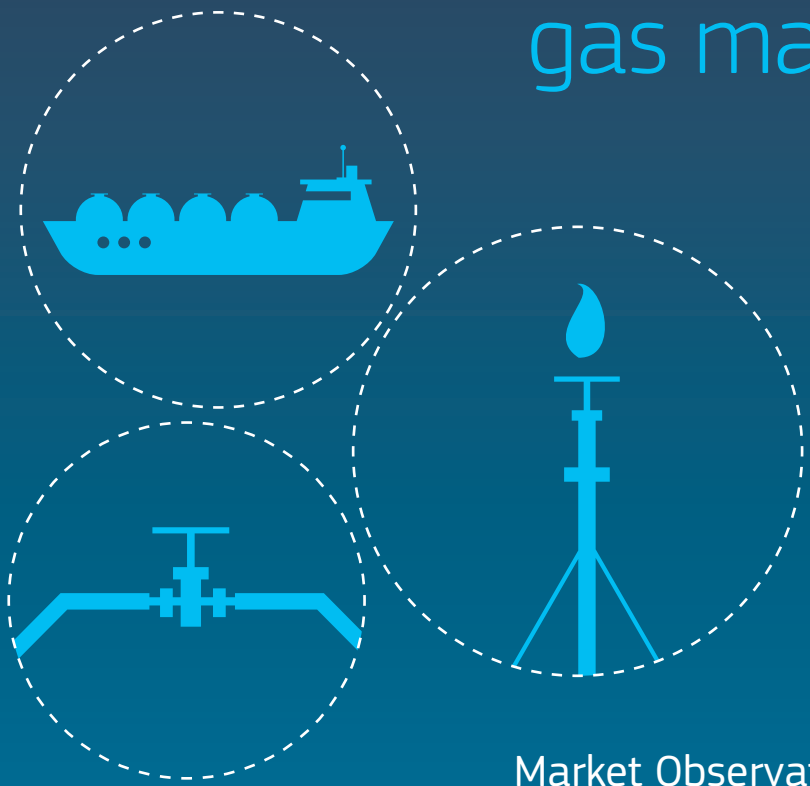
European Commission

Quarterly report

On European gas markets



Market Observatory for Energy
DG Energy

Volume 15
(issue 2, covering second quarter of 2022)

Energy

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CONTENT

HIGHLIGHTS OF THE REPORT

- **At the beginning of the second quarter of 2022, the daily TTF spot, having reached a peak prior in March, fell back to lower levels, and was relatively stable in April and May, below 100 €/MWh during most of the time. In June however, it started to rise again, and by the end of June it reached 145 €/MWh on daily average. In July and August, in parallel with increasing security of supply concerns on gas flows from the East, the upward trend continued. By the end of July the daily average spot reached 200 €/MWh and it rose to all-time high on 26 August, reaching 316 €/MWh. Russia has started to curb or terminate supplies to an increasing number of Member States, and as from the beginning of summer supplies on Nord Stream 1 were gradually reduced, falling to zero by early autumn.**

- **The broader energy complex** has also proved to be volatile in Q2 2022 and in the summer months beyond. Oil prices retreated from fourteen-year highs measured in early March, owing to the coordinated strategic stock release in most of the IEA countries. In May, in parallel with increasing demand and negotiations on the sixth sanction package between EU Member States, aiming at substantially decreasing Russian oil and oil product imports, crude oil prices rose again, and by mid-June reached levels close to the March highs. However, owing to increasing fears on global economic downturn prices started to decrease again and by early autumn fell to the levels of the beginning of 2022. In contrast, coal prices rose in Q2 2022, up from 250 €/Mt to 370 €/Mt, and varied in a high range in July and August. High coal prices and limited availability of coal-fired assets have put a lid on switching from gas to coal in electricity generation.

- **Russian gas supplier Gazprom made a series of announcements for a dozen of Member States to reduce or completely terminate gas supplies** in the second quarter of 2022, principally referring to non-compliance with the Russian presidential decree on payments in roubles, or to other technical reasons. By the end of June, announcements have been made in a total annual volume of 25 bcm for the countries concerned. As of June, referring to technical problems (non-repatriation of some spare parts of compressors under reparation abroad, needed for operating pipelines) Gazprom started to gradually reduce gas supply on Nord Stream 1, falling to zero by September. As result, wholesale gas prices underwent a tremendous increase during the summer, at the height of storage refilling season. Meanwhile, the EU has also adopted its 'RePowerEU' Plan, outlining measures to phase out fossil fuel imports from Russia, to increase security of energy supply and to support green transition, and proposed further measures on reducing demand for gas, electricity and reforms on market design during summer and early autumn of 2022.

- **EU net gas imports rose by 3% year-on-year** (by 2.7 bcm) in Q2 2022. Russian pipeline supplies saw a steep fall, by 45% year-on-year, ensuring less than 23% of the total extra-EU gas imports. For the first time, pipeline imports from Norway, up by 16% year-on-year, ensured more than pipeline imports from Russia. Around 34% of the total extra-EU gas imports arrived in the form of LNG, becoming the most important import supply source. Pipeline imports from both Algeria and Libya fell (respectively by 15% and 8%). Net gas imports in the EU amounted to 94 bcm in Q2 2022, while in the first half of 2022 they reached 182 bcm. The EU spent an estimated €75 billion on gas imports in Q2 2022 (of which €23 billion on Russian gas imports), up from €20 billion in Q2 2021, principally owing to higher import prices.

- **Russian gas imports fell measurably through all transit routes in the second quarter of 2022.** Flows through the Belarus transit route fell by a staggering 90% year-on-year; as of May flows fell practically to zero**.** Flows via the Ukrainian route fell by 51% in Q2 2022. In April and May, flows on Nord Stream 1 did not show big changes year-on-year, however, in June a steep fall followed and flows were down by 12% in Q2 2022 as whole. In August, the monthly flow through Nord Stream 1 fell below 1.0 bcm, as compared to 5.0 bcm in April and May 2022. Flows through the Turk Stream also fell back, by 14% year-on-year, however, in July and August they picked up again. In January-August 2022, Russian pipeline gas imports in the EU fell by 43 bcm, and total gas imports from Russia, including LNG, was down by 39 bcm. At the same time, non-Russian LNG imports were up by 28 bcm and pipeline imports other than from Russia rose by 17 bcm.

- EU **LNG imports were up by 49% in Q2 2022 year-on-year**, amounting to 36 bcm. In most of 2022 so far, gas hub prices in Europe developed a premium compared to the Asian markets, giving strong incentives to send LNG cargoes to Europe. Abundance of LNG in south-western and north-western Europe resulted in deepening discounts in LNG import prices to the TTF and other continental benchmarks in Q2 2022, and in July and August. In Q2 2022, Spain was the biggest LNG importer in the EU, importing 8.5 bcm, ahead of France (8.3 bcm) and the Belgium (5.0 bcm). The United States were by large margins the principal LNG supplier of the EU, ensuring 16 bcm (45% of the total EU LNG imports), followed by Russia (6.5 bcm) and Qatar (4.6 bcm). In January-August the EU imported 39 bcm of LNG from the US, compared to 22 bcm in 2021 as whole. The EU as block of 27 countries remained the biggest LNG importer in Q2 2022 in the world, ahead of Japan and China.

- **Gas storage injections were faster in Q2 2022** than in same period of 2021, as on 30 June 2022 the average EU storage filling rate was 58%, up by 32 percentage points during Q2 2022, whereas in the second quarter of 2021 the EU average storage filling rate rose only by 17 percentage points. However, on 30 June 2022 the average EU storage filling rate was still by 5 percentage points below the five-year average of 2016-2020. By the end of August 2022, the EU average filling rate reached 80% (policy objective set originally for 1 November), which was only 3 percentage point lower than the five year average. Abundant LNG and other pipeline inflows, milder weather than at the beginning of the last filling season, decreasing demand owing to high gas prices, resulting in demand destruction in energy intensive industries, all contributed to faster injections in Q2 2022 than a year before. Formerly Gazprom operated gas storages were in most cases overtaken by national governments, resulting in a decreasing gap of filling rates of these installations vis-à-vis other facilities. Winter-summer gas contract spreads for the next gas year remained negative at the TTF hub in Q2 2022, however, as of April-May quarter-ahead and two quarters-ahead contracts developed a premium over spot TTF prices, giving market incentives to refill storages.

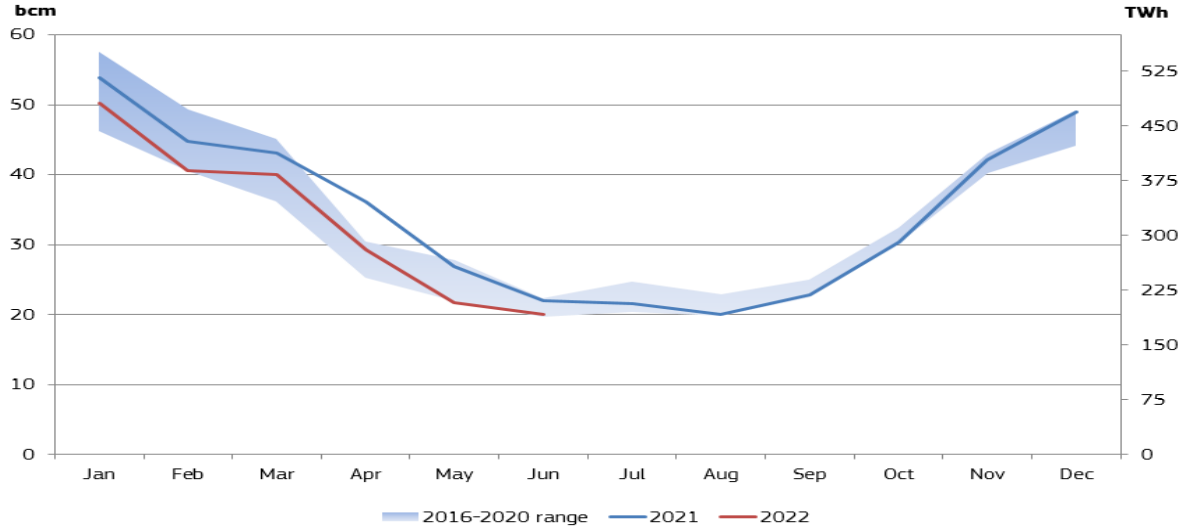
- **EU gas consumption in Q2 2022 fell steeply by 16%** (-13.9 bcm) year-on-year, amounting to 71 bcm. Gas demand in electricity generation also fell, by 7% (-8.1 TWh) compared to Q2 2021. On the other hand, increasing gas prices have led to demand destruction in energy intensive industries. In April and May 2022, weather was milder than in 2021, leading to less gas demand at the end of the heating season in the residential sector. Indigenous **gas production in the EU amounted to 12.3 bcm in Q1 2022, down by 3%** (0.4 bcm) compared to Q2 2021. In the first half of 2022, gas production in the EU amounted to 25.1 bcm. In September 2022, the Dutch government set a cap on Groningen gas production limit of 2.8 bcm for gas year starting on 1 October 2022, down from 4.5 bcm valid in the previous gas year.
- **Gas traded volumes on the European hubs underwent a measurable fall of 17% (2 704 TWh)** in Q2 2022 year-on-year. Over-the-counter (OTC) trade of gas contracts fell practically to the half of the volume of Q2 2021, whereas exchange executed trade rose by 38%. Since the peak of traded volumes measured in Q1 2020, the OTC market trade fell by 63%. The share of exchange-executed contracts within the total trade was 62%. Smaller traders, having lower financial coverage against default risk, were moving from OTC to exchange markets amid high and volatile wholesale gas prices.
- **Spot prices on the European gas hubs remained high and volatile in Q2 2022** and beyond in July and August, starting to sharply rise in June and reaching all-time highs by the end of August 2022. The discount of year-ahead contracts to the spot market, contrarily to the previous quarter, shrunk measurably, signalling the catch-up of year-head contracts, and expectations on the market on high wholesale prices in the near future. In the case of two and three year-ahead contracts, we could see bigger discounts, implying that spot prices might decrease on mid-term.
- **Retail gas prices for household customers in EU capital cities more than doubled, showing an estimated increase of 110% in August 2022 year-on-year.** Gas prices for households tripled year-on-year in five European capital cities and in six capital cities prices more than doubled. Most of the recent price increases on wholesale gas markets might already have been priced in the retail contracts. Retail gas prices for industrial customers also showed significant increases, up by an estimated 126% year-on-year in Q2 2022, for consumers with median annual consumption. Industrial retail gas prices in the EU were higher, compared to many of the global competitors, implying cost disadvantages for energy intensive industries.
- **Hydrogen costs-based assessments** showed that in the Netherlands **production costs of hydrogen** (capital expenditure costs included) with alkaline electrolyser technology amounted to 376 €/MWh in June 2022, whereas with polymer electrolyte fuel cells (PEM) the cost was assessed at 450 €/MWh, and with steam methane forming (SMR) at around 209 €/MWh in the same month. Price assessments followed the volatile gas and electricity market dynamics, reaching two-to-three times higher levels vis-à-vis wholesale gas and electricity prices.

1. Gas market fundamentals

1.1 Consumption

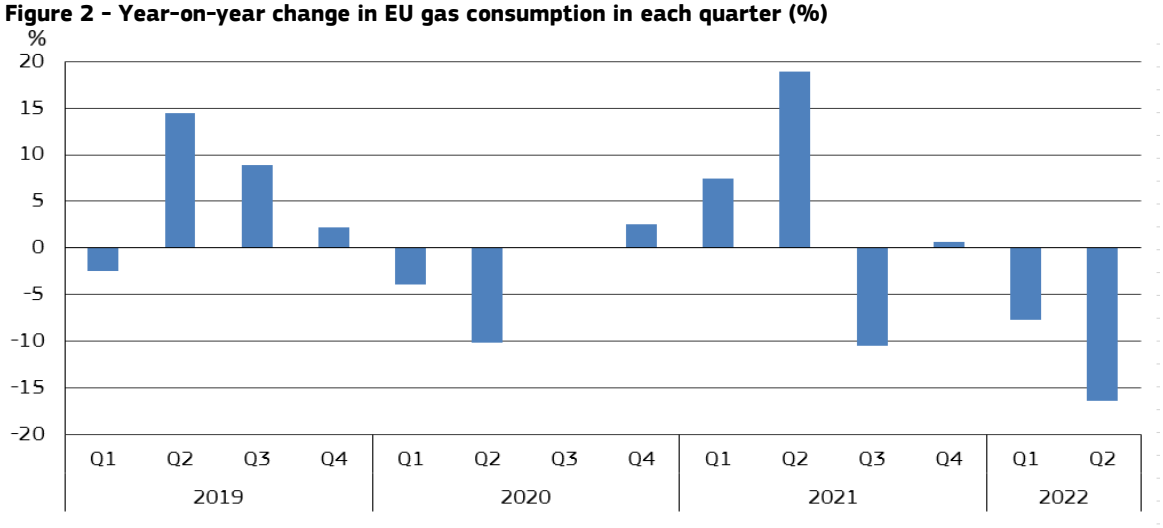
- EU gas consumption[1] in the second quarter of 2022 measurably fell, by 16.3% (-13.9 bcm) in year-on-year comparison, after decreasing by 8% in Q1 2022 and practically stagnating in Q4 2021 (+0.6%). In absolute numbers, the quarterly gas consumption in Q2 2022 amounted to an estimated 71 bcm, down from 84.9 bcm in Q2 2021, and from the consumption of the previous winter-quarter, Q1 2022 (130 bcm), after the end of the heating season. Gas use in power generation fell by 7% (-8.1 TWh) year-on-year, and other factors also pointed to decrease in gas demand in Q2 2022. High wholesale gas prices must also have had negative impact on gas demand in energy intensive industries, leading to reduction in production, which could already be observed in the previous quarters. In April and May 2022 the weather in Europe was milder than in the same period of 2021, reducing heating related gas demand. As Figure 1 below shows, in the second quarter (specifically in May and June of 2022) gas consumption in the EU was close to the lower end of the range of the last five years. In the first half of 2022, gas consumption in the EU amounted to 201.8 bcm, decreasing by 11% year-on-year, from 226.5 bcm.

Figure 1 - EU gas consumption



Source: Eurostat, data as of 15 September 2022 from data series nrg_103m. In the next edition of this report numbers might change retrospectively

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

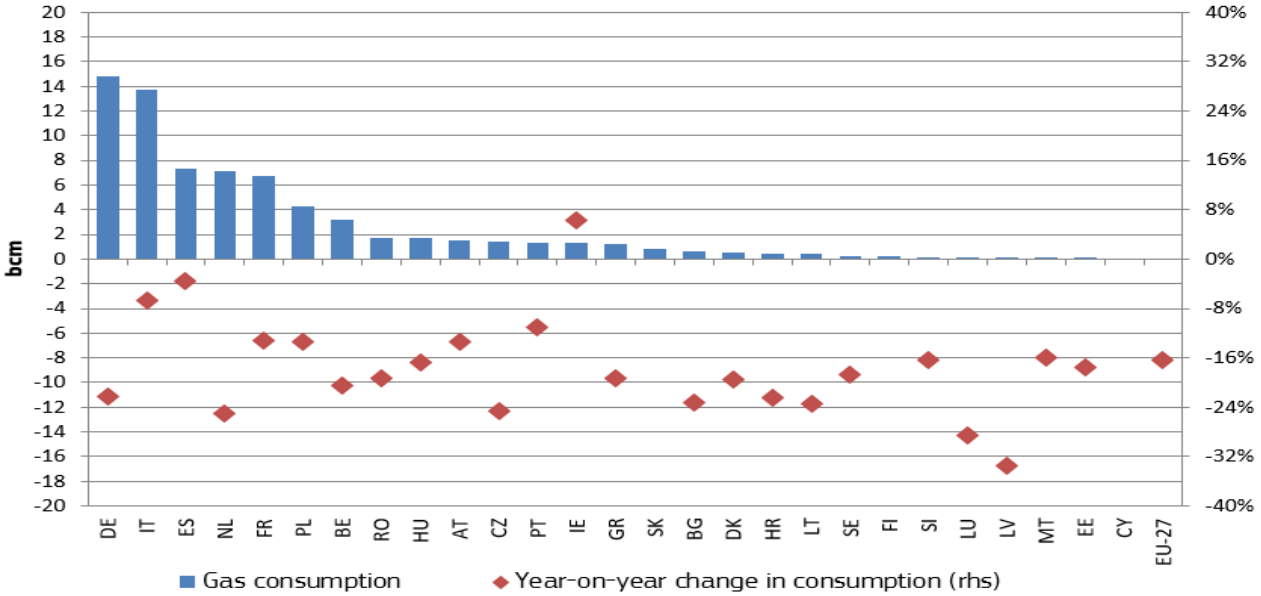


Source: Eurostat, data as of 15 September 2022 from data series nrg_103m. In the next edition of this report numbers might change retrospectively

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

- In the second quarter of 2022, the only EU Member State where gas consumption showed increase year-on-year was Ireland, (up by 6.4%, +0.08 bcm) whereas in the other 26 countries (there are no data for Cyprus) gas consumption fell. Gas consumption, in the order of percentage changes, fell by the most in Finland (-55%, -0.25 bcm), Slovakia, (-45%, -0.6 bcm) and in Latvia (-33%, -0.06 bcm), whereas it decreased in Spain only by 4% (-0.3 bcm), in Italy by 7% (-1 bcm) and in Portugal by 11% (-0.2 bcm). Among big gas consumer countries (beyond the aforementioned Spain and Italy) consumption in the Netherlands fell by 25% (-2.4 bcm), in Germany by 22% (-4.3 bcm) and in France by 13% (-1.0 bcm).
- In Q2 2022, Germany consumed the highest amount of gas (14.8 bcm), followed by Italy (13.7 bcm), Spain (7.3 bcm), France (6.7 bcm), and Poland (4.3 bcm). In the first half of 2022, gas consumption amounted to 46.2 bcm in Germany, to 39.1 bcm in Italy, to 21.1 bcm in France, to 17.1 bcm in Spain and to 10.8 bcm in Poland.

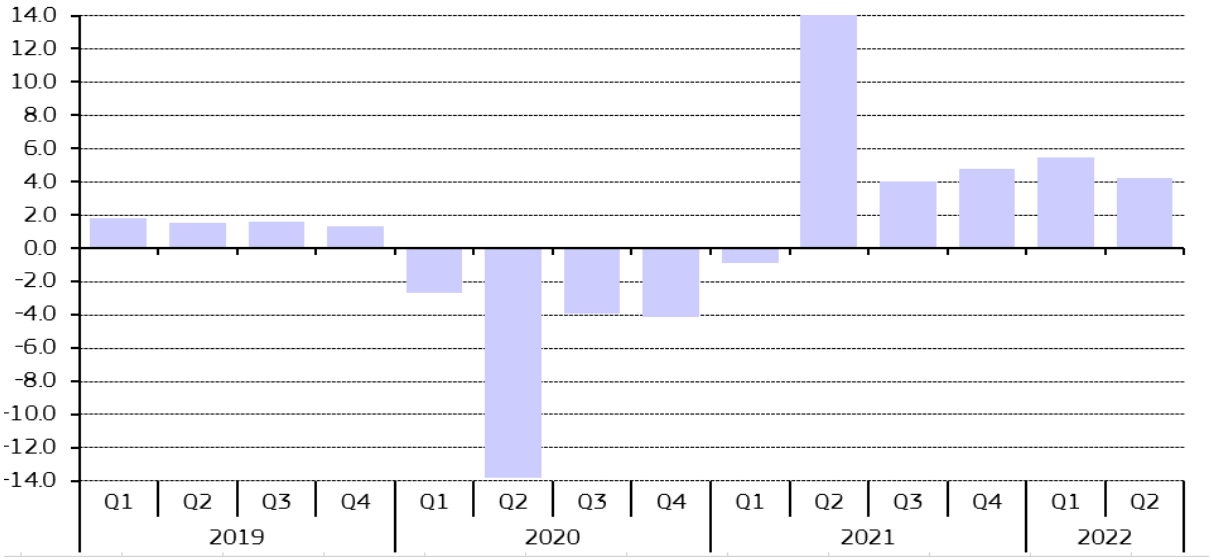
Figure 3 - Year-on-year change in gas consumption in the second quarter of 2022



Source: Eurostat, data as of 15 September 2022 from data series nrg_103m. In the next edition of this report numbers might change retrospectively

- In the second quarter of 2022, GDP in the EU-27 was up by 4.2% in year-on-year comparison, showing a slight deceleration in comparison to the previous two quarters. At the same time, GDP was up by 0.7% quarter-on-quarter, however, increase in the general economic activity did not really result in increasing gas consumption in the EU, as high wholesale gas prices prompted decreasing use of gas in energy intensive sectors, which might have acted counterintuitively for the economic growth in the EU countries.

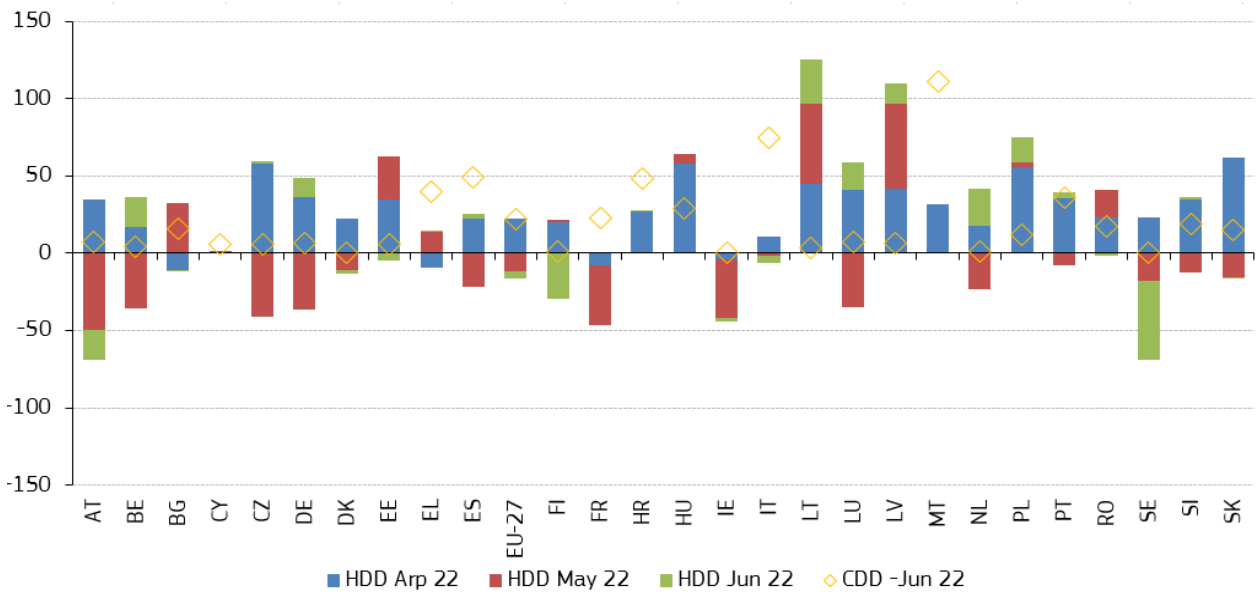
Figure 4 - Change in EU27 GDP, in year-on-year comparison (%)



Source: Eurostat, data as of 20 September 2022 from data series namq_10_gdp - Seasonally and calendar adjusted data

- Figure 5 shows the deviation of actual heating degree days (HDDs) from the long-term average[2] in individual EU Member States in the second quarter of 2022 and the deviation of cooling degree days (CDDs) from the long term average in the month of June. April 2022 was generally colder than usual in most of the EU countries, implying more heating needs in the residential sector. The month of May showed a mixed picture. However, both April and May were milder than in 2021 (when heating need was elevated), contributing to the decrease in gas consumption in Q2 2022 and to quicker replenishment of gas storages than in April-May 2021. June 2022 was warmer than usual in some south European countries, implying more cooling need, having a potential impact on gas-fired electricity generation. Nevertheless, market prices in Q2 2022 were mostly impacted by geopolitical events and security of gas supply concerns, rather than weather conditions.

Figure 5 – Deviation of actual heating degree days (HDDs) and cooling degree days (CDDs) from the long-term average in the second quarter of 2022



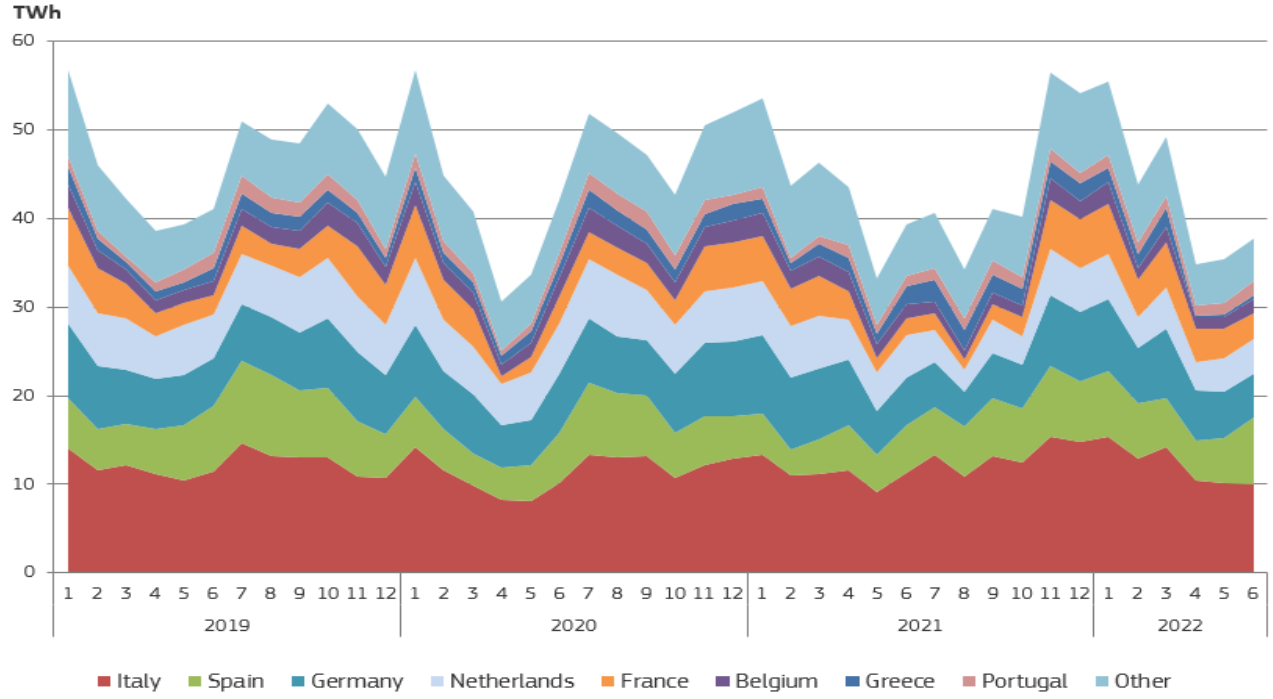
Source: Joint Research Centre (JRC), European Commission

- Based on data from ENTSO-E, gas-fired power generation showed a decrease of 7% (-8.1 TWh) year-on-year in Q2 2022, as Figure 6 shows. Gas-fired generation showed a significant fall in April year-on-year (-20%), whereas in May it rose by 7% and in June fell back again (-4%). In Q2 2022 wholesale gas prices were quite volatile and increased measurably in June on most of the EU gas hubs, which was not favourable to generation costs and hence the profitability of gas-fired generation. Carbon prices remained relatively stable over Q2 2022, and soaring coal prices did not give incentives to switch from gas to coal in power generation.
- In year-on-year comparison, the share of renewables in the EU power generation mix[3], rose by 1.5 percentage points, as wind, solar, biomass and hydro together represented around 42.9% of the EU power mix, up from 41.4 in Q2 2021. However, within renewables, the share of hydro fell by 2 percentage points, owing to dry periods in many parts of the EU, whereas the share of wind power went up by 1.5 percentage points and that of solar by more than 2 points. Electricity generation from nuclear fell by 17% year-on-year, largely owing capacities taken offline in France, Germany and other countries, and its share was down by 4 percentage points, reaching only 21% in Q2 2022.
- With record high gas prices, the share of gas was down by 1 percentage point year-on-year, and amounted to 17% in Q2 2022. The share of power generation from solid fuels rose slightly in Q2 2022, reaching 15% (up from 12.5% a year before) as coal and lignite-fired generation together rose significantly, by almost 19% in Q2 2022 year-on-year. Carbon prices practically remained stable at high levels (75-90 €/tCO2e during most of Q2 2022), but it had smaller impact on the power mix, as gas prices showed a measurable increase over the same period (from 110 €/MWh early April, decreasing in May but rebounding to 145 €/MWh by the end of June; rising further in July and August). At the same time, coal prices rose from 249 €/Mt early April to 372€/Mt by the end of June and stabilised at these levels until the end of August. Replacing gas by coal was limited by decreasing coal-fired capacities over the last few years.
- In Q2 2022, the amount of electricity generated from gas fell by 20% in the Netherlands in year-on-year comparison, and in Germany it also went down by 11%, whereas in Italy it fell only by 5%. At the same time, it rose significantly, by 49% in France, and by 17% in Spain, by 32%.

