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Quarterly Report on European Gas Markets

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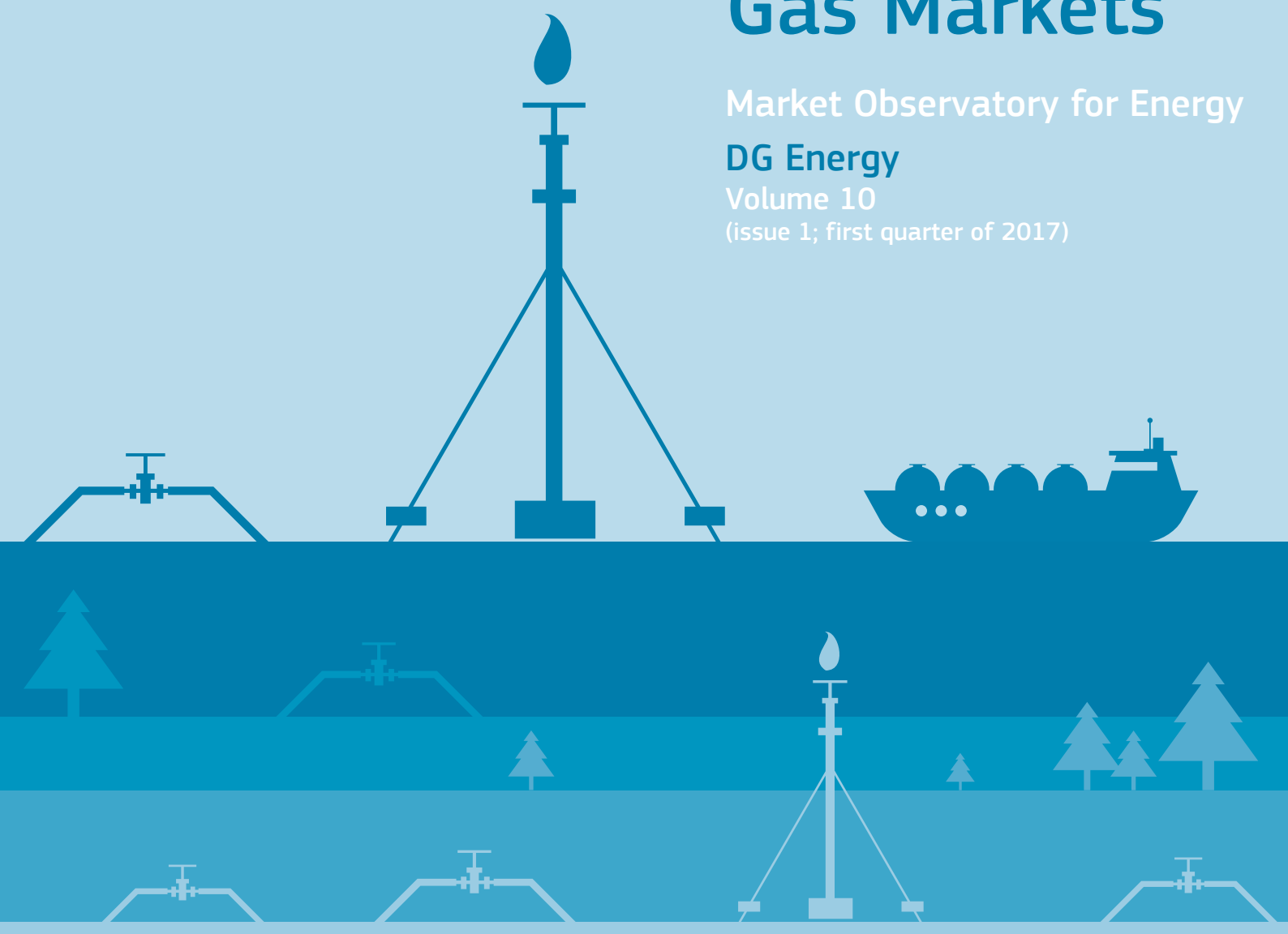

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CONTENT

HIGHLIGHTS OF THE REPORT

- **EU gas demand increased by 7% in 2016, with the UK and Germany taking the lion's share of the growth: these two countries were responsible for 58% of the annual increase in EU gas consumption. According to preliminary data, the growth continued in the first quarter of 2017 when EU demand grew by 5% year-on-year. A cold 2016-2017 winter and rapidly growing gas use in power generation supported the growth of gas consumption.**

- **Driven by the higher demand and falling indigenous production, in the first quarter of 2017 imports increased by 12% year-on-year. The growth was driven by increasing supply from traditional pipeline suppliers, particularly Russia and Algeria.**

- **Russia remained the top supplier of the EU in the first quarter of 2017, covering 41% of total extra-EU imports. While Ukraine pulled through two consecutive winters without Russian supplies, Ukraine remained the main supply route of Russian gas coming to the EU.**

