netherlands (-23%, the steepest fall in the last four years) and in Romania (-7%). In the UK production rose only by 1% in Q4 2019. In 2019 as a whole, gas production in the EU amounted to 109 bcm, which was 9% less than in 2018. Netherlands produced 33 bcm, Romania had a production of 10 bcm, followed by Germany (6 bcm) and Italy (5 bcm). The UK produced almost 40 bcm natural gas in 2019. Decreasing EU gas production coupled with increasing consumption points to increasing gas import dependency, which is expected to rise further after the withdrawal of the UK.
- **EU gas net imports rose by 8% in the fourth quarter of 2019** compared to Q4 2018. In Q4 2019 the amount of net gas imports (107 bcm) and domestic gas production (26 bcm) did not fully cover the quarterly gas consumption of 139 bcm, in the heating season storages (net decrease by 6 bcm) were also used. Pipeline gas imports from Russia increased by 7% year-on-year in Q4 2019, contrasting the decrease from Norway by 9%. Algerian pipeline gas imports fell steeply, by 26% compared to Q4 2018, driven by uncompetitive oil-indexed prices. Pipeline gas import from Libya, having only a small share in EU imports, rose by 4%. In 2019 EU gas net imports amounted to 398 bcm, up by 8% compared to 2018 (362 bcm). In 2019 the annual consumption (482 bcm) was satisfied by domestic consumption (109 bcm) and net imports (398 bcm), leaving room for increase in storages (around 25 bcm).
- **Russian pipeline supplies remained the main source of EU gas imports**, covering 39% of extra-EU imports in Q4 2019, which represents the lowest share since Q1 2015. For the first time, LNG came to the second place in extra-EU gas import sources, with highest share ever (close to 28%). Norwegian pipeline imports was only the third most important source, with a share of 26%, followed by pipeline supplies from North Africa (6%). When looking at the combined share of pipeline and LNG imports per country, Russia's share was 44% in the total extra-EU gas imports, signalling its increasing role in Europe's LNG supply, followed by Norway (28%), and the share of LNG sources other than from Russia, Norway and Algeria was 19%. The EU's estimated gas import bill was around €17 billion in Q4 2019, 39% less than a year earlier, mainly as a result of falling import prices (by 45%). In 2019 as whole, Russia supplied 46% of the total EU imports (pipeline and LNG), followed by Norway (29%) and other LNG sources (17%). The total gas import bill amounted to €69 billion, down from €98 billion, principally owing to lower gas import prices. The LNG import bill in the EU in 2019 was estimated at €16.3 billion.
- In the fourth quarter of 2019, **Ukraine was the main supply route of Russian pipeline gas to the EU**, covering 43% of the total Russian supplies (around 18 bcm), up by 4 percentage points compared to in Q4 2018. The share of Nord Stream was 34% (14 bcm) down by 2 percentage points compared to Q4 2018, while gas supplies transiting Belarus covered 23% (10 bcm) within the total EU imports from Russia. In 2019 as whole, pipeline gas from Russia ensured 41% (around 163 bcm) of the total extra-EU imports. The Ukraine transit route represented 74 bcm, while Nord Stream and the Belarus transit routes respectively supplied 53 bcm and 36 bcm of natural gas. In 2019 EU gas imports from Russia via the pipeline thorough Ukraine increased by 10 bcm.
- **On 20 December 2019 the EU, Ukraine and Russia announced reaching an agreement on the future of shipments of gas of Russian origin through Ukraine**. Following this, on **30 December 2019 Russia and Ukraine signed a package of agreements**, including a deal on transit volumes in the next five years, and agreements on technical regulations, and a settlement of legal claims arising from the preceding contract. According to the signed agreements, annual minimum transit volumes will be 60 bcm in 2020 and 40 bcm between 2021 and 2024. The transit will follow a ship-or-pay principle, where the buyer agrees to pay for contracted transport capacity regardless of actually transported volumes. As of 2025 the deal can be renewed for another 10 years. However, the Trans-Balkan pipeline, which was until now supplied through Ukraine, is to switch off as of January 2020 to taking gas from the newly operational TurkStream pipeline.
- **EU LNG imports showed a strong increase in the fourth quarter of 2019, up by 42% in year-on-year comparison**. Prices in different regions (e.g.: between Europe and Asia) remained aligned amid well-supplied global LNG markets, enabling plentiful LNG influx to Europe. The increase in European LNG imports was also helped by decreased demand for LNG in many Asian markets amid increasing global LNG supply. In Q4 2019 the United States became the leading LNG supply source for the EU, ensuring 25% of the total imports, ahead of Qatar (23%), Russia (19%) and Nigeria (11%). In Q4 2019 UK became the biggest LNG importer (7 bcm), ahead of France (6 bcm) and Spain (5.4bcm). The average EU LNG regasification terminal utilisation rate in the EU stood at 57% in Q4 2019, while in 2019 it was 51% on average, significantly up from 26% measured in 2018, amid record high LNG imports in the EU (108 bcm), representing 27% of the total gas imports and 22% of the total consumption in 2019. Qatar was the top LNG supplier for the EU, with an amount of 30 bcm, followed by Russia (21 bcm) and the US (17 bcm); in 2019 these three sources, ensured 39 bcm from the total increase in EU LNG imports (48 bcm). Last year an increasing competition could be observed between the US and Russia in LNG supply to the EU.
- **Gas storage levels in the EU stood at 88% at the end of December 2019, which was highest in the last eight years in at the end of the year**. Gas withdrawals in Q4 2019 amounted to only 9% of the total storage capacity, as opposed to 12% in the fourth quarter of 2018. At the end of 2019, the EU average storage-filling rate was 18 percentage points higher than a year before. At EU level, storages would cover around 60% of the typical consumption of the first quarter of the year, until the end of

the heating season. Amid abundant LNG imports well-supplied gas markets with competitive prices did not necessitate the recourse to storage withdrawals, and concerns on security of gas supply of Russian origin during the trilateral negotiations might also have reinforced the risk averse behaviour of storage operators.

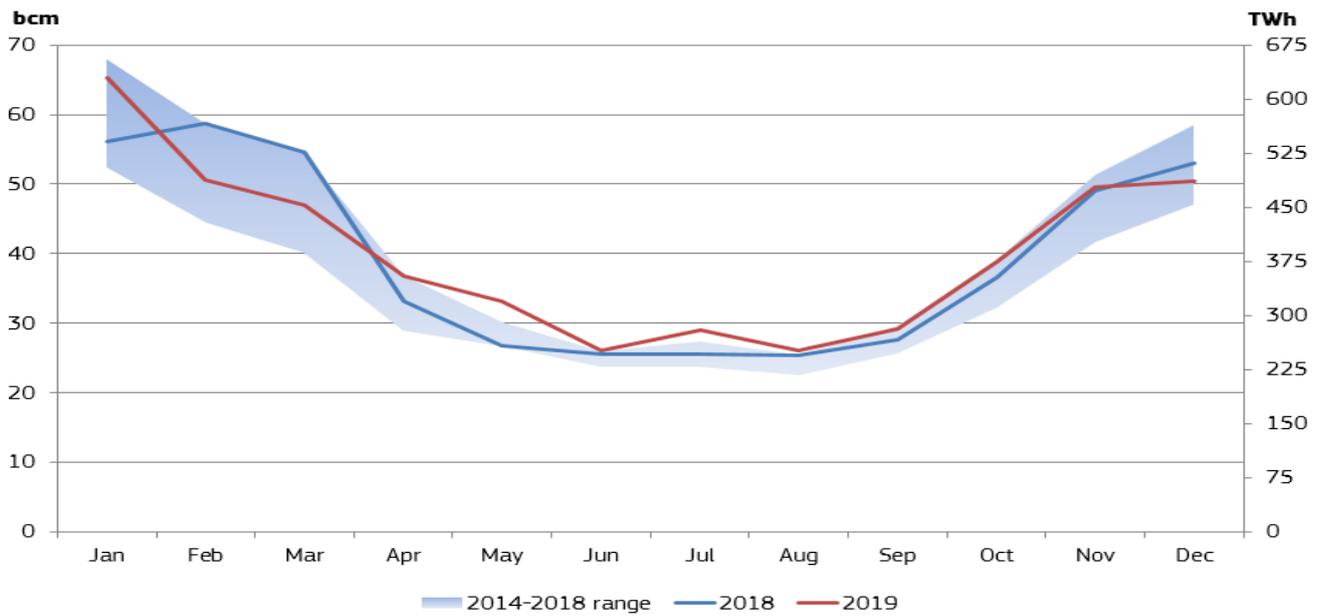
- **Spot prices temporarily rebounded to 12-15 €/MWh from the lows of the previous quarter on most of European gas hubs in Q4 2019.** Gas prices in Europe were still impacted by abundant LNG supply to Europe, however, a series of cold spells in November and anticipation of a colder than usual weather managed to lift wholesale gas prices. In December however, mild weather, decreasing gas demand in electricity generation and the successful conclusion of the talks on the future of Russian gas supply resulted in wholesale price decreases until the end of the year. In Q4 2019 European hub prices were down by 40-50% in year-on-year comparison. At international level, the Asian market premium to the TTF shrunk by the end of the year. The premium of the TTF to US Henry Hub rose again and the quarterly price ratio reached 1.7, still lower than in Q4 2018 (2.2.) At the end of 2019 the year-ahead forward contract began to decrease, as market participants anticipated significant LNG imports in 2020, resulting in lower prices for summer 2020. This also resulted in a widening gap for 2020 summer-winter contract prices.
- In September-December 2019 **traded volume on the European gas hubs increased** by 7.5% in year-on-year comparison, and the total traded volume on the most liquid European hubs was 18 062 TWh (equivalent to around 1 508 bcm and representing 9 times the combined EU consumption of natural gas). Lower increase in traded volumes, compared to the previous period, was the result of less trade on the curve (forward contracts). The share of the Dutch TTF hub in the total EU trade was 67%, reinforcing its leading role in Europe, and gradually turning into a global gas benchmark.
- **Retail gas prices for household customers decreased measurably (10%)** but industrial customers with average annual consumption experienced only a minor decrease (4%) in the fourth quarter of 2019 in year-on-year comparison. For larger industrial customers price decreases were more perceivable, implying that recent price falls on the wholesale gas markets only started to filter in retail price contracts in the observed quarter. However, in December 2019 household retail prices were lower than a year earlier in more than half of the European capital cities.
- **The withdrawal agreement between the United Kingdom and the EU entered into force on 1 February 2020. The current report, covering the fourth quarter of 2019, still includes the United Kingdom in the EU aggregates. The next report covering Q1 2020, will treat UK numbers separately from EU aggregates.**

1. Gas market fundamentals

1.1 Consumption

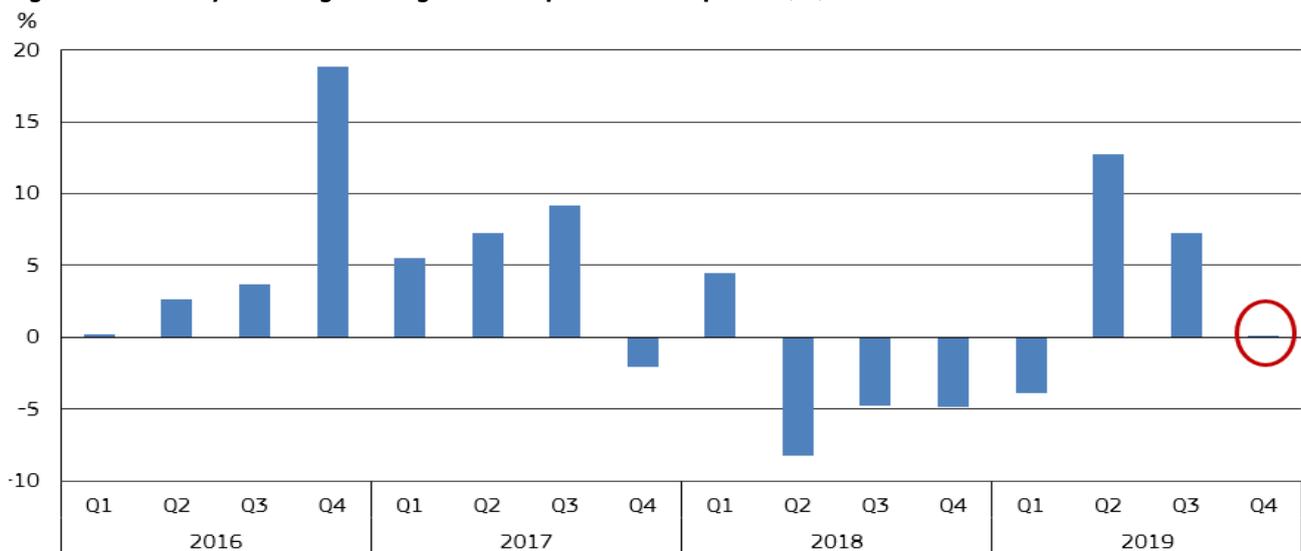
- EU gas consumption in the fourth quarter of 2019 remained stable in year-on-year comparison, increasing only slightly (by 0.1%), after going up by 12% and 7% in the previous two quarters. In absolute numbers, the quarterly gas consumption in Q4 2019 amounted to an estimated 138.9 bcm, following the seasonal increase from Q3 2019 (84 bcm), but practically equalling the Q4 2018 value (138.8 bcm). Gas-fired electricity generation showed slower year-on-year increase in Q4 2019 than earlier quarters of 2019 in many European countries, (increasing only by 6%, or 9.5 TWh in Q4 2019). On the other hand, the weather across Europe was generally warmer in October–December 2019 compared to the seasonal average, resulting in less heating-related demand for gas in the residential sector. During the whole Q4 2019 gas consumption was in the range of 2014–2018, as Figure 1 below shows.

Figure 1. EU gas consumption



Source: Eurostat, data as of 3 March 2020 from data series nrg_103m. Data missing for the Netherlands in December 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.

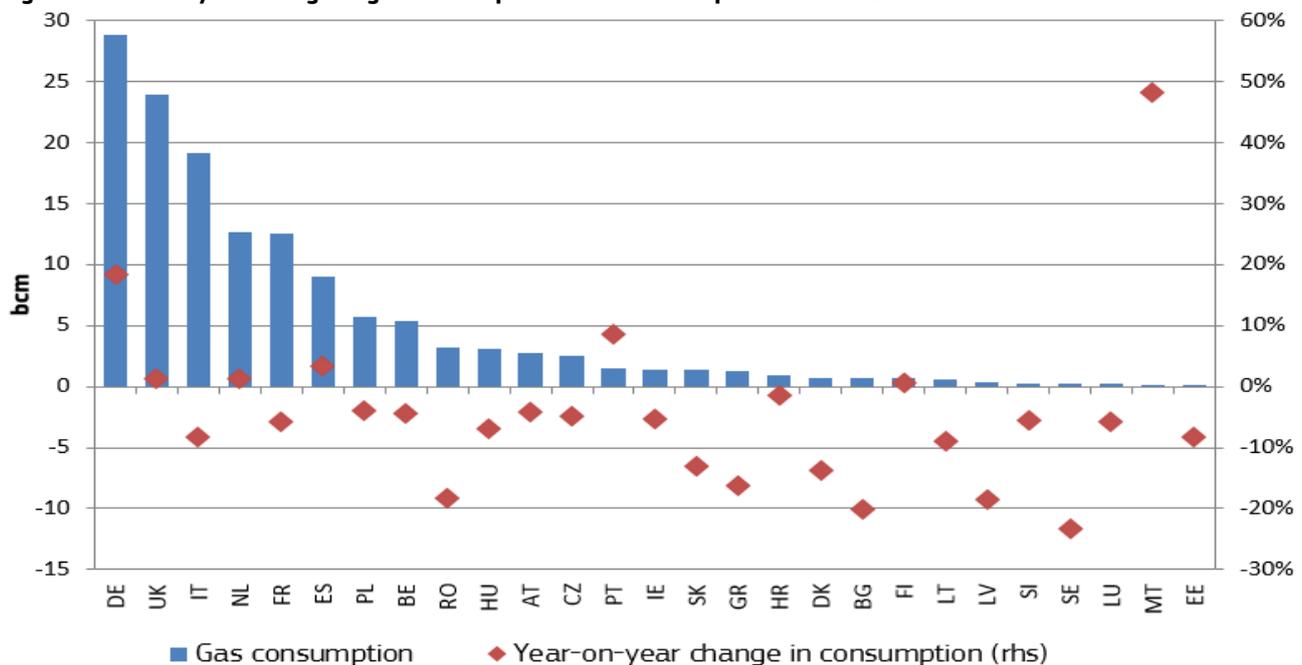
Figure 2. Year-on-year change in EU gas consumption in each quarter (%)



Source: Eurostat, data as of 3 March 2020 from data series nrg_103m. Data missing for the Netherlands in December 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 fourth quarter of 2019, the biggest year-on-year increase in gas consumption could be observed in Germany (18%, representing a volume of 4.4 bcm in Q4 2019). Gas consumption increased only in 7 EU Member States, whereas in 20 countries it decreased (in Cyprus there are still no data on natural gas consumption). In Romania, Slovakia, Greece, Denmark, Bulgaria, Latvia, and Sweden the quarterly gas consumption fell back by more than 10% year-on-year. Among the Member States with larger gas consumption, in Spain gas consumption rose by 3.3% and in the UK and the Netherlands it was up by 1.3% both. On the other hand, gas consumption fell in Italy, France and Poland in Q4 2019 year-on-year, respectively by 8%, 6%, and 4%.
- In absolute numbers, gas consumption in Q4 2019 increased in Germany (4.4 bcm), the UK and Spain (both 0.3 bcm), and the Netherlands (0.2 bcm). At the same time, consumption went down in Italy (1.7 bcm), France (0.8 bcm) and Poland (0.2 bcm). Although not among the biggest gas consumers in the EU, in Romania consumption fell by 0.7 bcm in Q4 2019. In the remaining Member States the change in gas consumption was less than 0.25 bcm in Q4 2019 in year-on-year comparison.
- In 2019 as whole, gas consumption in the EU went up by 2.1% (10.1 bcm) compared to 2018. The biggest increase in absolute numbers could be observed in Germany (7.1 bcm), Spain (4.1 bcm), while in the UK consumption decreased by 2.5 bcm. In the other EU countries the year-on-year change in 2019 remained below 1 bcm.

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

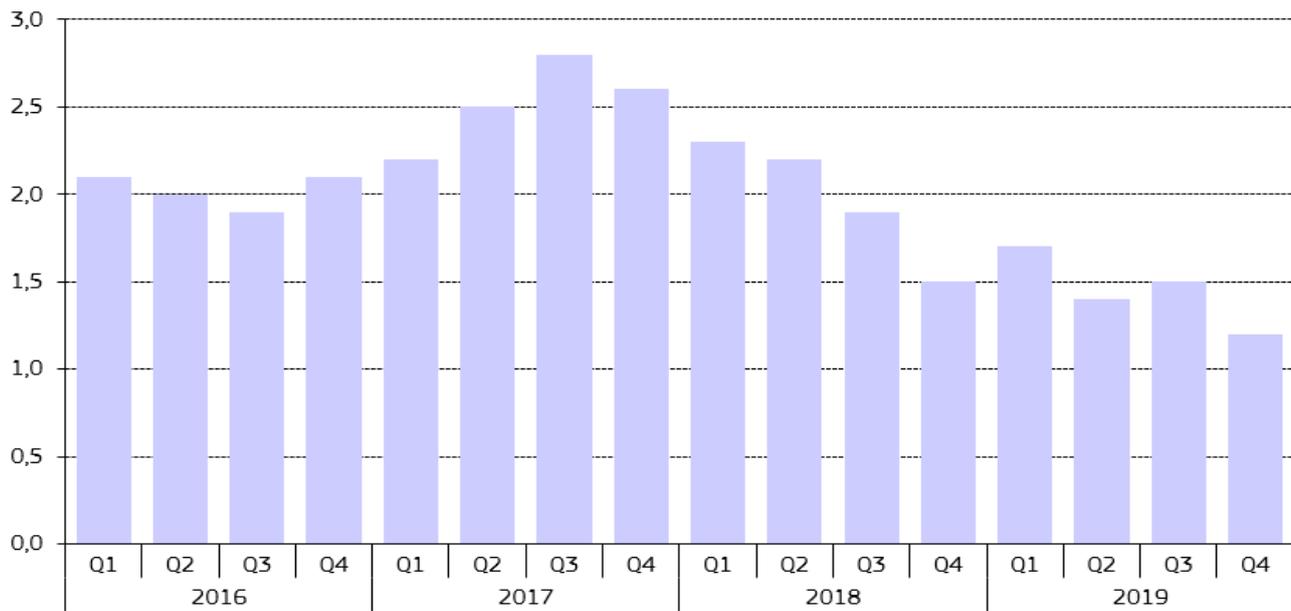


Source: Eurostat, data as of 3 March 2020 from data series nrg_103m. Data missing for the Netherlands in December 2019 are calculated by using short-term monthly gas data (nrg_ind_343m,) as proxy. Therefore, in the next edition of this report numbers might change retrospectively.

- Economic growth in the fourth quarter of 2019 in the EU fell to six-year low (the lowest since Q4 2013), as GDP grew only by 1.2% year-on-year¹, signalling a further slowdown in the economic growth, a practically uninterrupted trend in the EU since the end of 2017. The rate of value-added growth in industrial sectors that consume significant amount of energy (e.g.: manufacturing) showed a further decrease in Q4 2019 (-1.4%). However, this had a relatively small impact on the consumption of natural gas in Q4 2019 in the EU, as it rather depended on the residential sector and electricity generation.

¹ Source: Eurostat, data as of 10 March 2020 from data series namq_10_a10; seasonally and calendar adjusted data

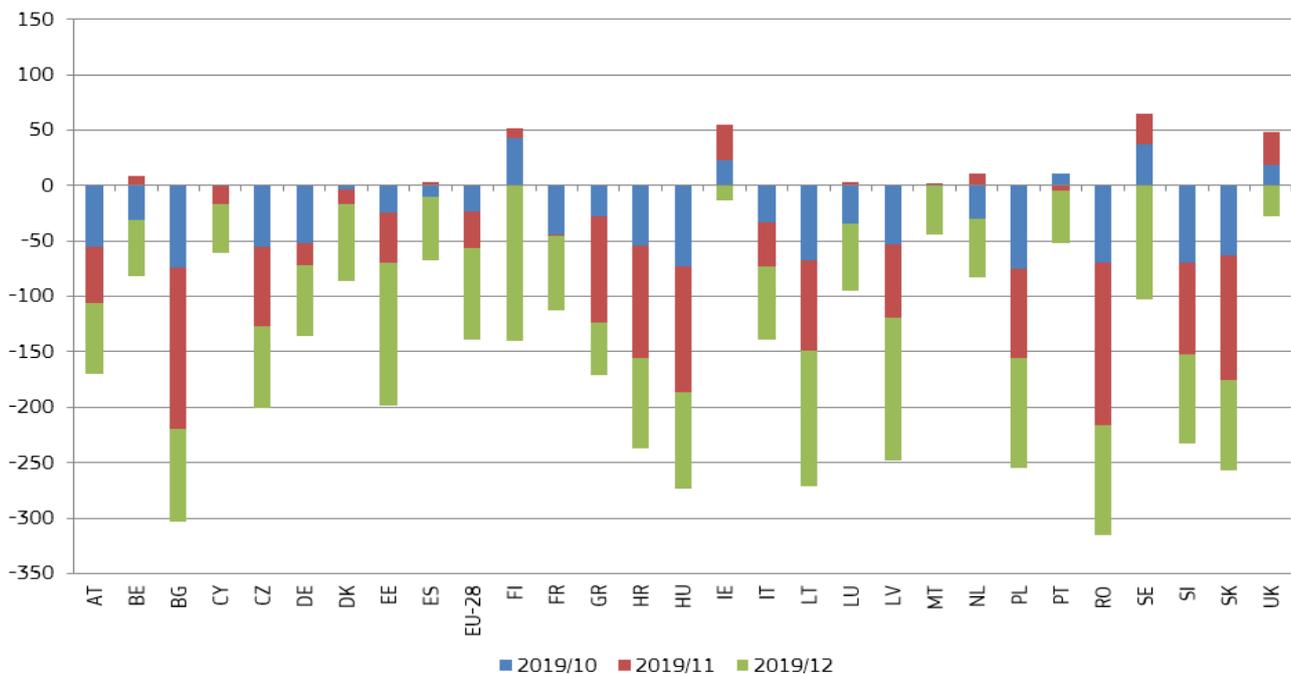
Figure 4 EU GDP Q/Q-4 change (%)



Source: Eurostat, data as of 10 March 2020 from data series namq_10_gdp - Seasonally and calendar adjusted data

- Figure 5 shows the deviation of actual heating degree days (HDDs) from the long-term average² in individual EU Member States in the fourth quarter of 2019. October and November 2019, with the exception of few countries in northern and north-western Europe, was milder than the seasonal average, implying higher temperatures and less heating related gas demand for households. December 2019 showed a rare example when HDD values were lower than the long-term average in all EU Member States, implying an overall mild weather across the continent. In the EU on average all of the three months of Q4 2019 were warmer than usual.