[2] Long term average temperatures, heating and cooling degree days refer to the period between 1978 and 2018
[3] See more information in Quarterly Report on the European Electricity Markets, Vol. 15, Issue 2

- Besides demand side factors, the share of gas was impacted by changes in the local power generation mixes in each country. In the Netherlands, the decrease in gas-fired generation (and in hydro power) was compensated by increasing solar, wind and coal-fired generation, and the overall electricity generation rose by 4% in Q2 2022 year-on-year. In Germany, the decrease in gas-fired generation, accompanied with the even deeper fall in nuclear, was compensated by increasing coal and lignite fired generation, but increasing solar and wind generation also added to domestic power generation. In Italy, decreasing gas-fired generation and steeply falling hydro was replaced by increasing coal and other renewable sources. In Spain, increasing gas-fired generation and renewables overcompensated the fall in hydro, and overall electricity generation rose by 11% in Q2 2022 year-on-year. In France, the increase in gas-fired generation and other sources, such as coal and solar power, could only partially compensate the impact of abruptly falling nuclear availability, and less hydro as well, which resulted in a 15% fall of the overall electricity generation in the country in Q2 2022, year-on-year.

Figure 6 - Gas-fired power generation in the EU



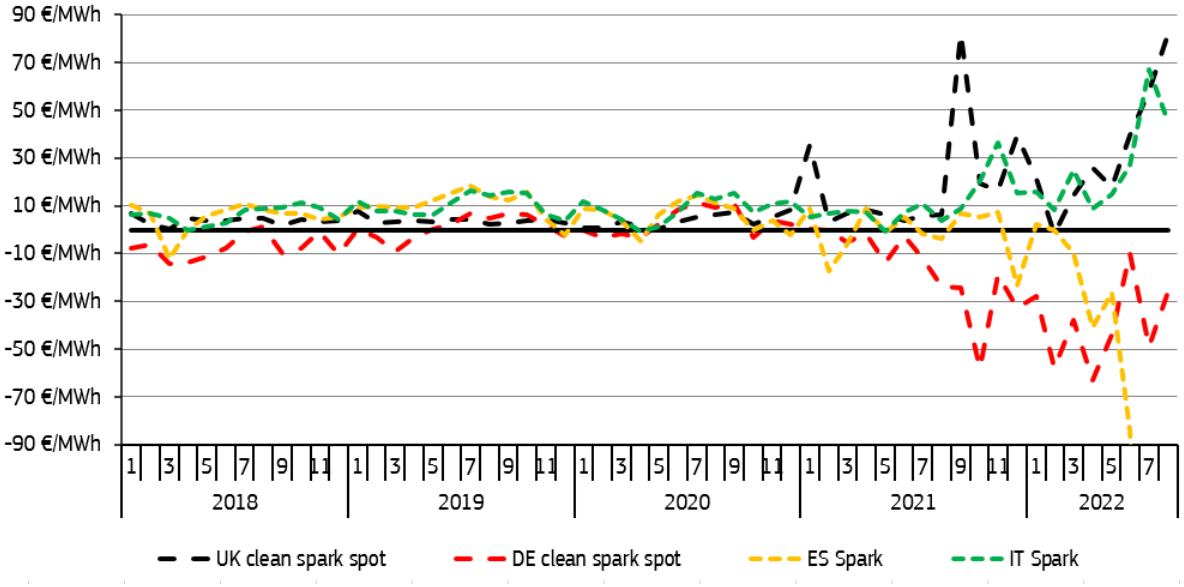
Source: Based on data from the ENTSO-E Transparency Platform and national data sources, data as of 15 September 2022.

- Clean spark spreads – measuring the profitability of gas-fired generation by taking into account variable costs – reached respectively -38.9 €/MWh, -50.4 €/MWh and 16.9 €/MWh in Germany, Spain and Italy in Q2 2022 on average, showing a mixed picture of estimated profitability of gas fired generation in the three countries. In Q1 2022, the three spreads respectively were: -41.3 €/MWh, -2.6 €/MWh and 16.4€/MWh, whereas in Q2 2021 they stood at -6.2€/MWh, 4.4€/MWh and 4.6€/MWh, respectively. This implies that in Germany profitability of gas-fired generation fell steeply both quarter-on-quarter and year-on-year, owing to increase in gas prices that outpaced the rise in wholesale electricity prices. In the case of Spain the sudden decrease in profitability in Q2 2022 might also have been related to the new electricity market design, that subsidises gas-fired generation. In contrast, profitability of gas-fired generation improved in Italy, probably owing to much higher wholesale electricity prices (See Figure 7[4]).

- In the United Kingdom, having relevance for the European gas market, clean spark spreads averaged at 27.8 €/MWh in Q2 2022, up from 11.3 €/MWh in Q1 2022, and from 6.2 €/MWh in Q2 2021. In the UK, wholesale electricity prices were much higher than in continental Europe, resulting in higher profitability of gas-fired generation. Electricity generated from gas was up by 5% year-on-year in Q2 2022, and the share of gas-fired generation was 46% in the same period, down from 49% measured in Q2 2021.

[4] Charts of clean spark spreads can also be found in the Quarterly Report of European Electricity Markets (Vol. 15, Issue 2). Data on the share of gas in electricity generation come from the database of ENTSO-E

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



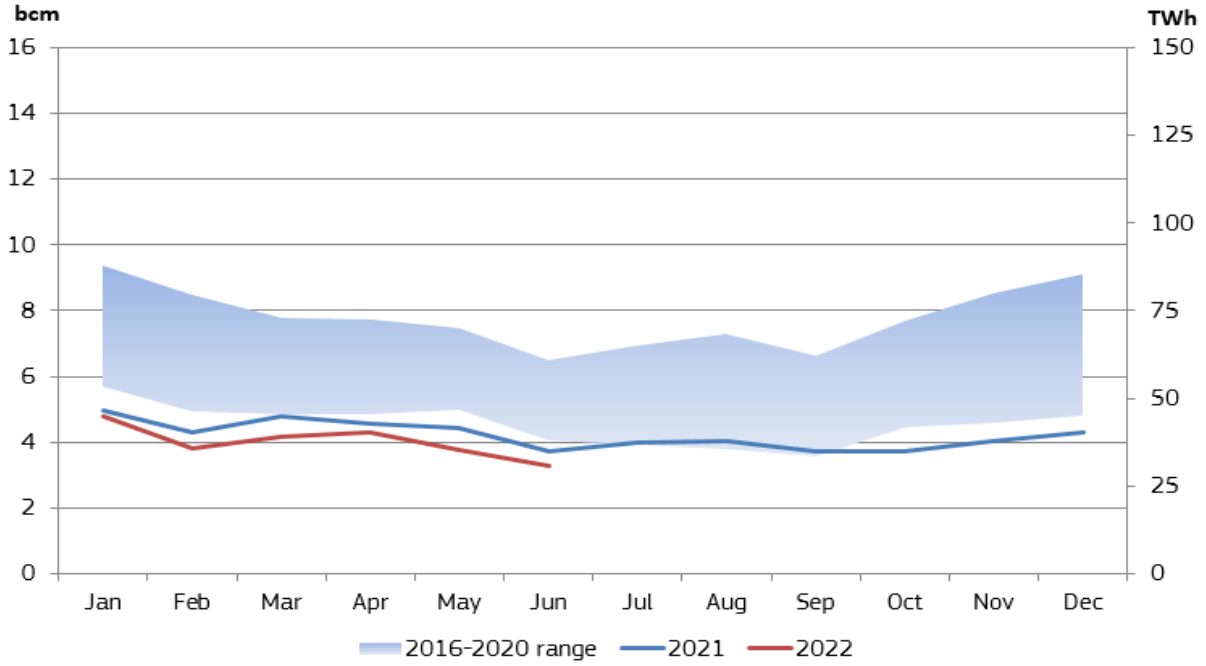
Source: Bloomberg

1.2 Production

- In the second quarter of 2022, EU natural gas production reached approximately 12.3 bcm[5], falling year-on-year again, by 3%, (by 0.4 bcm - See Figure 8). In Q2 2022, the actual quarterly production remained well below both the range of 2016-2020 and 2021 figures as well, reflecting the long-term dwindling trend of domestic gas production in the EU. Compared to the previous quarter, production went down by 0.5 bcm in Q2 2022, following the decrease in seasonal consumption after the end of the heating season.
- In the biggest gas producer Netherlands, the production fell steeply, by 23% (-1.4 bcm), and amounted to 4.5 bcm. In Romania, the second biggest gas producer in the EU, production decreased by 5% (-0.1 bcm) and reached 2.1 bcm in Q2 2022. At the same time, gas production rose by 12% in Italy (+0.1 bcm) and by 4% in Germany (+0.05 bcm), whereas in Ireland it decreased by 8% (-0.03 bcm) and in Denmark it fell by 5% (-0.02 bcm). In the first half of 2022, gas production in the EU amounted to 25.1 bcm, down from 26.1 bcm (-6%) in the same period of 2021.
- After the Groningen gas field production cap of 4.5 bcm for the gas year 2021 (running from 1 October 2021 to 30 September 2022), the Dutch government announced in September 2022 that for the gas year 2022 (1 October 2022 to 30 September 2023) the production would be capped at 2.8 bcm.[6] In spite of the pressure to change course due to the energy crisis triggered by Russia's invasion of Ukraine, the government has repeatedly said production could only be resumed as a last resort if gas supplies for Dutch households run out. The field is expected to be kept operational at least until April 2023, and the production will come to a definitive end in 2023 and 2024 at latest.
- Gas production in Norway was up by more than 15% year-on year in Q2 2022, amounting to 29.9 bcm. In the first half of 2022, Norway produced 60.8 bcm of natural gas, up from 55 bcm in the first half of 2021. In the United Kingdom, gas production amounted to 9.6 bcm in Q2 2022, up from 6.2 bcm a year before (+55%, year-on-year, owing to low base value in Q2 2021). In the first half of 2022, the UK produced 19 bcm of natural gas, up from 15.1 bcm a year before.

[5] Given that in some countries data for some periods are based on estimation, this number might retrospectively change
[6] https://www.reuters.com/business/energy/dutch-limit-groningen-gas-production-28-bcm-20222023-2022-09-26/

Figure 8 - Monthly gas production in the EU



Source: Eurostat, data as of 15 September 2022 from data series nrg_103m. In the next edition of this report numbers might change retrospectively.

1.3 Imports

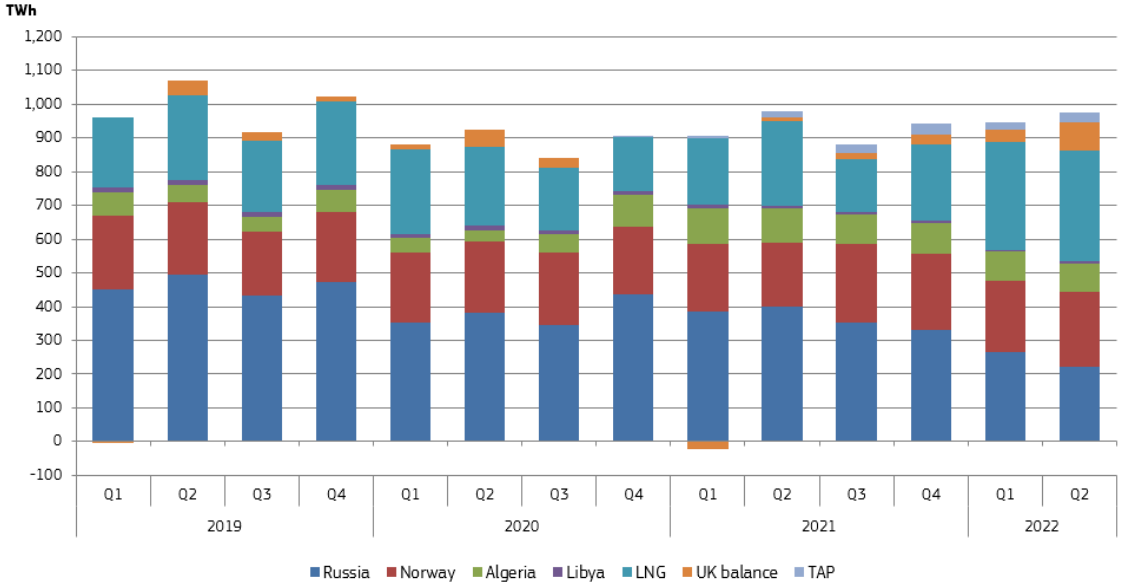
- According to Eurostat[7], net gas imports in the EU increased by 3% (2.7 bcm) in the second quarter of 2022 (year-on-year), amid decreasing gas consumption and further falling domestic production, which also facilitated the replenishment of storages. Net imports in different EU countries showed a high variation in Q2 2022. In Denmark, net imports doubled practically (+108%, +0.2 bcm), whereas in Slovakia they rose by 34% (+0.6 bcm) year-on-year, while in Latvia they fell by 56% (-0.4 bcm) and in Finland and Malta by 50% (-0.2 bcm and -0.1 bcm) year-on-year.
- Looking at the biggest importers, in the Netherlands net imports rose by a remarkable 58% (+2.7 bcm), in France they went up by 3% (+0.3 bcm), in Spain by 2% (+0.2 bcm), in Germany by 1% (+0.3 bcm), whereas they decreased by 7% (-1.3 bcm) in Italy, and by 12% in both Poland and Belgium (respectively -0.6 bcm and -0.5 bcm). The biggest net importers in the EU were Germany (22 bcm), Italy (18 bcm), France (11 bcm), Spain (8 bcm), the Netherlands (7 bcm), Poland and Belgium (both 4 bcm). These seven countries altogether imported 74 bcm out of the total gas imports of 94 bcm in Q2 2022 (the total up from 90.7 bcm in Q2 2021). In the first half of 2022, the EU imported 182 bcm of natural gas, up from 170 bcm in the same period of 2021.
- According to ENTSO-G data, net imports amounted to 977 TWh in the second quarter of 2022, of which 66% arrived through pipelines and around 34% through LNG terminals, which latter kept the previous quarter's record (the highest share in the last eight years). Pipeline gas imports from Russia saw a steep fall of 45% in Q2 2022, showing an accelerating fall within the quarter, as in June imports were down by 61% year-on-year. At the same time, imports from Norway were up by 16% in Q2 2022. Pipeline gas imports from Algeria showed a decrease of 15% year-on-year. Pipeline gas imports from Libya fell further, by 8%. At the same time, LNG imports reached 328 TWh in Q2 2022, the highest quarterly amount in the last eight years. The same can be said on gas inflows from the UK, showing a six-fold rise year-on-year and reaching 83 TWh.
- The share of Russian pipeline gas in the EU external gas imports fell below 23% in Q2 2022. Year-on-year, the share of Russian pipeline imports fell significantly, by 18 percentage points[8]. By August 2022, Russian pipeline gas ensured barely one tenth of the EU gas imports.
- The share of pipeline gas imports from Norway was 23% in the second quarter of 2022, similarly to the previous quarter and up by 3 percentage points compared to Q2 2021. For the first time since time series are available (practically 2014), the share of pipeline gas imports from Norway was slightly higher than that from Russia. However, competitive gas imports from Norway could only by

[7] Net imports equal imports minus exports and do not account for stock changes.
[8] It is worth to note that Russia increased its importance in the EU LNG imports over the last few years, numbers presented in this section, with the exception of LNG or unless otherwise indicated, refer to pipeline imports.

part replace dwindling Russian inflows. In the second quarter of 2022, Norwegian gas production[9] amounted to 30 bcm, up by 15% year-on-year.

- In the second quarter of 2022, pipeline gas imports from Algeria were down by 15% year-on-year, which resulted in a decreasing share within the total extra-EU imports (falling below 9% in Q2 2022). Although oil-indexed contracts gas contracts with Algeria were quite competitively priced in Q2 2022, the impact of the termination of gas transport through the GME pipeline through Morocco in Q4 2021, which used to supply the Iberian peninsula by gas, can be tracked on import numbers, falling by 46% in Q2 2022 year-on-year, as only the Medgaz pipeline remained in operation, even with increased capacity. At the same time, pipeline gas supply from Algeria to Italy was up by 10% year-on-year. Imports from Libya continued to fall and its share was barely 0.7% in the total EU gas imports, which also had to do with some infrastructure bottlenecks to supply Italy.
- In Q2 2022, the share of LNG remained close to 34% (similarly to the previous quarter) in the total EU gas imports, up by a 8 percentage points compared to Q2 2021, prompting LNG as individual supply source to the top positon of EU gas imports. Increasing LNG imports were principally owing to the price premium in Europe to the Asian markets, as fears on supply risks amid falling Russian imports helped to elevate European gas hub prices to record levels, which incentivised LNG cargo redirections towards Europe and increasing LNG send-out to the European gas grid. It seems that in Q2 2022 the year-on-year decrease in the share of Russian pipeline flows was compensated by increasing LNG and rising inflows from the UK and Norway, whereas the share of the North African sources slightly decreased.
- The Trans Adriatic Pipeline (TAP) ensured around 28 TWh gas imports in the EU in the second quarter of 2022, up from 18 TWh in the Q2 2021 (+57% year-on-year), which represented around 2.9% of the EU total gas imports. TAP provides access to Azerbaijani gas resources via the Southern Gas Corridor, an important result of the EU security of gas supply policies. The EU wants to rely more on the Southern Gas Corridor too in the future, replacing gas imports from Russia.
- Looking at the evolution of daily gas inflows from different sources on Figure 10, it is obvious that daily inflows from Russia continuously decreased in Q2 2022, and in July and August as well, whereas the importance of LNG inflows have gradually gained ground. The importance of other sources, such as Norway, North-Africa and the UK remained fairly stable over time, but with dwindling Russian imports their relative importance increased.

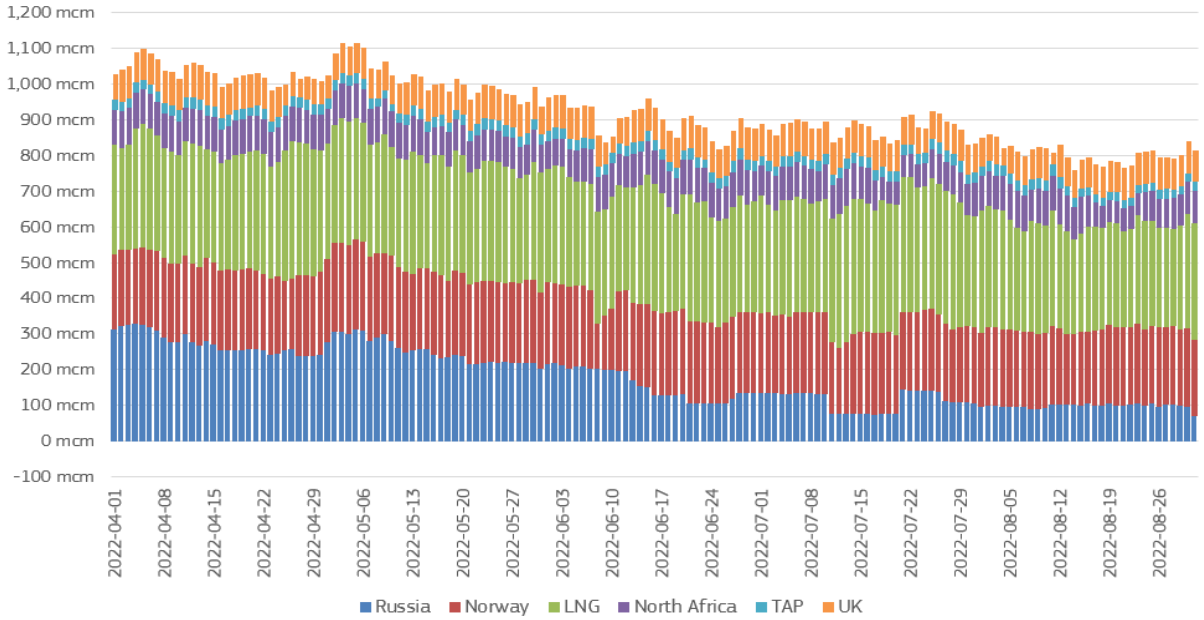
Figure 9 - EU imports of natural gas by source



Source: Based on data from the ENTSO-G Transparency Platform, data as of 6 September 2022.
Exports to the Baltic-states and Finland are not included in the chart owing to unavailability of reliable data
Russia, Norway, Algeria and Libya include pipeline imports only; LNG imports coming from these countries are reported in the LNG category.
A trade balance with the UK is estimated, reflecting that the UK is no longer part of the EU, and it is not easy to determine the origin of gas molecules arriving to the EU after going through the UK market (it can be UK production, imports from Norway of LNG imports from the UK, etc.). As of 2021, imports via the Trans Adriatic Pipeline (TAP) is also included.

[9] https://www.npd.no/en/facts/news/Production-figures/2020/production-figures-march-2020/

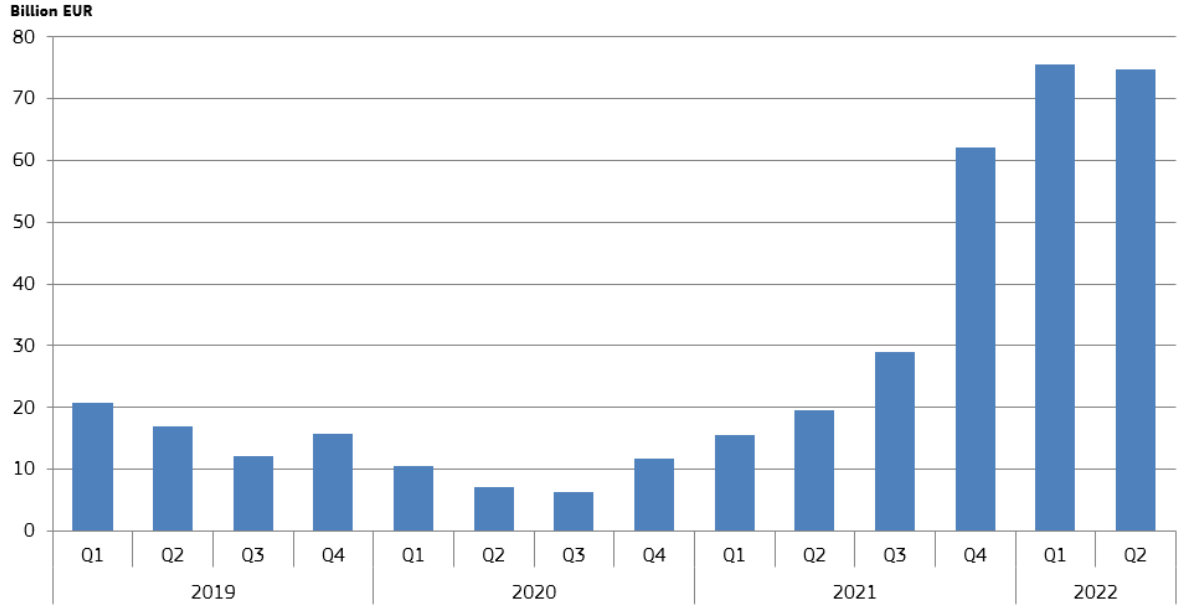
Figure 10 - EU daily imports of natural gas by source



Source: Based on data from the ENTSO-G Transparency Platform, data as of 6 September 2022.

- As average import gas prices increased significantly year-on-year (showing a nearly four-fold growth compared to Q2 2021), in the second quarter of 2022 the estimated gas import bill amounted to nearly €75 billion, remaining close to the record registered in the previous quarter (€76 billion). In comparison to €20 billion in Q2 2021, the bill rose by 282% year-on-year. However, it should be noted here that the estimation of the gas import bill is based on the mixture of sources on import prices (spot wholesale prices, foreign trade data, etc.), which might not give a fully accurate calculation on the actual gas import prices, rising by an estimated 284% in Q2 2022 year-on-year. Out of these the estimated amount, gas imported from Norway was around €21 billion followed by Russia (€18 billion), followed by North Africa (Algeria and Libya, €4.2 billion) and the TAP (€2.8 billion). If LNG imports from Russia, Norway and North Africa accounted to the source of origin, the total gas import bill from Russia amounted to €23.3 billion, that of Norway to €21 billion and that of North Africa to €4.4 billion.

Figure 11 – Estimated quarterly extra-EU gas import bill, in billions of euros



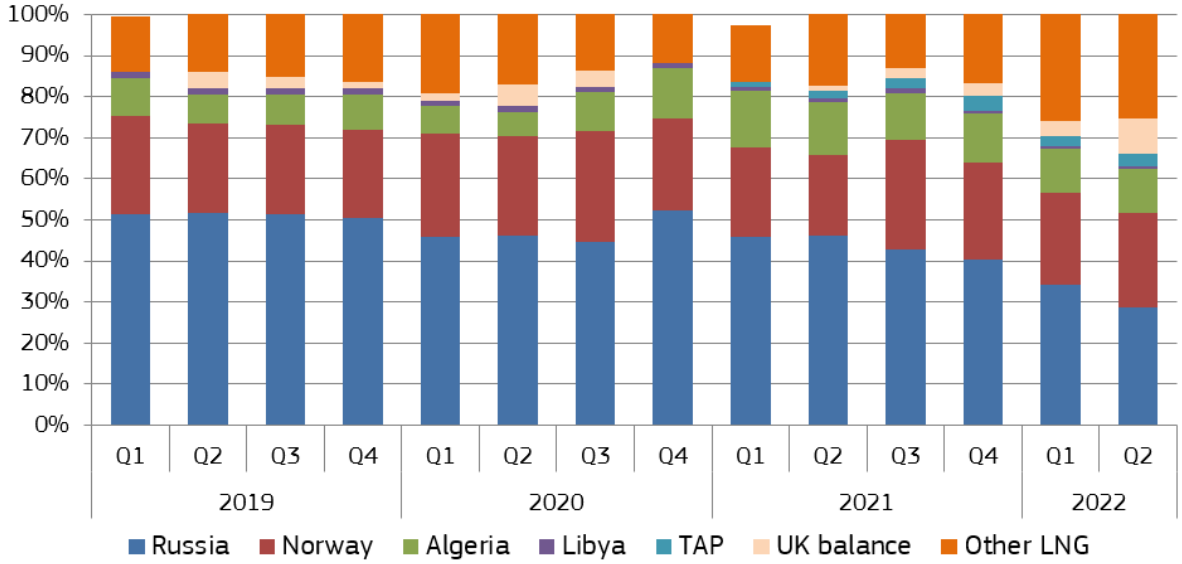
Source: ENTSO-G, Eurostat and own data calculations for the EU weighted average of import gas prices

- As important pipeline gas source countries, such as Russia, Norway and Algeria are also active on the LNG market, this gas report also takes a look at the combined imports of pipeline gas and LNG from these countries and attempts to calculate the share of imports including all gas sources. As Figure 12 shows, the share of Russia within total extra-EU gas imports (pipeline and LNG together) amounted to 29% in Q2 2022 (the lowest over the last eight years), split by 23% of pipeline imports and 6% of LNG.

Russia is also an important participant in European LNG market, not only in the traditional pipeline gas supply, but increasing LNG exports to the EU could not counter-balance its market losses in the pipeline segment in Q1 2022. The combined share of pipeline and LNG gas of Russian origin fell by 17 percentage points in Q2 2022 year-on-year.

- The share of Norway was 23% within gas imports in Q1 2022 (practically the same share as the Norwegian pipeline imports, owing to the still-ongoing repair and maintenance works on the country's sole LNG plant during most of Q2 2022). The share of Algeria within the total extra-EU gas imports was 10.8% with LNG (as opposed to 9% only including pipeline gas), down by 2 percentage points year-on-year. The share of LNG was 25.4% in Q1 2022, (on the top of LNG accounted in shipments from Russia, Norway and Algeria), up from 17% in Q2 2021. The share of gas inflows from the UK was close to 9%. The decreasing share of imports from Russia (and from Algeria) between the second quarters of 2021 and 2022 was mainly compensated by the increasing shares of LNG and inflows from the UK and Norway, whereas the share of TAP pipeline (from Azerbaijan) changed only slightly.

Figure 12 – 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 6 September 2022.