- **The EU's estimated gas import bill was around 20 billion euros in the first quarter of 2017, about 35% more than a year earlier.**

- **LNG imports fell by 5% in the first quarter of 2017. In January and February, imports significantly decreased in Northwest Europe as cargoes were attracted to the high-priced Asian markets.**

- **In the first quarter of 2017, the share of the US from total EU LNG imports increased to 6%. Malta joined the ranks of LNG importers.**

- **Because of the strong weather-driven demand, storage withdrawals during the 2016-2017 winter were much stronger than a year ago and by the end of March filling rates decreased to 26%. The woes of the Rough facility in the UK continued, thereby affecting prices and gas flows in Northwest Europe.**

- **As a result of the below-average temperatures, low LNG imports in Northwest Europe and uncertainty about the Rough storage site, in January 2017 European hub prices increased to the highest level since 2015. Milder weather and a rise in LNG imports helped prices to ease by March.**

- **Trading activity on European hubs decreased in the first quarter of 2017. The Dutch TTF hub alone covered almost half of total traded volumes.**

- **Retail prices continued to fall gradually, both for households and industrial consumers.**

EXECUTIVE SUMMARY

- EU gas **consumption increased by 7% in 2016**, driven by a sharp 19% year-on-year growth in the last quarter**.** Annual consumption reached nearly 5,000 TWh (465 bcm). In absolute terms, the UK and Germany showcased the biggest consumption growth: these two countries were responsible for 58% of the annual growth in EU gas demand. Preliminary Eurostat data shows that **the increase continued in the first quarter of 2017**: EU gas **consumption increased by 5%** year-on-year. A relatively cold winter and advancing gas use in power generation were instrumental to the recent growth of gas consumption.

- EU gas **production decreased by 3% in 2016**. From the six largest producers, only the UK showcased a year-on-year growth.

- **In the first quarter of 2017, EU gas imports were 12% higher than a year earlier** according to ENTSO-G data. The growth was driven by increasing flows from traditional pipeline suppliers, particularly Russia and Algeria, while LNG imports slightly decreased compared to the same period in 2016. Pipeline deliveries from Russia and Algeria increased by 18% and 65%, respectively while Norwegian supplies grew by 4% year-on-year.
- In the first quarter of 2017, **Russia remained the EU's top supplier**, covering 41% of extra-EU imports, followed by Norway (35%); LNG imports made up 12%. Nord Stream volumes increased noticeably in January, without reducing flows on other routes from Russia, and utilisation was practically 100%, probably related to the Commission's decision on the use of the OPAL gas pipeline. However, volumes dropped back after the decision was suspended by the European Court of Justice. **While Ukraine pulled through two consecutive winters without Russian supplies, Ukraine remained the main supply route of Russian gas coming to the EU.**
- **EU LNG imports decreased by 5%** year-on-year in the first quarter of 2017. Deliveries significantly decreased in Northwest Europe in January and February as cargoes were attracted to the high-priced Asian markets. On the other hand, deliveries to most Mediterranean countries increased in the first quarter. Qatar remained the main LNG supplier of the EU but, like in the previous quarter, its market share remained below 40%. **Imports from the US significantly increased**, reaching a 6% share from total EU LNG imports. The Dunkirk LNG project started commercial operations and **Malta** also **joined the ranks of LNG importers.**

- The EU's **estimated gas import bill was around 20 billion euros** in the first quarter of 2017, about 35% more than a year earlier. Both import volumes (1090 TWh) and the average import price (around 18.6 Euro/MWh) were higher than in the first quarter of 2016.
- Europe started the 2016/2017 winter with an average filling rate of more than 90% but **withdrawals between November 2016 and February 2017 were much stronger than a year earlier** and, as a result, filling rates decreased to unusually low levels, below the 5-year range. On 31 March 2017, the average filling rate was only 26%, compared to 36% a year earlier. The **woes of the Rough facility in the UK continued** and had widespread impacts on prices and gas flows in Northwest Europe: helped by a price premium, gas flows from mainland Europe to the UK significantly increased during the past winter.
- **In January 2017, spot prices at European gas hubs reached the highest levels since 2015** as below-average temperatures, strong demand in the power sector, low LNG imports in Northwest Europe and uncertainty about the Rough storage site supported prices. Milder weather and a rise in LNG imports helped prices to ease by March. Oil-indexed prices also increased but in the first two months of the year were lower than hub prices in Northwest Europe.

- **International gas prices were diverging in late 2016 and early 2017** as both European and Asian prices grew substantially compared to the US, but prices converged again by the end of the first quarter of 2017.

- **Trading activity on European gas hubs decreased**: traded volumes reached 12,400 TWh in the first quarter of 2017, 8% less than in the same period of 2016. The lower liquidity is explained by the particularly strong trade in early 2016 when record-low oil prices forced market participants to adjust positions and by tight seasonal spreads limiting activity on the front season delivery contract. The Dutch TTF hub alone covered almost half (49%) of hub traded volumes.