Figure 5 Deviation of actual heating degree days from the long-term average in the fourth quarter of 2019

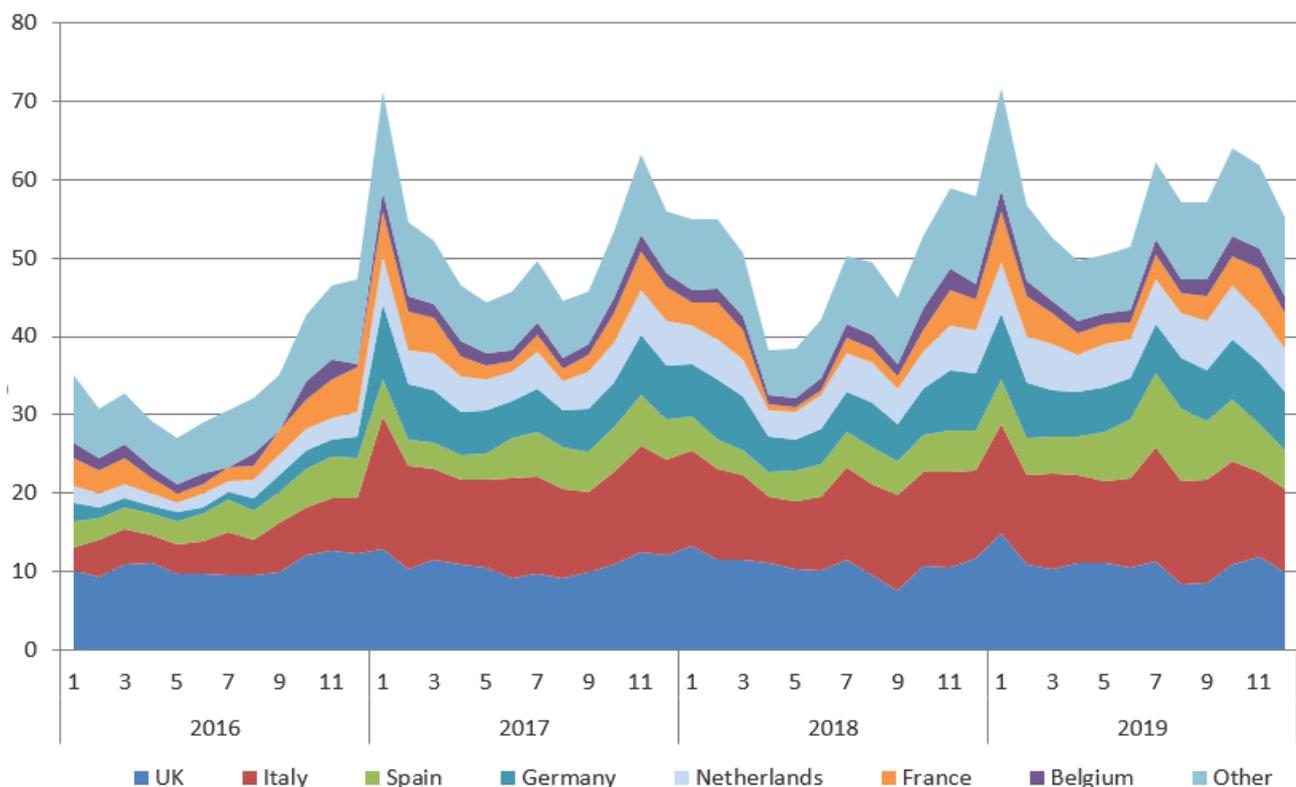


Source: Joint Research Centre (JRC), European Commission

² 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 6% in the fourth quarter of 2019 compared to the same period of 2018. In absolute terms, electricity generated from gas increased by 9.5 TWh year-on-year. As Figure 6 shows, gas-fired generation remained strong in Q4 2019, however, given the strong output in the first three quarters of the year, it showed less seasonality in 2019 than in earlier years. In Q4 2019 gas wholesale prices picked up in Europe, slowing down the increase in gas in the electricity sector. In 2019 as a whole, gas-fired generation in the EU increased by 88 TWh (by 15%), and it represented 23% of the total EU generation, up from 19.6% in 2018. At the same time, coal and lignite-fired generation decreased by 25% in the EU, and its share fell to 14% in 2019 from 18.6% measured in 2018. Meanwhile, solar and wind generation was up, implying that gas and renewables kept on replacing solid fuels in the European electricity generation mix³. Although carbon prices decreased slightly in Q4 2019, reaching almost 25 €/tCO_{2e} on average, the competitiveness of gas-fired electricity generation did not deteriorate measurably vis-à-vis coal⁴.
- In Q4 2019, in Spain, the Netherlands, Germany and France the amount of electricity generated from gas respectively increased by 23%, 20%, 10%, and 4% in year-on-year comparison, owing to changes in the local power generation mixes. In Spain solid fuels showed a significant fall and nuclear decreased as well, which could not be fully compensated by increasing hydro and wind, leaving bigger room for gas. In the Netherlands decreasing coal-fired generation and wind were replaced by increasing gas. In Germany gas-fired generation went up in parallel with practically all other sources, with the exception of dwindling coal and lignite. In France nuclear and biomass generation decreased amid falling coal-fired generation, replaced by increasing gas and other sources, such as wind and hydro. In Italy gas-fired generation decreased slightly in Q4 2019 (by 2.5%), as hydro, renewable sources and electricity imports compensated the decreasing gas and steeply falling coal-fired sources. In the UK and Belgium gas-fired generation showed less than 1% change in Q4 2019 in year-on-year comparison.

Figure 6 Gas-fuelled power generation in the EU
TWh



Source: Based on data from the ENTSO-E Transparency Platform and national data sources, data as of 11 March 2020.

- UK clean spark spreads – measuring the profitability of gas-fired generation by taking into account variable costs – averaged 3.6 €/MWh, in Q4 2019, which was quite similar to the previous two quarters (respectively 3.0 €/MWh and 3.3 €/MWh), or to Q4 2018 (3.7 €/MWh), providing evidence for the profitability of gas-fired generation in the UK (see Figure 7). The amount of electricity generated from gas remained practically unchanged (-0.5%) in Q4 2019 in year-on-year comparison, as renewable sources (mainly wind), nuclear and electricity imports were more competitive alternatives to gas, even amid the currently favourable gas prices. The share of gas in power generation was 40.7% in the UK in the fourth quarter of 2019, slightly higher than

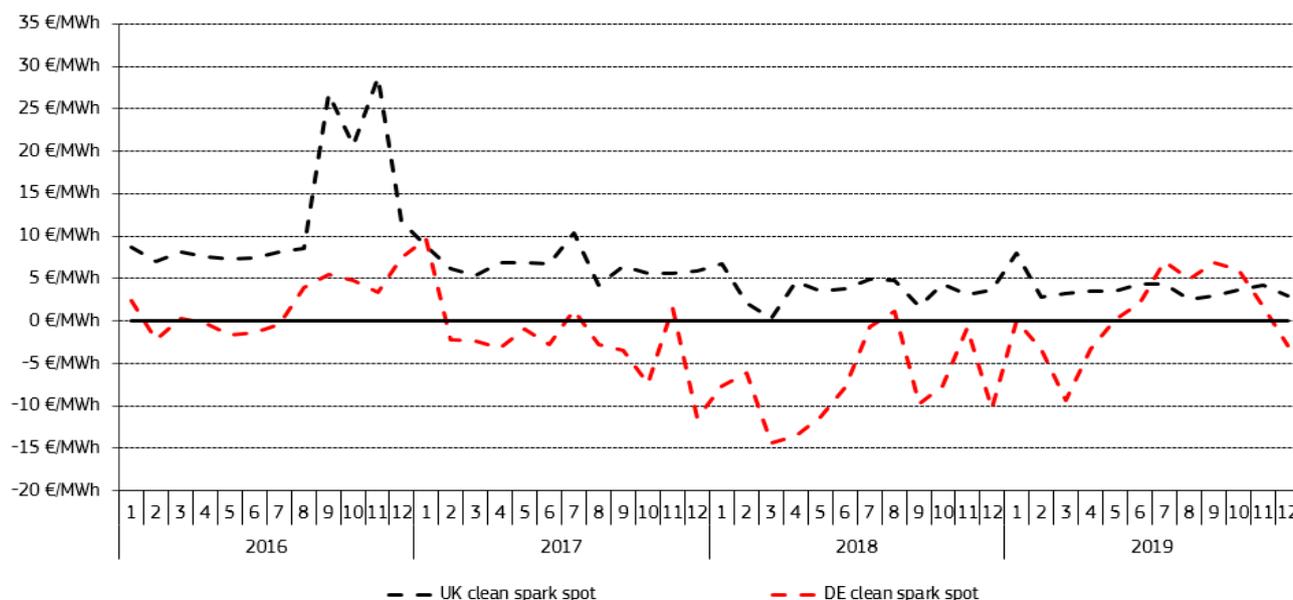
³ See more information in Quarterly Report on the European Electricity Markets, Vol. 12, Issue 4

⁴ As electricity generation from gas is less carbon intensive than from coal

in Q4 2018 (39.4%). This can mainly be explained by increasing imports, replacing domestic electricity generation, which mainly impacted generation sources other than gas (e.g.: coal, nuclear, renewables).

- Clean spark spreads in Germany averaged 1.6 €/MWh in the fourth quarter of 2019 (and in December they fell back to the negative range), implying a significant decrease in the profitability⁵ of gas-fired generation in the country, as in the previous quarter the average clean spark spread was still 6.6 €/MWh. This might have been related to increasing natural gas prices in Q4 2019, amid practically stable (or slightly decreasing) wholesale electricity price in the Germany⁶ over Q4 2019. The UK retained again its higher profitability in gas fired generation vis-à-vis Germany, principally owing to wholesale electricity price differentials between the two markets.

Figure 7 Clean spark spreads in the United Kingdom and Germany



Source: Bloomberg

1.2 Production

- In the fourth quarter of 2019 EU gas production reached approximately 26.1 bcm⁷, 12% (3.7 bcm) less than in the same quarter of 2018 (See Figure 8). During the whole Q4 2019 gas output was below the 2014-2018 range, reflecting the dwindling trend of gas production in the EU. In the Netherlands natural gas production in Q4 2019 decreased by 23% (2.1 bcm), which was the biggest quarterly decrease over the last four years. In the UK however, production increased slightly (by 1%, 0.1 bcm) year-on-year. Gas output in Denmark showed a very strong decrease (by 62%, 0.7 bcm year-on-year, principally owing to the suspension of production at the Tyra fields in the Danish North Sea, ahead of the redevelopment⁸ until 2022), and in Romania, Germany, Ireland and Italy production went down by 0.2 bcm each (in percentage change ranging from 7% to 25%). Besides the UK, there were no other country where production increased by at least 0.1 bcm. However, Norway produced 28.6 bcm gas in Q4 2019, up by 5% (1.4 bcm) year-on-year.
- In 2019 natural gas production in the EU amounted to 109.1 bcm, 9% less than in 2018, which meant in absolute numbers a decline of 10.8 bcm. The UK produced 39.6 bcm gas in 2019, down from 40.7 bcm in 2018. The following five biggest producers were: the Netherlands (33.4 bcm, down from 39.6 bcm), Romania (9.9 bcm, down from 10.3 bcm), Germany (5.7 bcm, down from 6 bcm), Italy (4.8 bcm, down from 5.6 bcm) and Denmark (3.1 bcm, down from 4.1 bcm in 2018). In 2019 as whole, Norway produced 100.8 bcm, down from 107.4 bcm in 2018.

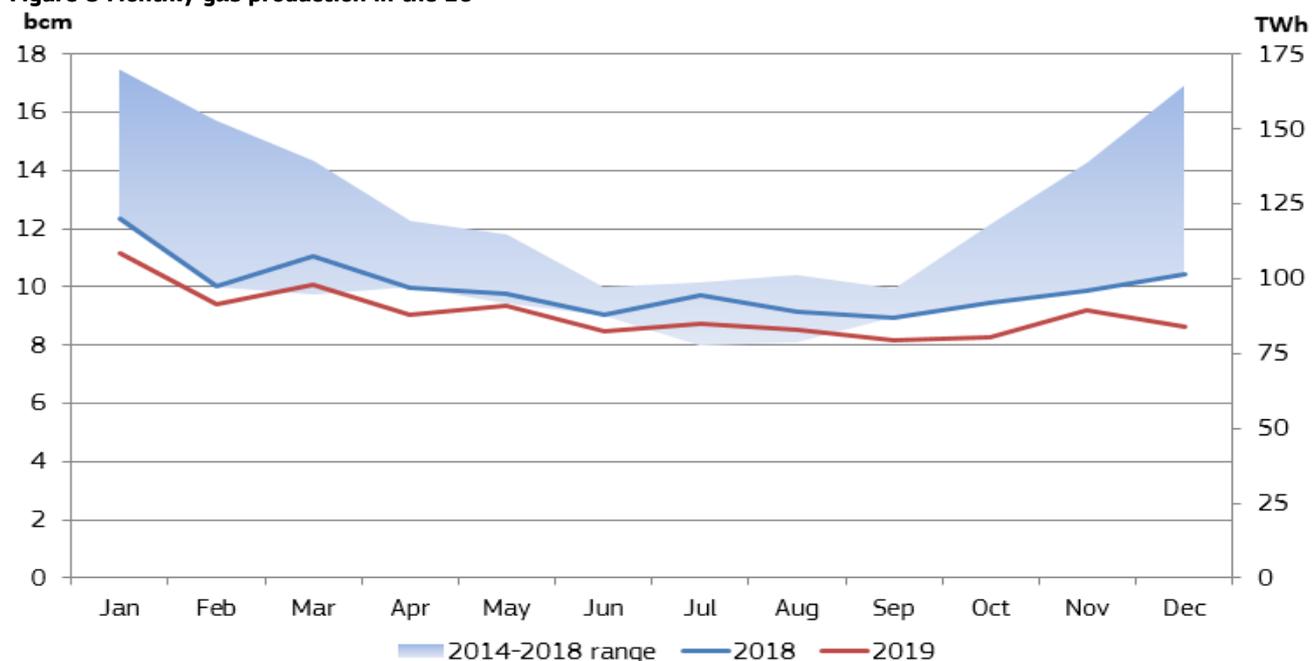
⁵ Assuming an average gas power plant efficiency, see more in the Glossary

⁶ 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

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

⁸ <https://dk.total.com/total-denmark/better-energy-projects-denmark/tyra-redevelopment-tyra-gas-field-processing-90-nations-gas-production>

Figure 8 Monthly gas production in the EU



Source: Eurostat, data as of 3 March 2020 from data series nrg_103m. Data missing for the Netherlands in December 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

- Gas consumption in the EU remained practically stable in the fourth quarter of 2019 in year-on-year comparison (+0.1%), net imports increased by more than 8% over the same period, as Eurostat data show.⁹ Net imports in different EU countries showed a high variation in Q4 2019, ranging from a decrease of 23% (in Sweden) to an increase of 81% (in the Netherlands) in year-on-year comparison. Among big gas consumer countries net imports increased in the Netherlands (by 81%, from a low base value), Germany (by 16%), in France (1%), but it decreased in the UK (5%), in Italy and Spain (both by 3%).
- In the fourth quarter of 2019 the total net extra-EU gas imports reached 107.4 bcm, slightly up from 101.6 bcm in the same period of 2018. The five biggest importers in the EU in Q4 2019 were Germany (28 bcm), Italy (15 bcm), the UK (13 bcm), France (11 bcm) and Spain (9 bcm), representing together around 70% of the total EU net gas imports in this quarter. In 2019 as whole, the total net EU gas imports in the EU amounted to 398 bcm, which was 10% more than in 2018, amid increasing consumption (+2.1%) and decreasing domestic production (-9%), implying a further increase in gas import dependency of the EU.
- According to ENTSO-G data, imports amounted to 1 233 TWh in the fourth quarter of 2019. Imports from both Russia and Libya increased slightly (by 7% and 4%, respectively), while imports from Norway decreased by 9% in Q4 2019 in year-on-year comparison. Imports from Algeria continued its decrease and fell significantly, by 26%, probably owing to uncompetitive oil-price indexation contracts. At the same time, LNG imports, though in a slower pace than in the previous quarters of 2019, increased further year-on-year and reached 342 TWh in Q4 2019.
- Russia remained the top gas supplier of the EU, however, the share of Russian pipeline gas in the extra-EU gas imports fell to 39% in the fourth quarter of 2019, which was the lowest since the first quarter of 2015¹⁰.
- As pipeline gas imports from Norway decreased by 9% year-on-year in the fourth quarter of 2019, the country's share in extra-EU gas imports fell to 27%¹¹, down from 32% a year earlier. For the first time since the beginning of available time series (2014) in Q4 2019 LNG imports surpassed pipeline gas imports from Norway, implying that LNG replaced Norway in this quarter as the second biggest extra-EU gas supplier. In the fourth quarter of 2019 Norwegian gas production¹² amounted to 28.6 bcm, up by 5%

⁹ Net imports equal imports minus exports and do not account for stock changes.

¹⁰ 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

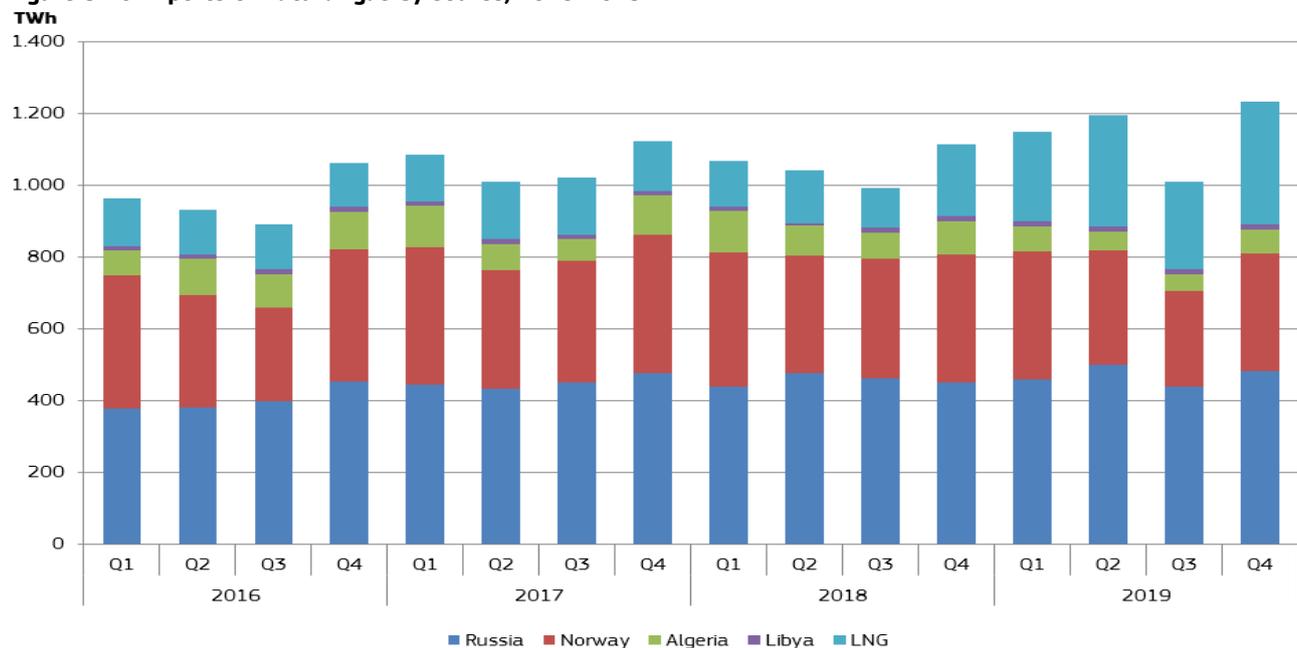
¹¹ Note that Norway to UK flows reported by ENTSO-G includes some gas from UK offshore fields, resulting in an overestimation of Norwegian imports.

¹² https://www.npd.no/globalassets/1-npd/fakta/nyheter/produksjonstall/2019/desember-2019/prod_data_pressemedling-2019.xlsx

year-on-year. In 2019 as whole Norway produced 100.8 bcm, down from 107.4 bcm in 2018. Norway's decreasing gas production and exports to Europe might point to the flexible accommodation to lower gas hub prices in 2019.

- Although in Q4 2019 pipeline gas imports from Algeria recovered somewhat from the lows experienced in the previous quarter, in year-on-year comparison it was still down by 26%. This increase might have been related to the need for shippers to meet take-or-pay contractual obligations with the Algerian gas supplier Sonatrach before the end of the year. However, the share of Algerian pipeline imports within the total extra-EU gas imports remained very low, around 5%. Imports from Libya continued to grow in Q4 2019 compared to the same period of the previous year, however, its share was only 1.2% in the total EU gas imports
- In 2019 as a whole, Russian gas pipeline imports increased slightly, by 3% in year-on-year comparison, while that from Norway went down by 9%. Algerian gas pipeline imports fell by 36%, while that from Libya went up by 28% in 2019. Imports from both Algeria and Libya showed a great volatility over the last few years, reflecting the competitiveness issue of import prices and supply availability concerns (occasional disruptions) in these two countries.
- According to several data sources, including ENTSO-G and Refinitiv, imports of LNG increased significantly in the fourth quarter of 2019 in year-on-year comparison, and covered almost 28% of total extra-EU gas imports, which was the highest share in the last six years.

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



Source: Based on data from the ENTSO-G Transparency Platform, data as of 3 February 2020.

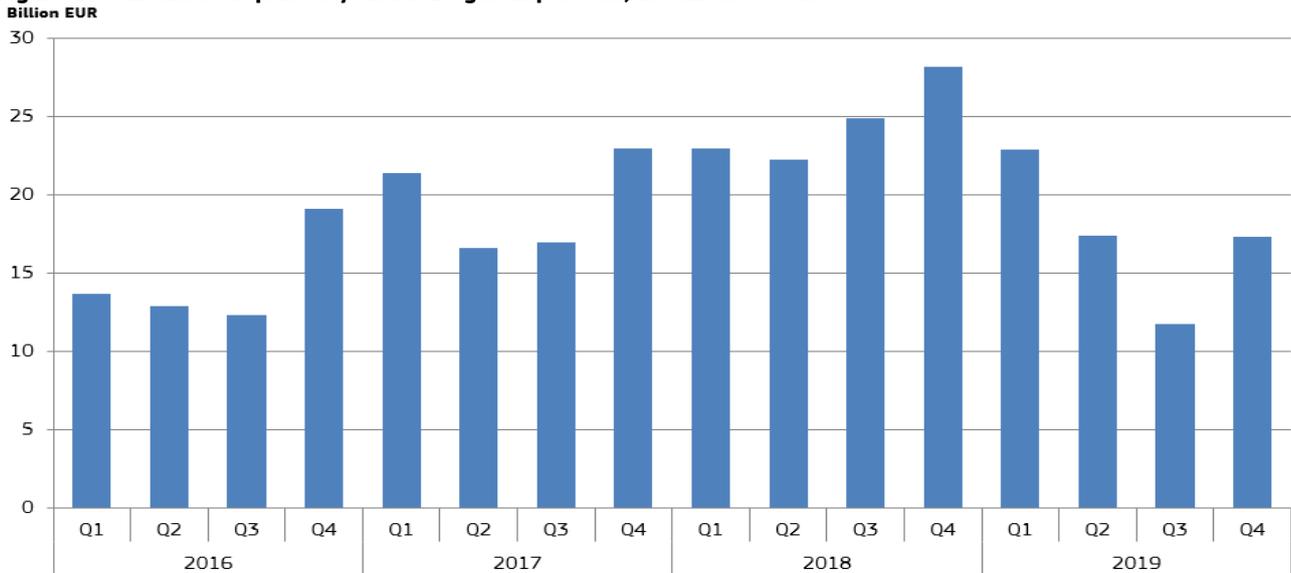
Russian deliveries to Estonia and Latvia were reported only for a limited period (Narva from 15 June 2015 to 10 December 2015, Värskä and Misso Izborsk from 26 May 2015). Therefore currently exports to the Baltic-states and Finland are not included in the chart

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.