1.3.1. Pipeline imports from Russia and EU supply to Ukraine

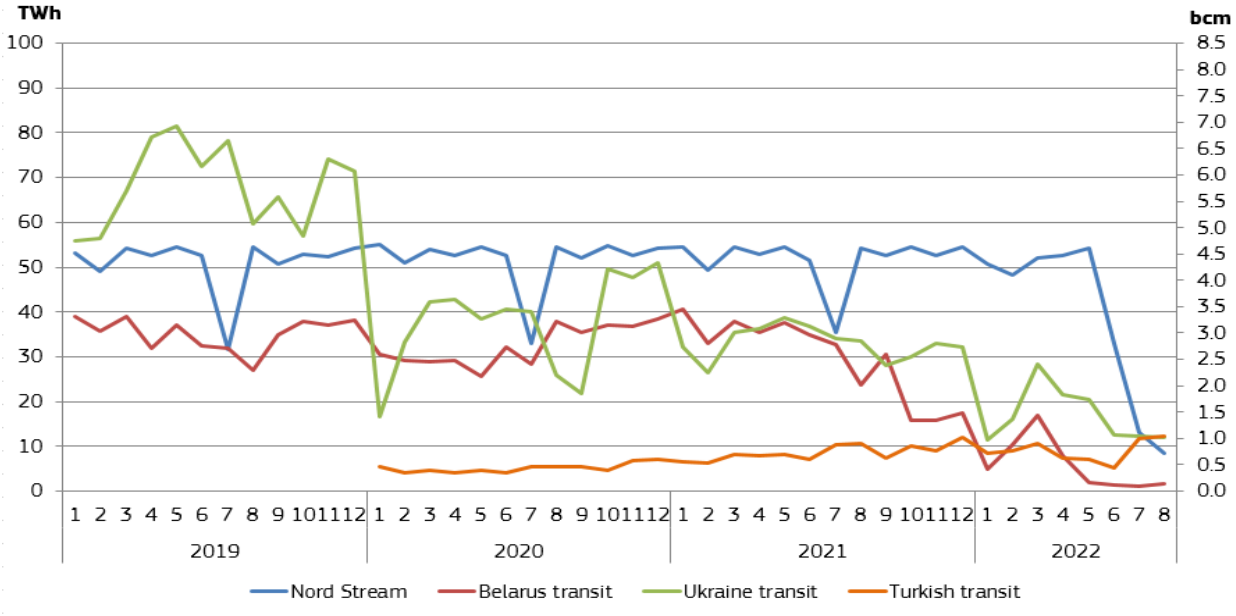
- Figure 13 shows the breakdown of EU gas imports from Russia on the four main pipeline supply routes: Ukraine (which includes the Brotherhood Pipeline and the - recently less important - Balkan route), Belarus (practically the Yamal pipeline), Nord Stream 1 and Turk Stream.
- In the second quarter of 2022, the volume of Russian imports fell significantly, by 45%, if compared with the same quarter of 2021. As shown on Figure 13 and Figure 14, gas transit through the route of Belarus fell by a staggering 90% in Q2 2022 year-on-year. In April 2022 flows through Yamal still reached 0.7 bcm, but as from May in each month flows were below 0.2 bcm, as Gazprom announced practically banning exports to its clients using the Yamal pipeline (See in Chapter 1.4).
- Gas flows transiting via Ukraine were down by 51% in comparison to Q2 2021, showing decreasing trend within the quarter, as April deliveries amounted to 2 bcm, and by June it fell to 1.2 bcm. The monthly average transit through Ukraine was 1.7 bcm, down from 3.5 bcm in Q2 2021. In July-August 2022 the monthly transit volume through Ukraine with EU destinations was around 1.1 bcm.
- In April and May 2022, in contrast to the Belarus route and Ukraine, transited volumes through the Nord Stream remained relatively intact, and the average transited volume reached 5 bcm per month. However, as of June, Gazprom started to decrease transited volumes, principally referring to technical maintenance problems (See Chapter 1.4), by early September transit fell to zero through Nord Stream 1. In June the transited volume was still 3.1 bcm, while in August it fell below 0.8 bcm.
- Transited volumes through the Turk Stream also fell back, by 14% year-on-year in Q2 2022, and the monthly average was 0.6 bcm in the quarter. In July and August however, 2022 transited volumes via the Turk Stream rose to 1.1 bcm. This might also be related to additional volumes contracted by Hungary from Gazprom during the gas storage filling season.
- As a result, in Q2 2022 the share of Nord Stream within Russian pipeline gas supply to Europe rose to the highest ever, 62%, up by 5 percentage points compared to Q1 2022 and by 22 points compared to Q2 2021. The Ukraine transit route came to the second place, ensuring 24% of the total Russian pipeline gas transit, which was the second lowest (21% in Q1 2022) over the last few years and was down from 28% a year earlier. The share of the Belarus transit route fell drastically, representing only 5% of the

total Russian pipeline imports in Q2 2022 (in May and June this share was only 2%), down from 27% in Q2 2021. The share of Turk Stream was 9% in Q2 2022, up from 6% in Q2 2021.

- In Q2 2022 Nord Stream represented 14% (13 bcm) in the total net extra-EU gas imports, the Ukrainian transit had a share of 6% (5 bcm), whereas the Belarus transit route ensured only 1% (1 bcm). At the same time, the Turk Stream had a share of 2%, with around 2 bcm gas transit within the total net extra-EU gas imports in Q2 2022.

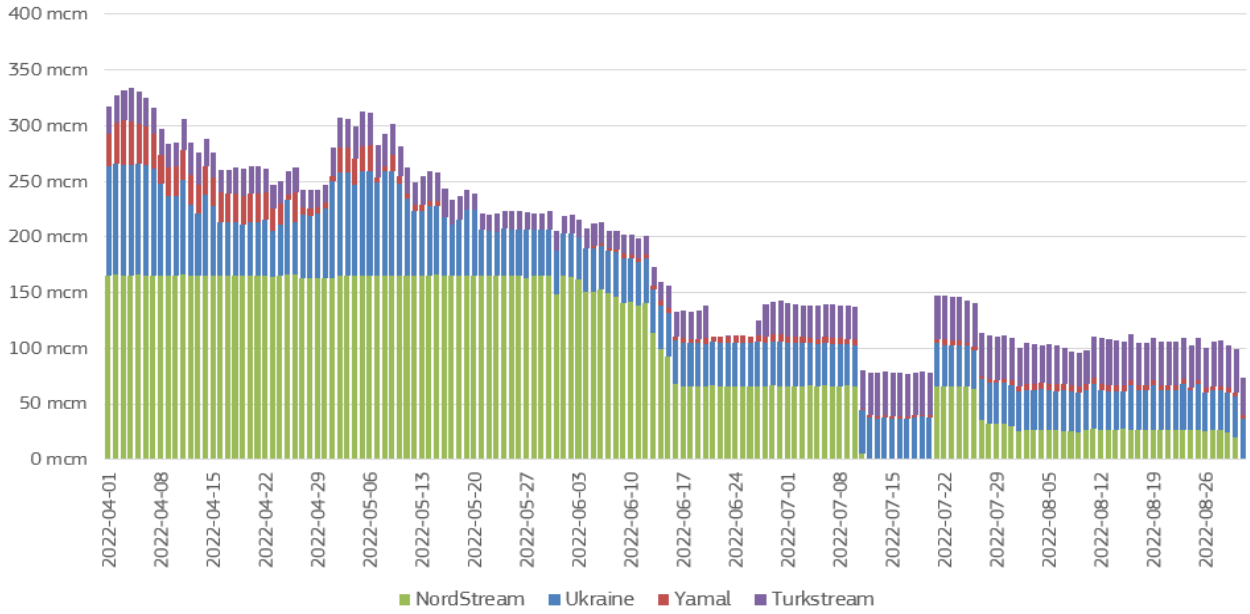
- If the total transit through Ukraine (without Moldova) is counted, in January-August 2022 around 13 bcm gas arrived from Russia via this route (to compare with the 40 bcm total transit for 2022 in the EU-Ukraine-Russia trilateral agreement in force), whereas Nord-Stream 1 transited 29 bcm. Via the Turk Stream around more than 8 bcm arrived (with all destinations, to the EU only 7 bcm), and the via the Belarus transit only 4 bcm was shipped in January-August 2022.

Figure 13 – Monthly EU imports of natural gas from Russia by supply route



Source: Based on data from the ENTSO-G Transparency Platform, data as of 6 September 2022.
Deliveries to Estonia, Finland and Latvia are not included; transit volumes from Russia to the Republic of North Macedonia and Serbia are excluded. Since the inauguration of Turk Stream flows to Turkey via the Balkans are not significant.

Figure 14 – Daily EU imports of natural gas from Russia by supply route



Source: Based on data from the ENTSO-G Transparency Platform, data as of 6 September 2022.

- According to an announcement from Gazprom[10], gas exports to the European Union is expected to fall by 50 bcm in 2022, compared to the previous year. Looking at the data of January-August 2022, pipeline imports from Russia fell by 43 bcm year-on-year, whereas LNG imports were up by 4 bcm from Russia. However, the decline from Russian pipeline imports was complemented by increasing non-Russian LNG (by 28 bcm) and non-Russian pipeline increase (by 17 bcm). Taking into account decreasing gas consumption (less heating need and demand destruction in energy intensive industries), increasing non-Russian gas imports have contributed to the quicker refilling of gas storages in the EU.
- The war in Ukraine has dramatically changed the role Ukrainian gas storages played over the last few years in the EU security of gas supply, as European storage operators also used Ukrainian capacities to balance gas demand in the EU. Now Ukraine has to find ways to import gas to secure its own needs at an elevated price environment. The number of displaced persons and the destruction of significant industrial potential both point to decreasing demand for gas in the country.

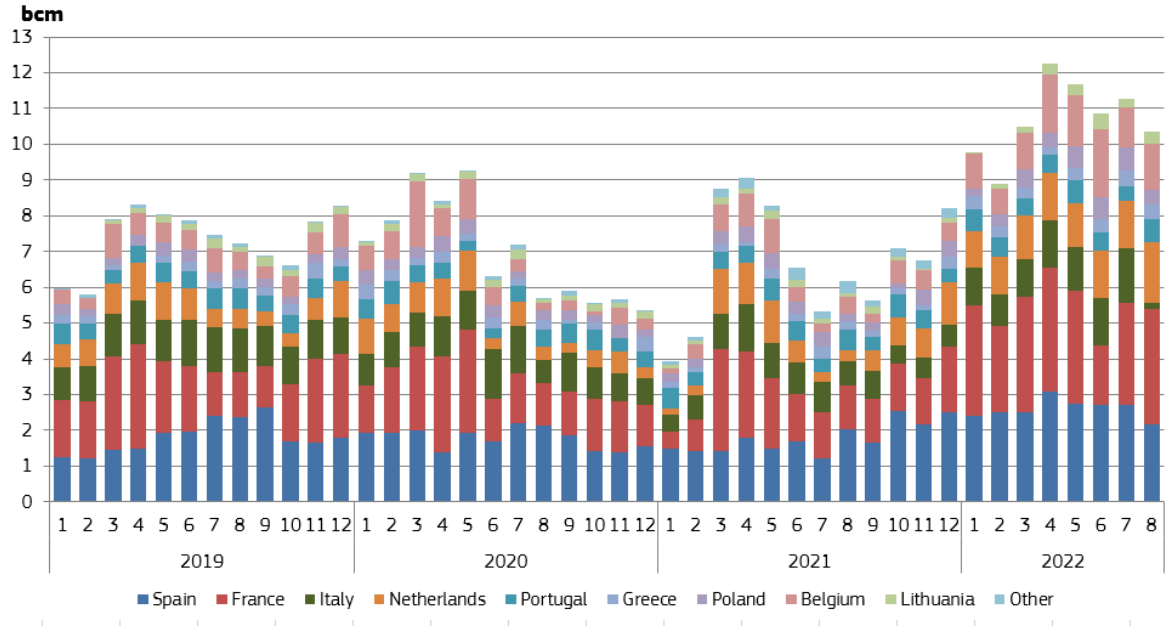
1.3.2. LNG imports

- LNG imports[11] in the EU grew significantly, by 49% in Q2 2022 in year-on-year comparison, after growing by 72% in the previous quarter. Looking at the three months of the quarter, EU LNG imports were up by 38% in April, by 46% in May and by 70% in June, compared to the same months of 2021. In July and August 2022 EU LNG imports respectively grew by 119% and 75%, largely owing to the measurable European wholesale gas premiums to Asia during most of the time in 2022 so far. The quarterly LNG imports in Q2 2022 in the EU were 35.6 bcm, up from 29.8 bcm in the previous quarter and up from 23.8 bcm in Q2 2021, as Figure 15 shows. The total number of LNG cargoes arrived in the EU was 433 in Q2 2022, up from 372 in Q1 2022, and from 318 in Q2 2021
- In Q2 2022, Spain was the biggest LNG importer in the EU, importing 8.5 bcm of LNG, slightly ahead of France, where LNG imports amounted to 8.3 bcm. In year-on-year comparison, imports were up by 72% in Spain whereas in France they rose by 44%. LNG imports in Belgium, amounting to 5.0 bcm in Q2 2022, were up by 115% year-on-year. Italy and the Netherlands were the fourth and fifth biggest importers, (both with imports around 3.9 bcm, respectively up by 23% and 31% year-on-year). Portugal came to the sixth place, importing 1.7 bcm (+2% year-on-year), followed by Poland (1.6 bcm, +33% year-on-year). Lithuania imported around 1 bcm in Q2 2022, up by 90% year-on-year, while Croatia had a quarterly import of 0.6 bcm (+37% than in Q2 2021). The total EU LNG imports amounted to an estimated €31.4 billion in Q2 2022, up from €5.3 billion a year before, principally owing to the impact of sharply increasing wholesale gas prices (rising to more than three-fold) year-on-year, and to the significant increase in imported volumes (49%). In the first half of 2022, the EU imported 65.5 bcm LNG, in comparison to 41.2 bcm imported in the first half of 2021.
- LNG imports in the United Kingdom in Q2 2022, amounting to 6.6 bcm, were significantly up year-on-year (+35%, rising from 4.9 bcm in Q2 2021). The number of cargoes berthed in the country picked up, and reached 60, as opposed to 43 in Q2 2021.
- In Q2 2022, wholesale gas prices remained volatile in the EU, however, and during most of the time Europe offered a price premium for LNG cargoes compared to Asia, and this premium persisted in July and August 2022 (see Figure 30 and Figure 31), resulting in abundant LNG imports in the EU. In north-western and south-western Europe local LNG import benchmarks maintained and deepened the measurable discounts vis-à-vis the general gas benchmark TTF in Q2 2022 and beyond during summer 2022.

[10] https://www.reuters.com/business/energy/russian-gas-exports-eu-will-fall-by-50-bcm-this-year-ifx-cites-deputy-pm-2022-09-15/

[11] In the report LNG imports are based on cargo tracking data from Refinitiv. Import numbers also include possible re-exports to third countries, implying that consumption of natural gas in the EU is less than these numbers would suggest. Actual consumption data is rather based on the send-out numbers of regasification terminals, provided by ENTSO-G

Figure 15 - LNG imports to the EU by Member States

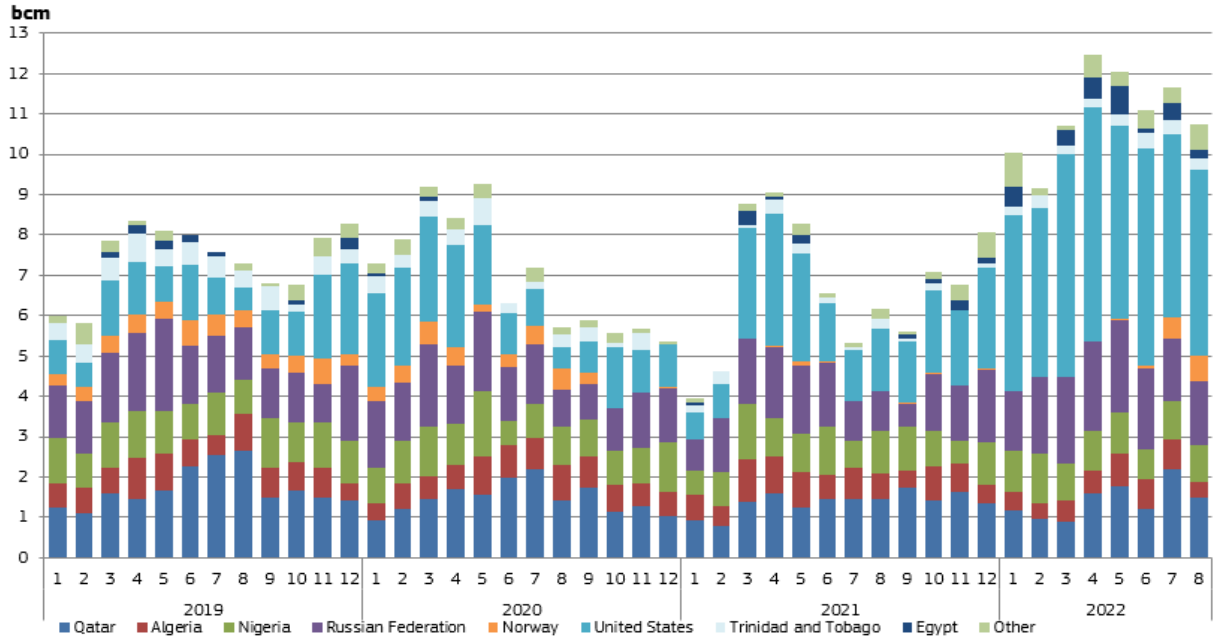


Source: Commission calculations based on tanker movements reported by Refinitiv "Other" includes Finland, Malta and Croatia

- In the second quarter of 2022, the United States proved to be the biggest LNG supplier of the EU, by a large margin to its competitors, ensuring 16 bcm of the EU LNG imports within a single quarter (for comparison: EU LNG imports from the US amounted to 22 bcm in 2021 as whole), representing around 45% of the total imports. Year-on-year, LNG imports from the US were up by 117%, and the share of the US in total EU LNG imports rose by 14 percentage points. In 2022 so far, the EU imported around 39 bcm LNG from the US, implying that the objective of the March 2022 EU-US joint statement on energy security[12], which foresaw and increase of 15 bcm compared to 2021, has already been fulfilled.
- In spite of ongoing geopolitical tensions, Russia remained the second biggest LNG supplier of the EU, representing 18% (6.5 bcm, up by 28% year-on-year). Qatar was the third most important EU LNG source (with an import share of 13% and imports amounting to 4.6 bcm, +7%), followed by Nigeria on the fourth place (with an import share of only 8% - 2.7 bcm, but falling by 11% year-on-year). LNG imports from Algeria amounted to 2.1 bcm, falling by 12% year-on-year and representing only 6% of the total imports. Within other sources, LNG imports from Egypt rose almost five-fold year-on-year, reaching 1.3 bcm (4% of the total EU imports), while those from Trinidad and Tobago amounted to 0.9 bcm and ensured around 3% of the total EU LNG imports – See Figure 16.
- In Q2 2022, Norway still had a very low share (around 0.3%) in total EU LNG imports, however, in June the Hammerfest LNG liquefaction terminal restarted its operation, being under repair and maintenance works since the fire incident at the end of September 2020 (See more in Chapter 1.4) and is expected to measurably contribute to the EU LNG supply as of from the second half of 2022.

[12] See more in Quarterly Report on European Gas Markets, first quarter of 2022 (Vol 15, issue 1).

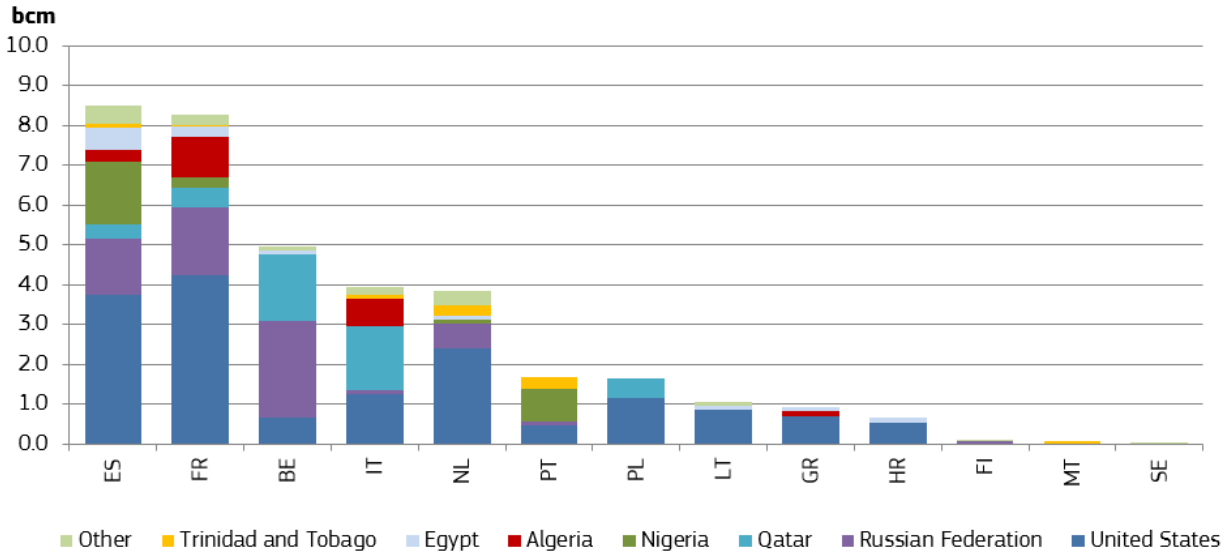
Figure 16 - LNG imports in the EU by supplier country



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

- In the second quarter of 2022, the United States were the biggest LNG supplier of Croatia (84% of the country's total LNG imports), Lithuania (81%), Greece (77%), Poland (70%), the Netherlands (62%) and Spain (44%). The US came to the second place in Italy (32%) and Portugal (28%). Russia was the biggest LNG supplier of Finland (representing 94% of the imports), Belgium (50%) and came to the second place in Sweden (31%), France (21%) and in the Netherlands (16%), and was the third biggest supplier in Spain (17%). It seems that self-restriction of western European energy consumers, perceivable on the oil market, did not manifest yet in LNG imports from Russia, though compared to the first quarter of 2022, Russia supplied less EU Member States in Q2 2022.
- Qatar was the biggest supplier in Italy (42% of the country's total LNG imports), and was the second biggest in Belgium (33%) and Poland (30%). Nigeria was the biggest supplier in Portugal (47%), and ensured 19% of the LNG imports in Spain. Algeria ensured 17% of LNG supply in Italy, 14% in Greece and 12% in France in Q2 2022. Egypt had a share higher than 16% in Croatia and ensured 10% of Lithuania's LNG imports. Malta imported all of its LNG imports from Trinidad and Tobago. Spain and France had 8 different LNG supply sources in Q2 2022, whereas Malta had to rely on a single supplier.
- In the second quarter of 2022, 174 LNG cargoes arrived in the EU from the US (up from 151 in Q1 2022, and from 78 in Q2 2021). LNG imports from the US amounted to 16 bcm in Q2 2022, up from 14.1 bcm in Q1 2022 and from in 7.4 bcm Q2 2021. The estimated market value of LNG imports from the US was around €14.2 billion in Q2 2022. In July-August 2022 LNG imports from the US continued at high pace, and 100 cargoes arrived, with 9.2 bcm of LNG, in a value of €16 billion, even amid the disruption of LNG imports from the Freeport terminal in the US (See Chapter 1.4) LNG imports from the United States became of particular importance in the EU, as geopolitical tensions mounted over the last few months, putting gas supply from the East under security risk.
- LNG exports to Europe represented 58% of the total US exports in Q2 2022, making Europe a market of principal interest for US LNG shipments. A year before, in Q2 2021 the share of the EU in US LNG exports was only 30%. In July-August 2022, the share of the EU as export destination remained high, around 56%.
- In the second quarter of 2022, the three most important EU destinations of the US LNG exports were France (4.3 bcm), Spain (3.8 bcm) and the Netherlands (2.4 bcm). The United Kingdom imported 2.3 bcm of US LNG in Q2 2022.

Figure 17 – LNG imports in the EU Member States from different sources in the second quarter of 2022

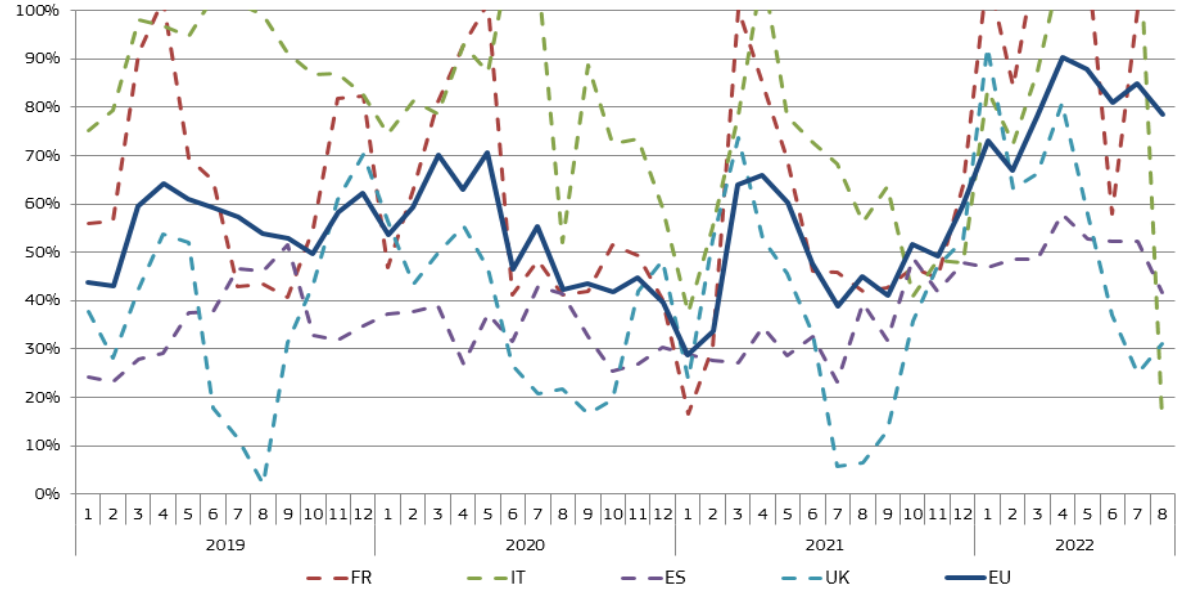


Source: Commission calculations based on tanker movements reported by Refinitiv
Imports coming from other EU Member States (re-exports) are excluded
"Other" includes Angola, Brazil, the Dominican Republic, Oman, Singapore, the United Arab Emirates and Yemen

- The average monthly LNG terminal utilisation rates can be followed on Figure 18, for some EU countries, the EU on average, and the UK. The average EU utilisation rate, which stood at 78% in March 2022, rose above 90% in April (the highest ever since the beginning of the available time series) and May it still reached 84%, sinking to 81% in June, and remaining at this level in July and August. At individual terminal or country level, monthly utilisation rates can be quite volatile, depending on the arrival of cargoes and the hourly regasification capacities.

- In France, the utilisation rate turned up in Q2 2022; based on annual nameplate capacities the French average utilisation rate was above 100% in April and May 2022, whereas in June it fell back sharply probably owing to maintenance works, but rebounded in July and August. In Italy, also having higher utilisation rate than the EU average, it rose 87% in March 2022, and well above 100% in Q2 2022. Utilisation rates in Spain remained stable between March and June 2022, around 54%, falling below 50% in August, which was below the EU average. In the UK utilisation the average utilisation rate rose above 80% in April 2022, but diminished afterwards, reaching fairly lower levels during summer 2022 (around 31%).

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 Refinitiv. Regasification capacities are based on data from International Group of Liquefied Natural Gas Importers (GIINGL) and Gas Infrastructures Europe (GIE)

1.4 Policy developments and gas infrastructure

- On 7 April 2022, the EU Energy Platform[13] was established at a first meeting with EU countries, to secure the EU's energy supply at affordable prices in the current geopolitical context and to phase out dependency on Russian gas. The platform will play a key role in pooling demand, coordinating infrastructure use, negotiating with the international partners and preparing for joint gas and hydrogen purchases. The Platform is practically operational as of June 2022. The Commission will prepare a proposal to implement joint purchasing in accordance with technical specifications prepared with the industry and in full compliance with the EU competition rules. Joint purchasing will help to ensure better access to new or additional gas sources across EU Member States and support the security of supply.

- There is a justifiable need for Member States to rally behind the Platform and support the joint purchasing mechanism, as an instrument that should benefit all Member States in the EU. The Commission, the Member States and the Energy Community countries identified five Regional Groups (South-East Europe, Central and Eastern Europe, South West Europe, North West Europe and Baltics and Finland) to work under the Energy Platform. The Regional Groups are helping to get a better understanding of potential demand to be pooled in the joint purchase scheme, once established, and it is intended to finalise the five regional action plans in the forthcoming period. Inputs from companies in the gas market are key for this mechanism to be successful. Therefore, the Commission will also establish the Industry Advisory Group, aiming at looking at arrangements of such as joint tendering and creating of joint ventures for the purchase of gas.

- Following Russia's announcement on switching to rouble based payments for natural gas shipments at the end of March 2022, an increasing number of EU Member States faced the situation of decreasing or completely terminating Russian gas supplies from Gazprom. On 3 April, Lithuania voluntarily decided not to comply with the Russian decree on payments in rouble and terminating the import of Russian gas. In other cases however, the announcement of termination came from the Russian side. On 27 April, Gazprom terminated all shipments to Poland and Bulgaria (both countries had long-term contracts ending this year). On 12 May, Gazprom announced to use no longer the Yamal pipeline for gas deliveries. On 21 May, Russia stopped gas deliveries to Finland, and on 31 May, it terminated to deliveries to Shell Deutschland (Germany), Gas Terra (Netherlands) and Orstedafter (Denmark).

- In the following month, June 2022, further gas importing partners of Gazprom have joined the row. On 15 June, the announcement came on stopping supplying gas to French gas utility Engie, and on the reduction of gas supplies to Eni (Italy) and to OMW (Austria). On 16 June, gas supplies to Czechia were also cut back, without any particular reason but principally relating to decreasing flows through Nord Stream 1, supplying the OPAL pipeline to Czechia. On 17 June, Gazprom announced cutting back supply to Slovakia, principally via the transit route through Ukraine. Looking at all of these announcements together, Gazprom decreased contractual shipments to a dozen EU Member States, in an annual volume of 25 bcm[14].