- **Retail prices continued to fall gradually**, both for households and industrial consumers. On the other hand, no real price convergence could be observed in the last few years.

1. Gas balances

1.1 Consumption

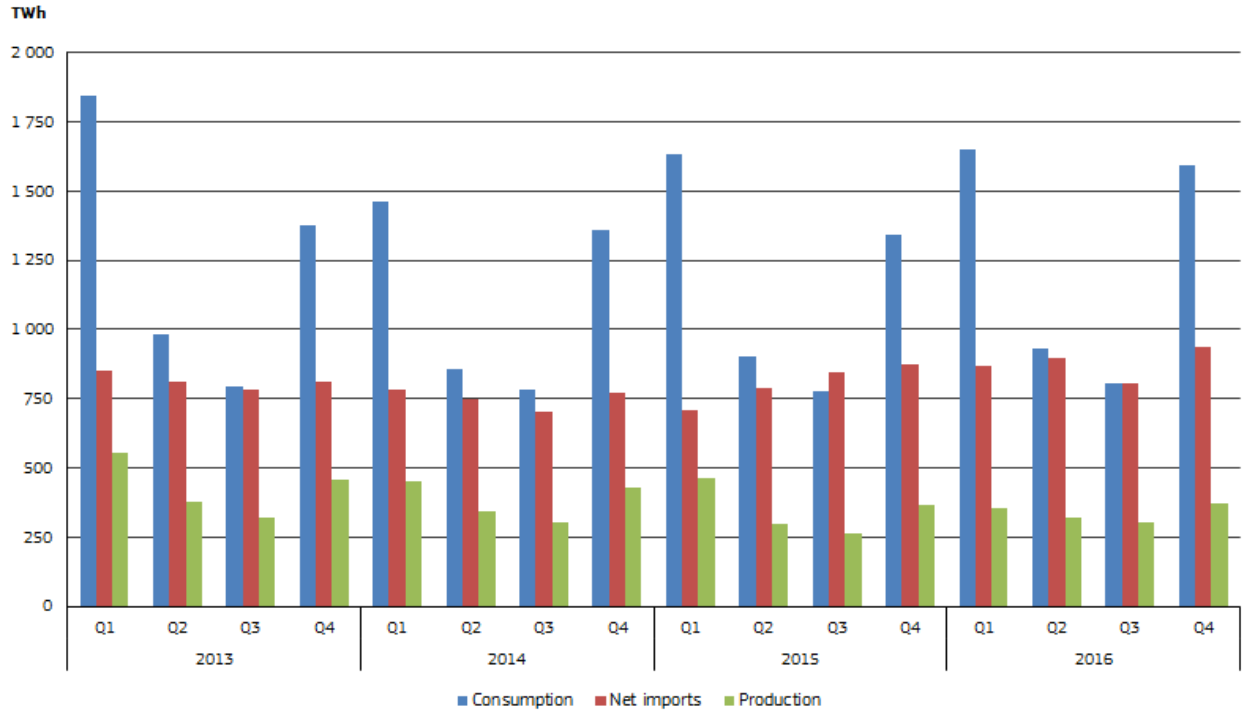
- In the first three quarters of 2016, EU gas consumption showed a slow increase compared to the same period of 2015 but the growth accelerated in the last quarter: after increasing by 1% in the first quarter, by 4% in the second quarter and by 3% in the third quarter, consumption grew by 19% in the fourth quarter of 2016, year-on-year.

- In the fourth quarter of 2016, all 26 Member States using gas experienced a year-on-year increase of consumption, with the biggest growth rates observed in Portugal (45%), Greece (26%), the UK (25%), France (24%) and Germany (21%). Relatively low temperatures (compared to the same period of the precious year) and increasing use of gas in power generation (in this period, gas deliveries to power generation in the EU increased by 19% year-on-year) were instrumental to the rapid growth of gas consumption.

- In 2016 as a whole, EU gas demand reached nearly 5,000 TWh (465 bcm), 7% more than in 2015 and the highest level since 2013. Greece showcased the biggest growth: the country used 30% more gas in 2016 than in 2015. Ireland, Portugal, Sweden and the UK also experienced a double-digit (12-13%) growth while Germany, Europe's largest gas market, had a growth rate of just under 10%. EU gas consumption grew for two consecutive years (by 4% in 2015 and 7% in 2016).