- Due to both increasing import volumes and average import prices, in the fourth quarter of 2019 the estimated gas import bill increased compared to previous quarter (up from €11.7 billion to €17.3 billion). However, if compared to Q4 2018, in spite of increasing import volumes, the quarterly import bill decreased from €28.2 billion to the aforementioned €17.3 billion, owing to the much lower estimated average import prices (which fell by 45%) In 2019 as whole, the estimated gas import bill in the EU-28 was €69.4 billion, down from €98.3 billion in 2018.

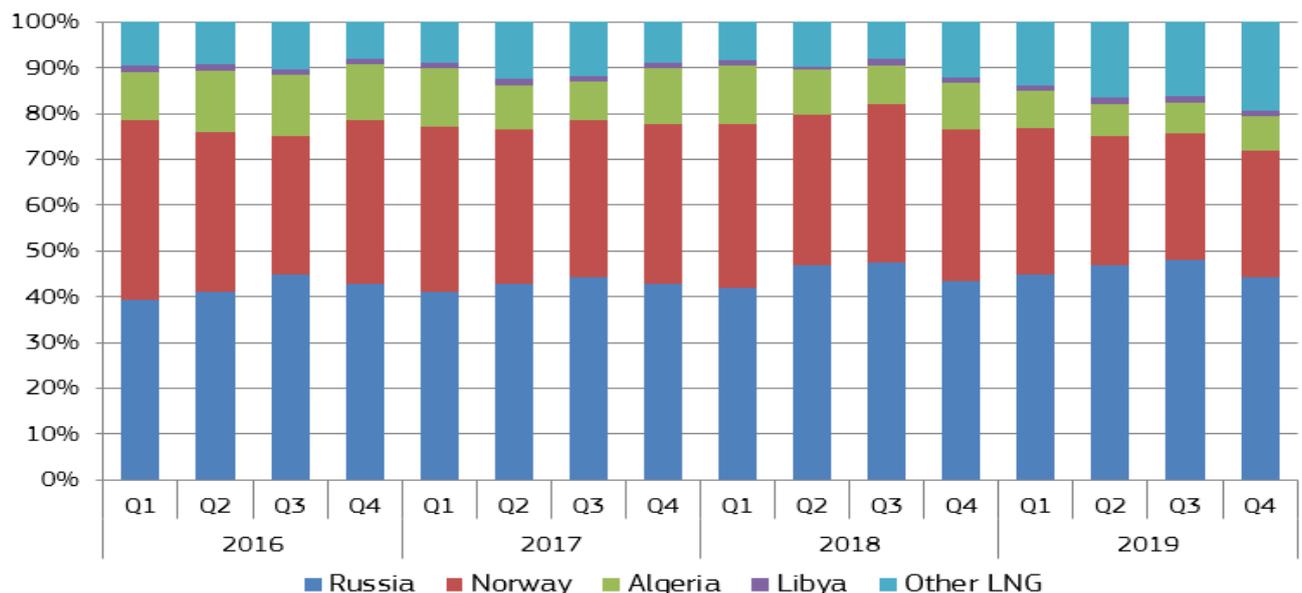
Figure 10 – Estimated quarterly extra-EU gas import bill, in billions of euros



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, too. As Figure 11 shows, the share of Russia within total extra-EU gas imports (pipeline and LNG together) amounted to 44% in Q4 2019, split by 39% of pipeline imports and 5% of LNG, indicating that Russia is becoming a more and more important actor in European LNG imports, not only in the traditional pipeline gas supply. Russia is maintaining its market share by switching to a more competitive export strategy, integrating EU benchmarks in the contract price formation formula.
- The share of Norway was 28% in Q4 2019 (vs. the aforementioned share of 27% for pipeline only), and the share of Algeria is 7.4% with LNG (as opposed to 5.5% only including pipeline gas). The share of LNG in the total extra-EU imports was 19.4%, 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, reaching the highest in Q4 2019 in the last six years.
- In 2019 as whole, the share of Russia in the total EU gas imports (including pipeline imports and LNG) was almost 46%. Norway had a share of 29%, while the shares of Algeria and Libya were lower (respectively 7% and 1%). The share of other LNG sources in the total EU gas imports was almost 17%. Compared to 2014, the share of Russia rose by 2%, while the share of Norway dropped by nearly 8% in the total EU gas imports. The big winner over this period was LNG, increasing its share by 9%. The share of gas from Algeria and Libya went down respectively by 2% and 1%.

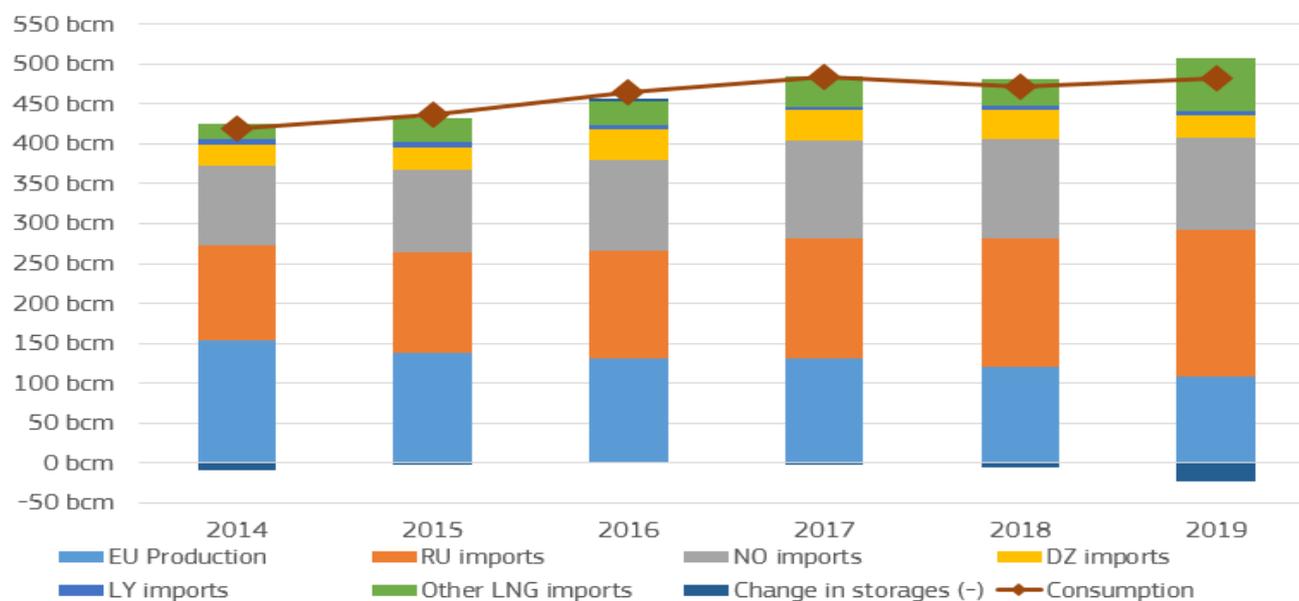
Figure 11 – The share of gas imports within the total, combining both pipeline and LNG imports



Source: Based on data from the ENTSO-G Transparency Platform, data as of 3 February 2020.

Over the period of 2014-2019 domestic gas production in the EU fell significantly, from 153 bcm to 109 bcm, whereas the total consumption rose from 419 bcm to 482 bcm, underlining the increasing import needs of the EU. Russia, Norway and with increasing importance, LNG plays an important role in ensuring gas supply to the European customers. In 2019 the total EU gas imports amounted to 398 bcm, which, together with the domestic production (109 bcm) covered the total gas consumption of 482 bcm and an estimated increase in gas storages by 25 bcm by the end of 2019.

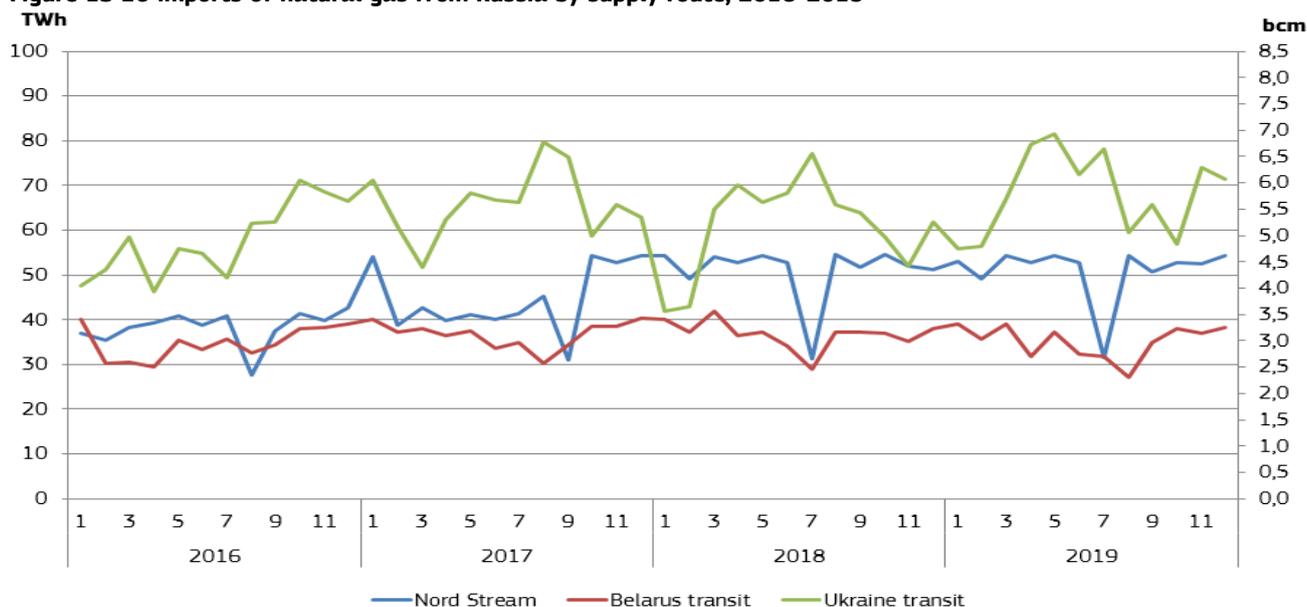
Figure 12 – Natural gas domestic production in the EU, with imports from different sources and changes in storage levels



Source: Commission calculations based on tanker movements reported by Refinitiv and data from Eurostat

- Figure 13 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 fourth quarter of 2019 the volume of Russian imports went up by 7%, if compared with the same period of 2018. As shown in Figure 13, gas flows transiting Ukraine were almost 18% higher than in Q4 2018, while flows through Belarus were up by 3% over the same period. Gas flows through the Nord Stream rose only slightly, by 1% in Q4 2019 in year-on-year comparison. In 2019 gas imports from Russia went up by 3% in the EU, compared to 2018. Gas flows through Ukraine was up by almost 12%, while gas transited through the Belarus route decreased by 4%, and NordStream transit volumes practically did not change (+0.1%).
- As a result, in Q4 2019 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, a bit higher than in Q4 2018, when it was 39%. The share of pipeline gas transit through the Nord Stream was 34% in Q3 2019 (after 36% in Q4 2018), and the Belarus transit route represented 23%, slightly down from 25% a year before. In 2019 the Ukraine transit represented 46% in the total pipeline imports from Russia, while Nordstream and Belarus had respectively shares of 33% and 21%.
- In Q4 2019 the Ukraine transit route represented 17% (18 bcm) in the total net extra-EU gas imports, Nord Stream had a share of 13% (14 bcm), and the Belarus transit route ensured 9% (10 bcm) of the total net extra-EU gas imports in Q4 2019. In 2019 the total net extra-EU gas imports amounted to 398 bcm, of which Russia supplied 41% (around 163 bcm). The Ukraine transit route represented 74 bcm, while Nord Stream and the Belarus transit route supplied respectively 53 bcm and 36 bcm.
- This implies that increasing pipeline gas imports from Russia in 2019, in spite of statements from the Russian side on the future of gas supply to Europe, were mainly satisfied by transit through Ukraine, and to a lesser extent, via Nord Stream, whereas the utilisation of the Yamal pipeline further decreased.

Figure 13 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 3 February 2020.

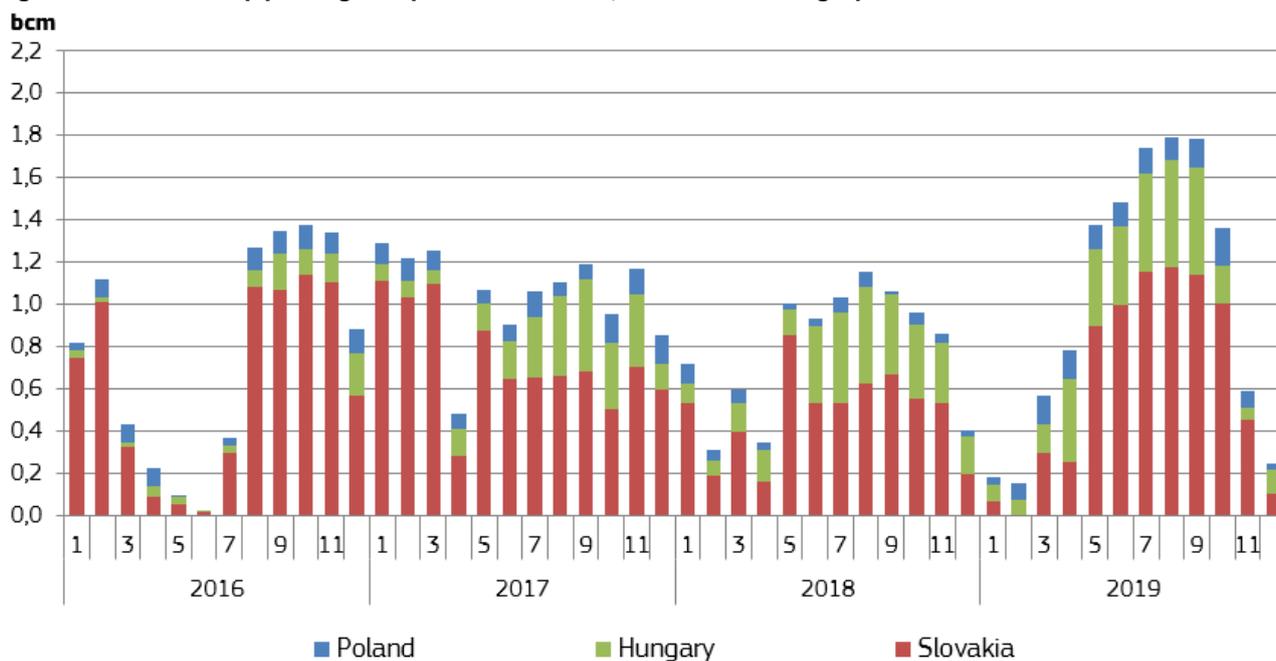
Deliveries to Estonia, Finland and Latvia are not included; transit volumes to the Former Yugoslav Republic of Macedonia, Serbia and Turkey are excluded

- In the fourth quarter of 2019, similarly to the preceding years, Ukrainian natural gas imports from EU countries dropped significantly, as at the end of October Ukraine also switched to storage withdrawals. Import needs supporting storage injection also decreased. In Q4 2019 total gas imports from Poland, Slovakia and Hungary in Ukraine amounted to 2.2 bcm, down from 5.3 bcm in Q3 2019. In Q4 2019 the volume of the Ukrainian gas import was similar to the fourth quarter of 2018 (2.2 bcm). In Q4 2019 1.6 bcm natural gas came from Slovakia, while amounts from Hungary and Poland were respectively 0.4 bcm and 0.2 bcm.
- In 2019 the total Ukrainian gas imports from these countries amounted to 12 bcm¹³, up from 9.4 bcm in 2018. Increasing activity of gas storage operators in the western part of Ukraine was largely owing to build up stocks throughout the year, regarding the security of supply risks ahead of the expiry of the gas transit agreement with Russia at the end of 2019. In 2019 Ukraine imported 7.5 bcm gas from Slovakia, 3.2 bcm from Hungary and 1.3 bcm from Poland.
- Ukrtransgaz (transmission system operator) has completed the modernization of Komarno compressor station in Lviv region, which is part of the Ukraine-Poland interconnector. This upgrade expands the capacity of Ukraine's gas transmission system to receive gas from Poland to 6.6 bcm a year¹⁴. This upgrade of the pipeline enables both east-west and west-east gas flows between Ukraine and Poland, as well as higher capacity and flexibility to ensure uninterrupted heating season 2019/2020 for both countries. The design capacity of the modernized pipeline section is 15 mcm per day for east-west flow and 18 mcm per day for west-east flow. However, in order to increase gas imports from westwards, Poland also needs to upgrade transmission infrastructure elements in the south of the country. If implemented, it will enable Ukraine to import more gas of LNG source from Poland.

¹³ Based on data from the ENTSO-G Transparency Platform, data as of 3 February 2020.

¹⁴ <http://naftogaz.com/www/3/nakweben.nsf/0/601C07184EB749E4C2258495005A762E?OpenDocument&year=2019&month=10&nt=News&>

Figure 14 – Ukrainian pipeline gas imports from Poland, Slovakia and Hungary



Source: Based on data from the ENTSO-G Transparency Platform, data as of 3 February 2020

1.3.1. Policy developments

- Bulgaria inaugurated on 21 October 2019 a 11-km gas pipeline from the Turkish border to compressor station Strandzha, which is to serve as part of the extension of Gazprom's TurkStream pipeline toward Serbia¹⁵. The project also included the construction of Strandzha gas metering station. Earlier, Bulgaria's gas transmission system operator Bulgartransgaz signed a 1.1 billion euro contract with Saudi-led consortium Arkad for the construction of a gas pipeline, which will connect the country's existing gas transmission system to the border with Serbia, and will carry gas from TurkStream.
- 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 €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.
- On 20 December 2019 US President Trump signed a bill imposing sanctions¹⁶ on companies participating in the realisation of the Nord Stream 2 pipeline project. Following the American announcement of asset freezes and visa bans targeting companies working on the project immediately led to Swiss pipe-laying contractor Allseas halting its work. This move would probably lead to delays in the completion of the project. In early January 2020, during a press conference¹⁷ between the Russian President and the German Chancellor, it was indicated that the finalisation of the project might be delayed until the end of this year or even until the first quarter of 2021.
- On 13 November 2019 Italian energy company Edison announced that it had extended the existing natural gas supply contract with the Algerian Sonatrach for eight years as of 2020¹⁸. Under this agreement 1 bcm natural gas will be delivered to Italy per year, half as much as under the contract the expired at the end of 2019. Earlier in 2019 Sonatrach signed similar agreements with two other Italian energy companies, Eni and Enel.
- On 14 November 2019 the European Investment Bank (EIB) adopted its new energy lending policies¹⁹, which aim at, amongst others, gradually phasing out support to the production of oil and natural gas; traditional gas infrastructure (networks, storage, refining facilities); and power generation technologies resulting in GHG emissions above 250 gCO₂ per kWh of electricity generated. EIB will continue to approve projects already under appraisal until the end of 2021. In addition, during this period, the Bank can

¹⁵ <https://seeneews.com/news/bulgaria-inaugurates-11-km-gas-pipeline-section-of-balkan-stream-673239>

¹⁶ <https://www.euractiv.com/section/energy/news/how-us-sanctions-could-hit-russias-nord-stream-2-gas-project/>

¹⁷ <http://en.kremlin.ru/events/president/news/62565>

¹⁸ <https://www.algerie360.com/energie-sonatrach-et-edison-renouvent-pour-huit-ans-le-contrat-dapprovisionnement-en-gaz/>

¹⁹ https://www.eib.org/attachments/strategies/eib_energy_lending_policy_en.pdf

approve gas infrastructure projects included under the 4th List of Projects of Common Interest (PCI) co-financed with EU budget, which are important to the European security of gas supply²⁰.

- After several rounds of trilateral talks between the EU, Ukraine and Russia on the future of shipments of gas of Russian origin through Ukraine, on 19 December 2019 the parties announced that they reached a preliminary agreement²¹. Following this, on 30 December 2019 Russia and Ukraine managed to sign a package of agreements²², including a deal on transit volumes in the next five years, an inter-operator agreement between Ukrainian gas TSO and Gazprom on technical regulations, and a settlement of legal claims arising from the agreement that expired at the end of 2019.
- According to the signed agreements, annual minimum transit volumes will be 60 bcm in 2020 and 40 bcm between 2021 and 2024. The transit will follow a ship-or-pay principle, where the buyer agrees to pay for contracted transport capacity regardless of actually transported volumes. As of 2025 the deal can be renewed for another 10 years. Gazprom committed to settle a debt of USD 2.9 billion to Naftogaz, as a part of the Stockholm arbitration award. Naftogaz was to drop (after having received the aforementioned outstanding debt on 27 December) other arbitration lawsuits and attempts to freeze Gazprom's assets. The deal does not include gas supplies from Gazprom to Naftogaz, nor address lawsuits filed by Naftogaz on its assets in Crimea.
- Under the transit deal Ukraine is expected to ship most of the gas to Central and Eastern Europe. It has signed interconnection agreements with Hungary, Moldova, Romania, Poland, and finally with Slovakia. However, Ukraine lost its historical transit role of transiting Russian gas to the Balkans, as at the beginning of 2020 the Turkstream came online, supplying Russian gas from the direction of Turkey, radically changing the role of the dominant Trans-Balkan pipeline.
- On 8 January 2020 Turkey and Russia officially launched Turkstream project²³, a double-pipeline of 31.5 bcm total annual capacity. Turkstream 1 is designed to supply Turkey, while Turkstream 2 will supply Bulgaria, Greece, North Macedonia, and later, pending on the construction of the necessary infrastructure, to Serbia and Hungary as well. From now on Bulgaria is no longer supplied via the Trans-Balkan pipeline, it rather takes gas volumes from the Turkstream. Turkey used to receive 14 bcm gas from the Trans-Balkan, now this shipment direction became insignificant.

1.3.2. LNG imports

- The year-on-year increase in EU LNG imports was 42% in Q4 2019, being definitely lower than in the previous three quarters of 2019 (respectively 117%, 92% and 75%). The quarterly LNG import reached 30.4 bcm however, up from 23.2 bcm in Q3 2019. This also reflects the impact of the base period, as LNG imports in the EU started to pick up in the last quarter of 2018. With the exception of Sweden and Malta, representing only small import quantities, all LNG importing countries in the EU showed measurable (in most cases double or triple digit) increases in per cent compared to Q4 2018 (See Figure 15).
- United Kingdom was the biggest importer in Q4 2019 (7 bcm) showing an increase of 84% in year-on-year comparison, while in France, importing 6 bcm, the year-on-year increase was 43% and in the third biggest importer Spain (5.4 bcm) imports rose by 16% compared to Q4 2019. LNG imports in Italy, amounting to 3.2 bcm in Q4 2019, showed only an increase of 6% while that in the Netherlands only 5% (reaching 2 bcm). Belgium showed a year-on-year LNG import increase of 148% in Q4 2019 (amounting to 2.8 bcm), similarly to Greece and Lithuania, where imports more than doubled, albeit with smaller quantities. The total EU LNG imports amounted to an estimated €4.6 billion in Q4 2019, down from €5.8 billion a year before, as LNG import gas prices showed a significant decrease since the end of 2018.
- In 2019 as whole, the total amount of LNG imported to the EU was more than 108 bcm, up by 48 bcm, or by 75% compared to 2018. The biggest LNG importers in the EU were Spain (22.4 bcm), France (22.1 bcm), the UK (18 bcm), Italy (13.5 bcm), the Netherlands and Belgium (8.6-8.8 bcm). The monetary value of LNG imports in the EU in 2019 amounted to an estimated €16.2 billion, slightly up from €15.4 billion in 2018, as result of increasing import volumes and decreasing average annual prices.
- In the fourth quarter of 2019, LNG market prices in Europe remained closely aligned with their East Asian peers (see Figure 27), 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). This was at least the fifth quarter when global LNG prices remained well aligned, primarily owing to the abundant global LNG supply, growing faster than demand in East Asia (see more in the Focus on part).