- On 5 May 2022, the Gas Interconnector Poland-Lithuania (GIPL) was formally inaugurated[15], boosting regional gas security of supply in Poland, the Baltics and Finland and increasing the possibilities use of LNG terminals of Klaipeda in Lithuania and Świnoujście in Poland, having increasing importance in this part of the EU amid the current geopolitical context. The capacity to transport gas from Lithuania to Poland is expected to reach 1.9 bcm per year in 2022, and gas transportation capacity from Poland to Lithuania will be 2 bcm per year. As a project of common interest (PCI), it was a key project supported by the EU's Trans-European Networks for Energy (TEN-E) policy and has received EUR 266.3 million co-financing from the Connecting Europe Facility (CEF). Within the broader framework of the Baltic Energy Market Interconnection Plan, the GIPL project follows the completion of the Baltic connector and the Estonian-Latvian interconnector, which ensured the integration of Finland into the internal gas market.

- After proposing an outline of a plan ("communication") to make Europe independent from Russian fossil fuels in March, the Commission adopted the Repower EU Plan[16] on 18 May 2022. The Repower EU Plan has three clear objectives: phasing out our dependence on Russian fossil fuels; easing the burden of high energy prices and speeding up the transition to renewable energy and become more energy efficient. Regarding the need to tackle the high and volatile energy prices, REPowerEU encourages both short-term and long-term measures focusing on three parallel priorities: energy savings, diversifying gas suppliers and fast-forwarding the green transition. The diversification of gas suppliers will largely be facilitated by the aforementioned EU Energy Platform.

- On 15 June, Gazprom announced that it would reduce flows via Nord Stream 1 to 60% of the total pipeline capacity, due to issues with spare parts for one of the compressors[17]. According to their arguments, it was the failure of the German producer that gas-pumping units could not be returned in time they took for repairs. However, in the assessment of the European Commission, sanctions in force in themselves would not have hampered returning the spare parts in question. Russia's technical supervisory organisation also identified other concerns at the Portovaya facilities and ordered a temporary halt for some equipment. Later in June, gas flows were further reduced to only 40% of the total capacity of the pipelines, and on 25 July, shortly after the usual maintenance period between 11 and 21 July, resuming flows were further reduced to 20% of the total capacity[18]. At the beginning of September another, non-planned three-day long maintenance period followed, and from this time on no further flows occurred

[13] https://energy.ec.europa.eu/topics/energy-security/eu-energy-platform_en
[14] Source: DG ENER data collection
[15] https://ec.europa.eu/info/news/inauguration-gas-interconnection-between-poland-and-lithuania-2022-may-05_en
[16] https://eur-lex.europa.eu/resource.html?uri=cellar:fc930f14-d7ae-11ec-a95f-01aa75ed71a1.0001.02/DOC_1&format=PDF
[17] https://www.bloomberg.com/news/articles/2022-06-14/gazprom-caps-flows-via-key-eu-route-by-40-amid-technical-issues
[18] https://www.reuters.com/business/energy/gazprom-cut-nord-stream-1-gas-supplies-33-mcm-july-27-2022-07-25/

through Nord Stream 1. Russian has linked the reduction of flows to sanctions the EU imposed upon them. At the end of September, both Nord Stream 1 and 2 (the latter has never been put in operation) suffered damages on international waters, probably owing to hostile actions on the infrastructure, resulting in a significant gas leakage in the Baltic Sea and putting into question the eventual return of Nord Stream 1 into operation.

- On 9 June 2022, Freeport LNG liquefaction terminal announced to shut down exports following an explosion incident[19]. Freeport LNG operates one of the largest LNG liquefaction and export facilities in the world; specifically, it is the seventh-largest in the world and the second-largest in the U.S. Therefore, this shutdown would likely impact European and Asian LNG markets. With its 15 mtpa (21 bcm) liquefaction capacity, the facility provides for around 20 per cent of U.S. LNG processing, and it has of particular importance in supplying Europe. The outage was originally estimated to last only for three weeks, however, at the end of summer news were circulated on resuming 85% of its operational capacity by November 2022 and full capacity only by March 2023[20].
- At the same time, on 2 June 2022, after extensive repairs and improvement work, Hammerfest LNG liquefaction plant (Norway) is back in production after the fire in September 2020[21]. Repairs of sophisticated equipment and compressors have been performed, in addition to a scheduled turnaround and ordinary maintenance. The plant's annual liquefaction capacity is 6.5 bcm and before the fire incident it ensured 4-5 bcm LNG imports in the EU. Its return to operation has of particular importance in ensuring gas security of supply in the EU, amid dwindling gas imports from Russia.

1.5 Storage

- Figure 19 shows EU gas stock levels as the percentage of storage capacity in gas years[22] 2020 and 2021, compared to the 5-year range of gas years 2015-2019. According to figures published by Gas Infrastructure Europe, operational EU storage capacity amounts to 1,148 TWh (roughly 102 bcm) as of July 2021[23].

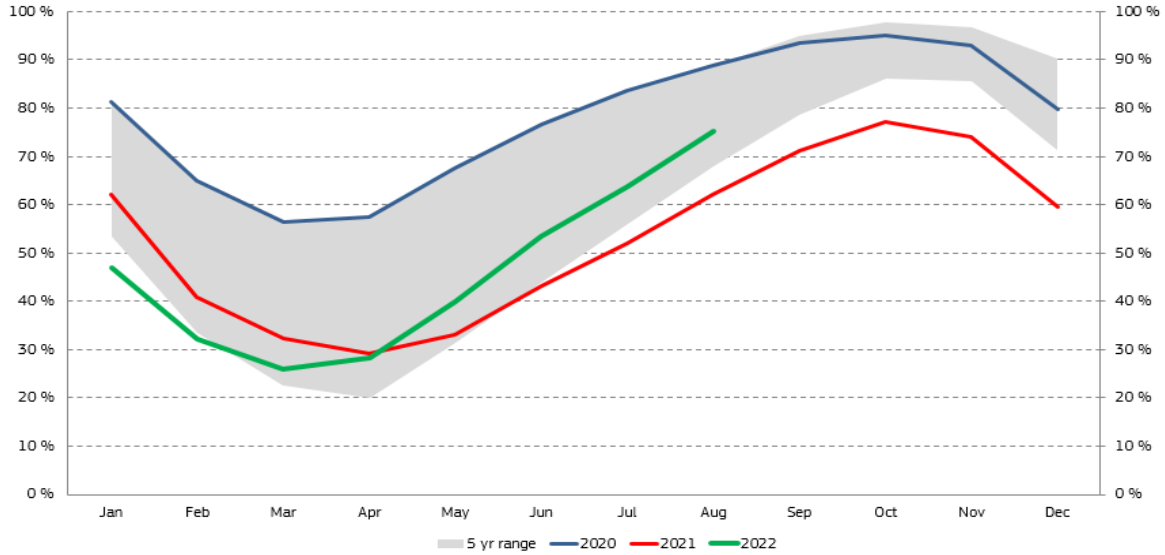
- The second quarter of the year is traditionally the start of refilling period of gas storages in the EU. Concerns on security of gas supply ahead of winter 2022/23 and the slow pace of the last storage filling period in 2021 has put an accent on refilling of storages. Some countries began to refill their storages well before April, owing to the relatively mild winter. The differential between quarter-ahead and two quarters-ahead prices to spot contracts was also favourable during Q2 2022, giving a strong incentive to refill storages (in contrast to 2021, when the forward gas price curve was in backwardation). The European Commission has also put forward an initiative on compulsory filling rates of gas storages ahead of the next heating season (setting an objective of 80% filling rates by 1 November 2022 for most of the Member States).

- On 31 March 2022, the average storage filling rate in the EU was 26.3%, which was only lower by 4 percentage points compared to 31 March 2021 (30.2%), however, compared to the five year average of 2016-2020 the gap was more than 8 %. On 30 June however, the EU average filling rate rose to 58.2%, which was higher than on the same day in 2021 (47.5%) but was lower than the five year average (63%). In Q2 2022 storage injections were faster than a year before, and this was facilitated by rapidly increasing LNG inflows to the EU, increasing pipeline flows from several directions, with lower gas consumption, even amid dwindling LNG imports from Russia. Further in July and August, the average EU filling rate was growing faster than in 2021, and at the end of August 2022 the average EU filling rate was 80.3%, being higher than on the same day in 2021 (67.2%), but still a bit lower than the average of 2016-2020 (83.6%). In April-May 2022 the weather was milder than the same cold period in 2021, enabling quicker replenishment of the underground gas storages in the EU.

- Since the start of the storage filling season until the spring of 2021, storages operated by Gazprom could be characterised by much lower filling rates compared to other facilities, which resulted in lower than usual overall filling rates on EU averages. However, as of May 2022 filling rates started to catch up in the formerly Gazprom managed storages (the facilities of Bergermeer in the Netherlands, Rehden and Katharina in Germany, Haidach in Austria and Damboricein in Czechia were practically requisitioned, partly or totally, by the national governments upon the 'use it or lose it' principles of gas security of supply regulations) . Whereas by the end of June storage filling rates in formerly Gazprom managed facilities stood at 25.7% (vs 58% of the EU average), by the end of August this gap diminished (68.3% vs. 80.3% at EU average)

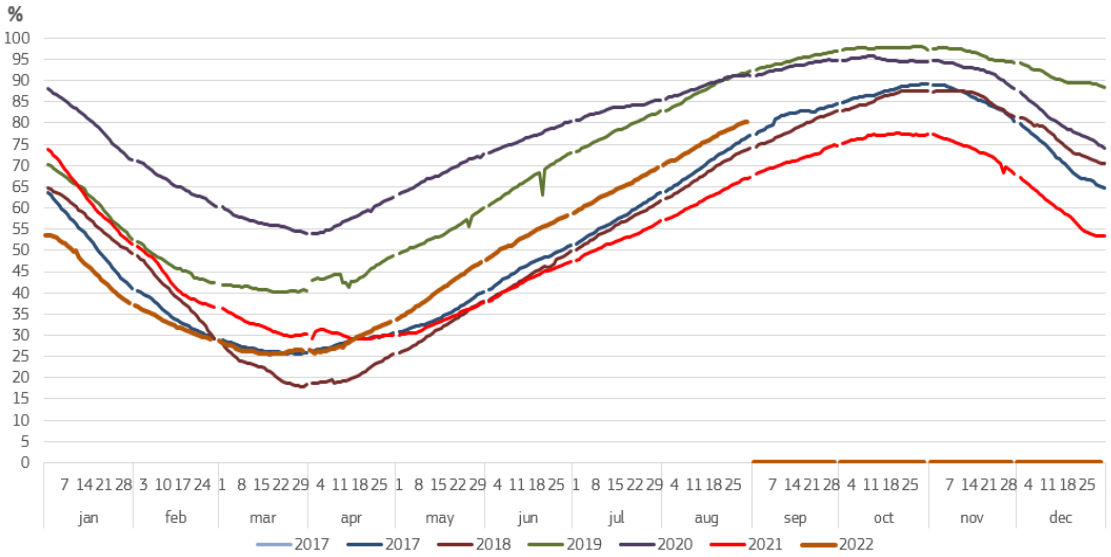
[19] https://www.offshore-energy.biz/freeport-lng-to-shut-down-for-three-weeks-minimum-following-explosion/
[20] https://www.reuters.com/business/energy/freeport-lng-expects-further-delays-resuming-texas-plant-operations-2022-08-23/
[21] https://www.equinor.com/news/20220601-production-start-up-at-hammerfest-lng
[22] Gas year always starts on the 1 October of a given year, for example, gas year 2021 started on 1 October 2021 and will end on 30 September 2022
[23] https://www.gie.eu/transparency/databases/storage-database/

Figure 19 - Gas storage levels as percentage of maximum gas storage capacity in the EU in the middle of the month



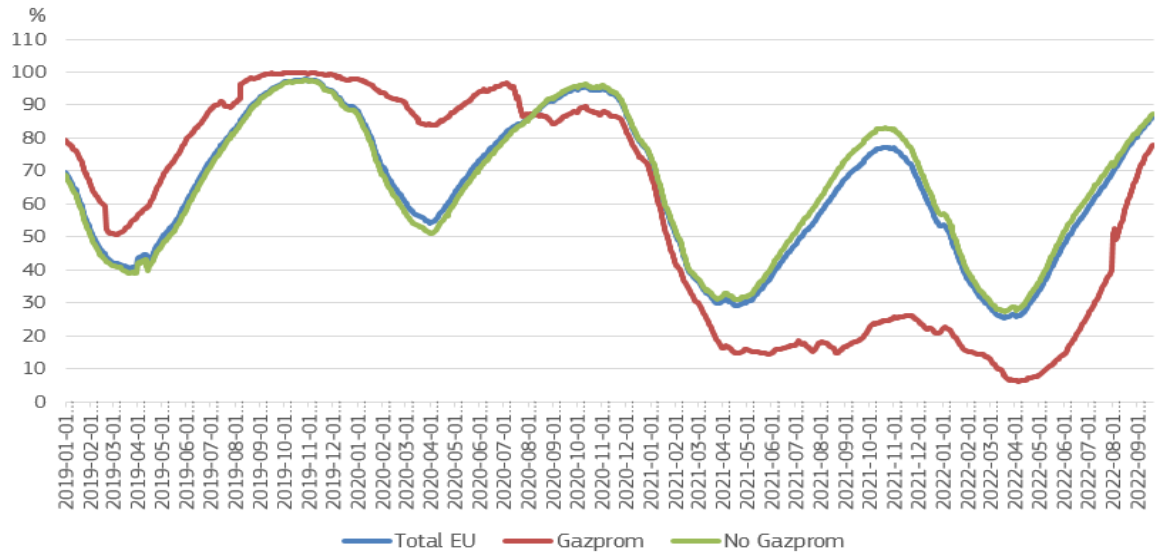
Source: Gas Storage Europe AGSI+ Aggregated Gas Storage Inventory, extracted on 12 September 2022. See explanations on data coverage at https://agsi.gie.eu/#/faq.The 5-year range reflects stock levels in years 2015-2019. The graph shows stock levels on the 15th day of the given month.

Figure 20 – Daily gas storage levels in the EU on average in per cent of total available storage capacities



Source: Gas Storage Europe AGSI+ Aggregated Gas Storage Inventory, extracted on 12 September 2022. See explanations on data coverage at https://agsi.gie.eu/#/faq.

Figure 21 – Difference in the filling rates of 'Gazprom-controlled' storages and other storages



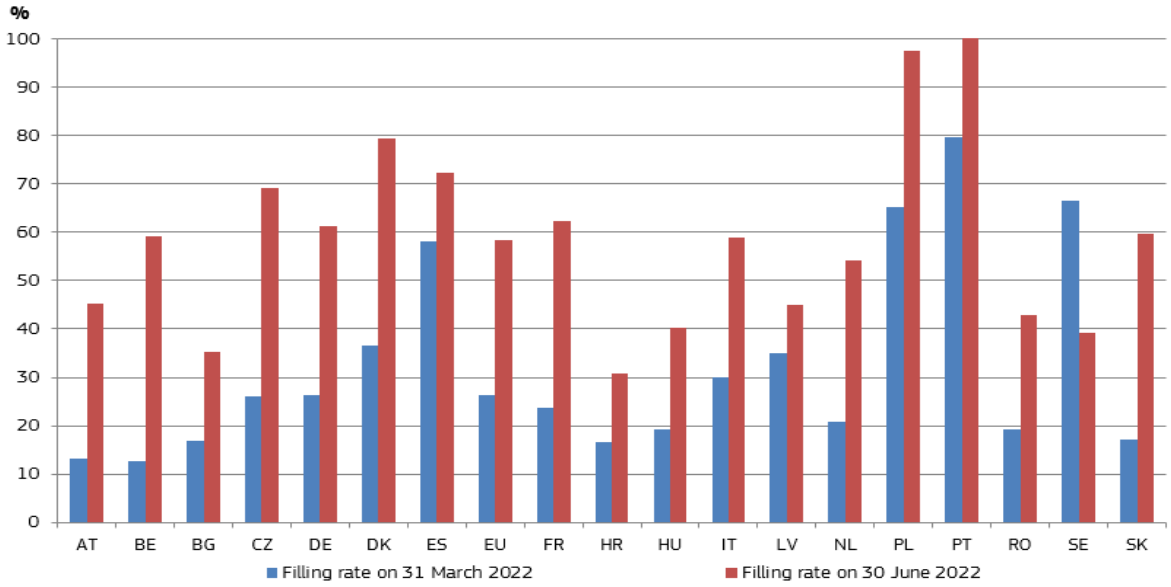
Source: JRC calculations, based on Gas Storage Europe AGSI+ data

- On 31 March 2022, the EU average filling rate was 26.3% with the lowest filling rates in Austria and Belgium (both 13%) and in Croatia and the Netherlands (both 17%), whereas the highest fullness rates could be observed in Portugal (80%), Sweden (67%) and Poland (65%). On 30 June 2022, the average rate was 58.3%, with the lowest filling rates measured in Croatia (30.7%) and Sweden (39.2%), whereas the highest rates could be observed in Portugal (practically 100%), in Poland (97.4%) and in Denmark (79.2%)

- Looking at the average filling rates on 30 June 2022, with the exception of Croatia and Italy (where actual filling rates were lower than the minimum of the 2017-2021 period) and Poland (where the actual filling rate was higher than the maximum of the 2017-2021 period) all actual rates were in the 2017-2021 minimum-maximum range.

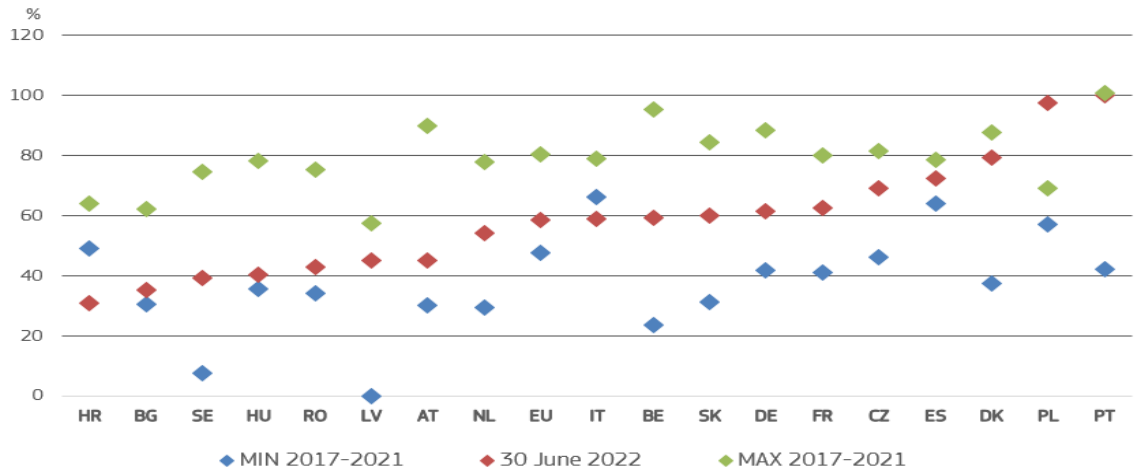
- The average EU injection rate between 31 March and 30 June 2022 was 32 percentage points, whereas it was only 17 percentage points in Q2 2021. The lowest injection rates in Q2 2022 could be observed in Latvia (9 percentage points), Croatia and Spain (both 14 percentage points), whereas the highest injection occurred in Czechia, Denmark and Slovakia (43% for all of the three countries). In Sweden (though having minimal storage capacities) filling rates even decreased by 27 percentage points in Q1 2022.

Figure 22 - Gas storage levels as percentage of maximum gas storage capacity at the end of March and June 2022 by Member State



Source: Gas Storage Europe AGSI+ Aggregated Gas Storage Inventory, extracted on 12 September 2022. See explanations on data coverage at https://agsi.gie.eu/#/faq. Injection level data in Sweden changed significantly for the first time since the first data reporting period in March 2017. Nevertheless, the Swedish storage facility has a limited capacity (10 mcm), mainly used for LNG storage.

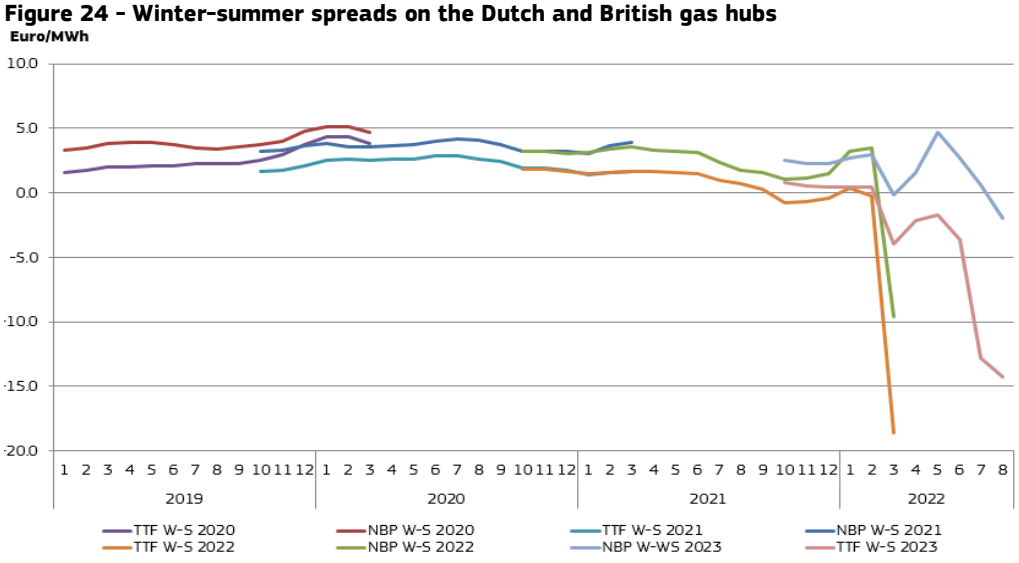
Figure 23 – Gas storage levels on 30 June 2022, compared with five-year minimums and maximums



Source: Gas Storage Europe AGSI+ Aggregated Gas Storage Inventory, extracted on 12 September 2022

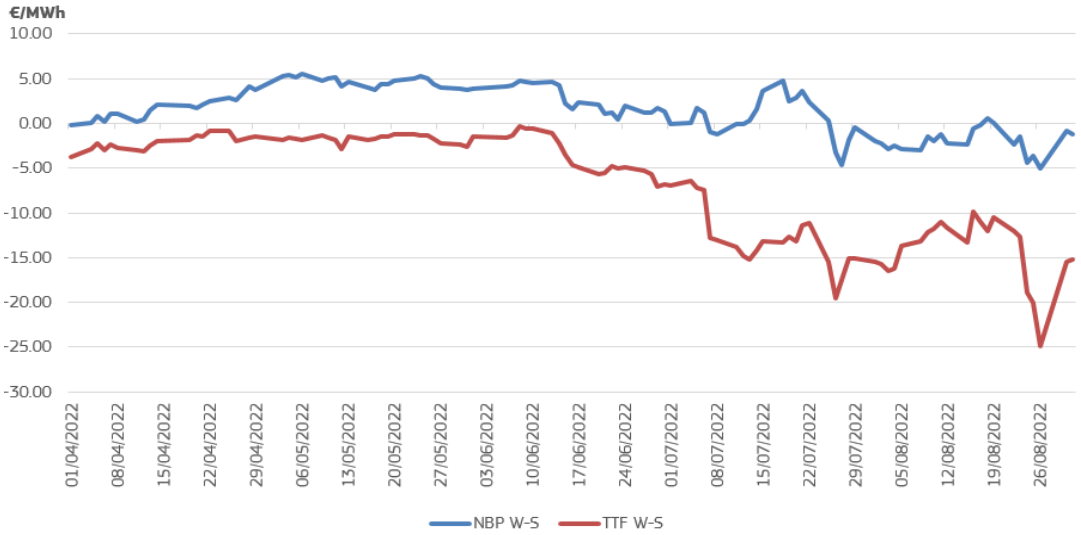
- The next two charts (Figure 24 and Figure 25) show the winter-summer spreads, (difference in the winter and summer contracts for given years). Difference between winter and summer contracts, if positive, give incentive to gas storage operators to inject gas during the injection (summer) season, as winter contract prices are higher, so the storage activity is profitable. In the case of negative winter summer spreads there is a lack of such incentive, implying that storing gas is not profitable, assuming all other factors unchanged. Figure 26 also shows the difference between the spot prices and quarter-ahead and two quarters-ahead contracts, which on the short run could be a good metric for assessing incentives to refill gas storages for the next heating season.
- On the TTF, 2022 seasonal spreads were slightly in the negative range in April, May and June (respectively at -2.2 €/MWh, 1.7 €/MWh, and 3.6 €/MWh). It is worth to recall that as of 1 April, winter summer spreads refer to the difference between winter 2023/2024 contracts and the 2023 summer contracts. This metric in Q2 2022 and beyond in July and August showed a deepening trend in the negative range, abruptly increasing spot prices dragged up year-ahead (practically summer 2023) contracts. Therefore the TTF winter-summer spread fell to as low as -20-25 €/MWh by the end of August 2022.
- However, looking at the difference between the spot TTF prices and quarter-ahead and two quarters-ahead contracts, they were mostly in the positive range during Q2 2022, and in July and August as well, indicating incentives on the market to fill up gas storages (this was reflected in faster refilling over summer 2022 than a year before). With contracts for Q1 2023, signalling the peak of the withdrawal period, spot prices differentials were less visible than with quarter and two quarters ahead contracts.
- At the same time, the seasonal spread on the NBP remained in the positive range in April, May and June (reaching respectively 1.6 €/MWh, 4.7 €/MWh and 2.7 €/MWh), primarily owing much lower spot and forward contracts on the NBP compared to the continental peers amid abundant LNG influx to the British gas wholesale market.

Figure 24 - Winter-summer spreads on the Dutch and British gas hubs



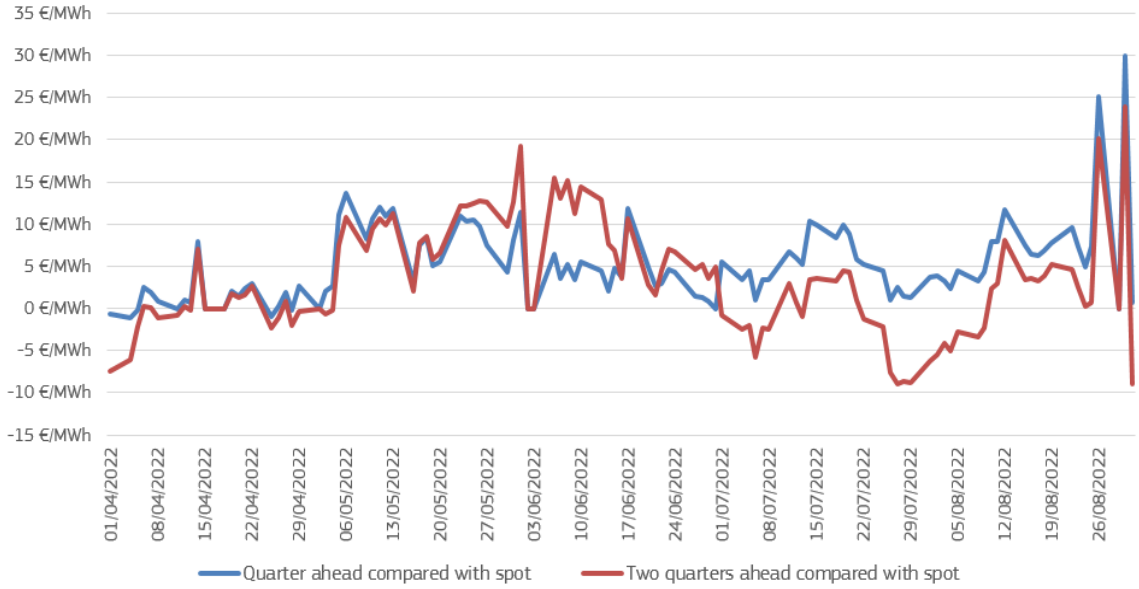
Source: S&P Global Platts
W-S 2020 refers to the premium of the winter 2020-21 contract over the summer 2020 price, W-S 2021 refers to the premium of winter 2021-22 contract over the summer 2021 price, and W-S 2022 refers to the premium of the winter period of 2022/23 over the price in the summer period of 2022 price, W-S 2023 refers to the premium of the winter period of 2023/24 over the price in the summer period of 2023.

Figure 25 – Daily winter-summer spread on the Dutch TTF hub



Source: S&P Global Platts
W-S refers to W-S 2023.

Figure 26 – Spot TTF prices compared with quarter-ahead and two quarters-ahead contracts

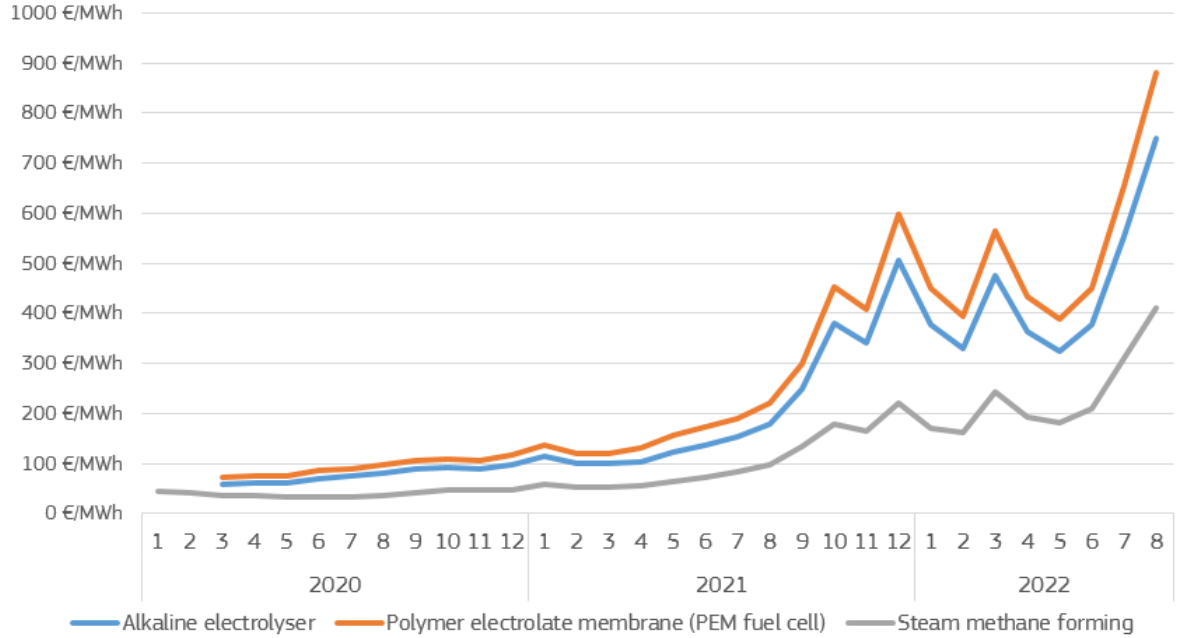


Source: S&P Global Platts

1.6 Hydrogen market developments

- The next chart shows the production cost-based estimated prices for hydrogen, generated by three different technologies. Alkaline water electrolysis is a type of electrolyser that is characterised by having two electrodes operating in a liquid alkaline electrolyte solution of potassium hydroxide (KOH) or sodium hydroxide (NaOH). A fuel cell is an electrochemical device that directly converts the chemical energy of reactants (a fuel and an oxidant) into electricity. Polymer electrolyte membrane (PEM) electrolysis is the electrolysis of water in a cell equipped with a solid polymer electrolyte that is responsible for the conduction of protons, separation of product gases, and electrical insulation of the electrodes. Steam methane forming (SMR) refers to a technology for producing hydrogen from natural gas; in the case on the chart below it includes the costs of Carbon Capture and Storage (CCS) as well.