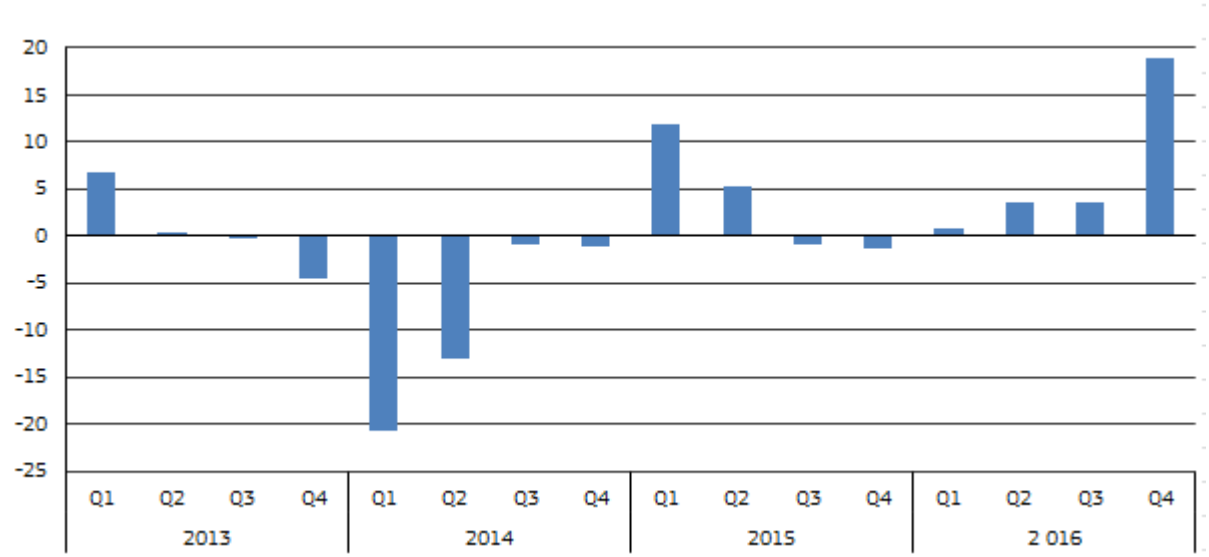
- According to preliminary Eurostat data, the increasing trend continued in the first quarter of 2017: consumption was about 5% higher than in the same period of 2016, driven by a 16% growth in January. Greece again proved to be the one of the main contributors (44% year-on-year growth), closely followed by Portugal (43%). In Scandinavian countries, on the other hand, gas demand went down as a result of a relatively mild winter.

Figure 1. EU gas consumption, imports and production



Source: Eurostat, data as of 5 May 2017 from data series nrg_103m. Net imports refer to imports minus exports.

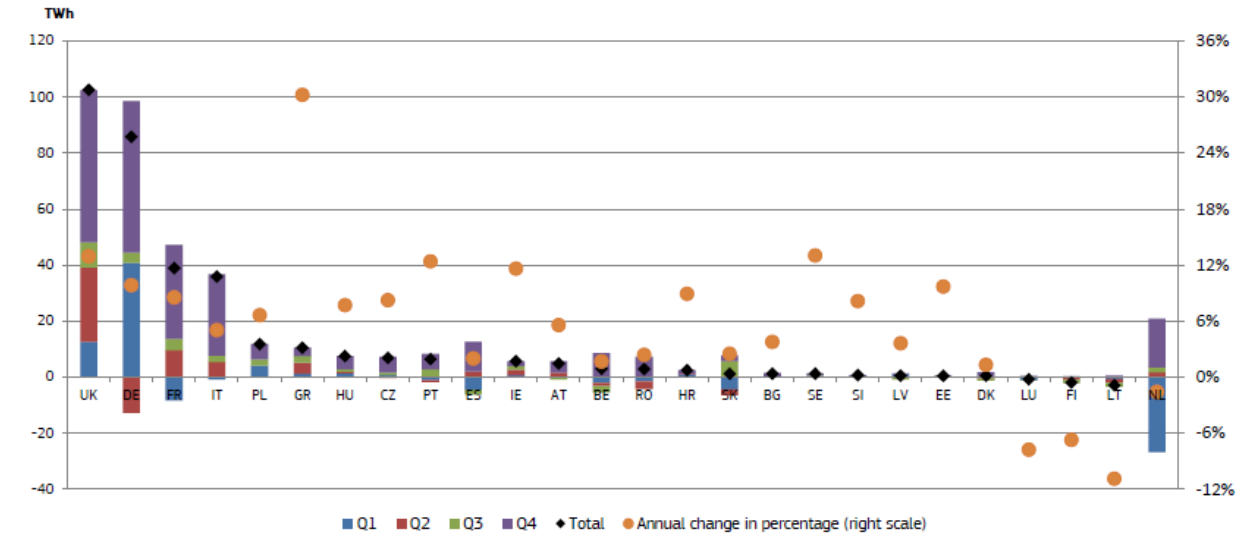
Figure 2. EU gas consumption Q/Q-4 change (%)



Source: Eurostat, data as of 5 May 2017 from data series nrg_103m; calculations of DG Energy.

- In absolute terms, the UK and Germany showcased the biggest consumption growth in 2016: these two countries were responsible for 58% of the annual growth in EU gas demand. In the last quarter, France, Italy and the Netherlands also experienced a significant absolute increase compared to the same period of 2015 but in case of the Netherlands this was not sufficient to offset the decrease seen in the first quarter.
- Only four Member States, Finland, Lithuania, Luxembourg and the Netherlands had a lower annual gas consumption in 2016 than in 2015.