²⁰ On 12 February 2020 the European Parliament has adopted the 4th list of PCIs, including 32 gas, 6 oil and 5 CO₂ network projects:

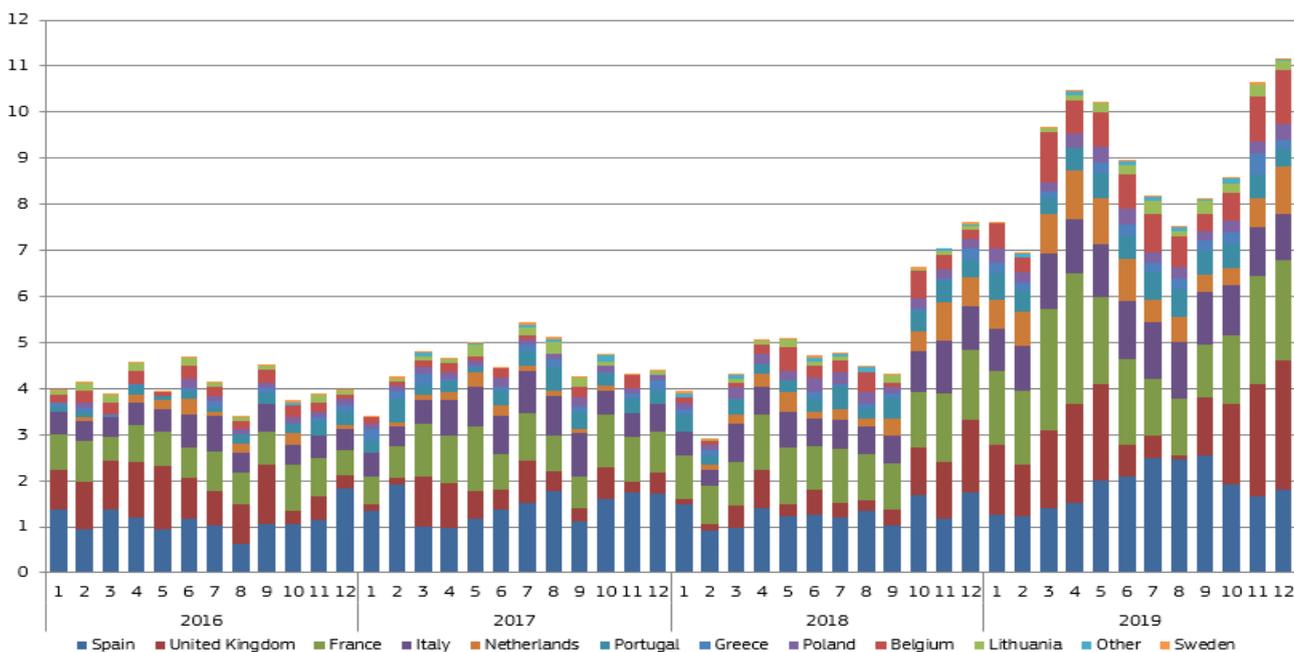
<https://bernardenergy.com/latestdevelopments/ep-adopts-fourth-list-projects-common-interest/>

²¹ <https://www.spglobal.com/platts/en/market-insights/latest-news/natural-gas/121919-russia-ukraine-agree-in-principle-new-gas-transit-deal-ec>

²² <https://www.euractiv.com/section/energy/news/russia-and-ukraine-finalise-gas-deal-just-ahead-of-new-year-deadline/>

²³ <https://www.euronews.com/2020/01/08/putin-and-erdogan-meet-in-istanbul-for-turkstream-inauguration>

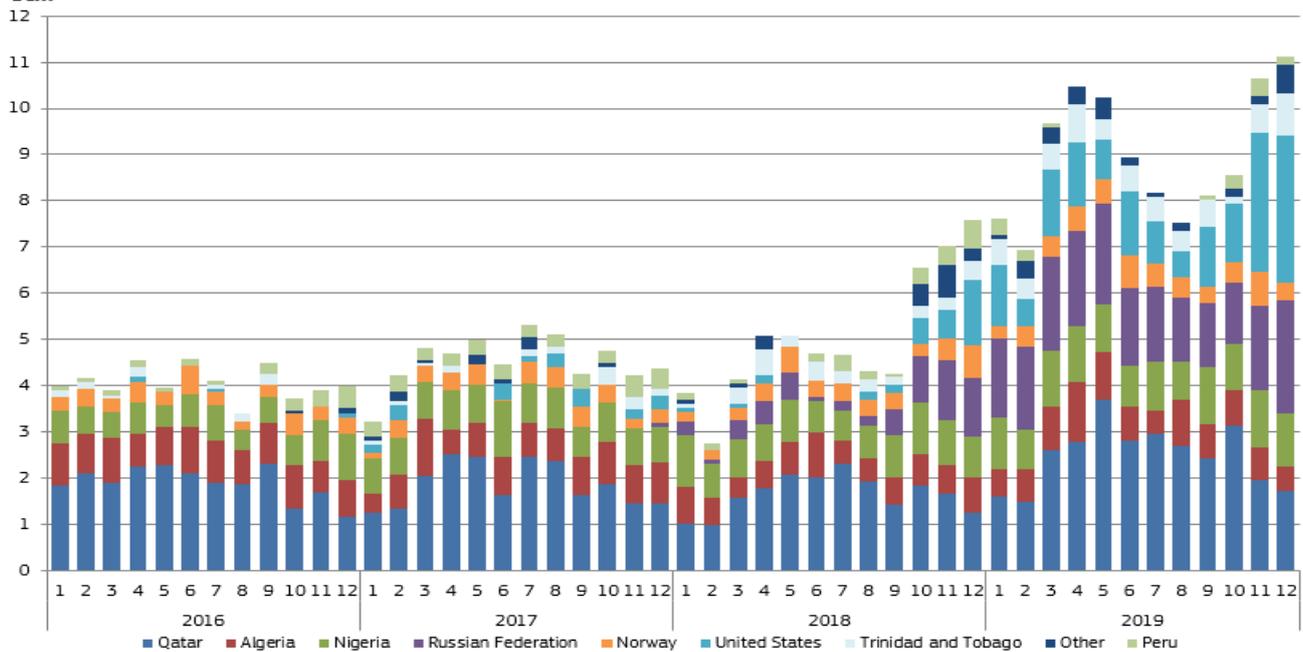
Figure 15 LNG imports to the EU by Member States
bcm



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

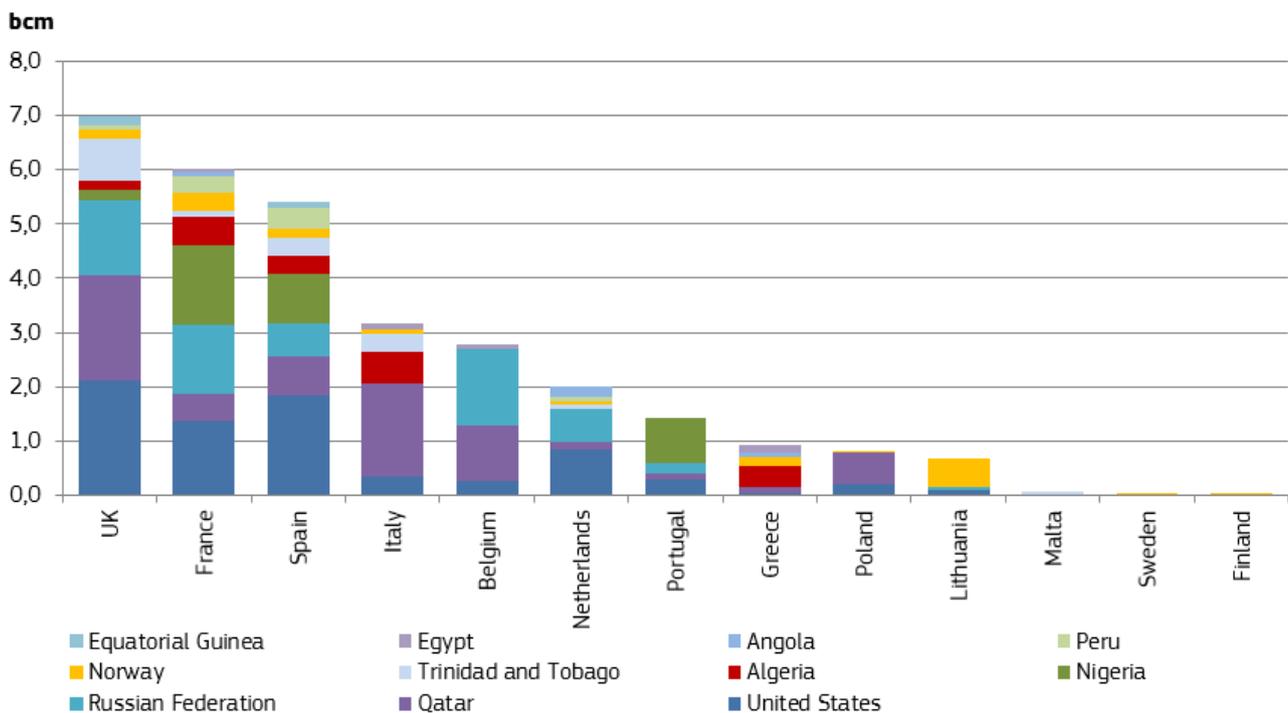
- In the fourth quarter of 2019, for the first time, United States became the most important LNG import source for the EU, ensuring 25% of the total imports, twice as high share as in the previous quarter. Qatar became only the second largest LNG supplier of the EU, and its market share fell to 23%, which was the lowest over the last five years. Russia came to the third place, with a share of 19% within the total EU LNG imports (similarly to Q3 2019), ahead of Nigeria (11%, as opposed to 14% in Q3 2019). The share of Algeria was 7% (down from 9% in Q3 2019), while those of Norway and Trinidad and Tobago only slightly decreased and reached both around 5-6% – See Figure 16.
- In the fourth quarter of 2019, the United States were the biggest exporter to the Netherlands (ensuring 43% of the country's total imports), to Spain (with a share of 34%) and to the UK (30%). Russia was the biggest supplier to Belgium (51%), to Sweden and Finland (with shares of 67% and 70%, though with small quantities), and was the second most important supplier to the Netherlands (31%). Russia had a share of 11% in the Lithuanian LNG imports. Qatar was the biggest import source for Poland (70% of the country's total LNG imports) and Italy (54% of the total), and second most import source for Belgium (37%). Nigeria supplied around 58% of Portugal's LNG imports, and its share in France was close to one quarter.
- Norway remained a dominant LNG supplier of Lithuania (75%); it had a share around 30% in Sweden and Finland, with small quantities in Q4 2019. At the same time, Trinidad and Tobago was the single supplier of Malta and ensured around 11% of LNG imports in the UK and Italy. France had the most diversified LNG import source structure in Q4 2019, receiving cargoes from ten different countries, followed by Spain and the UK (nine different sources both). On the other hand, Malta had a single supplier, while Finland and Sweden had to rely on only two LNG supply sources.
- In 2019 as whole, Qatar supplied 28% of the EU total LNG imports, followed by Russia (20%), the United States (16%) and Nigeria (12%). Qatar ensured high shares of LNG imports in Poland, Belgium, Italy and the UK (45-67%), while the share of Russian LNG was the highest in the Netherlands (51%). The US supplied around one quarter of the Polish, Dutch and Portuguese LNG imports, while the share of Nigeria was high in Portugal (56%).
- With the exception of November and December 2019, in spite of increasing EU LNG imports from the US, Russia exported more LNG to the EU than the United States in each month in 2019, implying that Russia made efforts to maintain its influence on the European gas market, complementing the pipeline business with growing LNG supply.

Figure 16 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 17 – LNG imports in the EU Member States from different sources in the fourth quarter of 2019
bcm

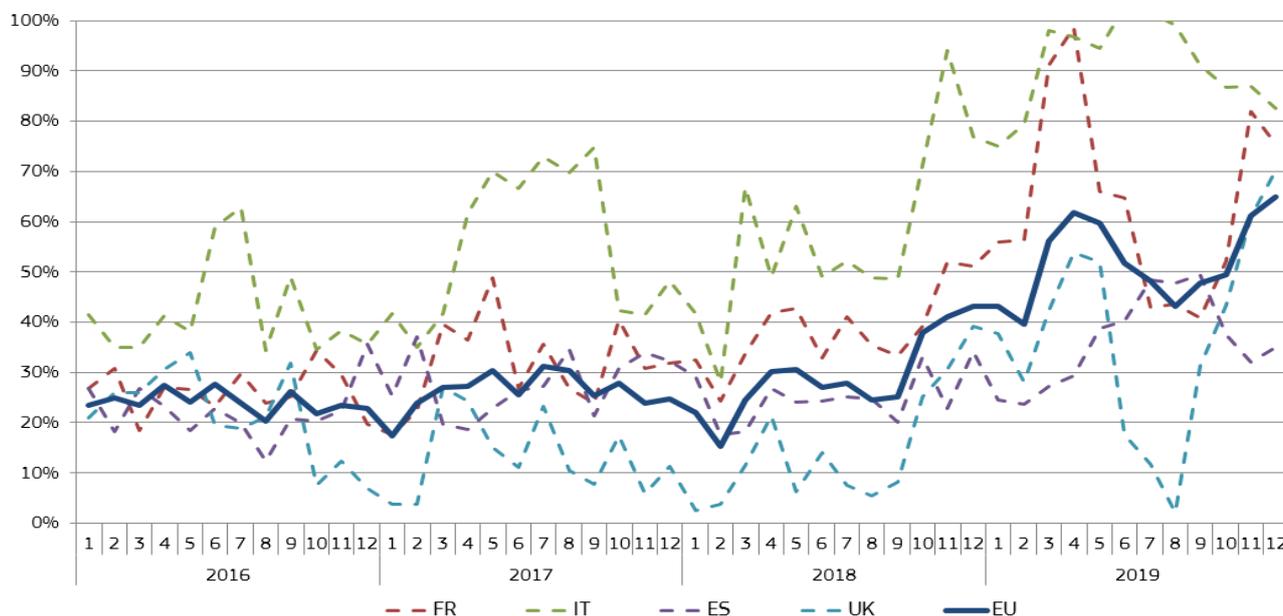


Source: Commission calculations based on tanker movements reported by Thomson Reuters
Imports coming from other EU Member States (re-exports) are excluded
"Other" includes Angola, Brazil, the Dominican Republic, Egypt, Equatorial Guinea, Oman, Singapore, the United Arab Emirates and Yemen

- The average monthly utilisation rates of terminals in the LNG importing EU Member States are presented on Figure 18 for some countries, as well as for the EU on average. The key story of the last two years, the rapidly increasing LNG imports in many EU markets, can also be clearly tracked on this chart, showing high utilisation rates in 2019. At individual terminal or country level, monthly utilisation rates can be quite volatile, depending on the arrival of cargos and the hourly regasification capacities. At EU level, the average utilisation rate rose to 65% in December 2019, which was the highest since the beginning of available time

series (2013). In Q4 2019, bearing in mind the total quarterly imports (30.4 bcm) and regasification capacities at the end of 2019 (213 bcm)²⁴, the average EU level utilisation rate of LNG terminals was around 57%, while in 2019 as whole it stood around 51%.

Figure 18 – Average monthly regasification terminal utilisation rates in the EU and in some significant LNG importer countries

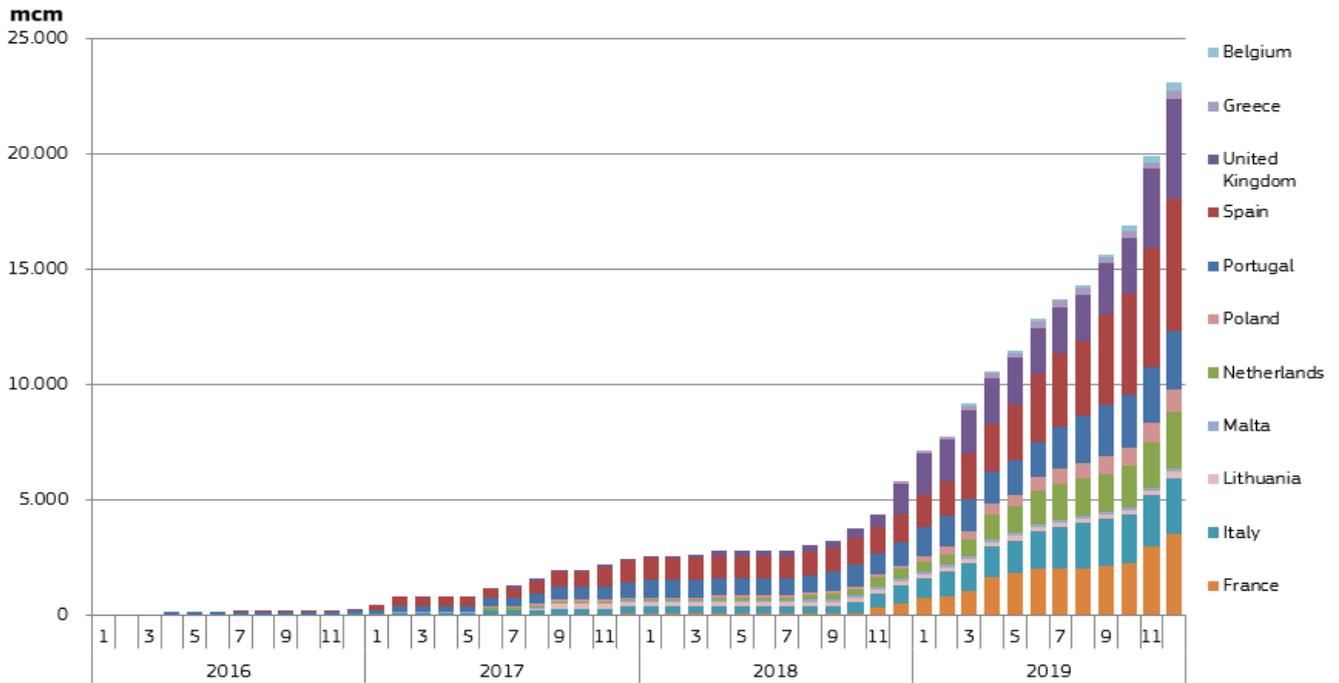


Source: Commission calculations for LNG imports based on tanker movements reported by Thomson Reuters. Regasification capacities are based on data from International Group of Liquefied Natural Gas Importers (GIINGL) and Gas Infrastructures Europe (GIE)

- In the fourth quarter of 2019 81 LNG cargoes arrived from the US, unloading more than 7.5 bcm of LNG (in re-gasified form), with an estimated monetary value of €1.4 billion. In November and December 2019 respectively 33 and 34 US LNG cargoes arrived in the EU (this compares with the total number of 37 in whole 2018). In both November and December 2019 the discharged volume of US LNG was higher than 3 bcm (this compares with the total volume of US LNG to the EU in 2018 – 3.3 bcm).
- LNG exports to the EU represented 48% of total US exports in Q4 2019, which was the highest since 2016. In the fourth quarter of 2019 the four most important EU destinations of the US LNG exports were the UK (2.1 bcm), Spain (1.8 bcm), France (1.4 bcm) and the Netherlands (0.8 bcm). In 2019 as whole, the US exported more than 4.5 bcm LNG to Spain, 3 bcm to the UK, 2.1 bcm to the Netherlands and 1.7 bcm of LNG to Italy. The total US LNG exports in the EU reached 17.2 bcm (representing 184 cargoes, with an estimated monetary value of €2.6 billion).
- Besides the US, Russia managed to increase rapidly its LNG exports to the EU. In Q4 2019 Russia sent 84 cargoes of LNG to the EU, representing a volume of 5.6 bcm and an estimated monetary value of €1 billion. In 2019 as whole, the number of Russian LNG cargoes arriving at European shores was 294, with an amount of 21.5 bcm and an estimated value of €3.3 billion. These annual figures were higher than the respective LNG import numbers from the US.

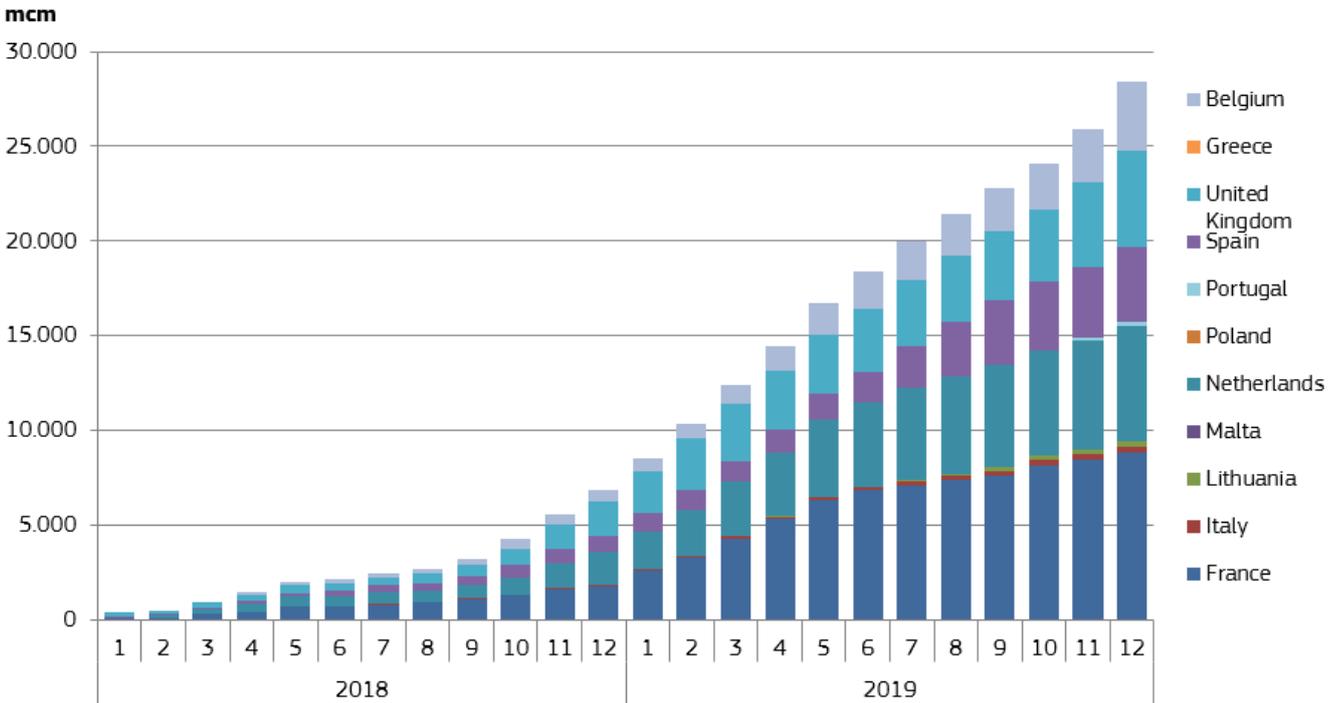
²⁴ Source: Gas Infrastructures Europe LNG database: https://www.gie.eu/maps_data/downloads/2019/GIE_LNG_Map_Database_May_2019.xlsx

Figure 19 Cumulative monthly LNG imports from the US in the EU



Source: Commission calculations based on tanker movements reported by Refinitiv

Figure 20 – Cumulative monthly LNG imports from Russia in the EU



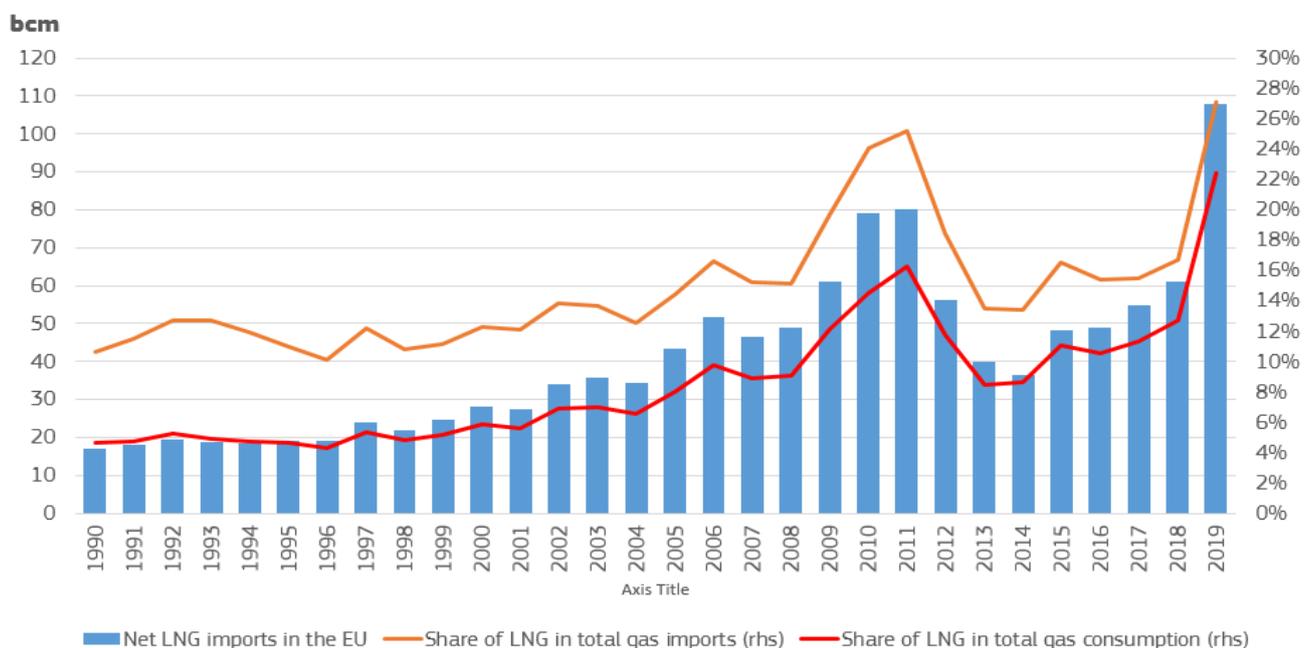
Source: Commission calculations based on tanker movements reported by Refinitiv

1.4 Focus on: Impact of global gas markets on LNG imports in the EU in 2019

As the next chart shows, LNG imports in the EU reached more than 108 bcm in 2019, being the highest since the beginning of the available data series (1990), and surpassing the previous peak in 2011 by more than 30%. LNG sources represented more than 27% in the total EU natural gas imports, whereas the amount of imported LNG reached more than 22% of the EU total gas consumption, both reaching the highest ever recorded value. The year 2019 has brought a significant increase in natural gas use in electricity generation, increasing by 15% compared to 2018. The uptick in natural gas supply was mainly driven by competitive LNG imports, resulting in the lowest wholesale gas prices on the European hubs since 2009. Low gas prices combined with increasing emission allowance prices resulted in an increasing competitiveness of gas vis-à-vis coal in power generation.