Figure 27 - Production cost based hydrogen price assessments for different technologies (including CAPEX)



Source: S&P Platts. The calculated prices reflect both the commodity production cost and the capital expenditure associated with building a hydrogen facility.

- Whereas alkaline electrolysis and PEM technology costs predominantly depend on the electricity price, the costs of SMR technology is driven by the cost of natural gas used for producing hydrogen. Alkaline and PEM are related to green power (hydrogen generation cost assessment is practically based on green power costs, adding EU wind guarantee of origin prices to wholesale electricity prices), whereas costs of SMR hydrogen generation is based on costs of natural gas (by adding CCS costs).
- In April 2022, the TTF spot gas hub prices averaged at 100 €/MWh, falling to 88 €/MWh in May and rebounding to 107 €/MWh in June. At the same time, the Pan-European Electricity wholesale price was around 182 €/MWh in April 2022, falling to 169 €/MWh in May and bouncing back to 194 €/MWh in June. In July and August 2022 both wholesale gas and electricity prices in the EU markets continued to increase, reaching new monthly records. High and volatile wholesale gas and electricity prices over the last few months also resulted in large movements in hydrogen price assessments.
- Cost-based assessment price for alkaline technologies decreased from 476 €/MWh in March 2022 to 376 €/MWh in June 2022 but rebounded in July and August, reaching respectively 554 €/MWh and 750 €/MWh (including CAPEX costs), whereas prices of PEM fuel cell technology based generation fell from 564 €/MWh to 450 €/MWh in Q2 2022 (and rising to new record, 882 €/MWh in August 2022). These cost assessments were almost three times as high as wholesale electricity prices. At the same time, SMR technology based costs assessments fell from 242 €/MWh in March 2022 to 209 €/MWh in June (but rebounding in July and August, reaching 310 €/MWh and 410 €/MWh in the two months), being around twice the wholesale natural gas price in each month.
- On policy measures, the REPowerEU plan committed to complete the first Important Projects of Common European Interest (IPCEIs) on hydrogen. The first IPCEI, called "IPCEI Hy2Tech", which includes 41 projects and was approved in July 2022, aims at developing innovative technologies for the hydrogen value chain to decarbonise industrial processes and the mobility sector, with a focus on end-users.
- In September 2022, the Commission approved "IPCEI Hy2Use", a second project which complements IPCEI Hy2Tech and which will support the construction of hydrogen-related infrastructure and the development of innovative and more sustainable technologies for the integration of hydrogen into the industrial sector. The project, called “IPCEI Hy2Use” was jointly prepared and notified by

thirteen Member States. The Member States will provide up to €5.2 billion in public funding, which is expected to unlock additional €7 billion in private investments. As part of this IPCEI, 29 companies with activities in one or more Member States.[24]

2. Wholesale gas markets

2.1 EU energy commodity markets

- After the fourteen-year high peak reached in Q1 2022 (on 8 March 2022 when the Brent dated crude reached 138 USD/bbl – 126 €/bbl, being the highest since summer of 2008), amid oil products stocks releases coordinated by the IEA, oil spot prices became lower, falling to 100-110 USD/bbl (90-95 €/bbl) in April 2022. In early May the European Commission presented its sixth sanction package, which was adopted by the Member States in June 2022, resulting in a 90% crude oil imports reduction from Russia as of December 2022 (for refined products the measure takes effect in February 2023). Geopolitical tensions and fears on decreasing supply propelled Brent crude up to 132 USD/bbl (126 €/bbl) by mid-June. However, demand side impacts on the global oil market (renewed lockdowns in China, increasing fear of recession in the world economy) started to impact spot oil prices, and by the end of September they fell to 85-90 USD/bbl (87-92 €/bbl) The dollar continued its appreciation vis-à-vis the euro in the second and third quarters of 2022, and by September it crossed the parity, implying less decrease in consumers prices in the EU. The discount of year-ahead contracts vis-à-vis the spot contract widened from 14 USD/bbl (12 €/bbl) at the beginning of Q2 2022 to 28 USD/bbl (27 €/bbl) by mid-June, whereas it fell back to 8 USD/bbl (9 €/bbl) by the end of September 2022, in parallel with decreasing spot prices.

- After reaching a peak in Q1 2022 (212 €/MWh on average on 8 March), at the beginning of Q2 2022 the daily average spot TTF gas price fell below 100 €/MWh, and remained in the range of 80-100 €/MWh during most of the time until mid-June, as fears on imminent supply disruption of Russian gas imports became less intense. However, as Russian gas supplier Gazprom started to announce decrease or termination of gas shipments to an increasing number of EU countries (see Chapter 1.4) and inflows began to decrease, security of supply concerns arose again. In May 2022, Russian gas deliveries through the Yamal pipeline fell practically to zero, and as from mid-June flows on Nord Stream 1 were cut back gradually (in June two steps to 60% and 40% of the total capacity, at the end of July to 20% and by early September to zero). As result, the TTF spot price rose significantly, to 145 €/MWh by the end of June, to 200 €/MWh by the end of July, and on 26 August to all-time high, to 316 €/MWh. In September 2022, even with no more flows on Nord Stream, prices fell back, amid good storage filling levels and expectations on policy interventions to tackle high energy prices. Interestingly, the discount of the year-ahead price contracts to the spot TTF shrank from 34 €/MWh to 22 €/MWh over Q2 2022, and remained close to this level in most of Q3 2022, implying that forward price contracts followed increasing spot prices, and the market does not anticipate a quick decrease in wholesale gas prices.

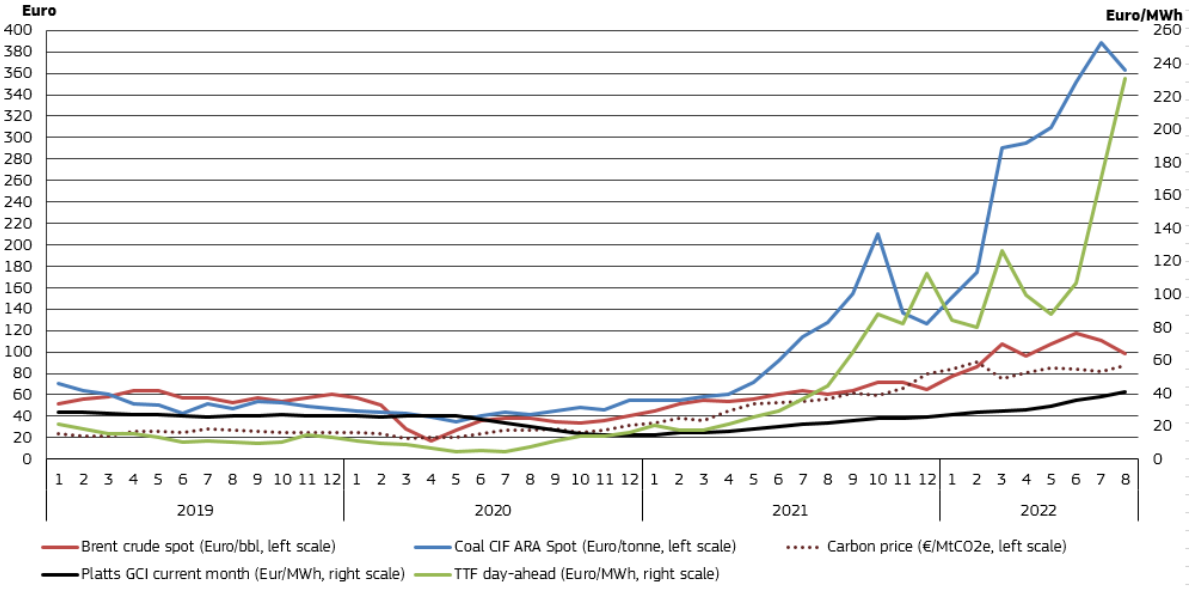
- Platt's North West Europe Gas Contract Indicator (GCI), a theoretical index showing a gas price linked 100% to oil, showed a measurable upturn in Q2 2022, mirroring the increase of crude oil prices in at the end of 2021. Typically, crude oil price changes appear in the oil-indexed contracts with a time lag of 6 months. GCI contracts rose from 29 €/MWh in March 2022 to 36 €/MWh in June 2022 (and rose further above 40 €/MWh in August 2022, which was the highest in more than a decade). High crude oil prices in Q2 2022 will filter in oil-indexed gas contracts in the second half of 2022. Amid current high gas wholesale prices, oil-indexed gas contracts offer a competitive opportunity for gas imports in the EU.

- Spot coal prices (CIF ARA) after retreating from 360 €/Mt measured early March, started Q2 2022 at 250 €/Mt, however, in parallel with the rebound of wholesale gas prices in Q2 2022, coal prices began to rise again. Demand for thermal coal in the EU increased as gas-fired generation became quite expensive, amid low hydro and nuclear availability in the EU power sector. In early May they rose above 300 €/Mt, and during the summer of 2022 they rose several times above 400 €/Mt. As of August 2022, import ban of Russian coal entered into force in the EU.

- Carbon prices in Q2 2022 showed a gradual increase and were at the beginning of April at 78 €/MtCO2e, whereas by the end of June they rose to 90 €/MtCO2e. During July and August they hovered around 80-90 €/MtCO2e during most of the time. In September, in parallel with general decrease in oil, gas and electricity prices, carbon prices also became lower.

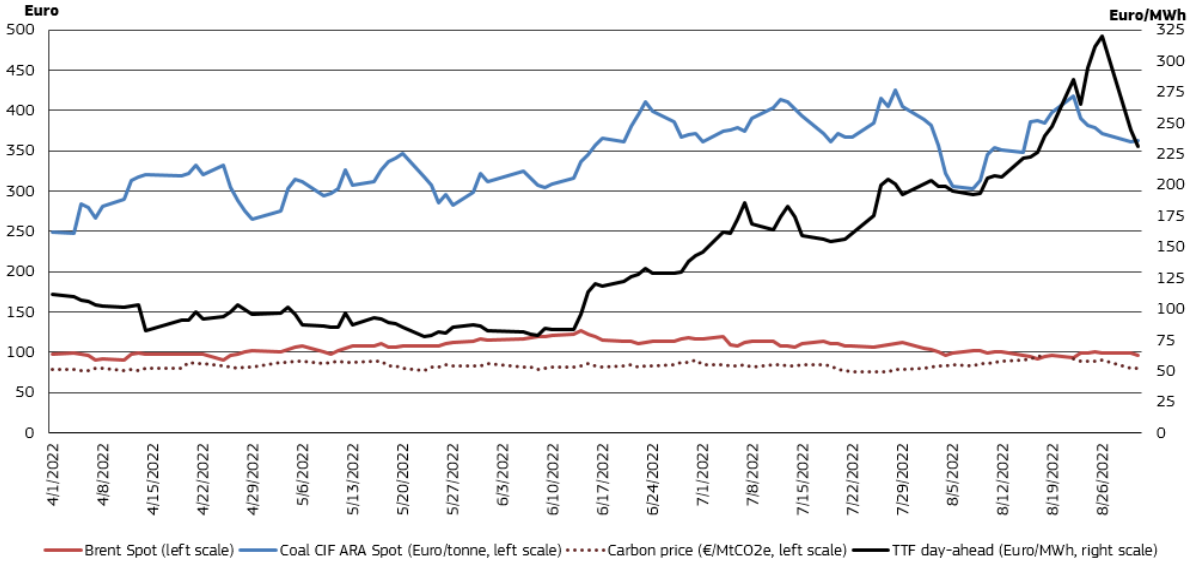
[24] https://ec.europa.eu/commission/presscorner/detail/en/ip_22_5676

Figure 28 – Monthly spot prices of oil, coal and gas in the EU



Source: S&P Global Platts

Figure 29 - Monthly spot prices of oil, coal and gas in the EU



Source: S&P Global Platts

2.2 LNG and international gas markets

- Figure 30 displays the international comparison of wholesale gas prices, including hub, LNG landed and pipeline import gas prices. In Q2 2022, the Henry Hub spot prices rose to the highest since September 2008, in May 2022 reaching 8 USD/mmbtu on average. In August 2022 the Henry Hub monthly average crept even higher, close to 9 USD/mmbtu. Increasing demand for LNG shipments from the US has impacted wholesale gas prices in the country, as Europe provided for a profitable destination for LNG to sell. As around half of LNG exports from the US were sent to Europe, the European gas market had increasing importance in shaping US domestic wholesale gas prices. Meanwhile, Asian contracts showed a measurable decrease in April and May 2022, while in June they turned up again on monthly average. The TTF followed a similar pattern, and many times in Q2 2022 and in July and August as well, it was in premium to the JKM, providing for good opportunity to lure LNG cargoes to Europe.

- The quarterly average Japanese LNG price was 27.2 USD/mmbtu in Q2 2022, down from 31.5 USD/mmbtu in Q1 2022, but up from 9.9 USD/mmbtu in Q2 2021. The price discount of the Japanese LNG deepened in Q2 2022 and turned out to be 3.5 USD/mmbtu, as opposed to 0.5 USD/mmbtu in Q1 2022. LNG import prices in China were comparable with their Japanese peers (27.2 USD/mmbtu in Q2 2022).

- Chinese pipeline gas imports, presumably mostly based on oil-indexed contracts, were at 7.4 USD/mmbtu in Q2 2022, up from 6.9 USD/mmbtu in Q1 2022, and from Q2 2021 (5.3 USD/mmbtu), having a significant price advantage vis-à-vis LNG imports (with the aforementioned quarterly average price of 27.2 USD/mmbtu in Q2 2022). High global (Asian and European) spot LNG prices are likely to ensure the competitiveness of oil-indexed contracts in the forthcoming months, even if recent price increases on the oil market are still to be priced in during the forthcoming few quarters.

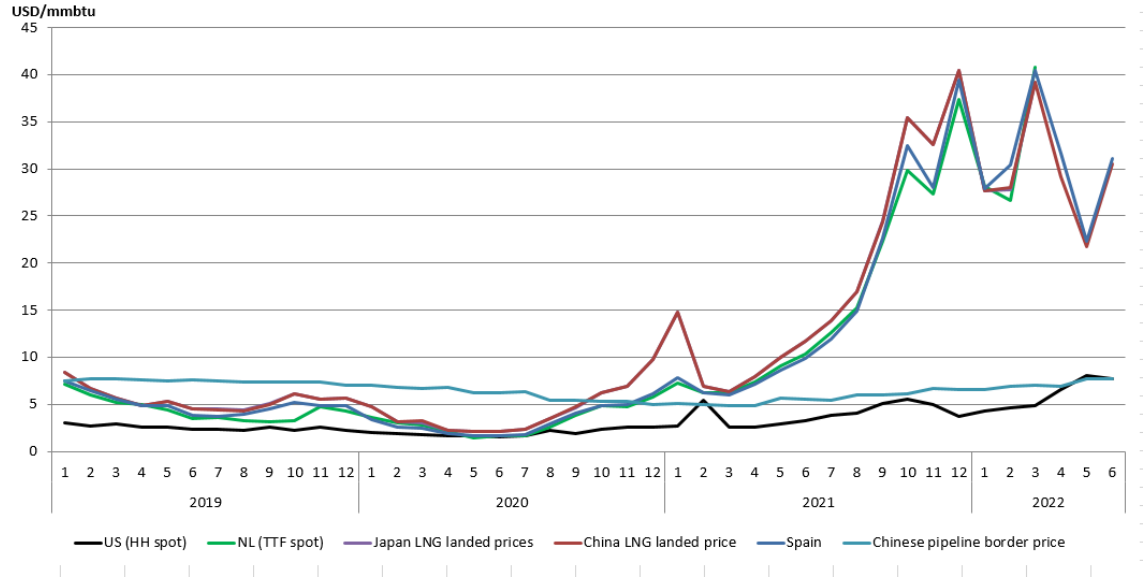
- The Henry Hub price rose by 61% quarter-on-quarter in Q2 2022 (to 7.4 USD/mmbtu from 4.6 USD/mmbtu in Q1 2022) and rose by 150% year-on-year (from 2.9 USD/mmbtu). As Figure 31 shows, both TTF and JKM continued to show measurable premiums vis-à-vis Henry Hub. In April and May 2022, TTF developed a premium to JKM, as Figure 32 shows, which resulted in an attractive gas market for LNG cargoes in Europe in these periods. High TTF prices in July and August ensured an even bigger premium to the Asian markets. On quarterly average, TTF had a premium of 23 USD/mmbtu (down from 27 USD/mmbtu in Q1 2022), whereas JKM had a premium to TTF of 20 USD/mmbtu (down from 27 USD/mmbtu in Q1 2022). The euro continued its depreciation against the USD in Q2 2022 (in March 2022 the exchange rate was 1.10, whereas in June it fell to 1.05), but this did not really impact the difference between the TTF and the Henry Hub.

- In the second quarter of 2022, TTF averaged at 30.7 USD/mmbtu (98 €/MWh), at a similar level of Q1 2022 - 31.8 USD/mmbtu (97 €/MWh). The average German border price in Q2 2022 was lower than the TTF (18.9 USD/mmbtu or 60 €/MWh, but up from 16.6 USD/mmbtu or 51 €/MWh in Q1 2022), showing that the impact of high spot prices in the long term contracts in the German gas import mix, presumably either still oil-indexed or hub indexed, will appear only with a few months' time lag, resulting in less volatility compared to the European hub spot prices.

- In Q2 2022, the Spanish LNG landed price was 28.3 USD/mmbtu on average, showing a discount to the Dutch TTF spot (30.7 USD/mmbtu). In April and May 2022 north-western and south-western LNG import prices were already in discount to TTF, and this deepened further in the summer months of 2022, owing to grid bottlenecks hampering the LNG flows from west to east and to the impact of uncertainties over gas inflows from the East (see Figure 32).

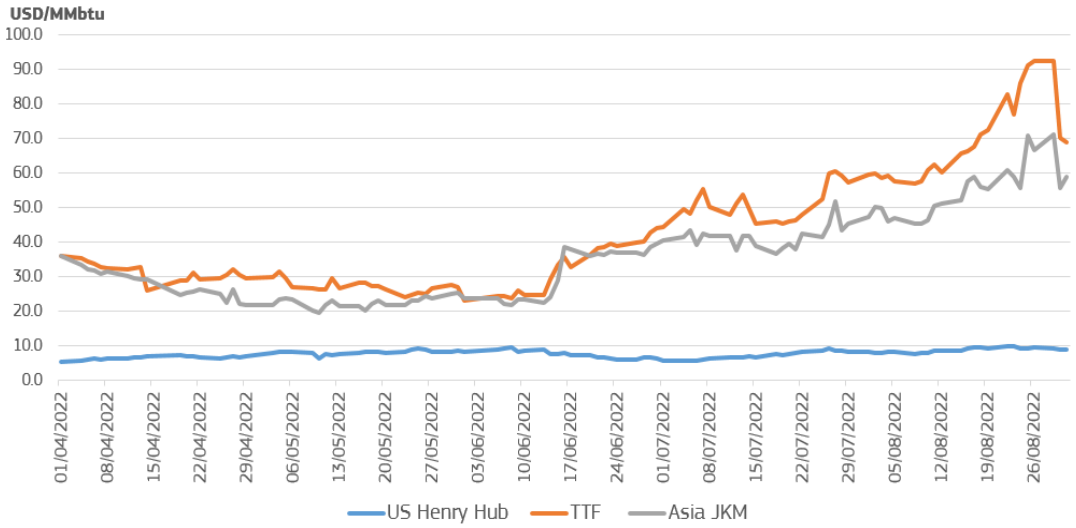
- Average LNG landed prices in China and Japan reached 27.2 USD/mmbtu in the second quarter of 2022. At the same time, the JCC (Japanese Crude Cocktail) contracts reached 16.2 USD/mmbtu, up from 14.9 USD/mmbtu in Q1 2022 on average, and almost doubling year-on-year (8.6 USD/mmbtu in Q2 2021), showing the impact of the increase in oil prices, but were significantly lower than both the Japanese LNG import price (27.2 USD/mmbtu), and the TTF (30.7 USD/mmbtu).

Figure 30 - International comparison of wholesale gas prices



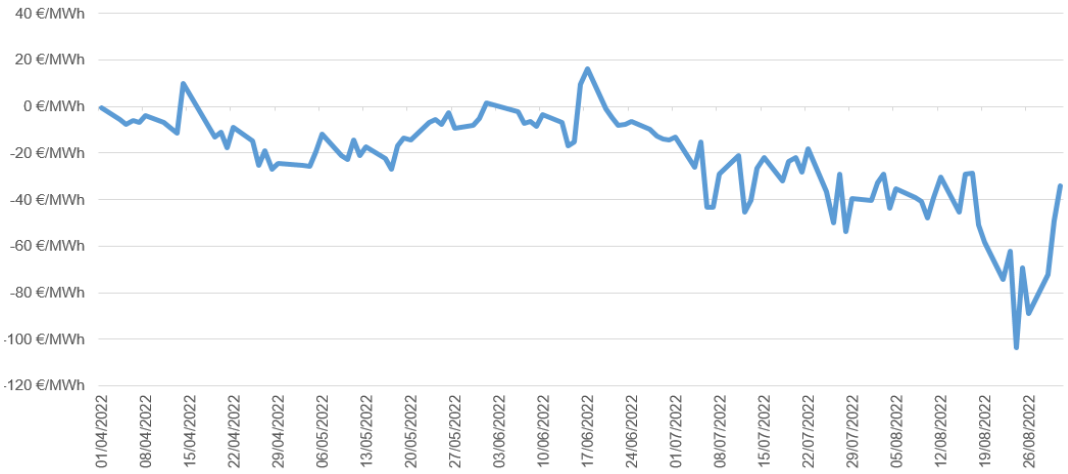
Sources: S&P Global Platts, Refinitiv, BAFA, CEIC

Figure 31 – Daily average prices on the TTF (Dutch), the US Henry hub and the JKM Asian reference index



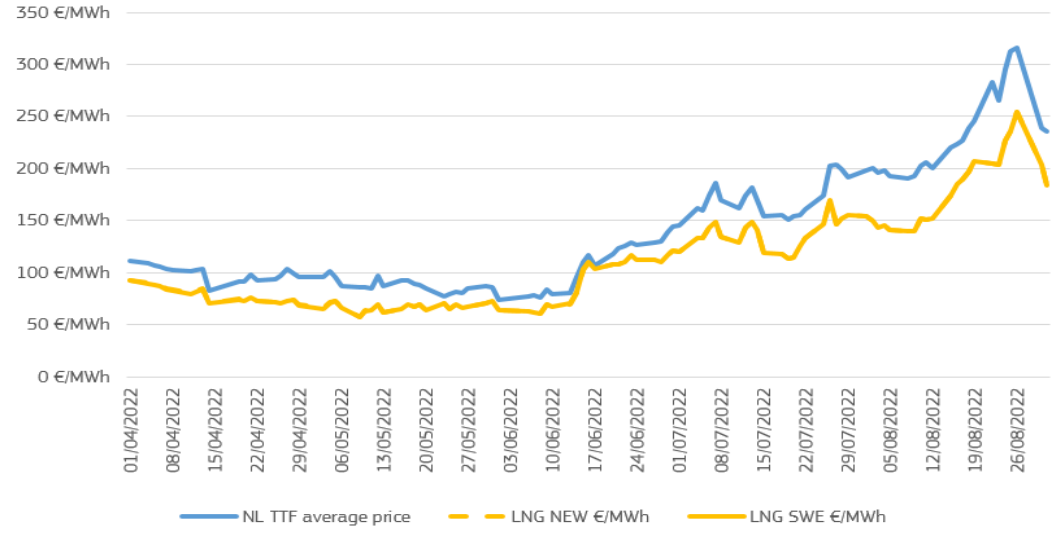
Sources: S&P Global Platts

Figure 32 – The difference of the daily JKM and TTF spots



Sources: S&P Global Platts

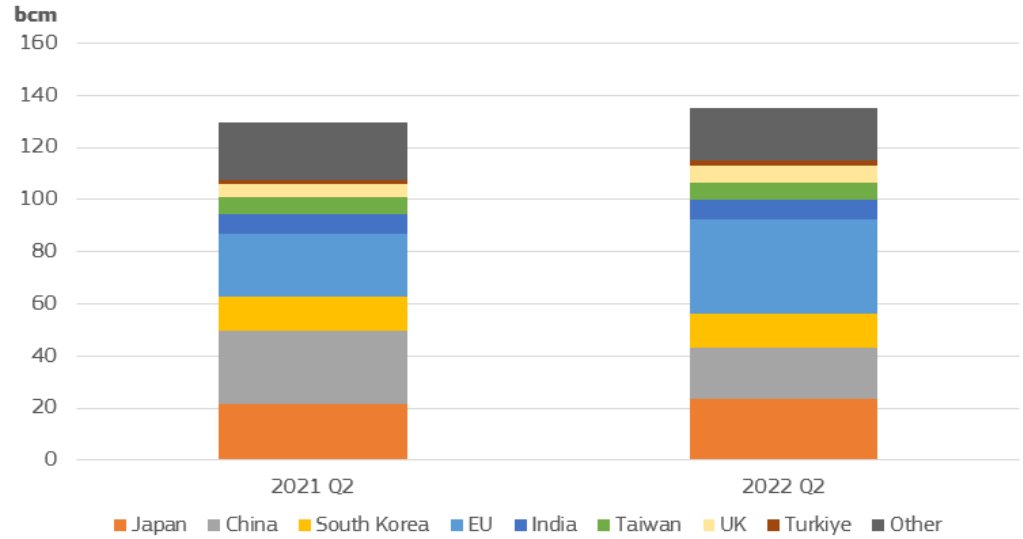
Figure 33 – LNG import benchmarks on north-western and south-western Europe compared with TTF



Sources: S&P Global Platts

- The next two charts show the key actors of global LNG trade on importer (consumer) and exporter (producer) side. In the second quarter of 2022, the EU as a block of 27 countries remained the largest LNG importer in the world (with an import of 36 bcm), owing to favourable sales prices in Europe, whereas Japan came to the second place, with imports of 23.6 bcm. China was only the third biggest LNG importer (19.5 bcm), followed by South Korea (13.1 bcm), India (7.4 bcm), Taiwan (6.7 bcm), the UK (6.6 bcm) and Turkiye (1.8 bcm). The total global LNG market could be estimated at 135 bcm in Q2 2022, up from 129 bcm in Q2 2021. Compared to the second quarter of 2021, a significant increase could be observed in the EU as total (49%, +12 bcm), the UK (35%, +1.7 bcm) and Turkiye (+20%, by 0.3 bcm), whereas in China imports fell by 30% (-8.3 bcm), along with those in India (by 5%, -0.4 bcm). In the first half of 2022, the three biggest LNG importer were: the EU (as block of 27 countries – 66 bcm), Japan (52 bcm) and China (42 bcm)

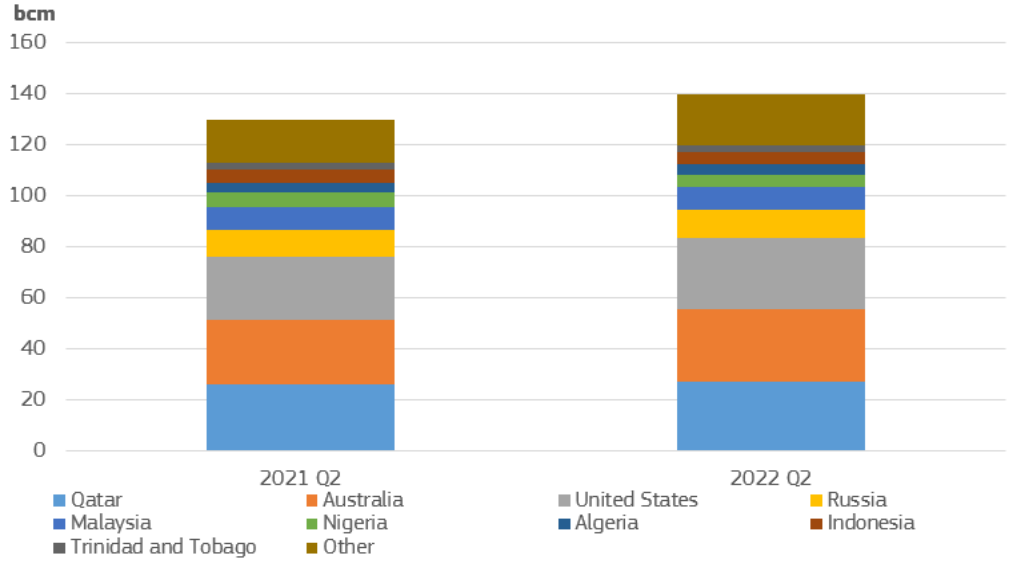
Figure 34 – LNG imports in the main consumer markets in the second quarters of 2021 and 2022



Source: Refinitiv tracking of LNG vessels. Import data are based on cargo arrival dates, therefore total amount of global imports might differ from global export numbers

- On the exporter side, in Q2 2022 the three biggest exporters delivered similar volumes. Australia exported 28 bcm, slightly more than the United States (27.9 bcm) and Qatar (27.5 bcm). The fourth biggest LNG exporter was Russia (11 bcm), followed by Malaysia (9 bcm), Nigeria (5.1 bcm), Indonesia (4.7 bcm), Algeria (4 bcm) and Trinidad and Tobago (2.7 bcm). Looking at year-on-year changes, LNG exports rose by 13% in the US (+3.2 bcm) and in Australia (10%, +2.6 bcm), whereas it fell substantially in Nigeria (-10%, 0.6 bcm) and in Trinidad and Tobago (-9%, 0.3 bcm). In the first half of 2022, the three biggest LNG exporters were: the United States (57 bcm), Australia (54 bcm) and Qatar (53 bcm).