Figure 3. Change of quarterly EU gas consumption in 2016, compared to the same period of 2015

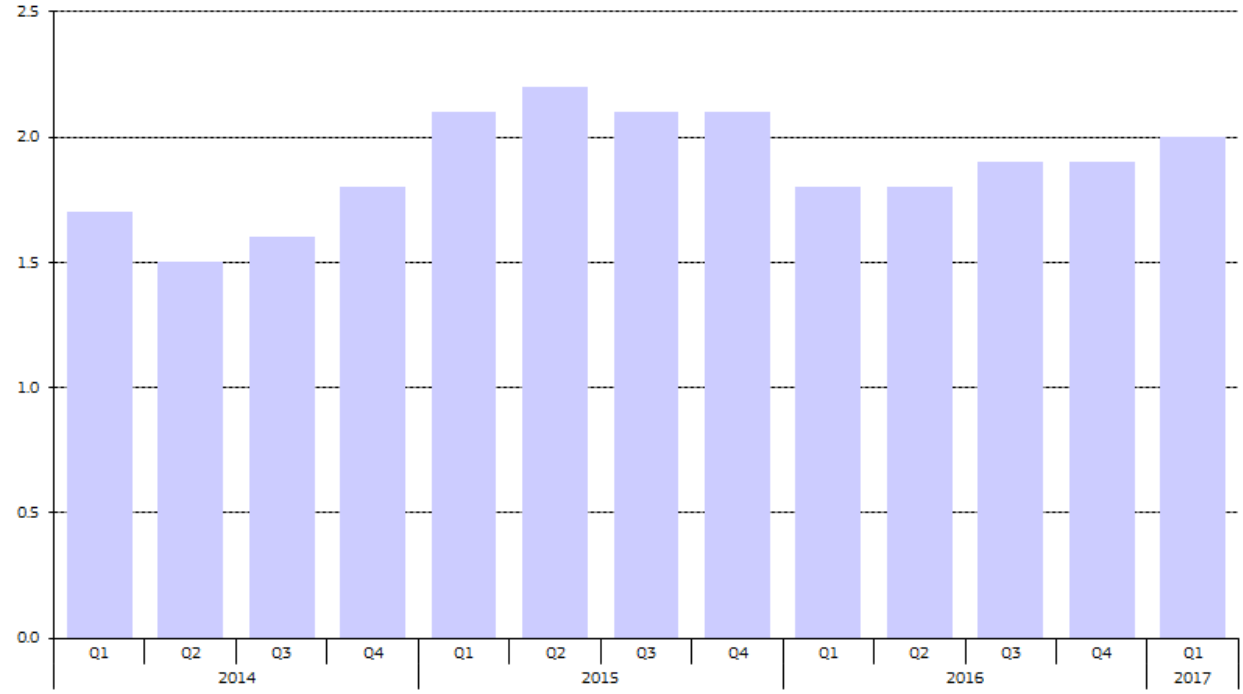


Source: Eurostat, data as of 5 May 2017 from data series nrg_103m; calculations of DG Energy.

- GDP growth seems to be picking up in the EU: compared with the same quarter of the previous year, seasonally adjusted gross domestic product (GDP) rose by 2.0% in the EU in the first quarter of 2017. This is the biggest growth rate seen since the last quarter of 2015. The gross value added in the manufacturing sector was 1.8% higher in the fourth quarter of 2016 than a year earlier; this is an improvement compared to the previous two quarters.[1]

[1] Source: Eurostat, data as of 1 June 2017 from data series namq_10_a10; seasonally and calendar adjusted data