Since the end of the nineties LNG imports in the EU showed an increasing trend, primarily owing to increasing re-gasification capacities in many EU countries, such as Italy, Spain, France, the UK, Belgium and the Netherlands. LNG offered a competitive alternative to pipeline gas imports in this period. In 2011 however, as the aftermath of the Fukushima nuclear incident in Japan, significant nuclear generation capacities had to be mothballed in the country, which had to be replaced mostly by gas-fired generation. These power plants are principally operated by LNG import gas, and as in consequence gas demand in the Asian markets increased, this resulted in a measurable gas market price premium to Europe, offering a competitive alternative to sell LNG in Asia. As result, EU LNG imports decreased measurably, and in 2014 the total imports were barely half as much as in 2011.

Figure 21 – LNG imports in the EU and its share in total gas imports and consumption



Source: Commission calculations based on tanker movements reported by Refinitiv and data from Eurostat

In 2016 the United States authorised the export of natural gas to the EU, however, until the end of 2018 the amount of US LNG arriving to Europe did not increase measurably, primarily owing to the aforementioned Asian price premium to Europe. In July 2018 the President of the European Commission and US President Trump²⁵ met in order to give a boost to transatlantic trade and among the issues discussed was how to increase US LNG deployment in the EU.

In 2019 global LNG trade underwent a further increase, reaching around 483 bcm²⁶, up from 428 bcm (by 13%) in 2018. In 2019 the three biggest incremental LNG supply increase came from Qatar, Russia and the US, adding around 45 bcm to the global supply (out of the 55 bcm total increase). LNG import increase in Europe was primarily owing to the shrinking Asian price premium as of autumn 2018.

Demand for LNG decreased in Japan as nuclear plants are coming back to the grid. In China domestic gas production is increasing and since the end of 2019 the new import pipeline from Russia (Power of Siberia) is exposing LNG imports to bigger competition. LNG imports in this country also faces an obstacle owing to high utilisation rates of re-gasification terminals and limited connection of LNG capacities to main gas consumer facilities. In South Korea LNG consumption also decreased, implying that the share of East Asia (still the biggest LNG market, including Japan, China, Taiwan and South Korea) went down from 62% to 55% in the world's LNG consumption in 2019.

²⁵ See in Quarterly Report on European Gas Markets Vol 11, Issue 2.

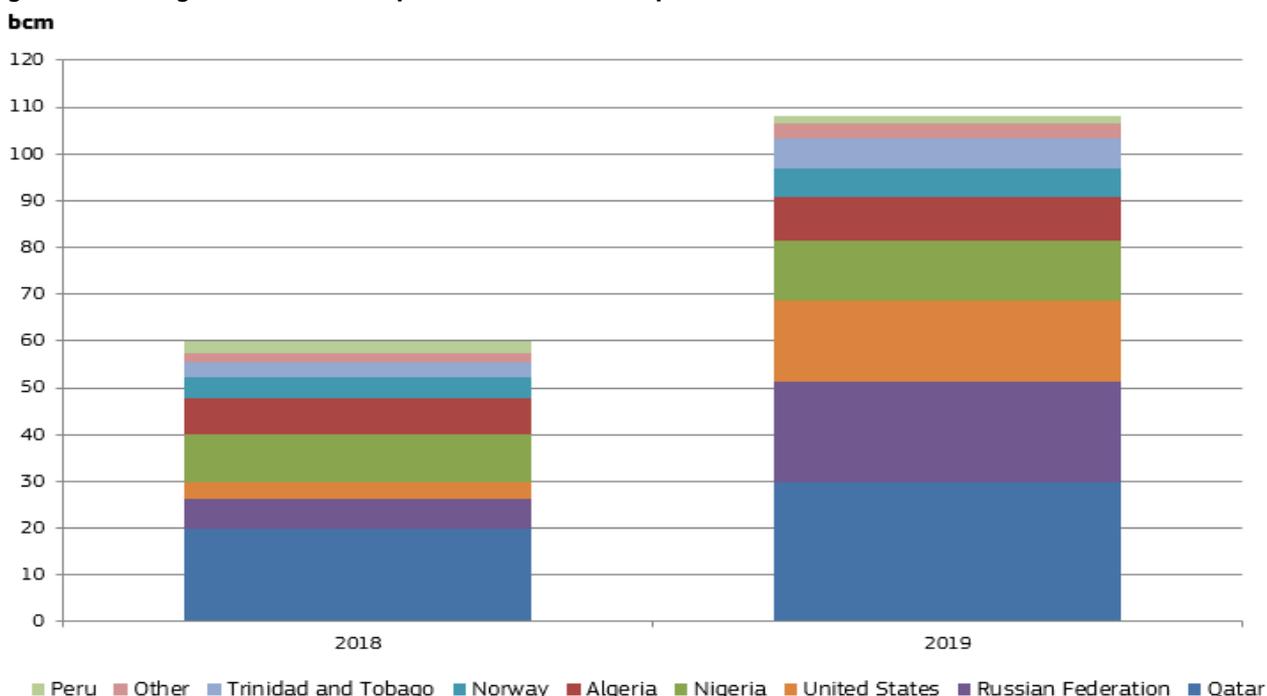
²⁶ Provisional data of ICS LNG Edge

At the same time, the share of Europe increased from 13% to 21%, showing the biggest year-on-year change in 2019. Europe has become a balancing market at the global LNG stage, which practically means that increasing supply from producer countries (Qatar, Australia, US, Russia, etc.) was not fully absorbed by the biggest LNG consumers in Asia, and the oversupply found a market in Europe. Abundant supply thus managed to shrink the traditional Asian price premium to Europe, resulting in competitive gas import alternative to pipeline gas imports in the EU. In the first half of the 2020 decade significant liquefaction capacities are expected to come operational in the US, Qatar and to a smaller extent, in Australia and Russia, which will ensure that global LNG supply will keep pace (or even outpace) with demand, and global LNG prices are likely to remain competitive in the forthcoming years.

Figure 22 shows the change in annual LNG imports between 2018 and 2019, providing an indication on the source of incremental LNG imports in 2019. The EU increased its LNG imports from the biggest supplier Qatar by 10 bcm (from 19.8 bcm to 29.8 bcm) in 2019, compared to 2018. However, at the same time LNG imports from Russia went up by 15 bcm (from 6.5 bcm to 21.4 bcm), and from the US by almost 14 bcm (from 3.3 bcm to 17.2 bcm). These three sources altogether provided an increase of 39 bcm in 2019, out of the total LNG import increase of 48 bcm in the EU. Both Trinidad and Tobago and Nigeria added to the EU LNG imports (by 3.5 bcm and 2.4 bcm in 2019), however, their impact on the European LNG market was less significant.

In 2019 the total LNG regasification capacities amounted to 213 bcm per year, implying that increasing LNG imports, albeit currently not facing obstacles in most of the recipient countries, are already taking more than half of the available capacities.

Figure 22 – Change in annual LNG imports from the most important extra-EU sources

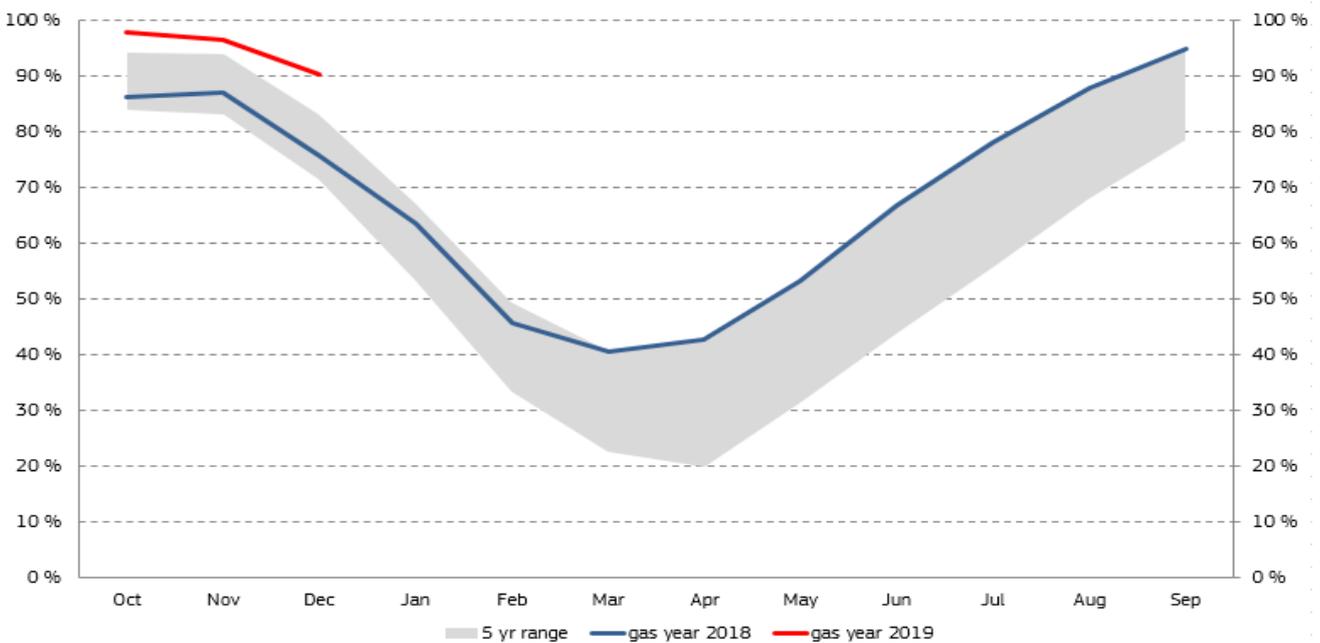


Source: Commission calculations based on tanker movements reported by Refinitiv

1.5 Storage

- Figure 23 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 2018²⁷, plus 177 TWh capacity planned or already under construction (adding potentially another 16 bcm).
- The fourth quarter of the year is the onset of the heating season and usually at the end of October gas storage switches to withdrawal mode from injection and the storage filling rates start to decrease. On average, net storage withdrawals made during the fourth quarter of 2019 were equivalent to 8.7% of storage capacity, which was measurably lower than that of 12.4% in the same period of 2018): the average filling rate decreased from 97% on 30 September 2019 to 88% on 31 December 2019. As result, at the end of 2019 the average filling rate in the EU was more than 18% higher than a year before, and was the highest end-of-the year value in the last eight years.
- Significantly increasing LNG imports in Europe, up by 42% compared to Q4 2018, and high send-outs to the gas grid in many countries resulted in competitive gas prices (though increasing compared to the through in Q3 2019) across the EU. Spot market prices were probably still lower than the average cost of injected gas in the storages, which resulted in the use of market transactions rather than reliance on storage withdrawals.
- The Russian gas transit agreement with Ukraine, representing a principal supply route to the EU, expired at the end of 2019, and in the last moment (see in the Policy developments chapter on page 16) a new agreement, in force as of 2020, was concluded. However, during most of Q4 2019 storage operators followed risk averse behaviour, which might also have been a reason behind less reliance on storage withdrawals.

Figure 23 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 4 February 2020. See explanations on data coverage at <https://agsi.gie.eu/#/faq>.

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

- However, as Figure 24 shows, there was a significant variation among Member States in terms of both the starting position (the filling rate at the end of September 2019) and the pace of withdrawals. Although the change in the filling rate over Q4 2019 was 8.7% on EU average, in Croatia, the Netherlands and Bulgaria filling rates decreased by more than 20% over Q4 2019. At the same time filling rates even increased in some countries (UK, Slovakia and Romania). At the end of December storage filling rates in most Member States were above 80%, however, in Latvia the filling rate was barely 61%, and in Bulgaria, Croatia and the Netherlands storages were around three-quarter filled of their total capacity.

²⁷ https://www.gie.eu/maps_data/downloads/2018/Storage_DB_Dec2018.xlsx

- Moreover, it is worth to look at how storage fillings in different countries at the end of the year could cover the average gas consumption of the remaining part of the winter (January-March). Figure 24 also shows the ratio of the gas stored in each country on 31 December 2019 and the average gas consumption between January and March for the period of 2014-2048. In Austria and Latvia the end-of-December storage level could have covered almost 2.8 times of the average first-quarter winter consumption, while in Slovakia, Hungary and the Czech Republic this ratio was also above 100%²⁸. At EU level the storages would cover around 59% of the average winter consumption, while in some countries (Belgium, Sweden and the UK this coverage ratio was around 10% or even less). Cross-country comparison of gas storage filling rates only really makes sense if we take into account the local gas consumption as well.

Figure 24 Gas storage levels as percentage of maximum gas storage capacity, and storage coverage of the average first-quarter gas consumption by Member State

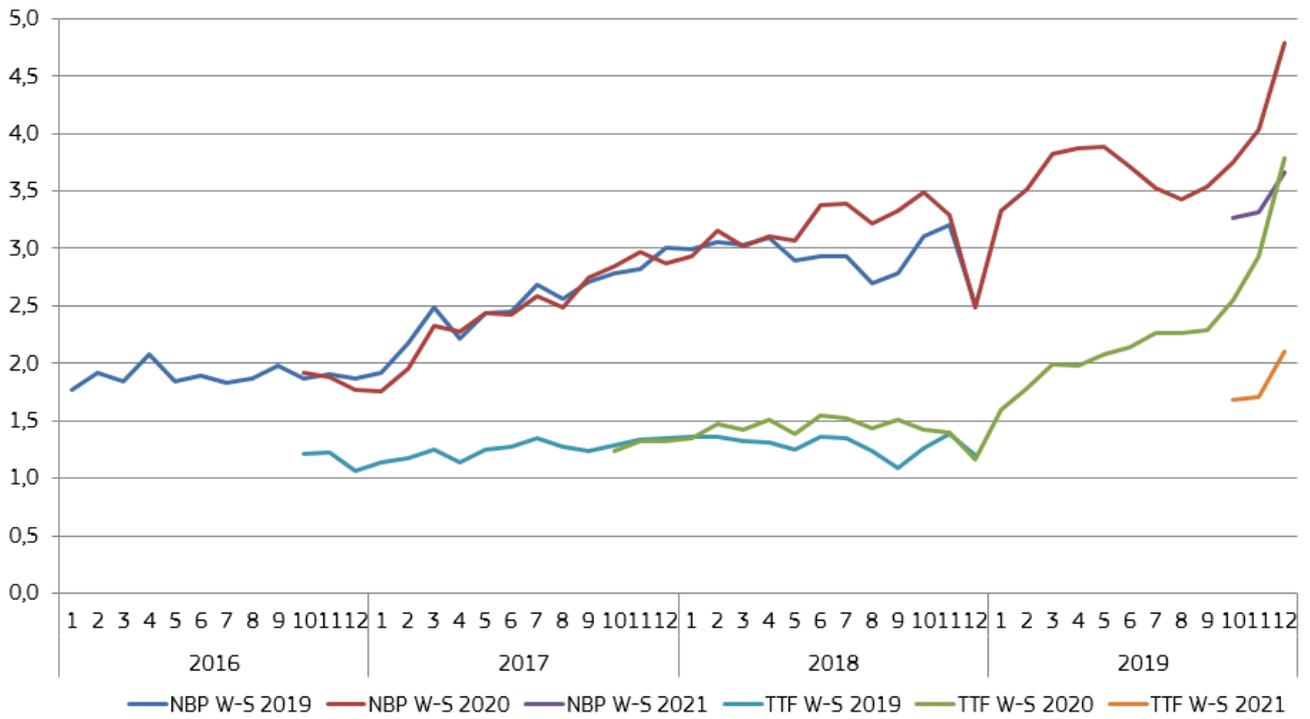


Source: Gas Storage Europe AGSI+ Aggregated Gas Storage Inventory, extracted on 4 February 2020; calculations of DG Energy. See explanations on data coverage at <https://aqsi.gie.eu/#/faq>. Injection level data in Sweden changed significantly for the first time since the first data reporting period in 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) increased further in Q4 2019 (from 3.5 €/MWh in September to 4.8 €/MWh in December 2019) and on quarterly average they reached 4.2 €/MWh after 3.5 €/MWh in Q3 2019. At the same time the average 2020 seasonal spread on the TTF increased slightly and by December 2019 it rose to 3.8 €/MWh from 2.3 €/MWh in September 2019, whereas the quarterly average went up from 2.3 €/MWh to 3.1 €/MWh. For the first time information is available on the price difference between winter 2021-2022 contracts and summer 2021 contracts, in December 2019 this type of NBP spread stood at 3.6 €/MWh, while the TTF was at 2.1 €/MWh.
- In spite of slightly increasing spot gas prices in Q4 2019, summer-2020 - winter-2020/21 differentials continued to increase, probably reflecting less injection needs in storages during 2020 as current levels are high, which implies less demand for next summer. On the supply side, LNG ample supply is expected to characterise the European gas market in 2020, as new liquefaction capacities are to come online in the US (e.g.: Freeport and Cameron sites in the first half of 2020), which might ensure abundant influx of LNG in Europe and this might contribute to low price expectations for summer 2020. However, the market seems to be less clear for the following winter. Summer-2021 - winter 2021-22 differentials were lower for both the NBP and TTF hubs, which might reflect anticipation of higher spot prices for 2021.
- UK exhibits a structural gas oversupply during the summer and tighter market during the winter, owing to less storage capacities in comparison to continental Europe. The UK seasonal (winter-summer) spreads developed a perceivable premium to the continental spreads over the last few years (amounting to 1.1-1.6 €/MWh in Q4 2019, taking the 2020 and 2021 summer-winter spreads).

²⁸ Although it is worth recalling that storage capacities in a given country might also serve the security of gas supply in other regional neighbours, and thus country-level consumption per storage level ratios might overestimate local consumption coverage with storages

**Figure 25 Winter-summer spreads in the Dutch and British gas hubs
Euro/MWh**



Source: S&P Global Platts

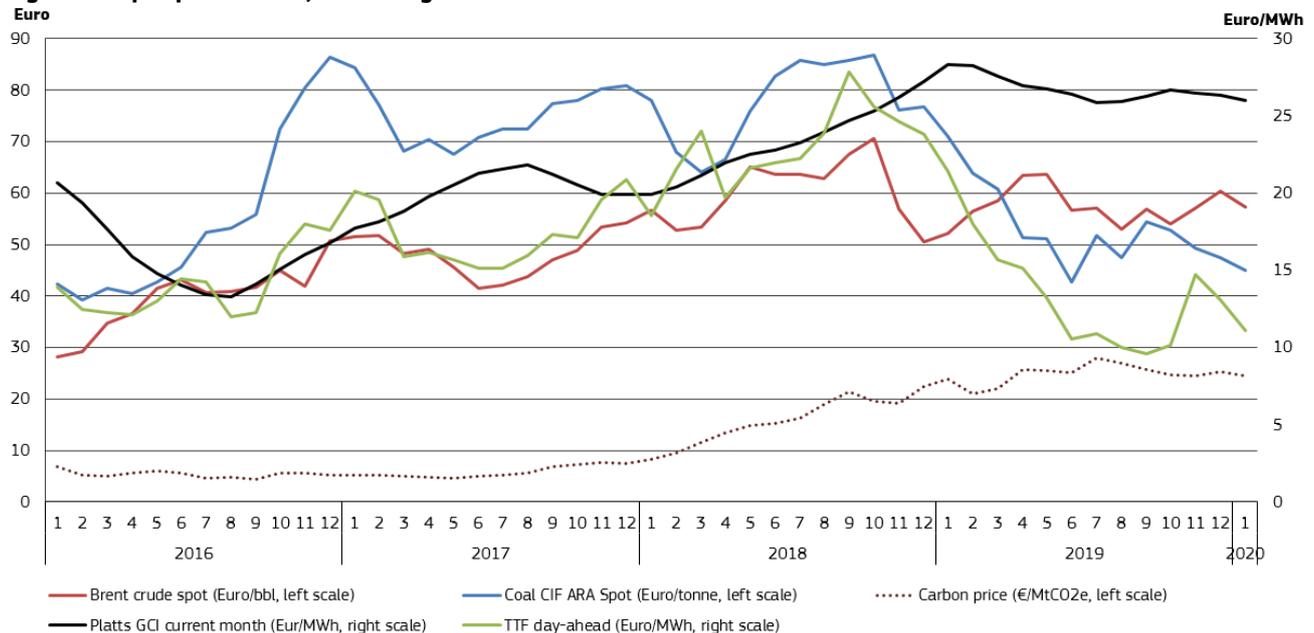
W-S 2019 refers to the difference between the winter 2019-20 price and the summer 2019 price, W-S 2020 refers to the difference between the winter 2020-21 price and the summer 2020 price, W-S 2021 refers to the difference between the winter 2021-22 price and the summer 2021 price.

2. Wholesale gas markets

2.1 EU energy commodity markets

- The Brent crude daily average oil price showed gradual increase over Q4 2019. While at the end of September 2019 it stood at 61 USD/bbl (56 €/bbl), by the end of December 2019 it rose to 66 USD/bbl (59 €/bbl), principally owing to the anticipation of lower supply ahead of the production limit cut of the OPEC+ (OPEC and other key suppliers, such as Russia). On 6 December 2019, countries participating in the OPEC+ agreed in deepening their cuts, having an additional 0.5 million barrel per²⁹ day (mb/d) production cut as of 1 January 2020.
- The Dutch TTF spot gas price that stood below 9 €/MWh at the end of September 2019 remained in the range of 8-12 €/MWh in October 2019. Then in November a significant increase could be observed and by the end of the month the daily average spot price rose above to 16 €/MWh, the highest since early March 2019. Albeit abundant gas supply and intensive LNG imports in the EU, in November some cold spells and further expectations on the onset of colder weather helped lifting the TTF spot contract prices. Beyond this, the sluggish progress on trilateral talks on the future of natural gas supplies of Russian origin (see the Policy developments part on page 16-17) might have also added to uncertainty of security of gas supply, contributing to the increase in spot market prices. However, in December, as the weather became unusually mild, and around 20 December 2019 the agreement on Russian gas supplies came closer, the wholesale gas price took a downward direction and by the end of December 2019 it fell below 11 €/MWh. High storage filling rates across Europe reduced the demand for gas on the spot market, helping to keep wholesale gas prices at low ranges. On the demand side however, owing to still favourable 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. In December 2019 however, even gas use in power generation showed decreases in year-on-year comparison.
- Although crude oil prices in Q4 2019 showed a gradual increase, oil prices in the spring months of 2019 showed only small increases, and taking into account of the usual time lag of 6-9 month, this might have had a little impact on the oil-indexed gas contracts in Q4 2019. In the second half of 2019, with the exception of event-driven spikes, crude oil prices showed range-bound movements, so it is likely that oil-indexed contracts will do not show big variations in the forthcoming period either. In Q4 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 26.5 €/MWh, being twice as high as the TTF (12.7 €/MWh).