Figure 35 – LNG exports from the main gas producers in the second quarters of 2021 and 2022



Source: Refinitiv tracking of LNG vessels. Export data are based on cargo departure dates, therefore total amount of global exports might differ from global import numbers

2.3 European gas markets

2.3.1 LNG contracts in Europe

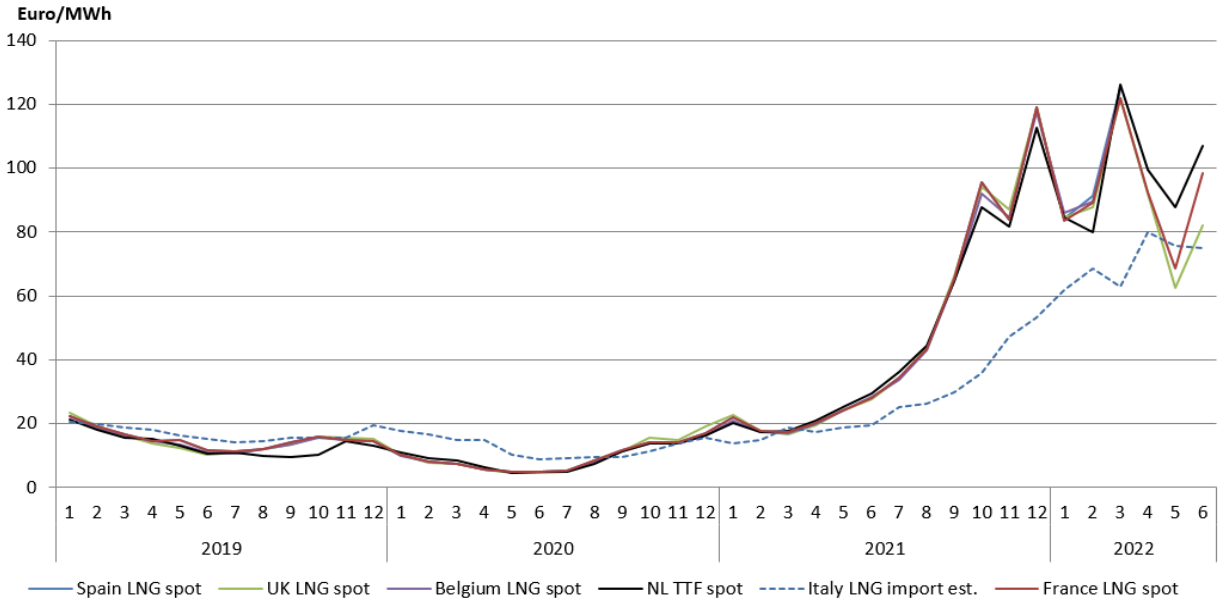
- Figure 36 displays the evolution of spot LNG prices paid in the UK, Spain, France, Belgium and Italy, compared with the TTF spot benchmark. With the exception of Italy, where LNG prices are estimated from commercial statistics (Eurostat COMEXT), using the imported values and volumes of LNG, other markets represent landed prices based on vessel movements (data from Refinitiv).

- In the second quarter of 2022, hub prices and hub-based import price contracts in western-Europe first fell back in April-May from the peaks measured in March 2022, however, in June 2022 they turned up again amid decreasing flows from the East. Looking merely the hub based contracts, unlike in the previous quarters, a clear sign of divergence appeared, and differentials in June 2022 amounted to 18 €/MWh (in March the differential was less than 2 €/MWh) as UK hub prices became cheaper compared to the continental peers. However, if we take into account the Italian COMEXT derived average price, the difference was more than 25 €/MWh (however, down from March when it reached 42 €/MWh), implying that LNG import contracts in Italy are either not fully linked to spot prices or there is a time lag impact, which will be only observable in the following periods. All in all, even in that contact we can observe a measurable increase compared to earlier periods.

- The TTF hub price, considered for a long time as price setter of LNG import contracts, showed an increasing premium to most the LNG import hub prices in Q2 2022, owing to the abundance of LNG imports and grid bottlenecks hampering flow of LNG from western European terminals to other parts of the continent.

- The Q2 2022 quarterly average hub-based prices showed for the first time since several quarters decreases quarter-on-quarter (between 10 and 20%. In year-on-year comparison, most contracts showed more than three-fold increases. The estimated price increase for LNG import contracts in Italy showed an upturn of 19% quarter-on-quarter, while year-on-year it went up by 310%.

Figure 36 - Price developments of LNG imports in the UK, Belgium, Spain and Italy, compared to the TTF benchmark



Note: Landed prices for LNG. Source: S&P Global Platts, Refinitiv, European Commission estimates based on Eurostat COMEXT data, retrieved on 15 September 2022.

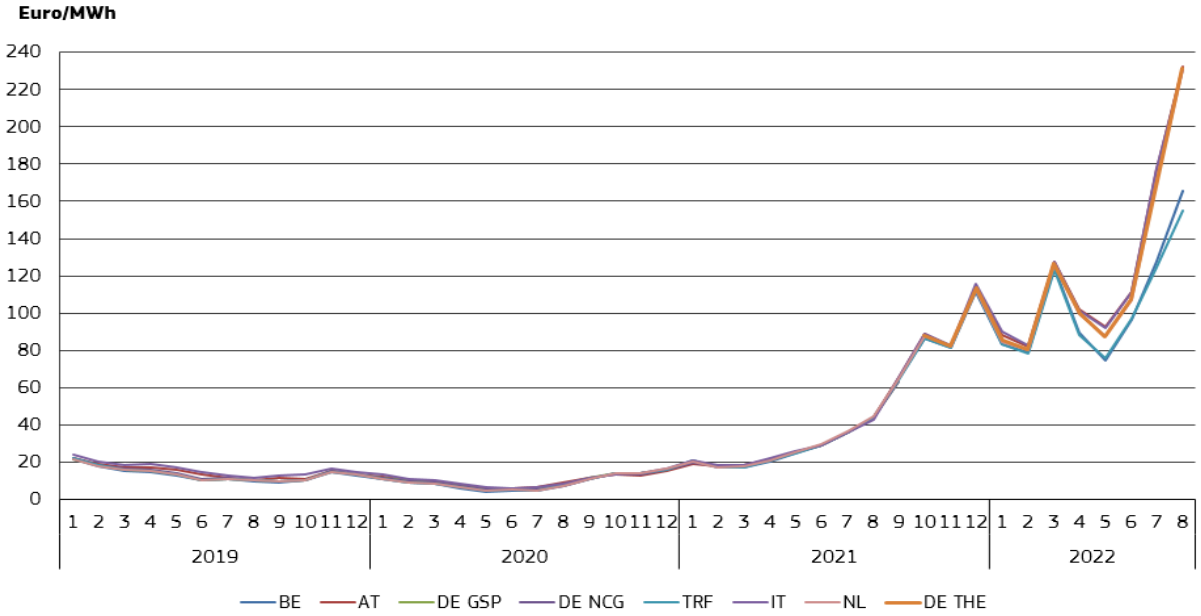
2.3.2 Wholesale price developments in the EU

- European hub prices, after reaching record highs in March 2022, fell back in April and May, but as of June they rebounded to touch new peaks in August 2022. In Q2 2022 they reached 87-102 €/MWh on quarterly average and were only slightly lower than in the previous quarter, Q1 2022 (95-101 €/MWh), reflecting the volatility of monthly prices within Q2 2022. Hub prices in year-on-year comparison showed a three-fold increase, compared to the price range in Q2 2021 (25-26 €/MWh). The average TTF hub price was 98 €/MWh in Q2 2022, significantly up from 25 €/MWh measured in Q2 2021. In August 2022, European hub prices were in a range of 155-232 €/MWh, implying new record highs.

- In the second quarter of 2022, principally geopolitical tensions, Russia's war against Ukraine, moved the market, and announcements from Russian side to reduce or terminate gas shipments to the EU markets. From the EU and its Member States

new policy measures arose to start to decouple from Russian gas supply and to replenish gas storages before the new heating season in autumn 2022.

Figure 37 - Wholesale day-ahead gas prices on gas hubs in the EU



Source: S&P Global Platts

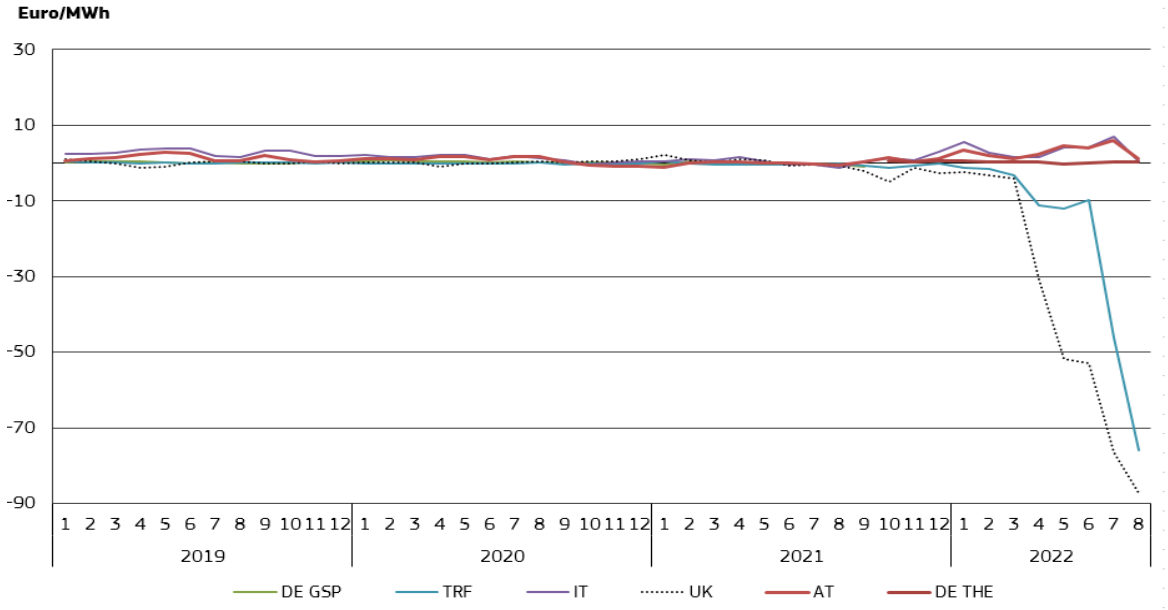
- As Figure 38 and Figure 39 show, the French TRF market was in discount to the TTF during most of the time in Q2 2022, and this discount showed an increasing trend throughout the quarter and beyond in July and August 2022. During the summer months of 2022, high continental gas hub prices, principally the TTF, resulted in beneficial conditions to sell LNG in Europe. The abundance of LNG inflows resulted in price discounts of western European hubs to the TTF. In mid-June French wholesale gas prices reacted with a jump on news on outage of the US Freeport LNG terminal. During Q2 2022 Spain exported gas to France during many periods as PVB prices were even in discount to the TRF market.

- Compared to other western European benchmarks, the German THE market remained closely aligned with the TTF, owing to less direct access to LNG (though bookings for import gas via Netherlands increased as supply from the east became uncertain) during Q2 2022. In the month of April, an outage on the Norwegian infrastructure resulted in decreasing inflows to Europe, however, this did not widen the differential between THE and TTF. At the end of June, the German government moved to the further phase of the gas emergency plan alarm level.

- Both the Italian PSV and the Austrian VTP wholesale gas hub prices were in premium compared to the TTF market practically throughout the whole Q2 2022. The Italian and Austrian markets were impacted by news on gas inflows from Russia, and the Italian market by the aforementioned Freeport incident as well. Around 11 May news from Ukraine on terminating flows through one interconnection point (Sokshranivka on the Russian-Ukrainian border) added to the upward price pressure on the market, while as of mid-June decreasing flows on Nord Stream 1 increased hub prices in Austria and Italy as well.

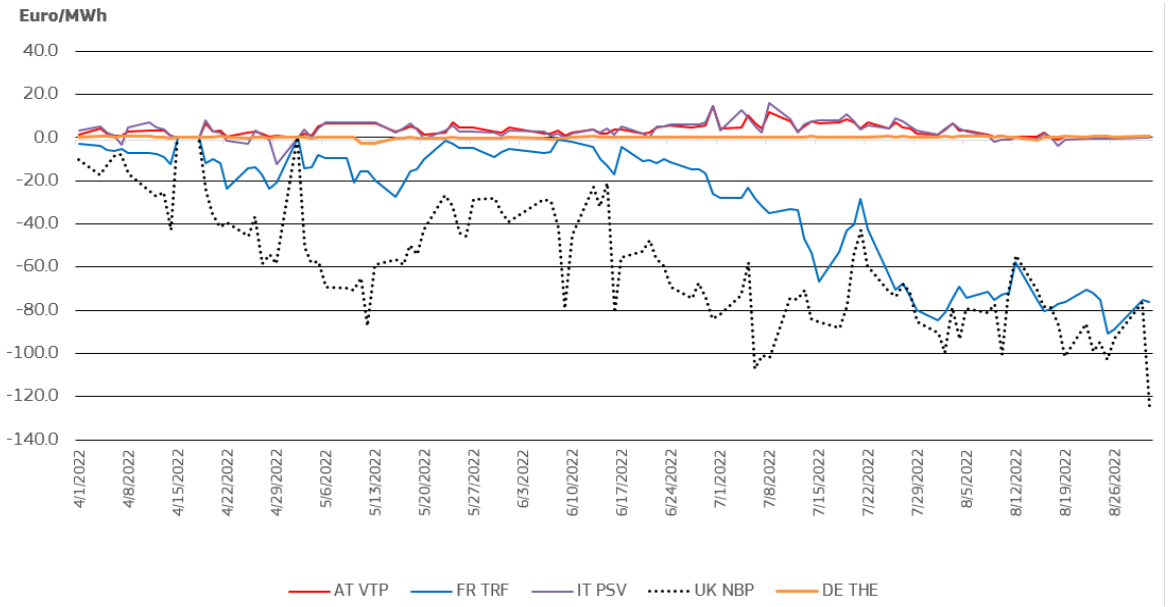
- During the second quarter of 2022, and in July and August beyond, the NBP hub developed a significant discount to the TTF, principally owing to abundant LNG shipments to the United Kingdom. In mid-May this discount reached 80 €/MWh and in early June it was higher than 100 €/MWh (at the end of August even reaching 120 €/MWh), implying that NBP hub prices amounted to less than half to that of TTF in these periods. At the end of May maintenance works on Norwegian infrastructure supply Britain resulted in increasing prices, and as of June dwindling Russian inflows to the continent also exerted and upward price pressure on NBP. However, UK gas exports towards the continent remained very strong in Q2 2022, amid significant price differentials.

Figure 38 - Premium of monthly average wholesale day-ahead gas prices at selected hubs compared to TTF



Source: S&P Global Platts, European Commission computations

Figure 39 - Premium of daily average wholesale day-ahead gas prices at selected hubs compared to TTF

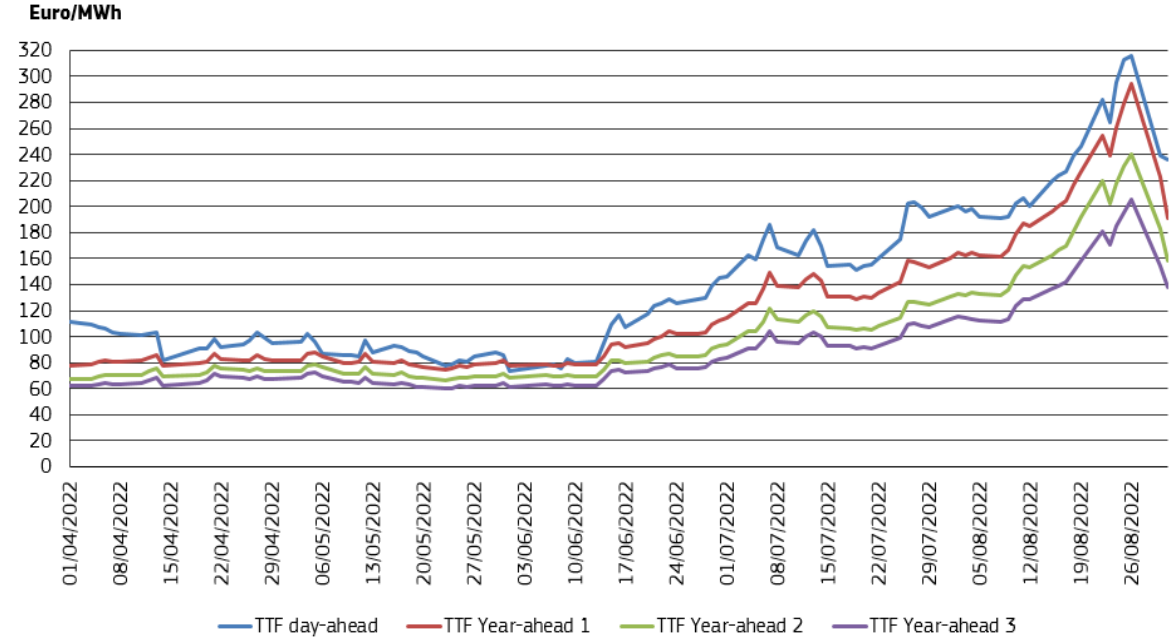


Source: S&P Global Platts, European Commission computations

- Figure 39 looks at the development of forward prices of one-year, two-year and three-year ahead contracts in comparison to the development of the day-ahead price on the Dutch TTF.

- Daily spot prices on the TTF hub, starting the quarter at 111 €/MWh, proved to be quite volatile over Q2 2022. At the beginning of Q2 2022, year-ahead, two years-ahead, and three years ahead contracts respectively were 78 €/MWh, 67 €/MWh and 62 €/MWh. By the end of June the spot-year-ahead discount amounted to 145 €/MWh, and the three forward contracts mentioned above respectively reached 113 €/MWh, 93 €/MWh and 83 €/MWh, which implies that in Q2 2022 forward curve prices also showed a significant upturn, as the market does not anticipate a quick return to lower price levels. On 26 August, as daily spot prices reached a historical peak of 316 €/MWh, the discount of the year-ahead contract amounted to 22 €/MWh, even lower than at the beginning of April or at the end of June. However, discount of three-year ahead contracts widened, rising from 49 €/MWh on 1 April to 62 €/MWh at the end of June and to 97 €/MWh on 26 August, implying that on mid-term the market reckons with lower spot prices.

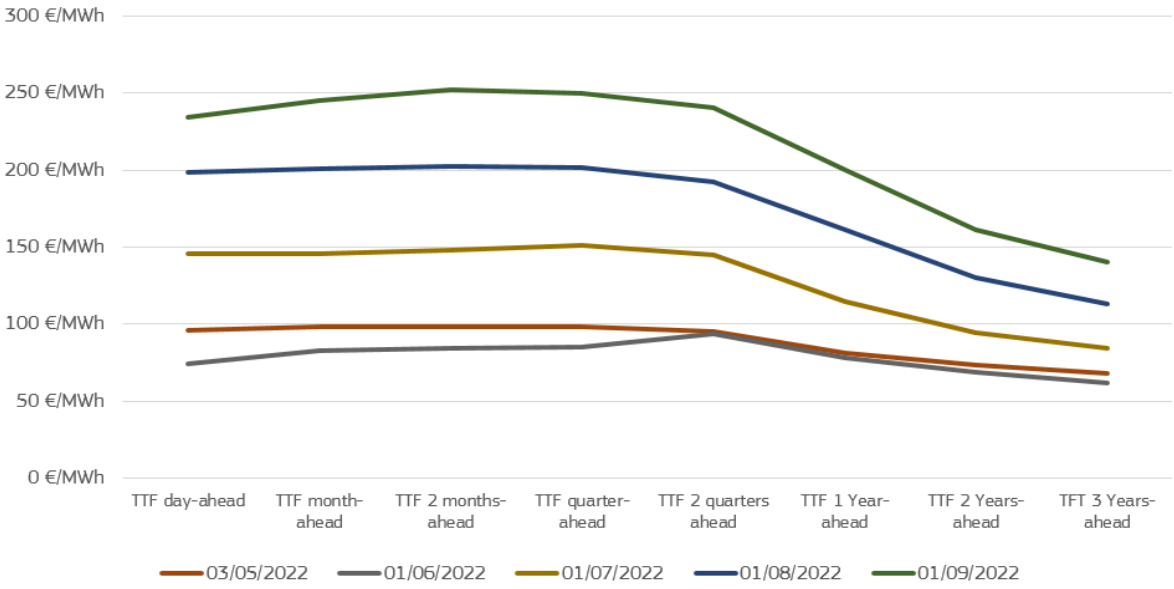
Figure 40 - Forward gas prices on the TTF hub



Source: S&P Global Platts

This expectation on ongoing high prices can also be followed on Figure 40, showing the forward price curves on the TTF market at the beginning of each month. Between June and September 2022 the forward curve shifted upwards significantly as the market anticipated a much higher price trajectory over the forthcoming years, even three-year ahead prices were up from 100 €/MWh to 150 €MWh.

Figure 41 - Forward price curves on the first trading day of each month on the TTF wholesale gas market



Source: Title Trading Facility (TTF)

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

- Figure 41 compares a selection of estimated border prices of pipeline gas deliveries from the main exporters to the EU: Russia, Norway, Algeria and Azerbaijan. For comparison, the evolution of the day-ahead prices on the Dutch TTF hub is also presented on the chart.

- In the second quarter of 2022, the estimated Algerian pipeline import price in Spain was 41.5 €/MWh, up by 16% compared to the previous quarter (28.9 €/MWh), and by 172% compared to Q2 2021. The Algerian contract clearly reflects the time-lagged impact of the increasing crude oil prices. In Q2 2022, the average estimated Algerian import price in Spain continued to be in a deep discount to the Spanish LNG import prices (91 €/MWh), providing a competitive advantage for Algerian imports. However, owing to the termination of the GME pipeline contract through Morocco in Q4 2021, import volumes to Spain could not increase further year-on-year, as the Medgaz pipeline, directly linking Spain with Morocco, also operated at nearly full capacity.

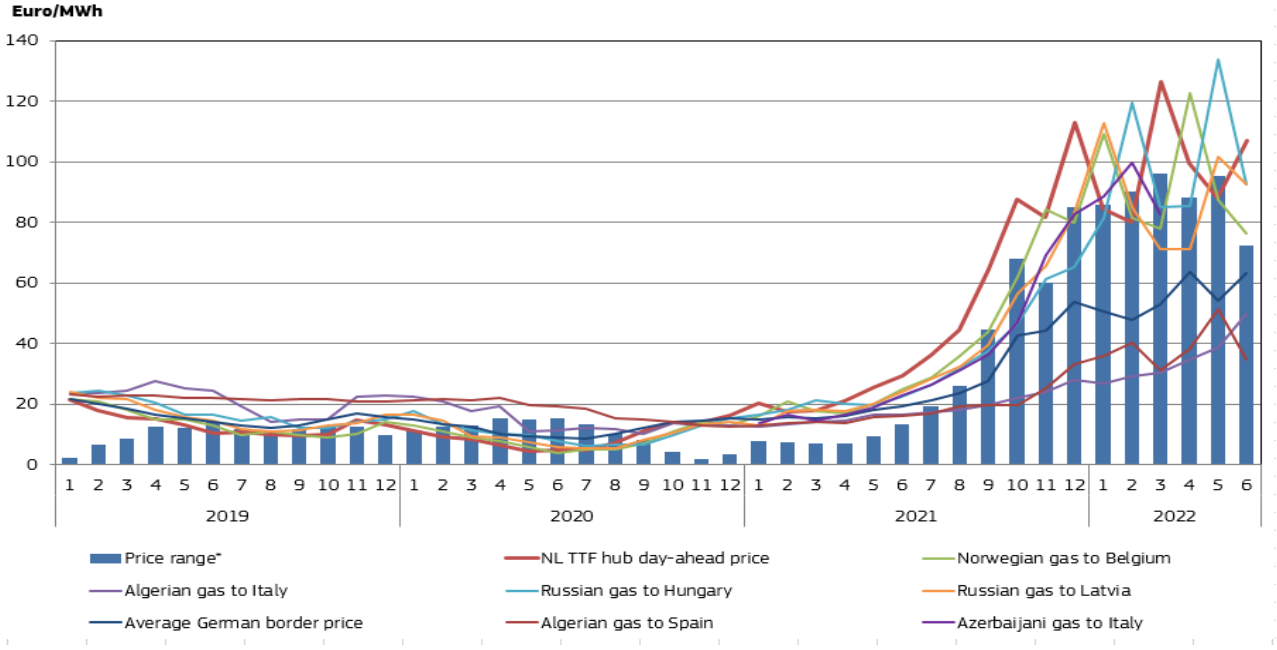
- Algerian gas import price in Italy (41.1 €/MWh) was close to that in Spain in the second quarter of 2022. In quarter-on-quarter comparison, Algerian import price in Italy was measurably up, by 42%, and year-on-year it rose by 160% in Q2 2022. Pipeline gas imports from Algeria was down by almost 10% in Q2 2022 year-on-year in Italy (See Chapter 1.3 Imports). For the future, the current price advantage of oil-indexed contracts is likely to remain as long as spot gas prices are at current high levels, though high crude oil prices during spring 2022 will filter in the oil-indexed contracts during further quarters of 2022.

- Russian gas imports prices in Hungary showed an increase of 9% in Q2 2022 compared to the previous quarter, whereas in the case of Latvia import prices were slightly down, by 1%. On year-on-year comparison, Russian import prices showed four-to-five fold increases in both countries. This implies a much closer mirroring of European hub prices compared to the oil priced contracts, implying that the latter must have had a minimal share in the pricing formulae. Hungarian import gas prices of Russian origin averaged at 104 €/MWh in Q2 2022, whereas in Latvia they amounted to 88 €/MWh in the same period.

- Prices of European gas contracts continued to show a measurable divergence in Q2 2022, as the difference between the cheapest and most expensive contract fell from 96 €/MWh in March 2022 to 72 €/MWh in June 2022. In Q2 2022, the TTF spot prices proved to be the more expensive compared to the observed import contracts, as it takes some time till spot prices filter in the import contract pricing. Without TTF, price differential would have only increased slighlty, from 55 €/MWh to 57 €/MWh between March and June 2022, however, in April-May 2022 it reached 88-95 €/MWh, implying that high and volatile price levels usually magnify differences between differently priced gas import contracts.

- Hub-based contracts and hub prices themselves showed a slight increase in the second quarter of 2022, with a significant intra-quarter price volatility. Reported German border prices also rose slightly (from 51 €/MWh to 60 €/MWh in Q1 2022). The average German border price had a discount of 35-40 €/MWh to the hub-based contracts, probably reflecting the impact of time lags in the indexation to hub prices or to oil contracts.

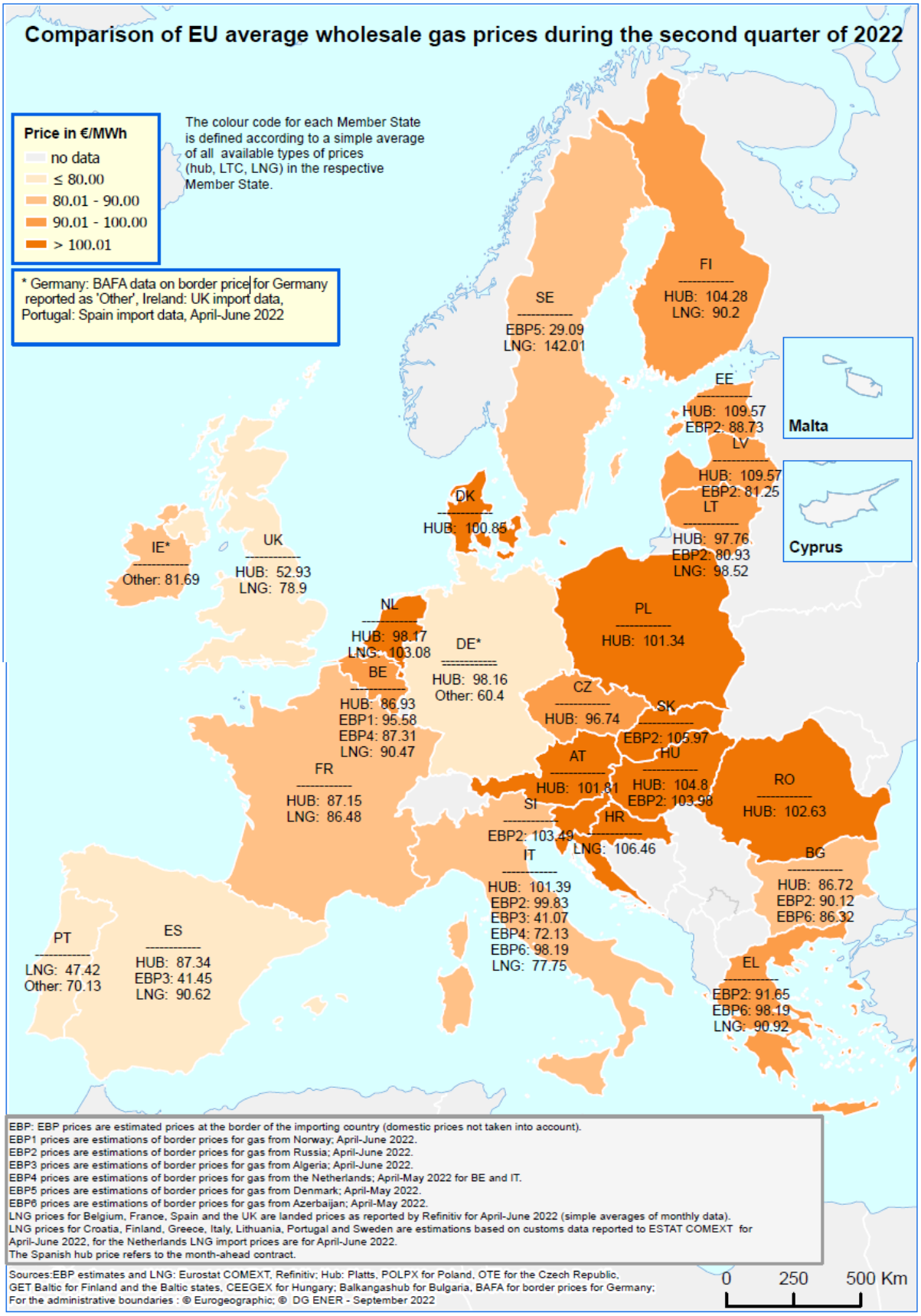
Figure 42 - Comparison of EU wholesale gas price estimations



Source: Eurostat COMEXT and European Commission estimations, BAFA, S&P Global Platts
*The difference between the highest and lowest price depicted on the graph
Note: Border prices are estimations of prices of piped gas imports paid at the border of the importing country, based on information collected by customs agencies, and are deemed to be representative of long-term contracts.