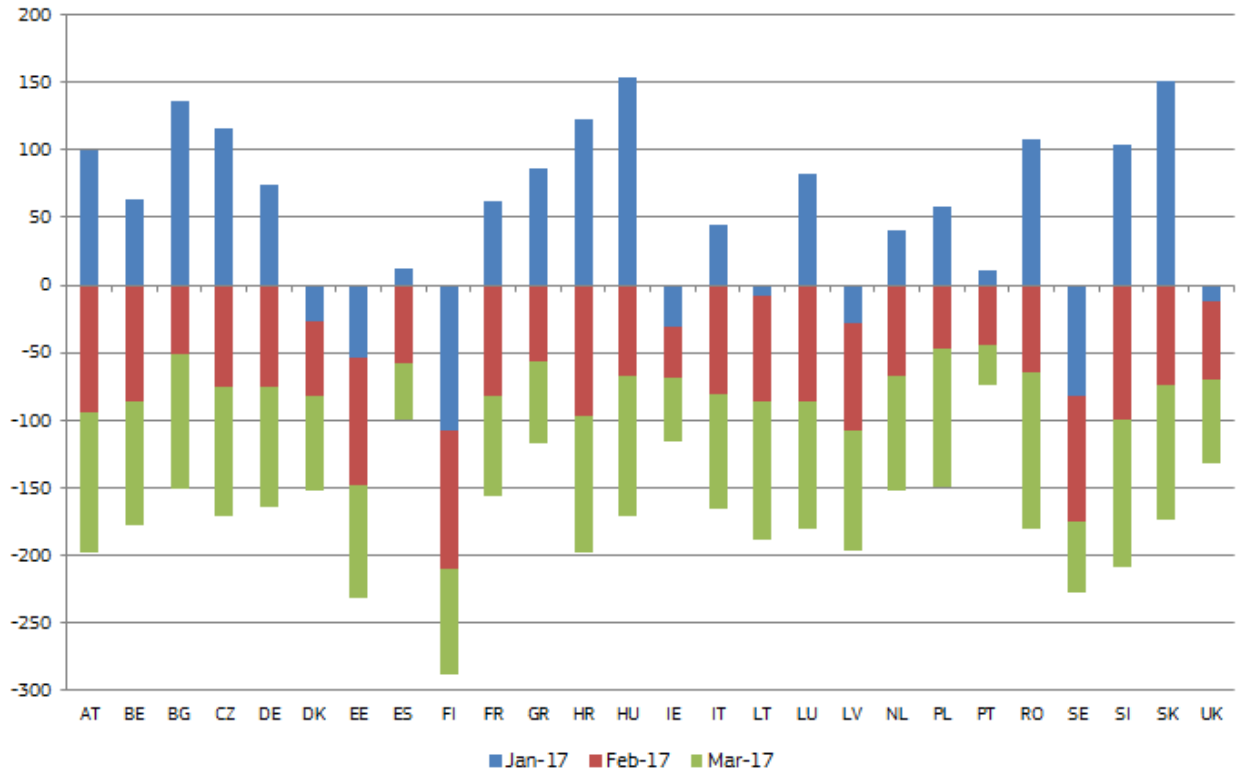
Figure 4. EU GDP Q/Q-4 change (%)



Source: Eurostat, data as of 16 May 2017 from data series namq_10_gdp
Seasonally and calendar adjusted data

- Figure 5 shows the deviation of actual heating degree days (HDDs) from the long-term average in individual EU Member States in the first quarter of 2017. On average, temperatures in January were below the seasonal norms, but February and March was warmer than usual. In Scandinavian and Baltic countries even January was relatively mild, thereby reducing gas demand for space heating. Overall, the number of heating degree days in the first quarter of 2017 was lower than the long-term average in the EU as a whole and more or less the same than in the same period of 2016.

Figure 5. Deviation of actual Heating Degree Days from the long-term average in Q1 of 2017



Source: Joint Research Centre (JRC), European Commission

- Since July 2015, gas deliveries to power generation in the EU as a whole have consistently shown a year-on-year increase. In the seven important markets depicted in Figure 6, gas deliveries to power generation increased by 22% in 2016. The growth rate was 119% in France, 55% in Greece, 39% in the UK, 9% in Italy and 4% in the Netherlands. On the other hand, gas deliveries to power generation slightly decreased in Spain (-2%) and Belgium (-1%).