Figure 26 Spot prices of oil, coal and gas in the EU



Source: S&P Global Platts

- Spot coal prices decreased again in Q4 2019, after recovering in the previous quarter. The daily average prices fell from 54 €/Mt in at the end of September 2019 to just below 46 €/Mt at the end of December 2019. 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, as China had less and less

²⁹ https://www.opec.org/opec_web/en/press_room/5797.htm

import needs in parallel with restructuring its coal mining sector. Carbon prices were moving in a range of 23-26 €/MtCO_{2e} in Q4 2019, and averaged 24.9 €/MtCO_{2e} in the quarter, decreasing from 26.8 €/MtCO_{2e} in Q3 2019 (showing a 7 percent decrease on quarterly average). However, this was high enough to still ensure competitive advantage to gas vis-à-vis coal in the EU power mix.

2.2 LNG and international gas markets

- Figure 27 displays the international comparison of wholesale gas prices. In Q4 2019 European, Japanese and Chinese landed LNG contracts still remained well-aligned, and as TTF picked up during the quarter, the small Asian premium of September 2019 disappeared. 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 Q4 2019 LNG imports picked up again after temporary setback in the previous quarter, and in December 2019 total LNG imports in the EU was the highest monthly ever, 11 bcm. 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 5.8 USD/mmbtu in Q4 2019, up from 4.6 USD/mmbtu in Q3 2019, however, down by 43% compared to fourth quarter of 2018, when it stood at 10.1 USD/mmbtu. The Japanese premium above the Dutch TTF hub was on average 1.6 USD/mmbtu in the fourth quarter of 2019, up from 1.3 USD/mmbtu in Q3 2019, but down from 1.9 USD/mmbtu in Q4 2018. High premium in Q4 2019 was mainly due to the month of October, as of November TTF and Japanese contracts converged again. On quarterly average, LNG import prices in China were comparable with their Japanese peers (5.8 USD/mmbtu in Q4 2019). These numbers show a measurable price convergence between European and Asian LNG prices since autumn 2018.
- The average price of Chinese pipeline gas imports in Q4 2019 was 7.2 USD/mmbtu, which was well above the Asian LNG reference prices, by 1.4 USD/mmbtu. This contract showed a slightly decrease compared to Q3 2019, however, was still higher than in Q4 2018 (7 USD/mmbtu), still impacted by the evolution of crude oil prices in Asian gas import contracts.
- The Henry Hub price remained in a narrow range in Q4 2019, increasing from 2.3 USD/mmbtu in October and to 2.6 USD/mmbtu in November and fell back to 2.2 USD/mmbtu in December 2019.³⁰ At the same time the euro-dollar exchange rate remained practically unchanged, in September 2019 reaching 1.10 and in December 1.11. In year-on-year comparison the euro depreciated against the dollar (1.13 in December 2018), implying that changes in the gas price in euro over the last twelve months preceding December 2019 was partly cushioned by the depreciating euro.
- In the fourth quarter of 2019, TTF averaged at 4.1 USD/mmbtu (12.7 €/MWh). The average German border price was somewhat higher (5.1 USD/mmbtu or 15.8 €/MWh), reflecting the impact of still existing oil-indexed contracts in the German gas import mix.
- Over the course of the fourth quarter of 2019 differentials in international price contracts showed only minor changes, as traditionally lower US prices stagnated and European and Asian contracts slightly increased. The ratio of the Japanese LNG price and US Henry Hub was 2.4 in the fourth quarter of 2019, slightly up from 2.0 in the Q3 2019 but down from 2.7 in Q4 2018.
- The average TTF/Henry Hub ratio increased to 1.7 in the fourth quarter of 2019 from 1.4 in Q3 2019, but it was down from 2.2 in the same period of 2018. In absolute terms, the price spread between Henry Hub and TTF was 1.8 USD/mmbtu in the fourth quarter of 2019, which compares to an average of 4.5 USD/mmbtu in the same period of 2018. By December 2019 the price differential between US Henry Hub and the TTF rose to 2 USD/mmbtu, which was higher than the one measured in September 2019 (0.6 USD/mmbtu).
- In the fourth quarter of 2019, spot prices averaged 4.1 USD/mmbtu in the Netherlands, 4.9 USD/mmbtu in Spain, 5.8 USD/mmbtu in China and Japan, implying that the Asian price premium to the TTF rose to 1.6 USD/mmbtu, whereas in Q3 2019 it was 1.3 USD/mmbtu. In 2019 as whole, the average of Henry hub spot prices was 2.5 USD/mmbtu, while the TTF was 4.5 USD/mmbtu, Spain LNG landed prices were 5 USD/mmbtu, Japanese and Chinese landed prices were 5.5 USD/mmbtu on average.
- JCC (Japanese Crude Cocktail), the Japanese benchmark of oil-indexed LNG prices, averaged around 10 USD/mmbtu in the fourth quarter of 2019, which was more than 70% higher than the average spot price (5.8 USD/mmbtu), reflecting the slow responsiveness (time-lag in the oil indexation) to the spot market prices of this oil-indexed contract.
- LNG imports in the fourth quarter of 2019 increased slightly in China (+1.3% year-on-year), reaching almost 23.2 bcm³¹. Japan was the biggest LNG importer again in Q4 2019 in Asia, importing 25.6 bcm, which however was 8.5% less than in Q4 2018. South Korea imported 15.7bcm LNG in Q4 2019, 4.4% less in year-on-year comparison. India imported 7.7 bcm, also down by 9.2%

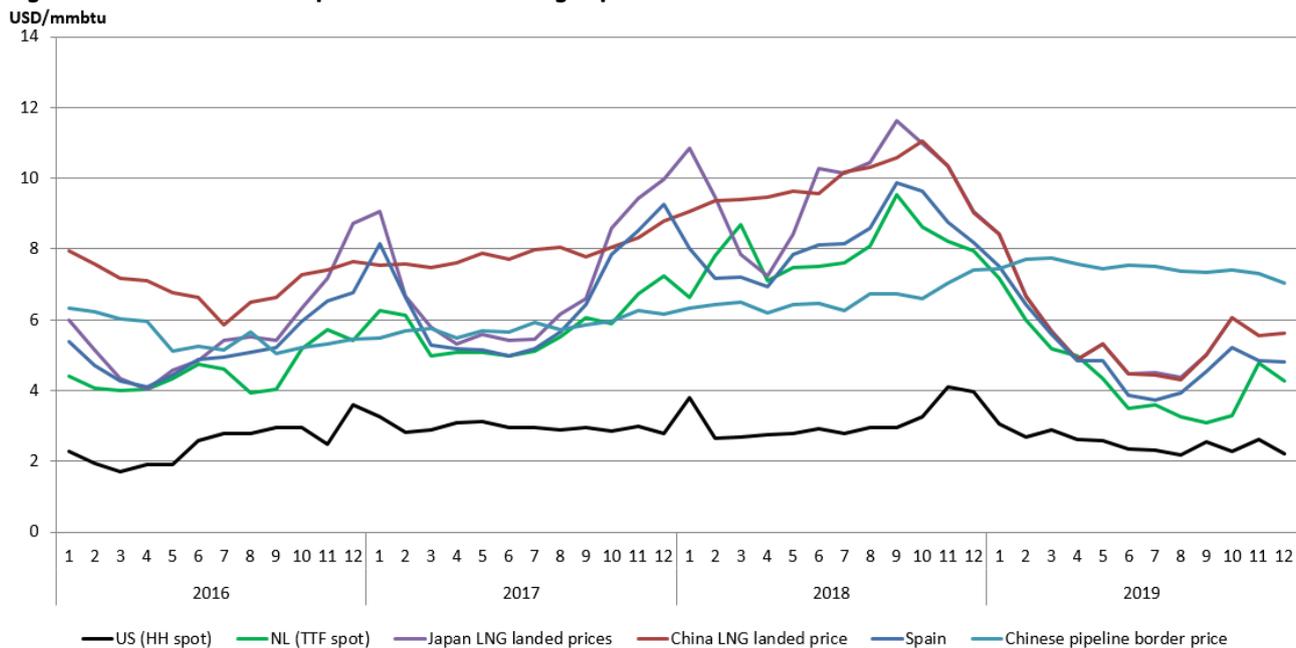
³⁰ Due to infrastructure bottlenecks in some shale gas producing regions of the US, resulting in inability to transport gas to other regions to be consumed, in some periods even negative spot prices occur in regional gas markets.

³¹ Source: Commission calculations based on tanker movements reported by Thomson Reuters

compared to Q4 2018. Taiwan (having an individual LNG market) imported 5.8 bcm LNG in Q4 2019, up by 8.5% in year-on-year comparison. These five markets imported more than 78 bcm LNG in Q4 2019, practically two and half times as much as the EU, reflecting the importance of the Asian markets in the global LNG trade. In 2019 Japan, China, South Korea, India and Taiwan respectively imported 103 bcm, 82 bcm, 55 bcm, 30 bcm and 22 bcm LNG out of the world's total estimated market of 483 bcm. The total imports of these five destinations amounted to 292 bcm, which compares with the EU's total LNG imports (108 bcm).

- Global LNG supply continued to expand in the fourth quarter of 2019: and LNG trade amounted to 127 bcm, 7% more than in the same quarter of 2018 (119 bcm). In Europe alone the demand for LNG increased by more than 7 bcm in Q4 2019 year-on-year. Global LNG trade went up from 428 bcm to 483 bcm in 2019, of which EU imports contributed by 48 bcm.

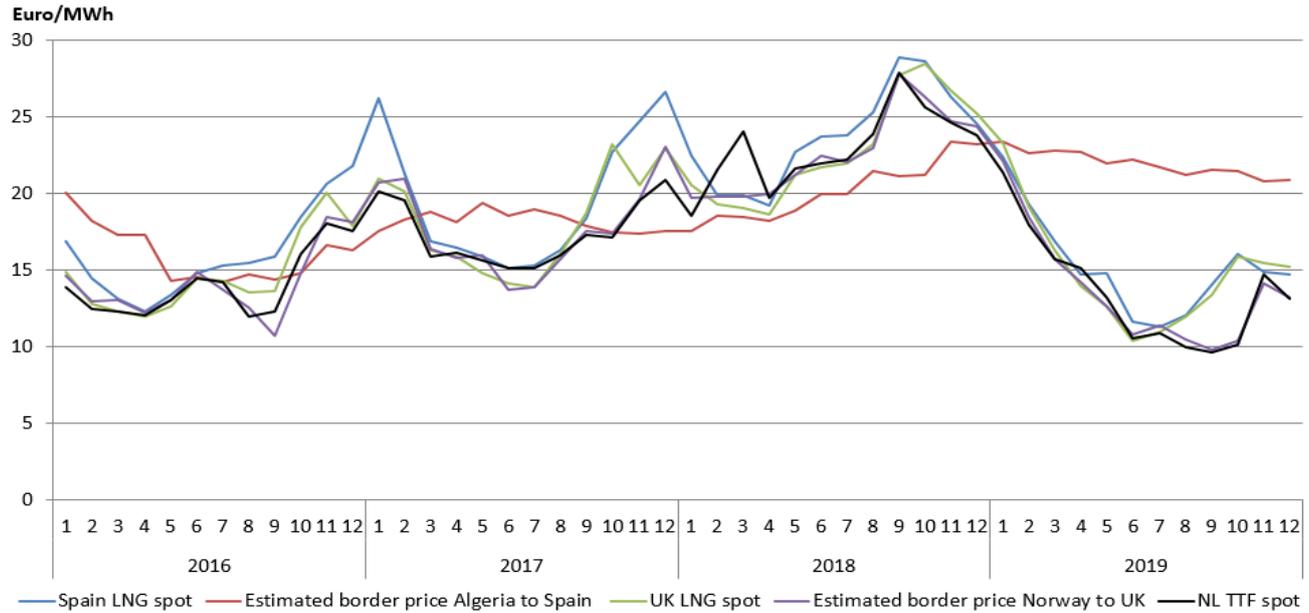
Figure 27 International comparison of wholesale gas prices



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

- Figure 28 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 fourth quarter of 2019, the estimated Algerian pipeline import price in Spain decreased slightly (by 2%), compared to the previous quarter, averaging around 21.1 €/MWh, and was down by 7% compared to Q4 2018. However, in December 2019 the average estimated Algerian import price in Spain was more than 41% higher than the Spanish LNG import price and 60% higher as the TTF benchmark. This is a highly probable explanation why pipeline gas imports from Algeria fell by 26% in the EU in Q4 2019 in year-on-year comparison (See Chapter 1.3 Imports).
- In September and October 2019, owing to very low spot prices on the TTF hub, a premium of Spanish LNG and UK LNG import prices appeared to the TTF, amounting to 5-6 €/MWh in some cases. However, in November and December TTF prices rose from the previous trough and this resulted in the re-convergence of these contracts, implying a maximum 1-2 €/MWh price differential. The quarterly average prices showed an increase of 20-30% compared to the previous quarter in Q4 2019, however, on year-on-year comparison they were still down by 40-50%, with the exception of the aforementioned import contract for Algerian gas.

Figure 28. 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 3 February 2020.

2.3 European gas markets

2.3.1. Gas trade on the EU hubs

- As Figure 29 and Figure 30 show, liquidity on the main European gas hubs increased in the September-December 2019³²: total traded volumes amounted to around 18 062 TWh (equivalent to around 1 508 bcm, and in monetary terms representing €215 billion³³), 7.5% more in volume than in September-October 2018. This was around 13 times more than the gas consumption in the seven Member States³⁴ covered by the analysis in September-December 2019. In September 2019 the year-on-year increase in gas traded volume on the observed European trading platforms was 14%, whereas in October and November, for the first time since December 2018, year-on-year volumes were down, respectively by 4% and 6%. In December 2019, owing to the low base period value, year-on-year increase in gas trade was 35%. In 2019 as whole the total observed gas trade in the EU amounted to 57 749 TWh, 20% more than in 2018.
- Traded volumes in September-December 2019 increased by 18% year-on-year on the most-liquid European hub Dutch TTF. In Germany, the traded volume on Gaspool and NGC together went up by 2% over the same period. In Italy (PSV) volume was up by 16%, in France the TRF hub volume was up by 17%, whereas biggest growth could be observed on VTP in Austria, where the traded volume went up by 38%. At the same time, traded volumes on the second biggest hub (NBP) in the UK registered a decline of 17% compared to September-December 2018. The smallest hub in traded volumes, Belgium's Zeebrugge underwent a further decrease of 5%.
- The significant increase on the TTF hub further reinforced its leading role in Europe, in September-December 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 September-December 2019 was down by 17% 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 27% in September-December 2018.
- Other markets had lower shares: Germany (NGC and Gaspool together) had a share of 6%, while the Italian PSV only had 2.2%, whereas TRF, VTP and Zeebrugge respectively had 1.7%, 1.6% and 0.6% in September-December 2019.

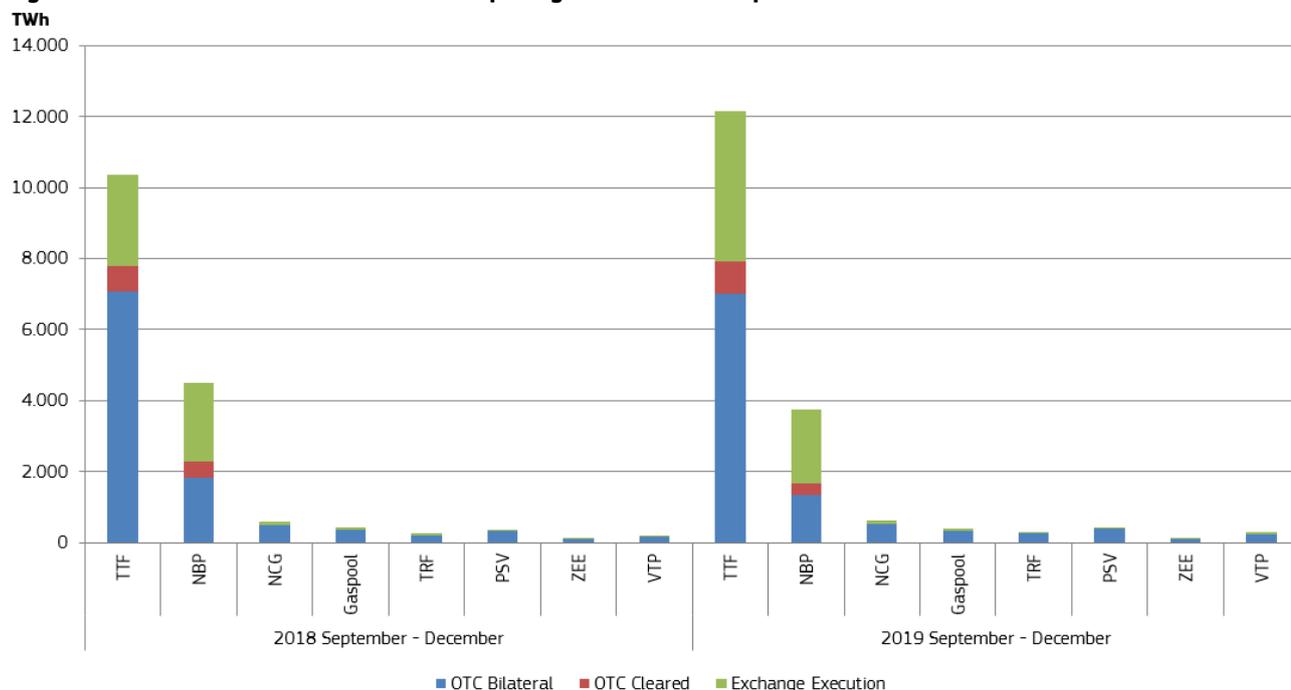
³² Due to non-availability of data for September 2019 in the previous report, now the period September-December 2019 is analysed and presented.

³³ Assuming that all trade was carried out on the quarterly average spot price

³⁴ Netherlands, UK, Germany, France, Italy, Belgium, Austria The ratio of the quarterly traded volume and gas consumption can show a big volatility across different quarters, as gas consumption has a high seasonality, whereas gas trade depends on market factors, which are albeit linked to consumption but have less seasonality. Comparing to the EU as a whole, traded volume in this period represents 9 times the total EU gas consumption in this period.

- Although the increase in LNG imports in Europe was still robust, the uptick starting in autumn 2018 had a lowering impact in year-on-year increase in LNG imports and send-outs to the grid, and this might have also impacted the slowdown of the increase in traded volumes on the EU gas hubs. After the end of the storage-filling season and amid increasing spot prices there were less incentives for trading on the hubs. Slowdown in traded volumes were principally owing to less activity in the forward contracts trade, as market anticipated further LNG influx in the first half of 2020, making less interest in purchasing gas via 2020 summer contracts, related to storage refilling activities. As curve contracts had already a measurable premium to spot contracts, this also gave incentives to market actors to conclude contracts on the spot market, which resulted in increasing spot and decreasing curve trade, especially in October and November 2019.
- On the UK NBP hub, 56% of the total traded volumes were executed directly on the exchange in the September-December 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 September-December 2018 the share of exchange executed contracts within the total trade was up by 10 percentage points. On the VTP hub in Austria this share was 19%, on the French TRF it amounted to 18%, and was 16% on the two German hubs together, whereas on the Italian PSV and on Zeebrugge in Belgium it was only 1-3%. On the two German hubs the share of exchange trade slightly went up, by 2 percentage points, while on the French TRF it decreased by 2 percentage points and was down on the Austrian VTP hub by one percentage point in comparison to September-December 2018.

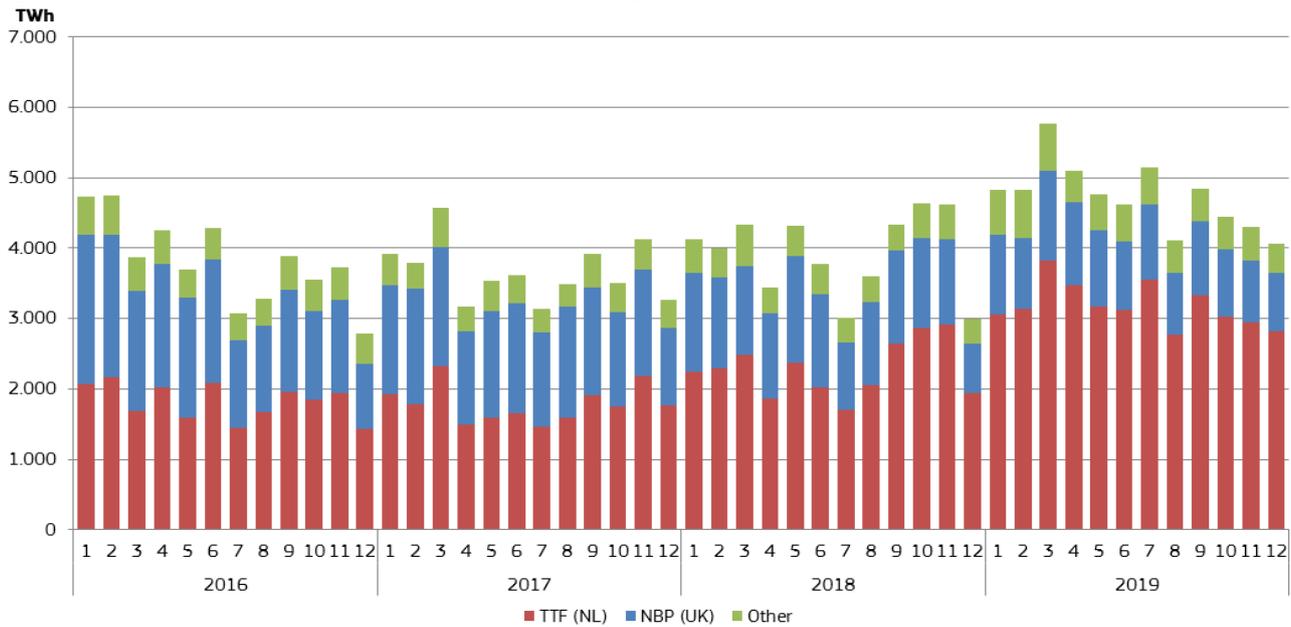
Figure 29 Traded volumes on the main European gas hubs in the September-December of 2018 and 2019



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

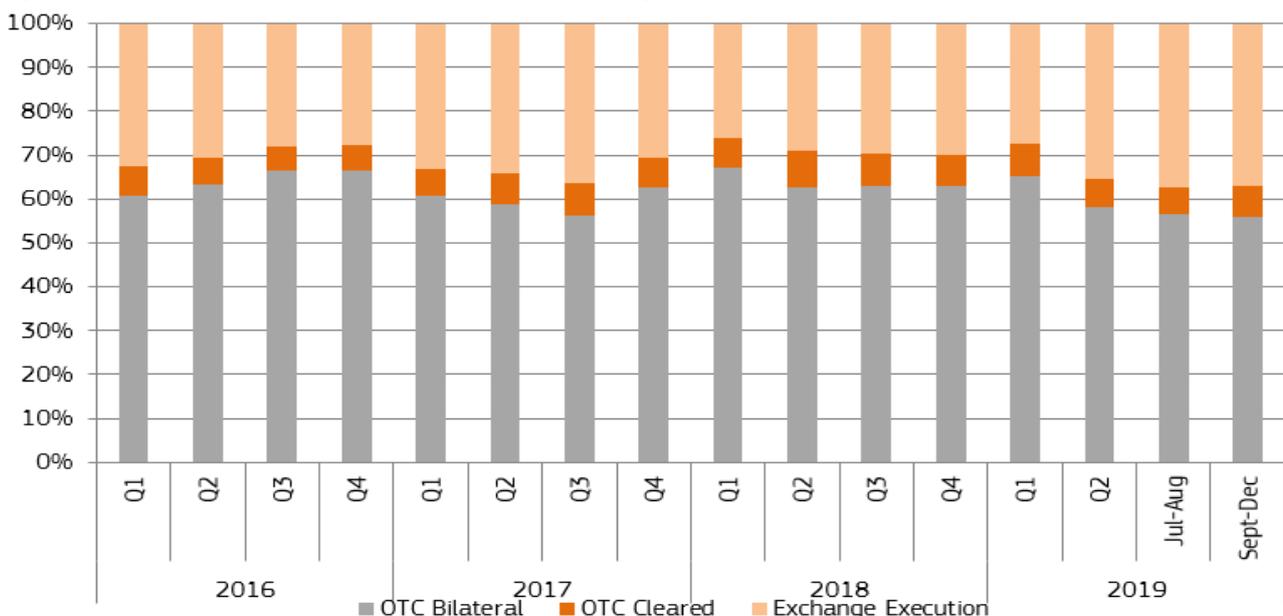
Figure 30 Monthly traded volumes on the main European gas hubs



"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 September–December 2019 56% of the total trade was OTC bilateral, 7% was OTC cleared, whereas the share of exchange-executed contracts was a 37%, which was close to the highest in the last five years. The share of exchange-executed contracts went up by 7 percentage points year-on-year in September–December 2019, whereas the share of OTC bilateral went down by 7 percentage points, and that of OTC cleared did not change significantly.
- Exchange executed volumes in September–December 2019 showed a significant increase (31%) in year-on-year comparison on the observed European markets. In the same period, the total OTC traded volume (bilateral and cleared together) went down by 4.4%, principally owing to the decrease in OTC bilateral contracts (-5.7%). In this period, liquidity was driven by exchange-executed contracts, whereas OTC volumes showed a slower increase.