- Map 1 on the next page shows the different hub prices, estimated pipeline and LNG import prices in most of the European countries, giving an indication to wholesale gas prices in the given country in the second quarter of 2022. Owing to data revisions of national authorities, some average price numbers might change retrospectively, implying the need for a certain cautiousness when comparing the data on the current maps with those in earlier editions of this report.

Map 1 - Comparison of EU wholesale gas prices in the second quarter of 2022



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.

2.3.4. Gas trade on the EU hubs

- As Figure 43 shows, liquidity fell by 17% year-on-year (by 2 704 TWh) on the main European gas hubs in the second quarter of 2022, after falling by 2% in Q1 2022 and 6% in Q4 2021. The total traded volume in Q2 2022 amounted to around 13 140 TWh (equivalent to around 1 219 bcm, and in monetary terms representing €1 290 billion[25]). The Q2 2022 traded volume was around 18 times more than the gas consumption in the seven Member States[26] covered by the analysis in April-June 2022. Comparing to the EU as a whole, traded volume in Q1 2022 represented 14 times the total EU-27 gas consumption in this period.

- The year-on-year change in traded volumes in Q2 2022 fell practically on all observed trading hubs in Europe. Volumes on the largest and most liquid TTF hub fell by a staggering 21% year-on-year. Similarly to TTF, volumes on the Austrian VTP and on the Italian PSV shoed a double-digit percentage decrease (by 50% and 33% respectively). Traded volumes on the German THE hub (compared to the combined volumes of the separate NGC and Gaspool hubs in Q2 2021) were down by 7% and those on the Spanish PVB by 8%. Volumes were only up year-on-year in Q2 2022 on the French TRF (by a remarkable 84%). Traded volumes on the Belgian Zeebrugge hub went down (from a very low base value anyway) by almost nine tenth in Q2 2022 year-on-year. Traded volumes on British NBP hub, which was still the second biggest hub on the broader European market, decreased this time only slightly, by 4% compared to Q2 2021.

- As fall in traded volumes on the TTF (-21%) exceeded the decrease in traded volumes of the observed European markets (-17%), the share of TTF within the total European trade also decreased. In Q2 2022, TTF represented almost 69% in the total European gas trade, down from 72% in Q2 2021. If looking at only the EU countries, its share was bigger, 84%. The TTF hub became the most liquid European hub with good infrastructure connections, and its index is a benchmark referred to in Europe and in global gas trade as well. However, over the last few months LNG imports have a significant price discount to TTF, reflecting infrastructure bottlenecks in the EU gas grid. Traded volumes on the British NBP fell only by 4% in Q2 2022 compared to the same period of 2021, and at the same period the share of NBP rose to 18% in the total European observed trade, up from 15% in Q2 2021.

- Other markets had lower shares: the German THE, in spite of expectations after the merger of NGC and Gaspool, managed only to slightly increase its share (6.3% in Q2 2022, as opposed to 5.6% in Q2 2021), while the French TRF had a lower share, 3% (though doubling year-on-year), followed by PSV (1.9%) and VTP (1.2%), while the Spanish PVB and the Belgian Zeebrugge had only minor shares of respectively 0.3% and 0.1% in the European gas trade in Q2 2022.

- Net gas import in the EU rose by 3% in Q2 2022, however, LNG imports soared by a magnificent 49% year-on-year. However, consumption of natural gas was down by 16% at the same period. Although increasing imports and significant LNG send-out could have been supportive, traded volumes were down on the most liquid European hubs. Shifting trade from the OTC market to exchange-executed contracts was helped by permanently high and volatile prices as the number of traders being able to trade effectively decreased, owing to elevated default risks and increasing margin calls for smaller traders on the OTC market. Exchange-executed trade is close by in term, helping smaller traders to engage in this market, in contrast to the OTC, where collaterals cover a decreasing number of contract and margin calls might be invoked for insurance reasons, also pushing out smaller participants from the OTC market.

- The total traded volume in Q2 2022 amounted to 13 140 TWh in Q2 2022 on the observed European markets, and this was the lowest traded volume since Q3 2018, as Figure 44 shows.

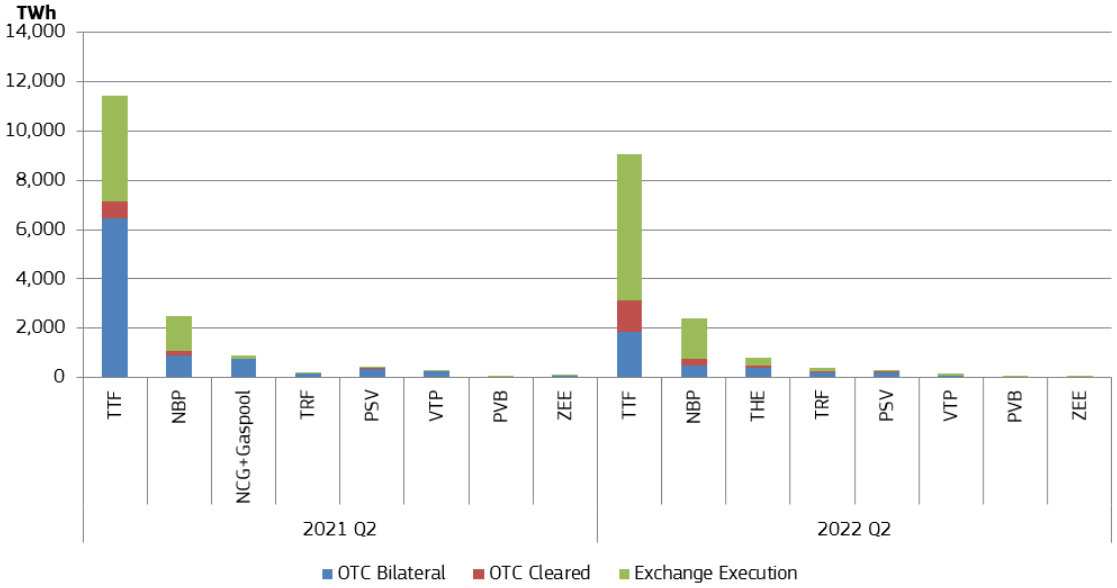
- The share of exchange executed contracts on the Dutch TTF hub was 65% in Q2 2022, which was the second highest among the observed countries, and was up by a remarkable 28% percentage points compared to Q2 2021. Only on the NBP market was the share of exchange executed contracts higher than that on the TTF (68%, 11 percentage points higher year-on-year). On the Austrian VTP, the share of exchange executed contracts was 51% in Q2 2022, up from only 14% a year before, while on the THE German hub it went up from 12% to 41% between Q2 2021 and Q2 2022. At the same time, on the Spanish PVB, the share of exchange executed contracts also amounted to 41%, somewhat lower (by 3 percentage points) than in Q2 2021. In contrast, on the French TRF the share of exchange executed contracts rose to 37% in Q2 2022 (up from 19% in Q2 2021). On Zeebrugge, the share of exchange-executed contracts was lower, only 11% (though up from 4% in Q2 2021), whereas it was the lowest on the Italian PSV, amounting to 1% in Q2 2022, similarly to the share a year before.

- On the European hubs as whole, in Q2 2022 25% of the total trade was OTC bilateral, 13% was OTC cleared, whereas the share of exchange-executed contracts rose to the highest over the last eight years (62%). The share of exchange-executed contracts increased by almost 25 percentage points year-on-year in Q2 2022, whereas the share of OTC bilateral fell by 32 percentage points, and that of OTC cleared went up by 7 percentage points.

[25] Assuming that all trade was carried out on the quarterly average spot price of the TTF hub. As spot in Q2 2022 had a considerable premium over some of the forward contracts, this amount might overestimate the monetised traded value.
[26] Netherlands, Germany, France, Italy, Belgium, Austria and Spain. 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.

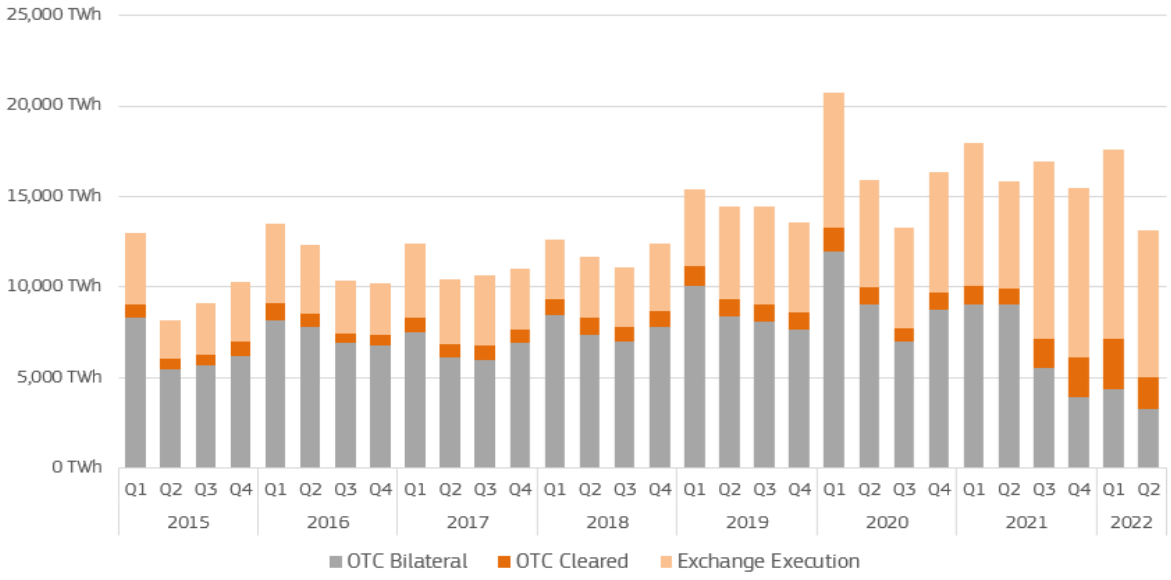
- Amid the general decrease in traded volumes (17% in Q2 2022 year-on-year), exchange executed volumes managed to increase measurably, by 38% on the observed European markets. In the same period, the total OTC traded volume (bilateral and cleared together) fell to the half. Since the peak of traded volumes measured in Q1 2020, the OTC market trade fell by 63%, whereas exchange executed contracts rose by 10%. This underlines the increasing importance of exchange-executed contracts in the gas trade on the major European hubs.

Figure 43 - Traded volumes on the main European gas hubs in the second quarters of 2021 and 2022



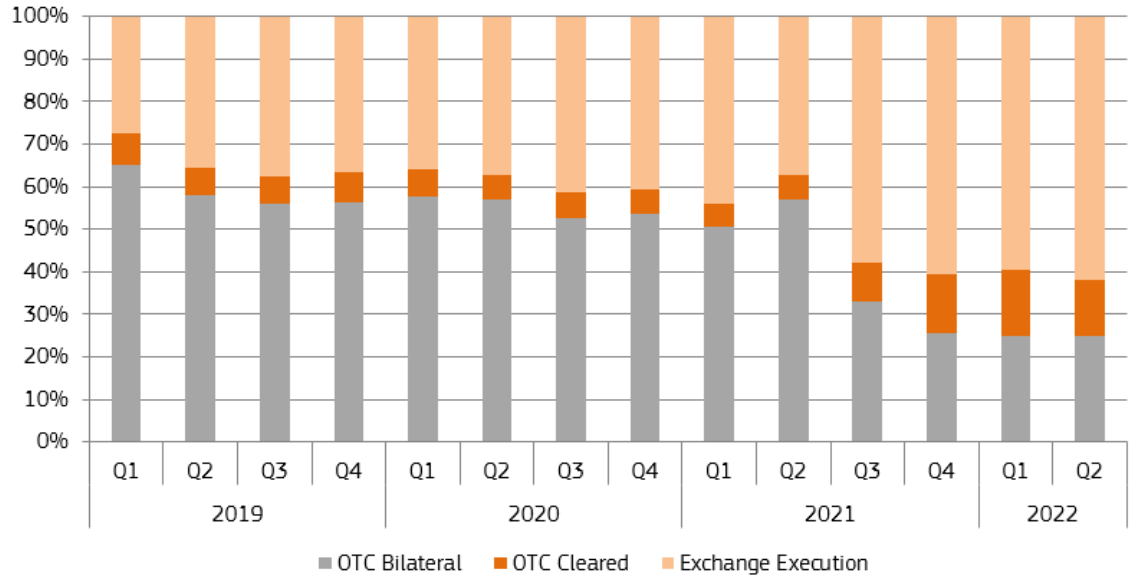
The chart covers the following trading hubs: Netherlands: TTF (Title Transfer Facility); Germany: THE (Trading Hub Europe); France: TRF (Trading Region France); Italy: PSV (Punto di Scambio Virtuale); Spain: PVB (Virtual Balancing Point); Austria: Virtual Trading Point (VTP); Belgium: Zeebrugge beach; UK: NBP (National Balancing Point)
Source: Trayport Euro Commodities Market Dynamics Report

Figure 44 – Over the counter (OTC – bilateral and cleared) and exchange executed trade on the EU gas hubs



The chart covers the following trading hubs: Netherlands: TTF (Title Transfer Facility); Germany: THE (Trading Hub Europe); France: PEG (Point d'Echange Gaz); Italy: PSV (Punto di Scambio Virtuale); Spain: PVB (Virtual Balancing Point); Belgium: Zeebrugge beach, Austria: Virtual Trading Point (VTP); UK: NBP (National Balancing Point).
Source: Trayport Euro Commodities Market Dynamics Report

Figure 45 - Share of traded volumes on the main European gas hubs



The chart covers the following trading hubs: Netherlands: TTF (Title Transfer Facility); Germany: THE (Trading Hub Europe); France: PEG (Point d'Echange Gaz); Italy: PSV (Punto di Scambio Virtuale); Spain: PVB (Virtual Balancing Point); Belgium: Zeebrugge beach, Austria: Virtual Trading Point (VTP); UK: NBP (National Balancing Point).
Source: Trayport Euro Commodities Market Dynamics Report

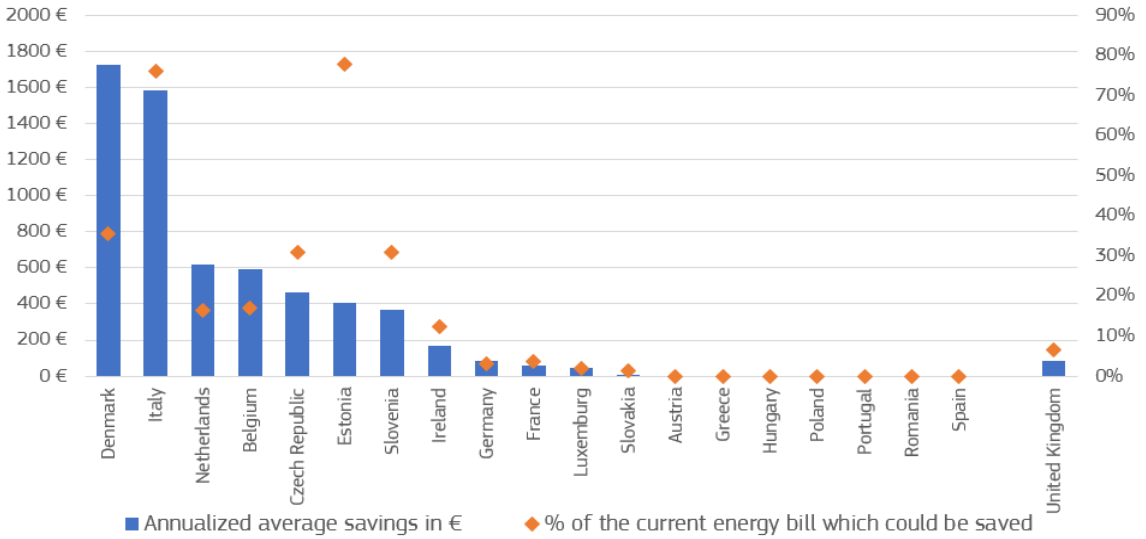
3. Retail gas markets in the EU and outside Europe

3.1 Savings from switching for residential gas customers

- The next chart shows the estimated annualised average gas bill savings in euro and in percent of the current energy bill, available to typical households who might switch away from their local by-default contract to the cheapest offer available in August 2022. Prices in capital cities were used as a proxy to assess prices at the national level.

- In August 2022 in absolute terms, households in Denmark could have had the highest annualised savings (€1 723 or 36%), had they switched from their incumbent utility to the most competitive offer available. On the other hand, households in Slovakia could have had the lowest annualised savings, amounting to €7 or 1.4%, if they had chosen the most competitive offer.

Figure 46 – Annualised gas bill saving potential in August 2022 in the EU Member States and the United Kingdom

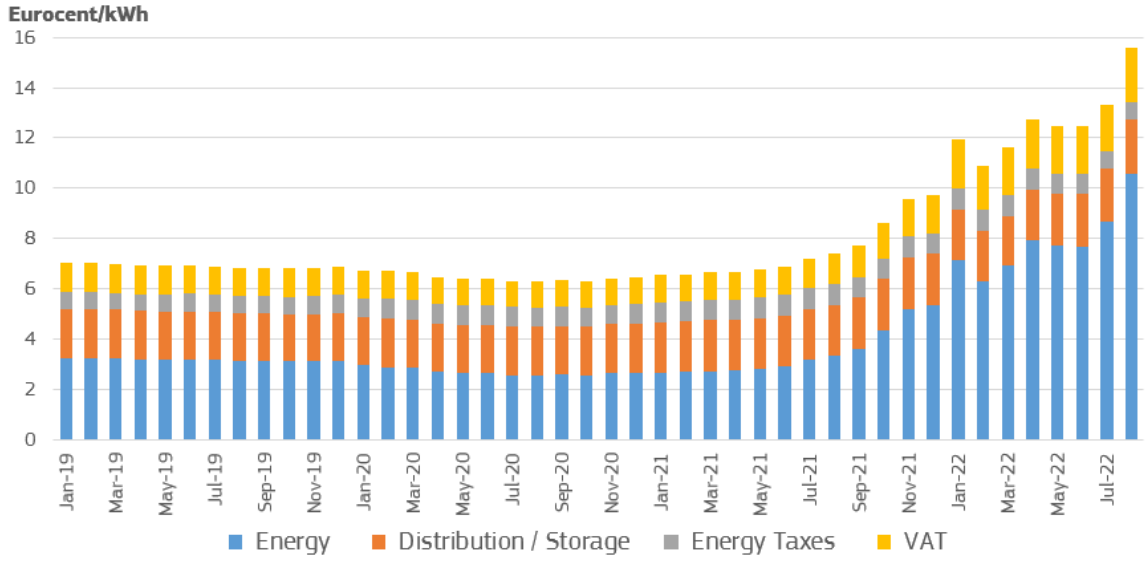


Source: VaasaETT data collection. Saving potential is reported to be zero for Austria, Belgium, Estonia, Hungary, Portugal, Romania and Spain. For Bulgaria, Croatia, Finland, Latvia, Lithuania, no data are available

3.2 Recent developments on EU retail gas markets

- Monthly and quarterly retail prices are estimated by using half-yearly prices from Eurostat (with the latest available figures relating to the second half of 2021) and Harmonised Consumer Price Indices (HICP) for both the household prices and industrial consumers.
- For household consumers, the estimated average retail price in Q2 2022 in the EU (including all taxes) showed a significant increase of 62% in year-on-year comparison, and compared to the previous quarter, Q1 2022, the average price went up by 8%. In the most typical consumption Band, D2, in the second quarter of 2022 the estimated average price (including all taxes) was 10.4 Eurocents/kWh, up from 9.7 Eurocents/kWh in the previous quarter and from 6.4 Eurocents/kWh in Q2 2021. (See the estimated household prices on Map 2). It is important to recall that substantial retail gas price increases occurred in the second quarter of 2022, implying that a significant part of the wholesale price increases of the first half of 2022 must have probably appeared in the final retail prices, looking merely at the magnitude of retail price changes.
- In the second quarter of 2022, significant differences could be observed in retail gas prices across the EU. The lowest estimated household prices in consumption Band D2 could be observed in Hungary (2.9 Eurocents/kWh), Croatia (4.6 Eurocents/kWh), and Slovakia (5.1 Eurocent/kWh), whereas the highest prices could be measured in Denmark (19.6 Eurocent/kWh), Sweden (18.9 Eurocents/kWh) and the Netherlands (18.6 Eurocent/kWh). The price differential ratio between the cheapest and the most expensive Member State across the EU rose measurably in Q2 2022, to 6.8 (in the previous quarter it was 6.3), in comparison with that in Q2 2021 (4.3), principally owing to some Member States' practices where retail gas prices had still not followed increasing wholesale contracts.
- Figure 46 and Figure 47 show the monthly evolution of the EU average residential end-user retail gas prices over the last few years, the breakdown of prices paid by typical households in the European capitals in August 2022, and the change in percentages compared to August 2021. In August 2022, retail gas prices in EU capitals more than doubled year-on-year, showing an estimated increase of 110%. Over the recent period, as higher wholesale gas prices measurably appeared in the retail contracts, the share of the energy component within final consumer prices showed a significant increase. On average, 68% of the retail price could be assigned to the energy component in August 2022, while the rest covered distribution/storage costs (14%), energy taxes (4%) and VAT (14%). The share of the energy component was generally increasing, as in August 2021 it was around 45% on average, increasing by 23 percentage points in the following year.
- There were significant differences in August 2022 in the share of energy costs, distribution costs and taxes within the total prices across Member States. The share of energy costs ranged from 32% (Stockholm) to 86% (Brussels) and 85% (Athens). The share of distribution/storage costs ranged from 3% (Tallinn) and 4% (Amsterdam) to 37% (Stockholm) and 34% (Bratislava). The share of energy taxes ranged from 1% (Brussels, Madrid and Riga) to 14% (Amsterdam) and 11% (Copenhagen). For 7 of the 24 capitals covered, the price does not include any energy tax component. VAT content in the total gas price also varied a lot across the EU – from 5% in Zagreb to 21% in Budapest, whereas according to the VaasaETT data collection VAT content in Warsaw was 0.

Figure 47 – Monthly average gas price in the EU, paid by typical household customers



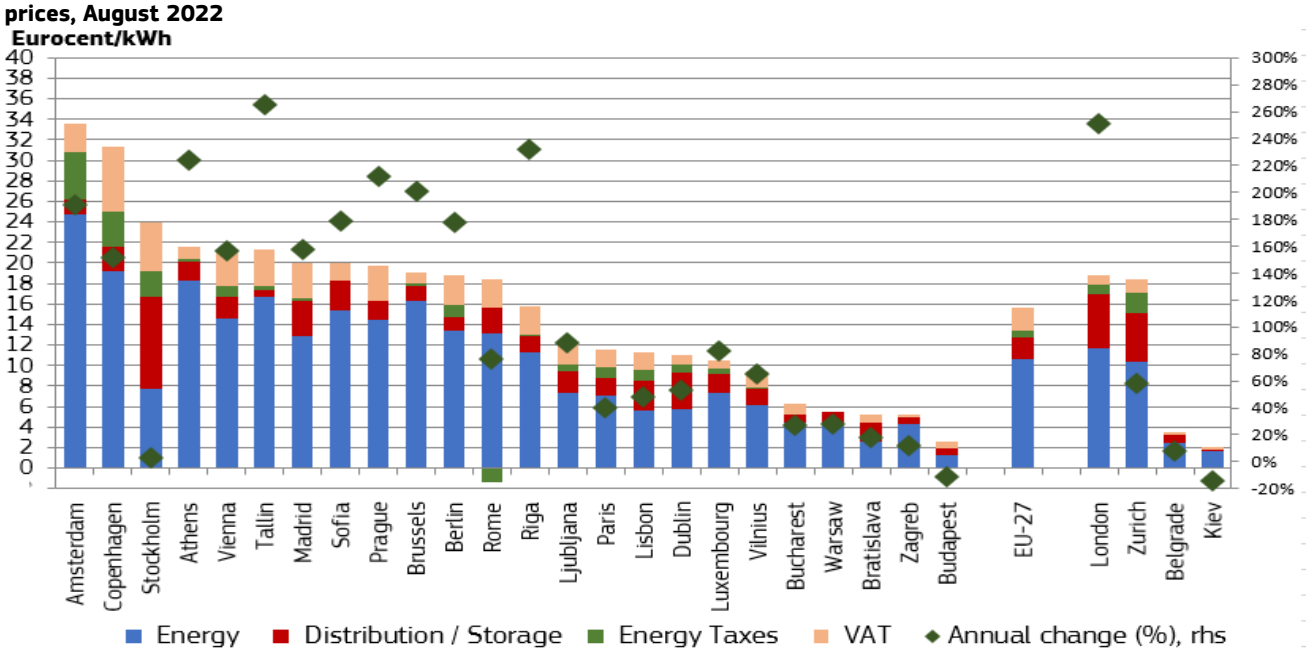
Source: VaasaETT

- Figure 47 also shows that even the energy component is measurably variable in absolute terms: in August 2022, it was 18.9 times higher in Amsterdam than in Budapest (for this latter the gas price has been regulated for a long time for most of the households, not reflecting increasing energy costs). There were also considerable differences across the Member States in the relative share of network costs and taxes. The ratio of highest and lowest network components across the EU was 13.5 (between Tallinn and

Stockholm). The highest-lowest tax component ratio (taking energy taxes and VAT together), not counting Warsaw, where energy taxes and VAT rates has been reported as 0, was 39.1 (Zagreb and Amsterdam) in the same period.

- With the exception of one capital city out of the observed 24, prices were higher in August 2022, compared to the same month of the previous year. Prices decreased only in Budapest (11%), probably driven by the depreciation of the local currency vis-à-vis the euro amid constant final consumer prices. It seems that changes in the regulated price regime in Hungary did not yet occurred in the collected retail prices. Prices more than tripled in Tallinn (+264%), Riga (+232%), Athens (+224%), Prague (+212%) and Brussels (+201%), practically driven by the increase of energy costs, and in Athens energy taxes also rose. It seems that significant price increases on wholesale gas markets have mostly appeared in the final retail household prices in most of the EU capital cities. In August 2022, Budapest remained the cheapest capital in the EU in terms of gas prices for household consumers, followed by Zagreb and Bratislava, whereas Amsterdam was the most expensive capital city, followed by Copenhagen and Stockholm.