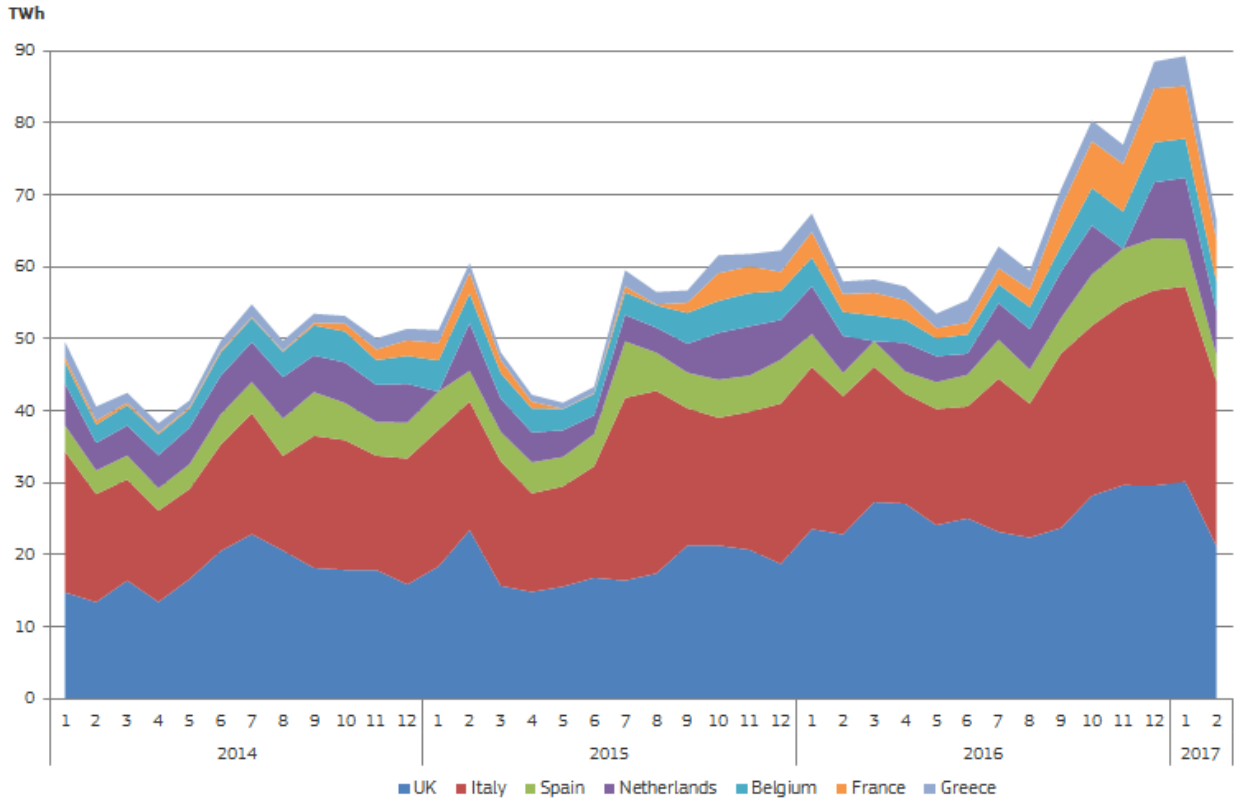
- Gas continued to gain ground in the power sector in 2017: in January and February (data for March were not available at the time of writing), in these seven markets, gas deliveries to power generation increased by 24% compared to the same period of 2016. The growth rate was 116% in France, 61% in Greece, 31% in Belgium, 30% in Spain, 24% in the Netherlands, 20% in Italy and 11% in the UK.

- While EU electricity consumption is hardly increasing (in 2016 it grew by less than 1%) and gas has to face the continuing penetration of renewables in the power sector, it seems that the falling prices have improved the competitiveness of gas compared to other fuels, in particular coal. While gas prices started to increase in the fourth quarter of 2016, coal prices increased at a faster rate, suggesting an improvement in the relative competitiveness of gas. (See more details about the price development of different fuels in chapter 2.1.) In addition, the closure of coal-fired plants and outages in French nuclear plants also allowed gas to increase its role in the electricity fuel mix.

- UK clean spark spreads – measuring the profitability of gas-fired generation – averaged 16 Euro/MWh in the first quarter of 2017. They were lower and less volatile than in the previous quarter but gas-fired generation remained clearly competitive compared to coal. As a result of the improving economics and the closure or converting of some coal-powered plants, the share of gas in power generation increased from 29.5% in 2015 to 42.4% in 2016, mainly at the expense of coal.[2] According to the National Grid, 21 April 2017 was the first working day since the industrial revolution without coal in the UK's electricity mix.[3]

- Clean dark spreads continued rise in Germany: they averaged 6 Euro/MWh in the first quarter of 2017, the highest level since 2011.[4] As a result of the improving competitiveness of gas in Germany, the share of gas-fired power generation continued to increase in the first quarter of 2017: it reached 15.3%, compared to 11.6% in the same period of 2016 and 14.3% in the last quarter of 2016.[5]

Figure 6. Gas deliveries to power generation in selected Member States



Source: Eurostat, data as of 15 May 2017 from data series nrg_103m. Germany is not included because of gaps in reporting.

[2] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/612492/Energy_Trends_March_2017.pdf
[3] https://twitter.com/Grid_Media/status/855324680076484608
[4] Charts of clean spark spreads in Germany and the UK can be found in the Quarterly Report of European Electricity Markets
[5] https://www.destatis.de/EN/FactsFigures/EconomicSectors/Energy/Production/Tables/ElectricityProductionSupply.html

1.2 Production

- EU gas output decreased by 24% year-on-year in the first quarter of 2016 but increased in the following quarters: by 8% in the second quarter, by 17% in the third quarter and by 1% in the fourth quarter. In the last quarter, Dutch production decreased by 2%, UK output was up by 2% while Ireland continued its robust growth (2503%) thanks to the commissioning of the Corrib field in late 2015. The production of all the other Member States combined was 3% less than in the same period of 2015.