Figure 31 Share of traded volumes on the main European gas hubs



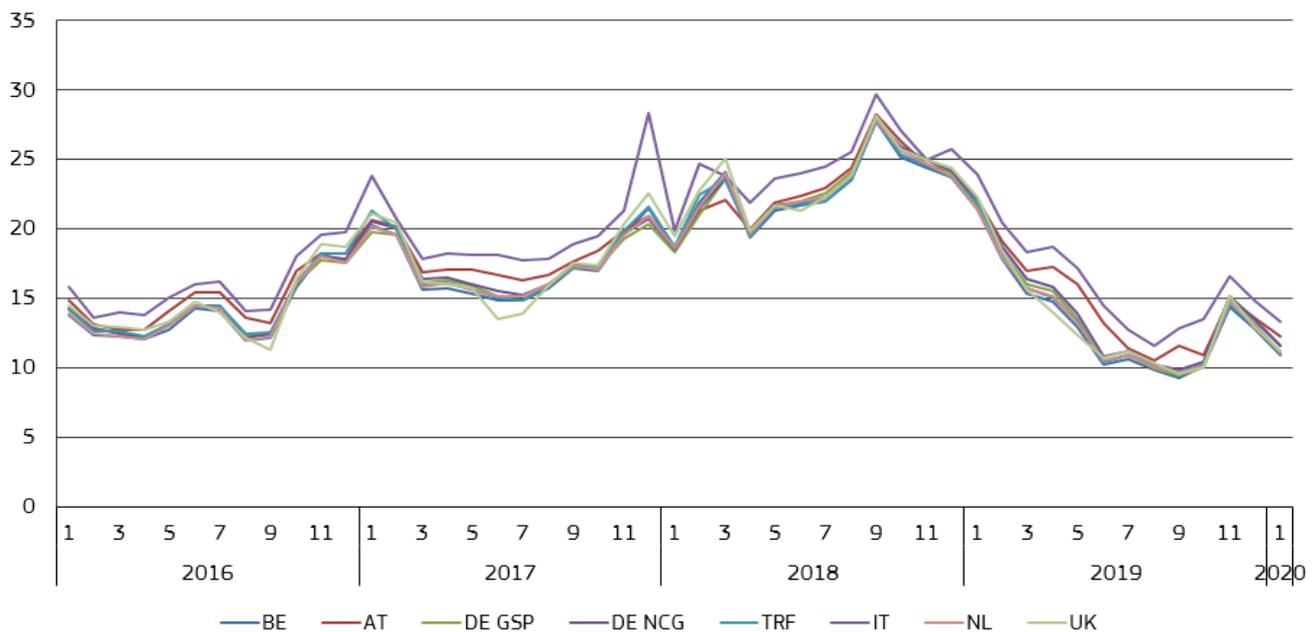
The chart covers the following trading hubs: UK: NBP (National Balancing Point); Netherlands: TTF (Title Transfer Facility); Germany: NCG (NetConnect Germany) and Gaspool; France: PEG (Point d'Echange Gaz); Italy: PSV (Punto di Scambio Virtuale); Belgium: Zeebrugge beach, Austria: Virtual Trading Point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

Source: Trayport Euro Commodities Market Dynamics Report

2.3.2. Wholesale price developments in the EU

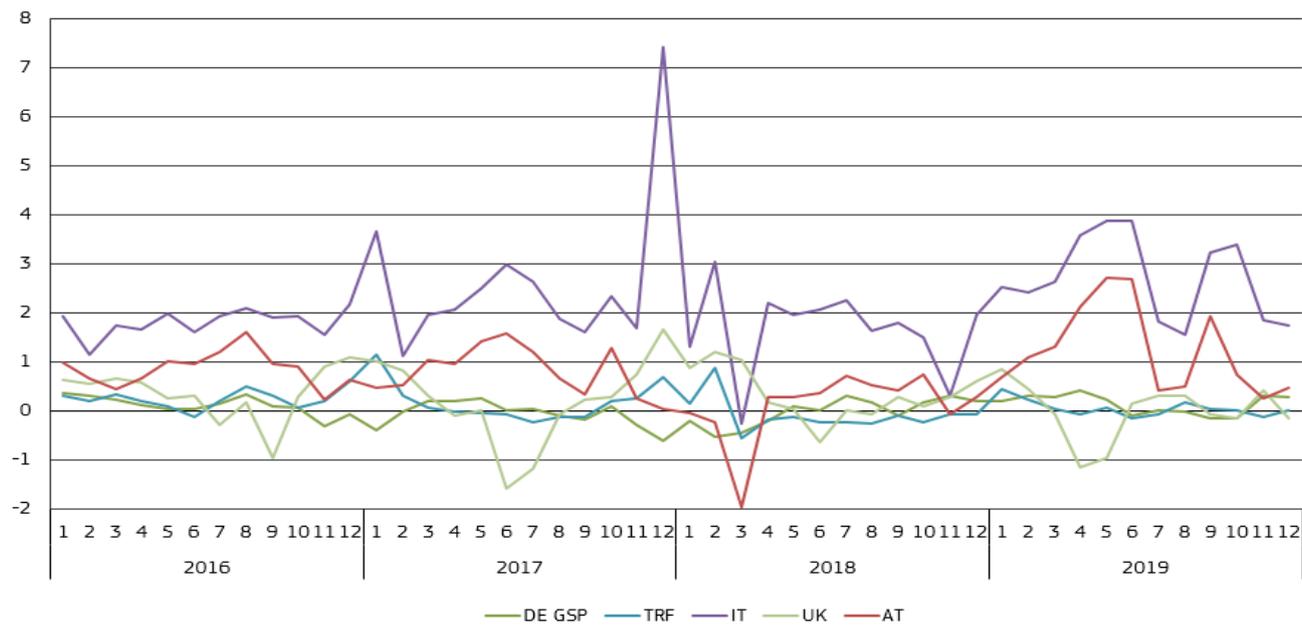
- European hub prices were averaging around 12.5-15 €/MWh in the fourth quarter of 2019, which was higher than the range in Q3 2019 (9.9-12.4 €/MWh), but significantly lower as the range in Q4 2018 (24.4-26 €/MWh). In fact, in the fourth quarter of 2019 hub prices in Europe were down by 40-50% in year-on-year comparison. The average TTF hub price fell by 49% in year-on-year comparison, but was up by 25% since its ten-year low in Q3 2019.
- Wholesale gas prices in the third quarter of 2019 were still heavily impacted by the abundant LNG inflows to the European markets, which were up by 42% in Q4 2019 in year-on-year comparison. However, in this quarter temporary factors, such as cold spells in November and uncertainty around the outcome of the negotiations on the future of Russian pipeline gas supply to Europe resulted in an increase in gas hub prices across Europe. However, at the end of the year mild weather, slowing (or even decreasing) demand for gas in electricity generation and high filling rates of gas storages all acted as demand reducing factors that kept a lid on wholesale gas prices across Europe.

Figure 32 Wholesale day-ahead gas prices on gas hubs in the EU Euro/MWh



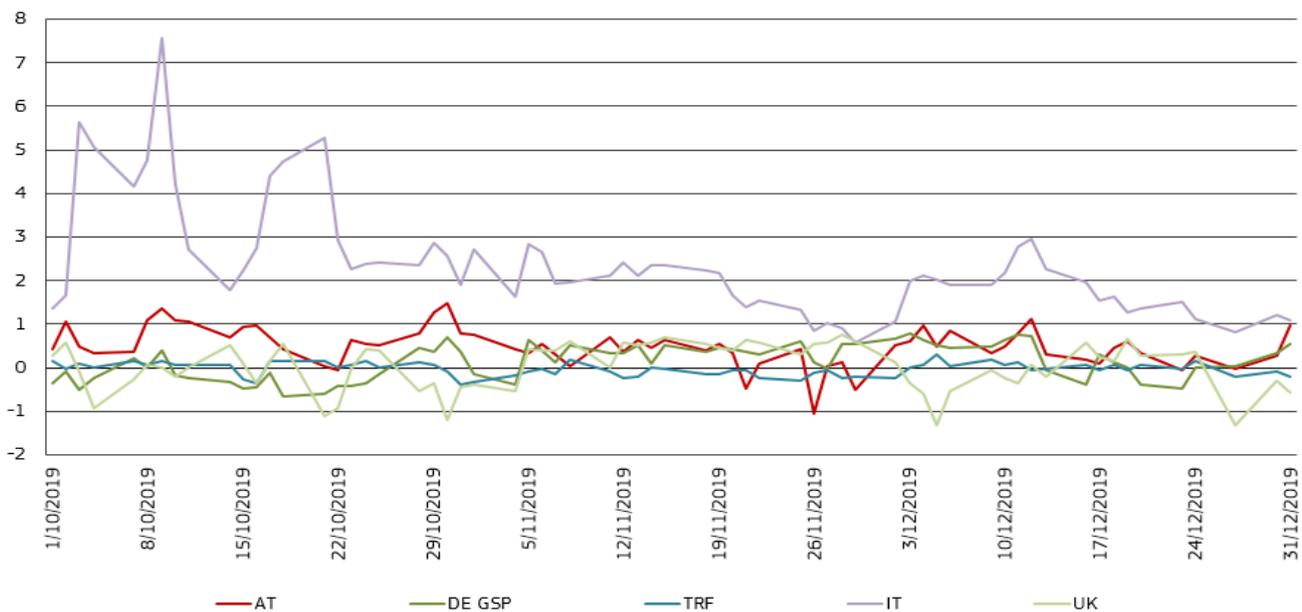
- In October and December 2019, the UK spot price showed a minor discount to the Dutch TTF hub (0.2 €/MWh), while in November it showed a premium (0.4 €/MWh). As the chart on daily average price premium (Figure 34) shows, UK was in several times discount to the TTF in Q4 2019, mainly in the periods of significant LNG influx to the British market. German benchmarks had a premium of (0.1-0.3 €/MWh) in Q4 2019 on average. The Austrian premium at the end of Q3 2019, linked to maintenance on the HAG pipeline, shrunk and was 0.3-0.7€/MWh in the months of the fourth quarter of 2019.
- The price premium of the Italian hub to the TTF fell was high in the first half of October, as due to maintenance works on the TAG pipeline between Austria and Italy (between 4 October and 14 October available capacities were reduced) gas imports in Italy decreased. During the first two-three weeks of this month Italy had a premium of 3.9 €/MWh to the TTF hub. In November and December however the premium fell to 1.7-1.8 €/MWh, owing to the abundant LNG influx to the market.
- The French TRF market was in several times (in November on average 0.2€/MWh) at discount to the TTF during Q4 2019, as French LNG regasification terminals received huge amounts of LNG shipments and in November and December high wind generation reduced the need for gas in power generation. LNG influx also resulted in very low prices and discounts in Spain to TTF, again driven by LNG and lower gas demand in the electricity sector, owing to abundant renewable availability.

Figure 33 Premium of monthly average wholesale day-ahead gas prices at selected hubs compared to TTF
Euro/MWh



Source: S&P Global Platts

Figure 34 Premium of daily average wholesale day-ahead gas prices at selected hubs compared to TTF
Euro/MWh

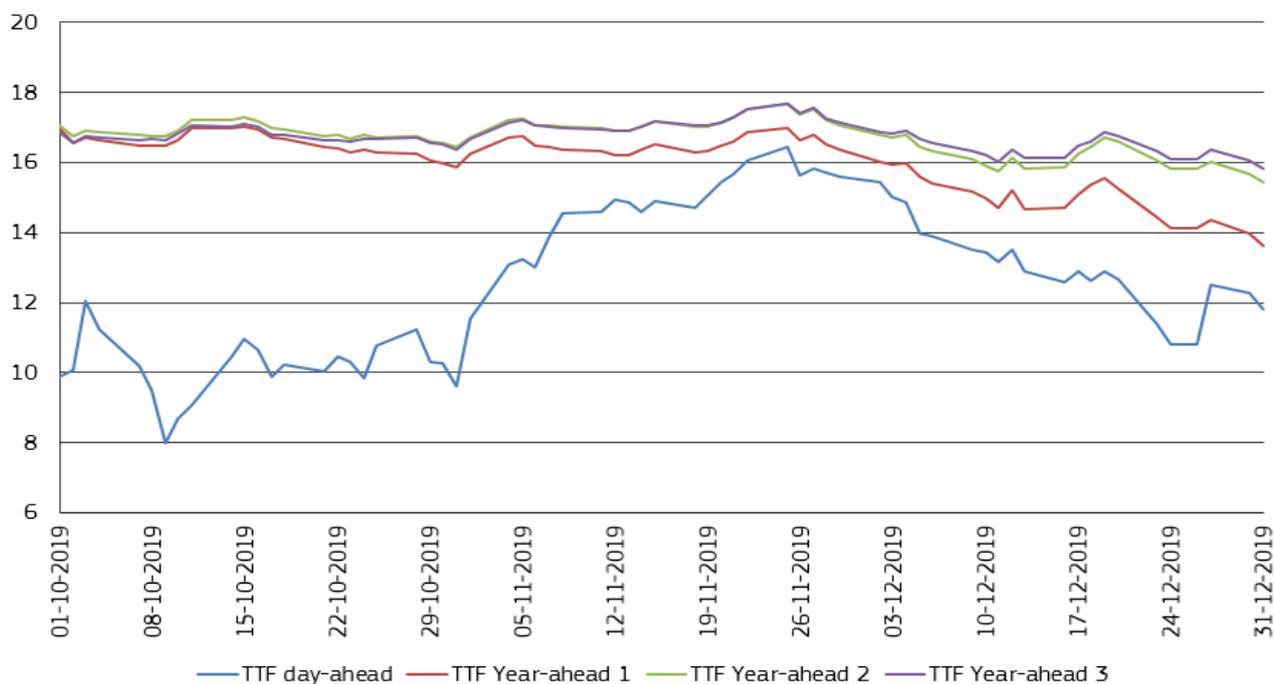


Source: S&P Global Platts

- Figure 35 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.
- Daily spot prices on the TTF hub hovered around 10 €/MWh in October 2019, however, due to sporadic cold spells in November, leading to anticipation of cold weather, and uncertainties around the future of gas supply from Russia - see more on page 27) the spot price showed a sharp turnup, rising to 16 €/MWh. In December 2019 however, spot price fell back. These short term developments could be less perceived in the curve contracts, however, as from December 2019 the year-ahead contract decoupled from the two-year ahead and three-year ahead peers and started to more closely follow the spot contract. This might be related to the successful outcome of the negotiations on the agreement on the future contract of the Russian gas supply to Europe for the forthcoming years, and the anticipation of significant LNG imports in 2020, as new US liquefaction capacities are expected to come

online in the forthcoming months. By the end of December 2019 the spot contract was below 12 €/MWh, the year-ahead contract stood just below 14 €/MWh, while two and three-year ahead prices were around 16 €/MWh.

Figure 35 Forward gas prices on the Dutch gas hub
Euro/MWh

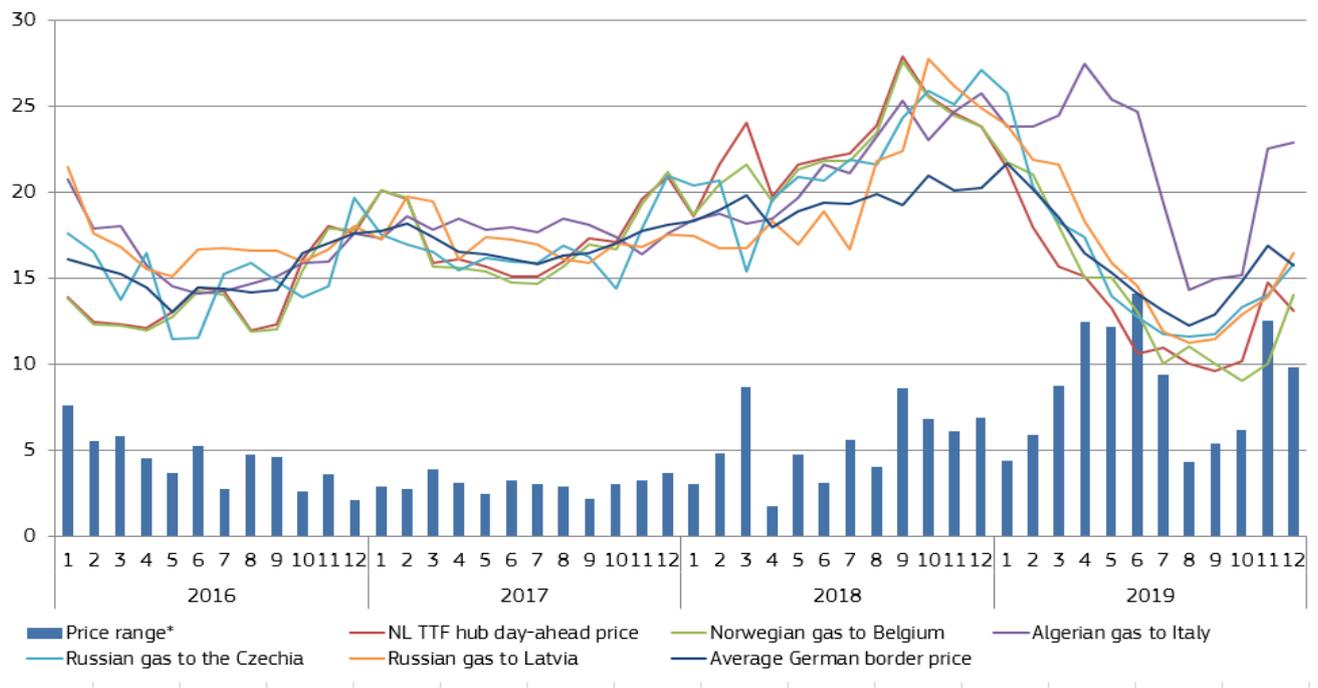


Source: S&P Global Platts

2.3.3. Prices of different contracts for gas in the EU

- Figure 36 compares a selection of estimated border prices of gas deliveries from the main exporters to the EU: Russia, Norway, and Algeria. For comparison, the evolution of the day-ahead prices on the Dutch TTF hub is also presented on the chart.
- Prices of European gas contracts showed signs of divergence in Q4 2019, as the difference between the cheapest and most expensive contract increased again, from 5.3 €/MWh measured in September to 9.8 €/MWh in December 2019. Looking at the price differential without the most expensive Algerian gas import price to Italy, this would be less, only 3.3 €/MWh in December, showing practically no change compared to September 2019.
- Hub based contracts, such as the Norwegian import, or hub prices themselves, edged up in the fourth quarter of 2019 after ten-year lows in Q3 2019. Reported German border prices also rebounded, similarly to most of the hub-based and oil-indexed contracts, and they remained the second most expensive contract, probably owing the existence of oil-indexation in some import sources to Germany.
- In the fourth quarter of 2019, according to data from Eurostat, gas prices of Algerian import of origin in Italy underwent a significant recovery and prices by the end of the quarter were close to the June 2019 prices, and Algerian import prices in Italy re-converged with Algerian import prices in Spain. Russian gas imports prices in Latvia and the Czechia followed practically the same path as the other increasing 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 36 Comparison of EU wholesale gas price estimations
Euro/MWh

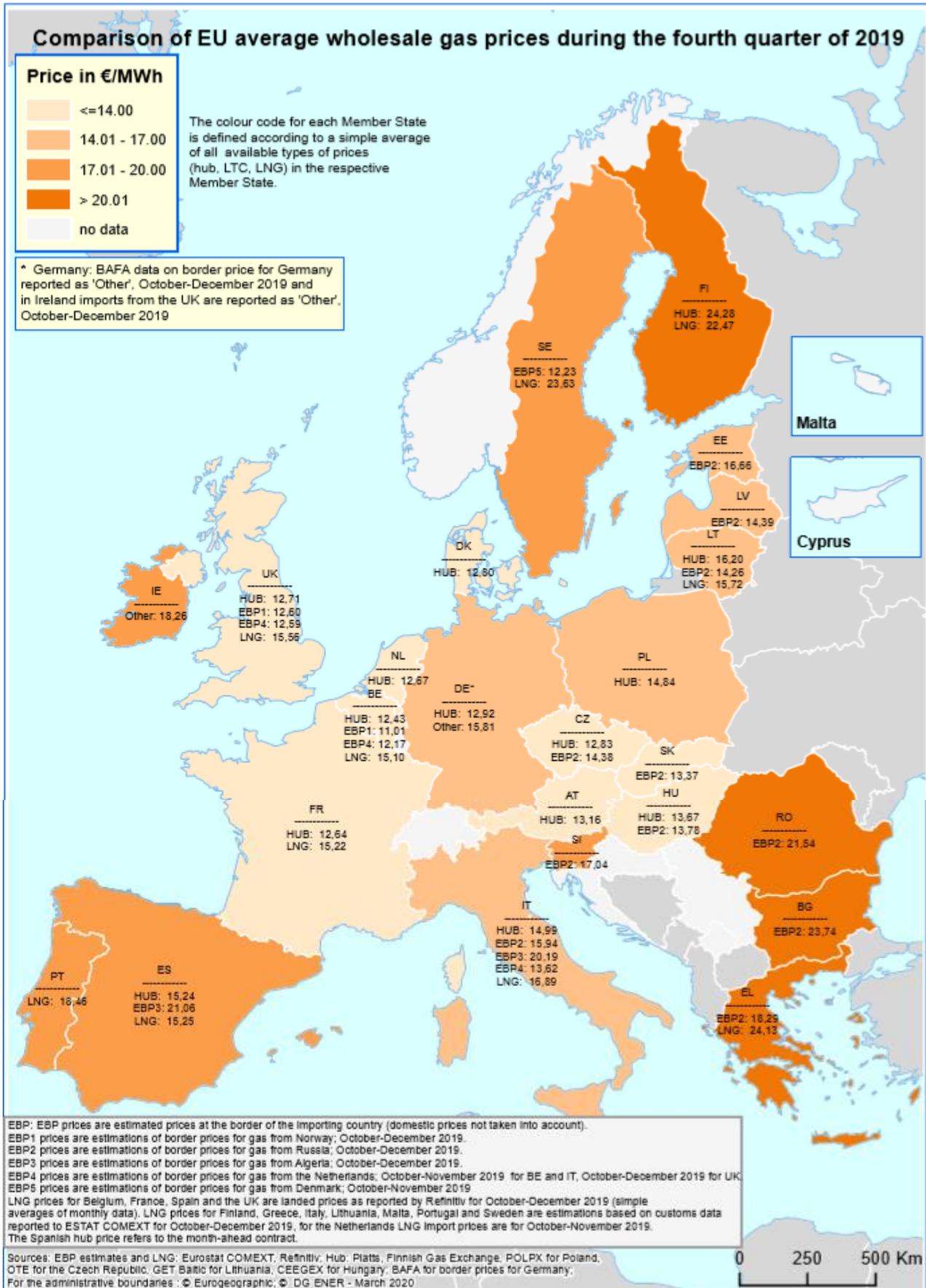


Source: Eurostat COMEXT and European Commission estimations, BAFA, S&P Global Platts