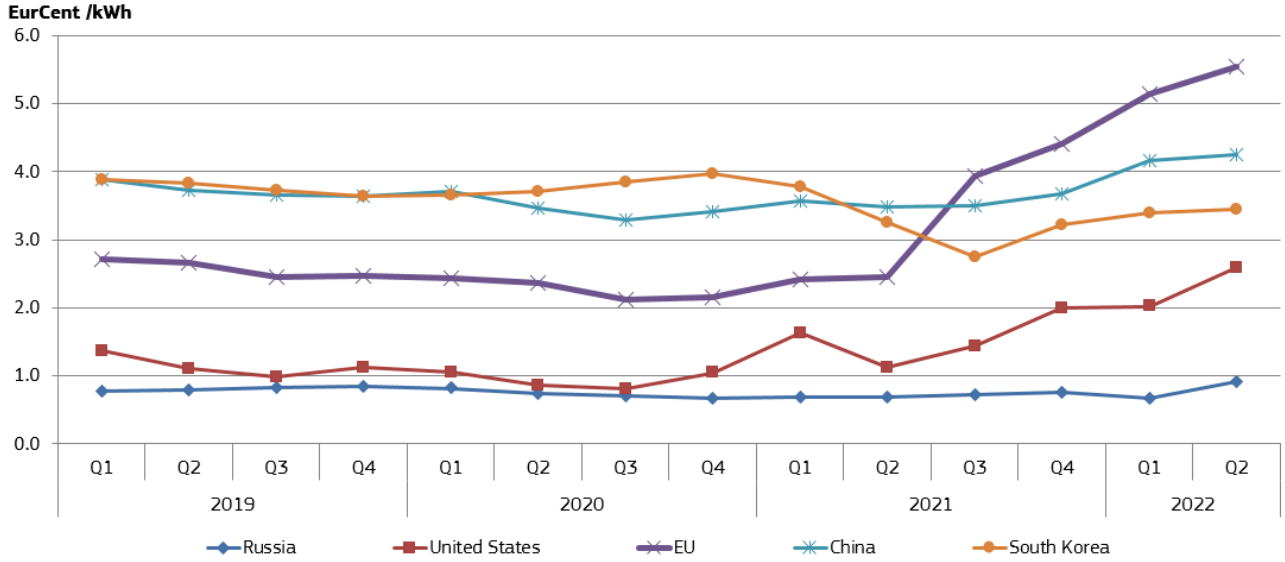
Figure 48 - Breakdown of gas price paid by typical household customers in European capitals and annual change in prices, August 2022



Source: VaasaETT. EU-27 represents an aggregate average of the 27 capital cities

- Estimated retail gas prices for industrial customers rose measurably, by 126% in Q2 2022 year-on-year in the EU on average, and the average estimated price (VAT and other recoverable taxes excluded) in consumption Band I4 was 5.5 Eurocent/kWh, up by 8% compared to Q1 2022 (when reaching 5.1 Eurocent/kWh on average - See the estimated industrial prices on Map 3.) With the exception of three countries, in all other 21 observed countries (data were not available for Cyprus, Luxembourg and Malta) price increases could be observed year-on-year. It seems that price rises on wholesale gas markets have already appeared in the retail prices for industrial customers in Q2 2022, having an average annual consumption. Price increases could also be observed for industrial customers having larger annual gas consumption (in Band I5 and Band I6 bands increases of 184-199% could be observed in Q2 2022, year-on-year). Significant price increases for energy intensive industries meant bigger production costs, leading to decrease (or shut down) in production and/or increases in the final product prices.
- It must be noted that these computed quarterly prices are based on Eurostat data (referring to the second half of 2021), corrected by HICP figures, implying that by the time the next half-yearly price data will be available, numbers might show different trends. In the second quarter of 2022, the lowest estimated industrial price in consumption Band I4 could be observed in Slovakia (3.9 Eurocent/kWh), Portugal (4.3 Eurocent/kWh), and Spain (4.4 Eurocent/kWh). The highest prices could be observed in Denmark (12.0 Eurocent/kWh), Finland (11.5 Eurocent/kWh), and Estonia (10.5 Eurocent/kWh), In Q2 2022, the price ratio of the cheapest and the most expensive country in the EU was 3.1, which was higher than in Q2 2021 (2.5).
- Figure 48 shows the evolution of industrial retail gas prices in the EU, compared with some important trade partners of the European economy. In the second quarter of 2022, retail gas prices for industrial customers were the highest in the EU, compared with the peers of the United States, China, Russia and South Korea. Prices were lower by 23% in China, by 38% in South Korea, by 53% in the United States and by 84% in Russia, implying that EU businesses consuming significant amount of gas compared to their production value faced higher energy costs compared to many global competitors. Retail industrial gas prices in the EU were up by 126% in Q2 2022 year-on-year. Gas price rose by 129% in the US, by 32% in Russia, by 22% in China and by 6% in South Korea.

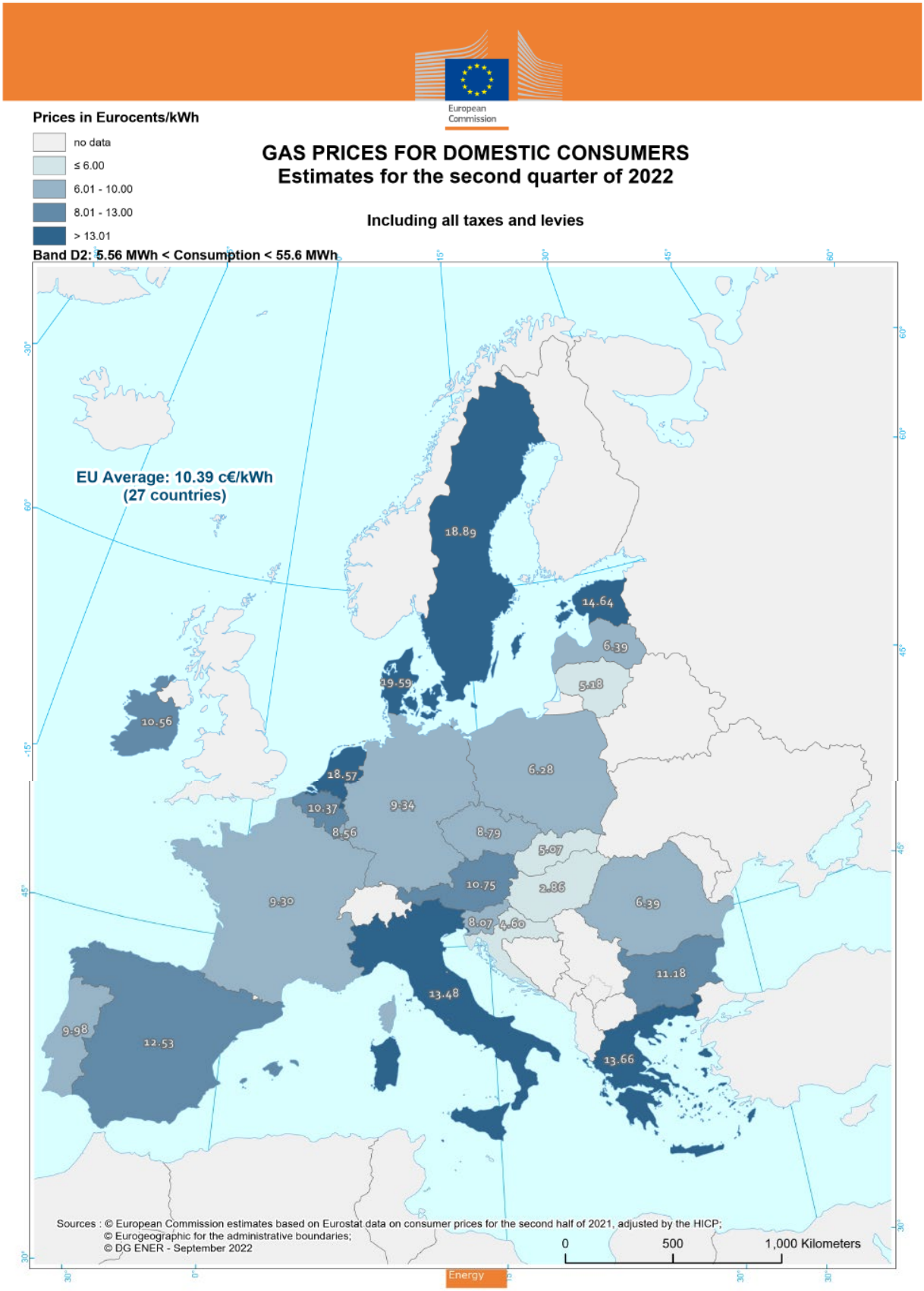
Figure 49 - The EU average industrial retail gas price in comparison with the prices of some important trade partners of the EU



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

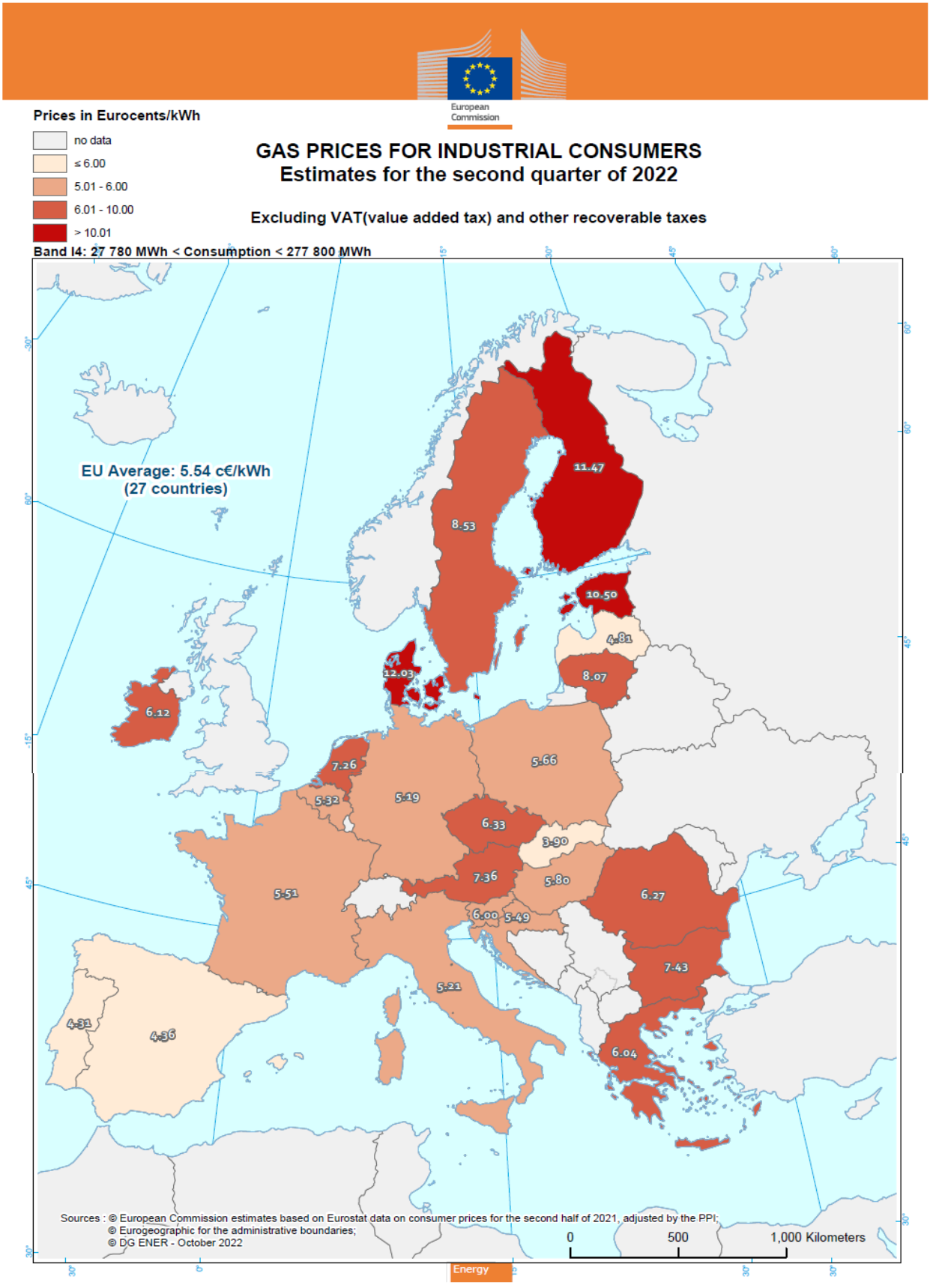
- Maps 2 and 3 on the next two pages show the estimated retail gas prices paid by households and industrial customers in the second quarter of 2022.

Map 2 - Retail gas price estimates for households in the EU – second quarter of 2022



Source: Eurostat

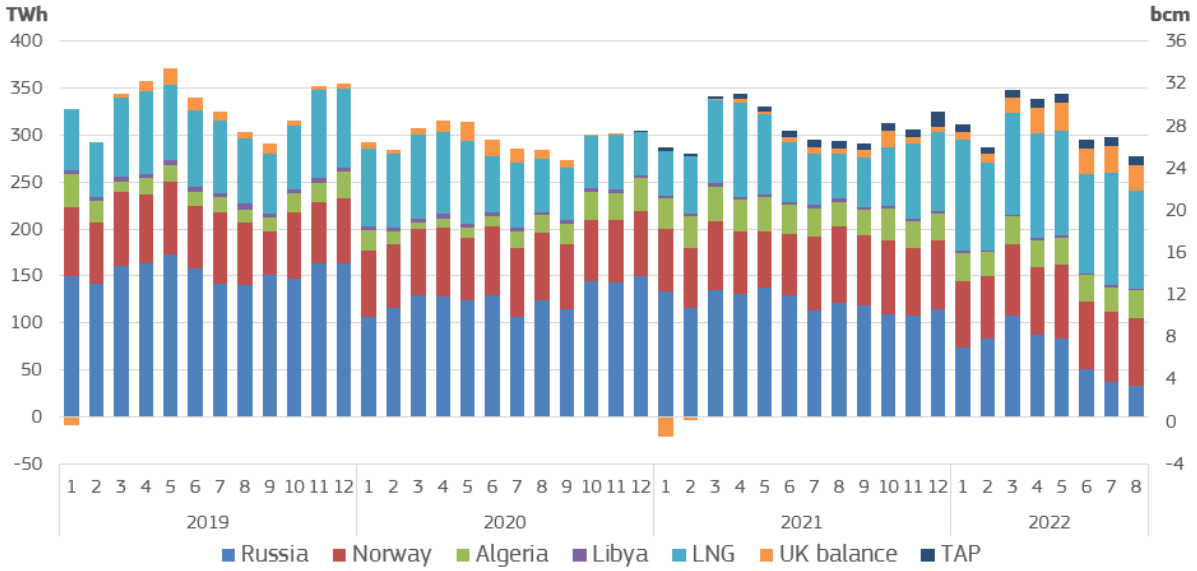
Map 3 - Retail gas price estimates for industrial consumers in the EU – second quarter of 2022



Source: Eurostat

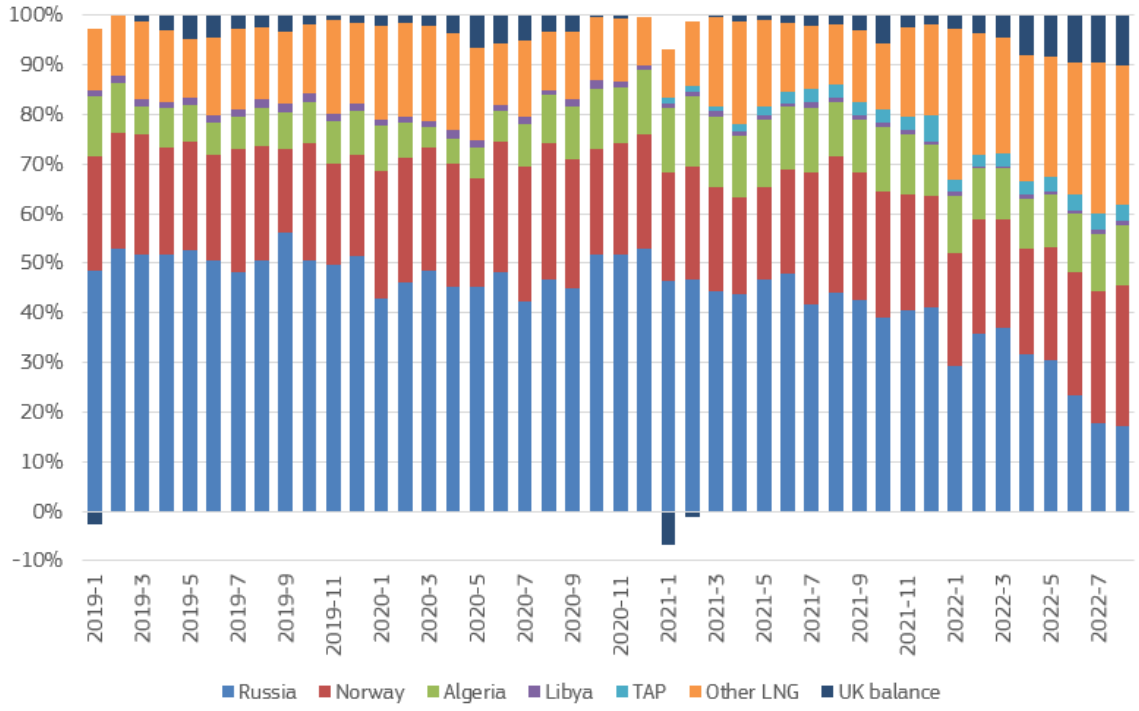
4. Appendix – charts providing further details on market developments[27]

Figure 50 – Monthly evolution of gas imports from extra-EU sources



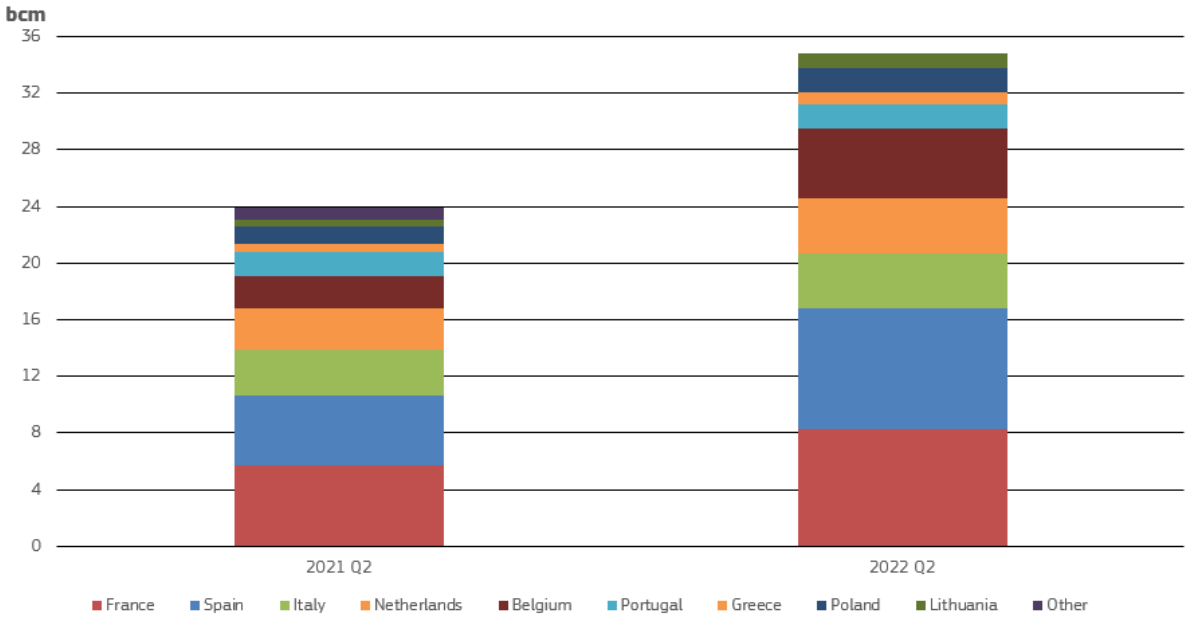
Source: ENTSO-G

Figure 51 - Monthly share of gas imports from various sources



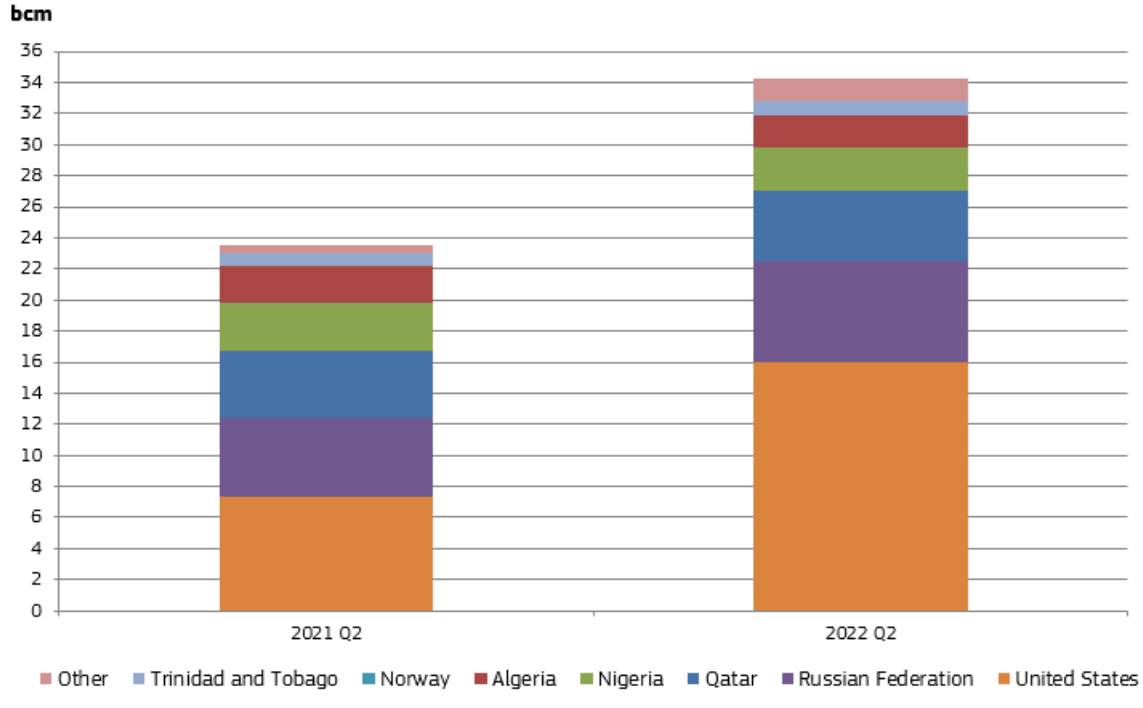
[27] These charts provide additional information on the main market developments, without textual comments and/or further detailed analysis

Figure 52 – LNG imports in the EU Member States, second quarters of 2021 and 2022



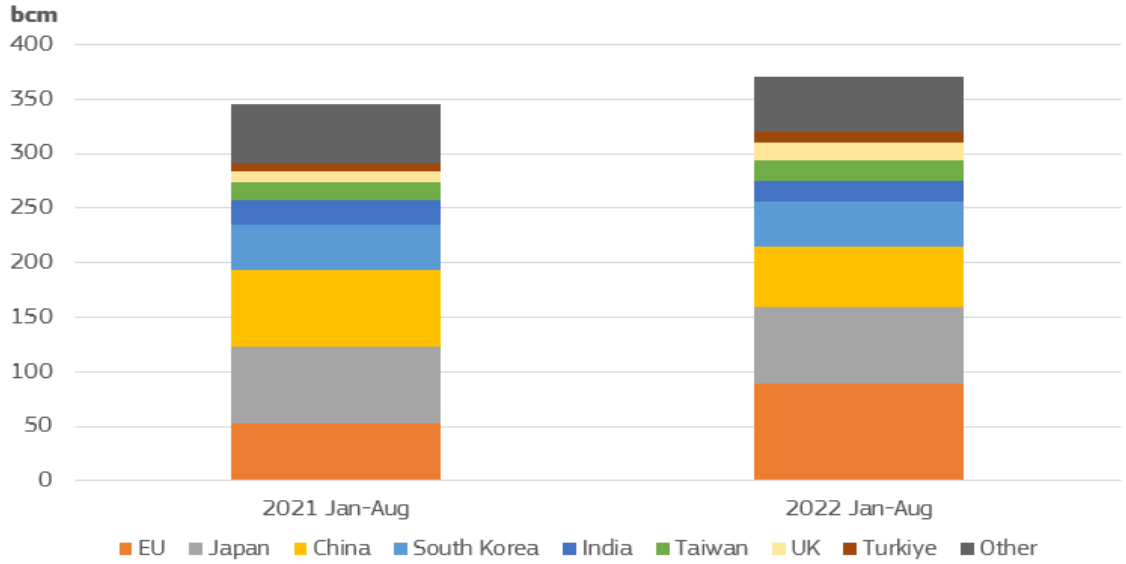
Source: Refinitiv

Figure 53 – LNG import from the main suppliers in the EU in the second quarters of 2021 and 2022



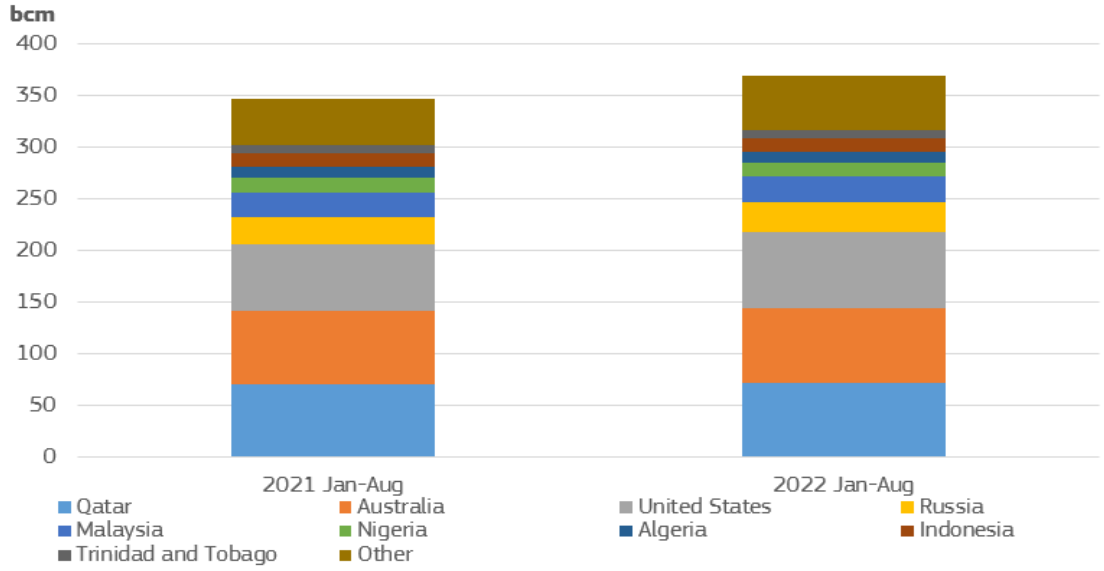
Source: Refinitiv

Figure 54 – LNG imports in the main consumer markets in January-August of 2021 and 2022



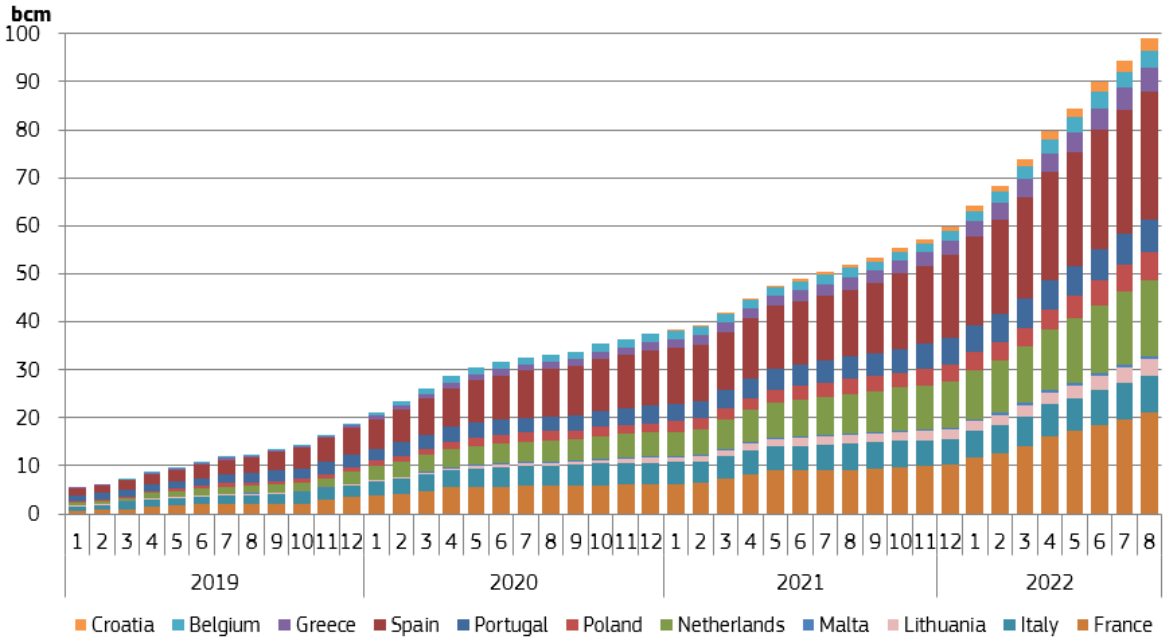
Source: Refinitiv

Figure 55 - LNG exports from the main gas producers in January-August of 2021 and 2022



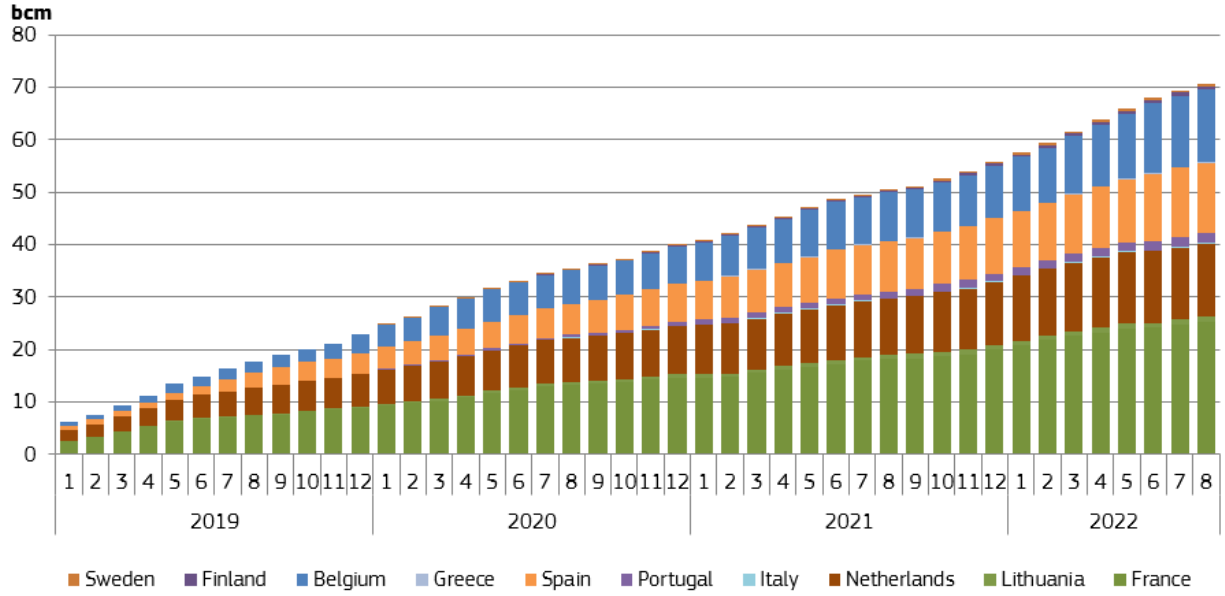
Source: Refinitiv

Figure 56 - Cumulative monthly LNG imports from the US in the EU



Source: Commission calculations based on tanker movements reported by Refinitiv

Figure 57 – Cumulative monthly LNG imports from Russia in the EU



Source: Commission calculations based on tanker movements reported by Refinitiv

5. 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 1978-2018) 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.