*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 fourth quarter of 2019

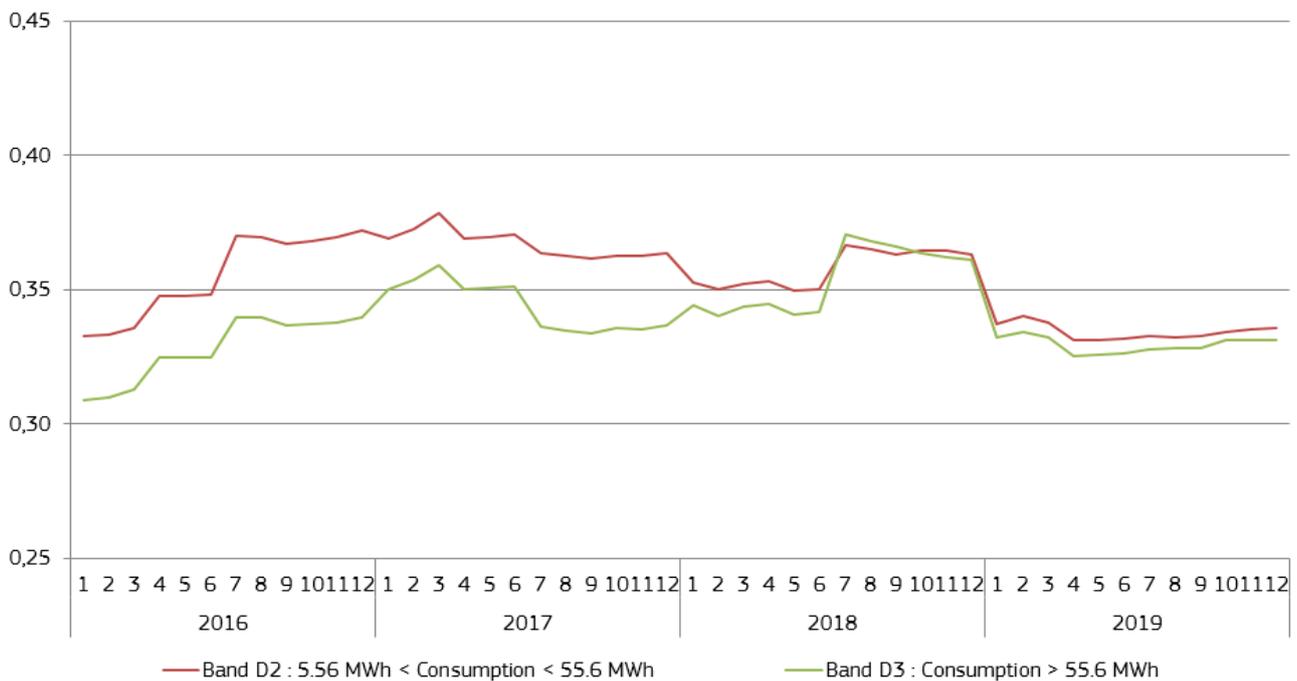


Note: Border prices are estimations of prices of piped gas imports paid at the border of the importing country, based on information collected by customs agencies, and are deemed to be representative of long-term gas contracts.

3. Retail gas markets in the EU and outside Europe

- Figure 37 and Figure 39 show the degree of convergence (or divergence) of retail gas prices for household and industrial customers, using as metric the relative standard deviation of the prices in individual Member States. Monthly retail prices are estimated by using half-yearly prices from Eurostat (with the latest available figures relating to the 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) started to decrease at the beginning of 2019, after two years of continuous increase. In the most typical consumption band, D2, in the fourth quarter of 2019 the estimated average price (including all taxes) was 6.10 Eurocents/kWh, down by 10.4% compared to 6.81 Eurocents/kWh in Q4 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 37. 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.
- In the fourth quarter of 2019 there were still significant differences in retail gas prices across the EU. The lowest estimated household prices in consumption band D2 could be observed in Romania (3.3 Eurocent/kWh), Hungary (3.5 Eurocent/kWh) and Croatia (4.0 Eurocent/kWh), whereas the highest prices could be measured in Sweden (11.8 Eurocent/kWh) in the Netherlands (8.8 Eurocent/kWh) and Denmark (8.0 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 2017 it stabilised around 3.4-3.6.

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



Note: all taxes included.

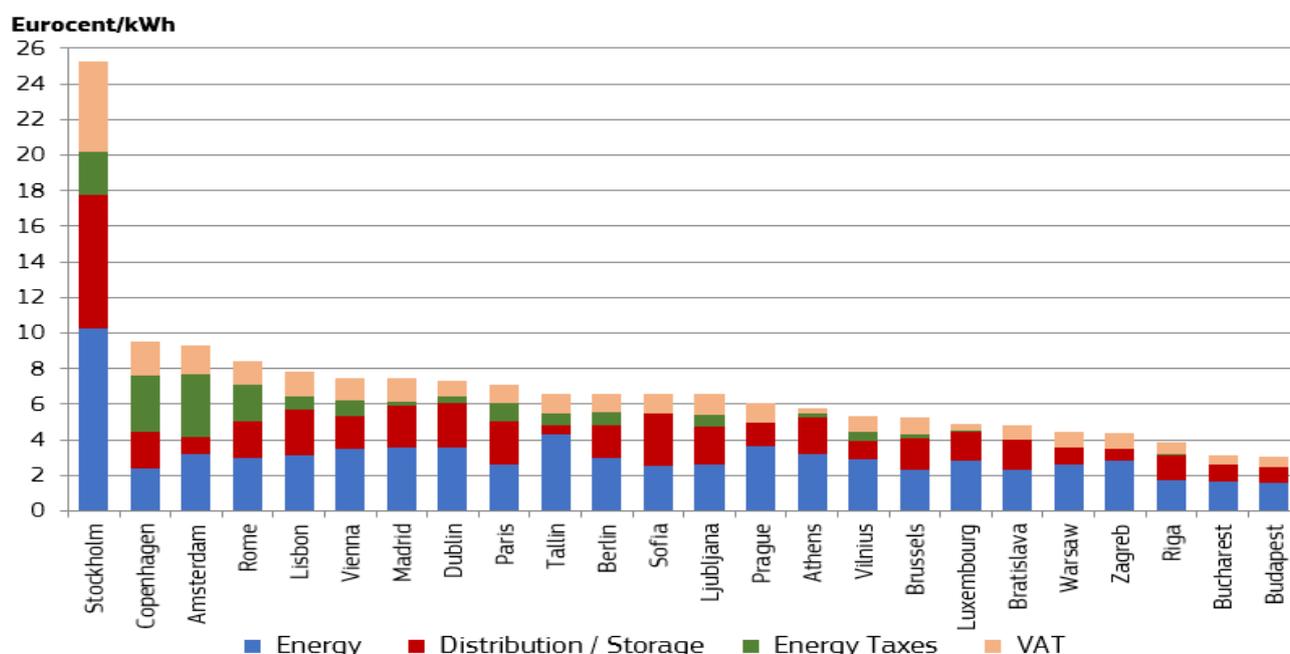
Source: European Commission estimates based on Eurostat data on consumer prices adjusted by the HICP

- Figure 38 shows the level and the breakdown of residential end-user gas prices paid by typical households in European capitals in December 2019. On average, 46% of the price covered the energy component, while the rest covered distribution/storage costs (28%), energy taxes (10%) and VAT (16%).³⁵

³⁵ Note that these are arithmetic averages. No data are available for Helsinki (Finland), Nicosia (Cyprus), and Valetta (Malta).

- There were significant differences across Member States; with the share of energy costs ranging from 25% (Copenhagen) and Amsterdam (34%) to Tallinn (65%), the share of distribution/storage costs ranging from 8% (Tallinn) and Amsterdam (11%) to 45% (Sofia) and Bratislava (36%), and the share of taxes ranging from 2% (Riga) and 3% (Madrid, Athens) to 38% (Amsterdam) and 33% (Copenhagen). For 7 of the 25 capitals covered, the price does not include an energy tax component. VAT content in the total gas price also varied a lot across the EU – from 6% in Athens to 21% in Budapest.
- There were also considerable differences across Member States in the relative share of network costs and taxes. Figure 38 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 December 2019. However the ratio of highest and lowest network components across the EU was 13 (between Tallinn and Stockholm), and highest-lowest tax component ratio (taking energy taxes and VAT together) was 16 (Luxembourg and Stockholm) in December 2019.
- In more than the half (13 out of the 25) of the capitals prices were lower in December 2019 compared to the same month of the previous year. The biggest decrease occurred in Brussels (18%), Riga (15%), Paris (11%), and Vienna and Copenhagen (10%), driven mainly by the decrease in energy costs and network costs (and in the case of Riga, taxes as well). On the other hand, the biggest increase could be observed in Amsterdam (21%) and Vilnius (14%), driven by the growth of the energy taxes component and to a lesser extent, energy costs. It seems that price falls on wholesale gas markets in 2019 in Europe started to filter in the final retail household prices in more and more capital cities. In December 2019 Budapest remained the cheapest capital in the EU in terms of gas prices for household consumers, followed by Bucharest and Riga, while Stockholm, Copenhagen and Amsterdam were the three most expensive capital cities.

Figure 38 Breakdown of gas price paid by typical household customers in European capitals, December 2019

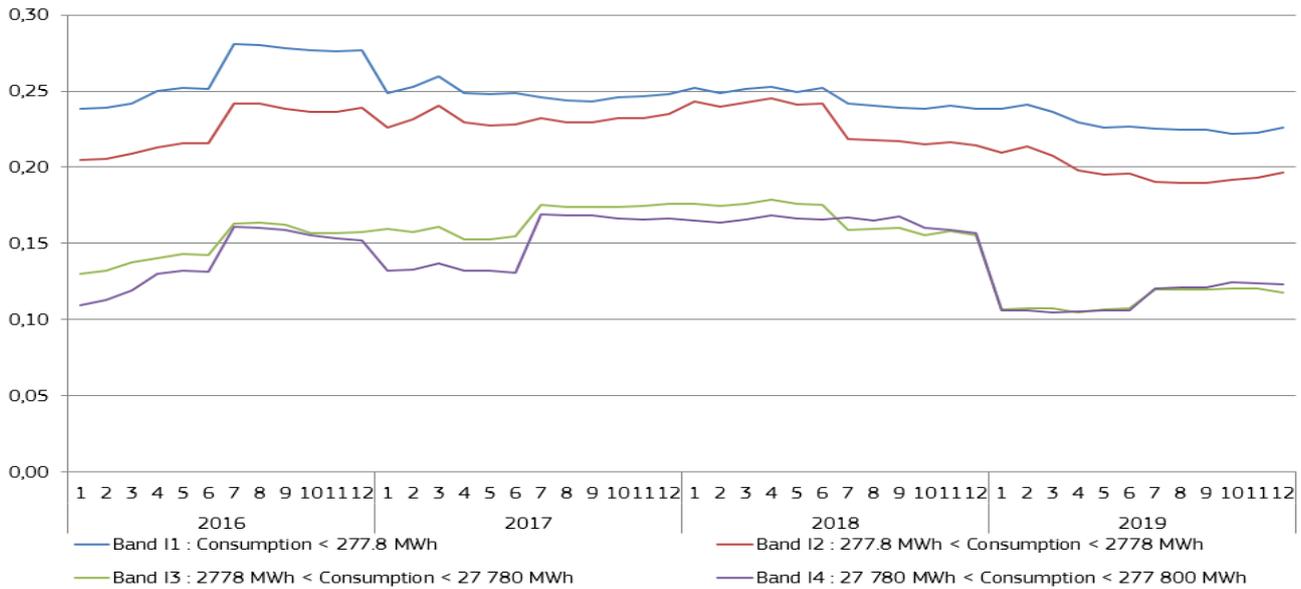


Source: VaasaETT

- After being stable in the first half of 2019, retail gas prices for industrial customers continued to gradually decrease in Q4 2019 in the EU on average. The average estimated price (VAT and other recoverable taxes excluded) in consumption band I4 was 2.55 Eurocent/kWh in the fourth quarter of 2019, slightly down from 2.62 in Q4 2018. (See the estimated industrial prices on Map 3.) Prices increases and decreases varied across the Member States in Q4 2019 in year-on-year comparison, however, it seems that at EU level recent price decreases on the wholesale gas markets only partially appeared in retail prices for industrial customers, having average consumption. However, decreases already could be observed for household customers (10% for households with middle level annual consumption) and for industrials having larger annual gas consumption (for example Band I5: 10.6%, band I6: 13.5% decrease).
- Figure 39 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 half of 2019 (though came to a halt afterwards), implying better price convergence across the EU. In the remaining two bands (I3, I4) price convergence did not change significantly in 2019.
- In the fourth quarter of 2019 Belgium had the lowest estimated industrial price in consumption band I4 (1.8 Eurocent/kWh) followed by Luxembourg (2 Eurocent/kWh), while the highest prices could be observed in Sweden (3.4 Eurocent/kWh) and Estonia

(3.2 Eurocent/kWh). In Q4 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 39 Relative standard deviation of gas prices paid by industrial customers in EU Member States



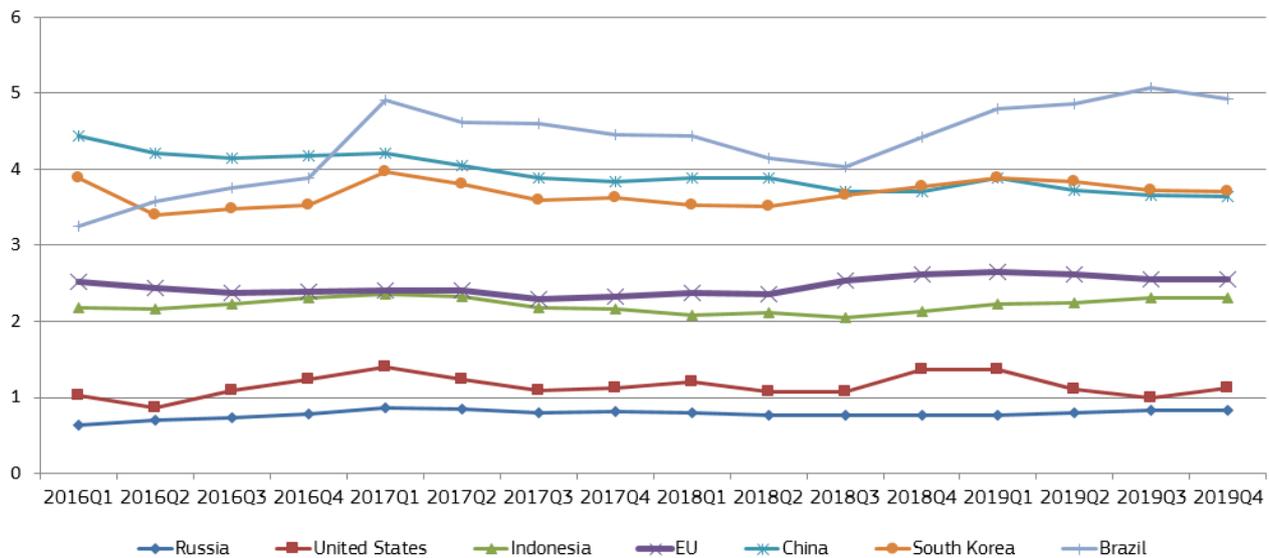
Note: Excluding VAT and other recoverable taxes.

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 fourth quarter of 2019 retail gas prices for industrial customers were almost twice as high in Brazil, whereas China and Korea had a premium of 45% to the EU average. On the other hand, retail gas prices in the United States were less than half of the EU and in Russia gas prices were the third of the EU average. Indonesia also had a small discount (10%) to EU retail gas prices. Compared to Q4 2018, the biggest increase could be observed in Brazil (11%), while industrial retail gas prices fell the most in the US (17%), in parallel with decreasing prices on Henry hub.

Figure 40 The EU average industrial retail gas price in comparison with the prices of some important trade partners of the EU

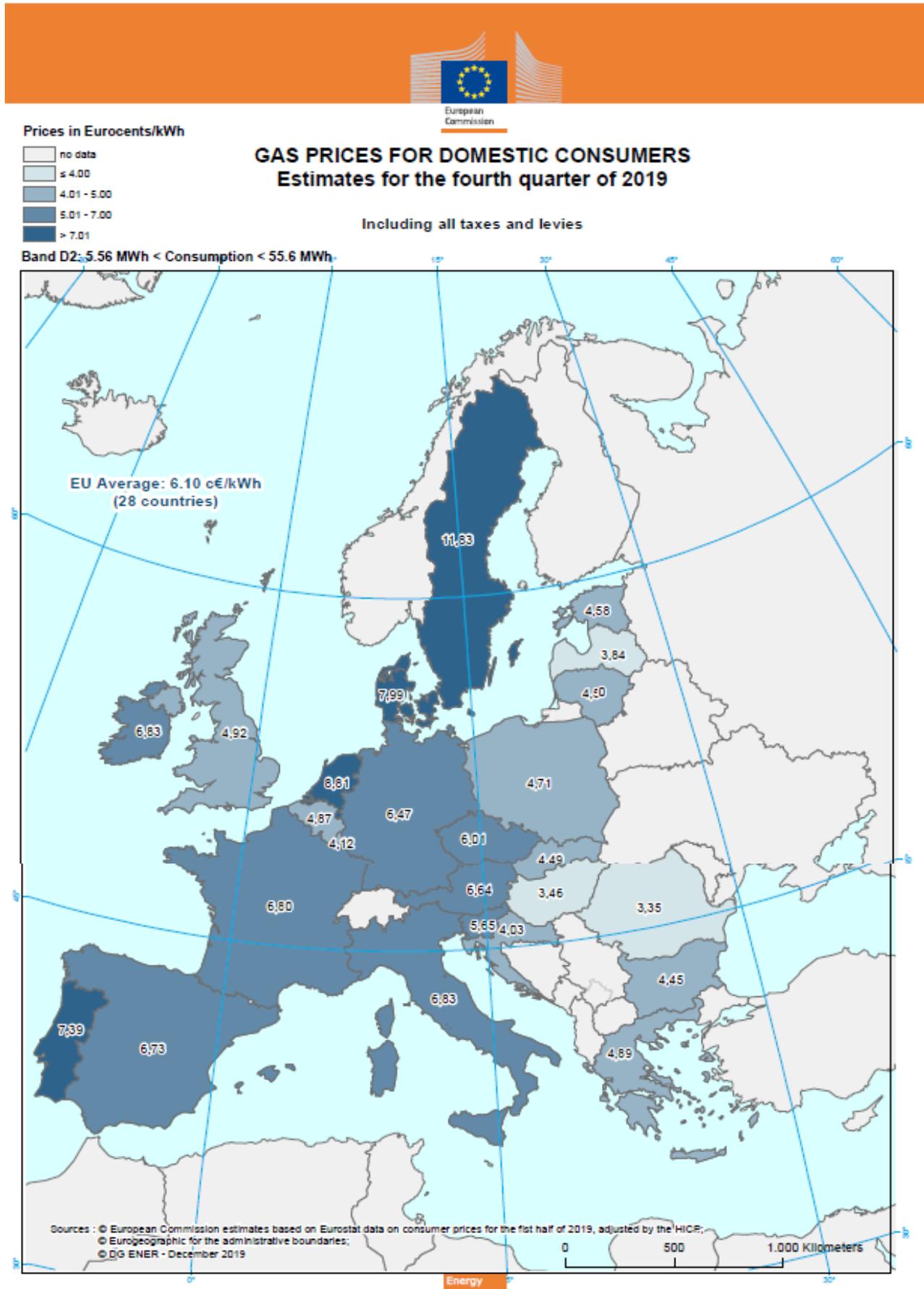
EurCent /kWh



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

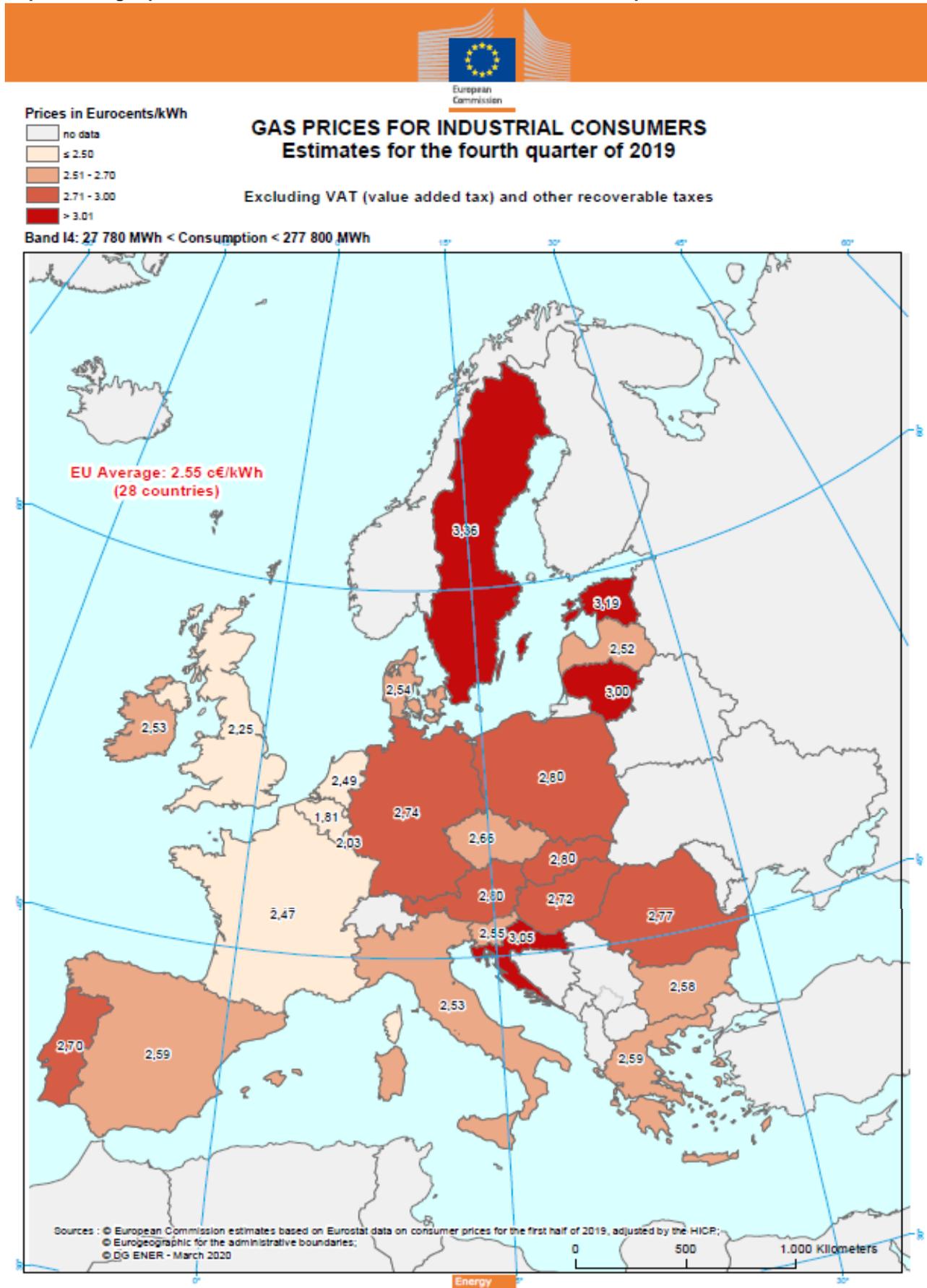
- Maps 2 and 3 on the next two pages show the estimated retail gas prices paid by households and industrial customers in the fourth quarter of 2019.

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



Source: Eurostat

Map 3. Retail gas price estimates for industrial consumers in the EU – Fourth 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.