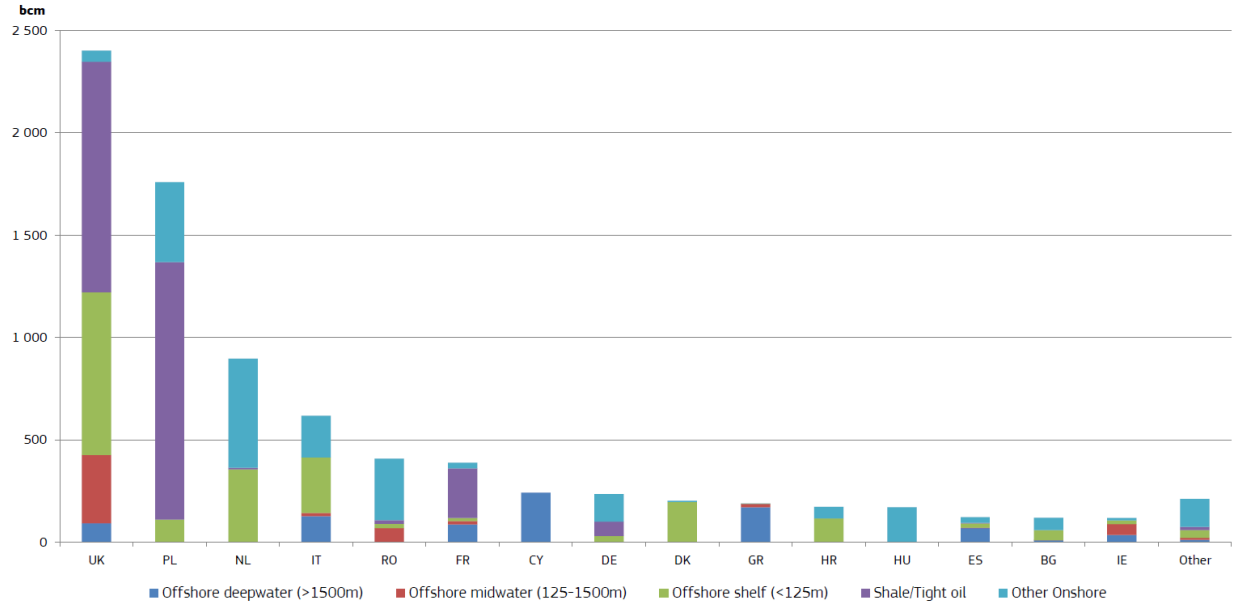
- In 2016 as a whole, EU gas production was 3% lower than in 2015. Looking at the six largest producers (in descending order), gas output increased in the UK (4%) but decreased in the Netherlands (-10%), Romania (-11%), Germany (-9%), Italy (-15%) and Denmark (-2%).

- At the end of 2016, Maersk Oil announced that Tyra, Denmark's largest gas field would be closed on 1 October 2018.[6] As the facilities of the field are used for the processing of more than 90% of Danish output, the decision raised doubts about the future of the country's gas production. In March 2017, the company reached an agreement with the Danish government, pledging a full reconstruction of the Tyra field facilities while the government will cut taxes on hydrocarbon activities between 2017 and 2025.[7]

- On 3 April 2017, Cyprus, Greece, Italy and Israel gave their support to moving forward with the East Med pipeline project to carry natural gas from Israel and Cyprus to Europe, setting a target date of 2025 for completion.[8] The pipeline, which the Commission has identified as a Project of Common Interest[9], has the potential to diversify EU gas imports. In addition to providing access to the Israeli offshore gas fields, it would facilitate production in Cyprus, in particular in the Aphrodite field.

- Cyprus is not a gas producer yet but has significant potential: as it can be seen in Figure 7, it has the seventh largest gas resources and the largest deepwater resources among EU Member States. From total EU gas resources, about 40% is found in offshore fields while a third is classified as shale gas. 87% of shale gas resources are concentrated in two Member States, Poland and the UK.

Figure 7. Gas resources of the EU in 2016



Source: Rystad Energy, data as of 18 May 2017

[6] http://www.maerskoil.com/Media/Newsroom/Pages/EngineeringthefutureoftheTyrafieldstartsJanuary2017.aspx
[7] https://uk.fm.dk/news/press-releases/2017/03/agreement-on-behalf-of-the-duc-partners
[8] http://uk.reuters.com/article/energy-natgas-israel-idUKL5N1HB1V8
[9] https://ec.europa.eu/energy/sites/ener/files/documents/pci_7_3_1_en_2015.pdf

1.3 Imports

- According to Eurostat data, net imports increased year-on-year by 22% in the first quarter and 14% in the second quarter of 2016, followed by a 5% decrease in the third quarter and a 7% increase in the last quarter. In 2016 as a whole, net imports were 9% higher than in 2015. Growing consumption and falling indigenous production both contributed to the rise of imports. In 2016, net imports grew faster than consumption which means that import dependency[10] increased from 69.3% in 2015 to 70.4% in 2016.

- Among the biggest EU gas markets, in 2016 the net imports of France, Germany, Italy and the UK increased by 9%, 10%, 7% and 19%, respectively. In case of Ireland, the rapid ramp-up of production at the Corrib field allowed the country to halve imports (-53%); indigenous production covered 58% of the country's consumption in 2016, up from 3% in the previous year.

- Like in 2015, the Netherlands was a net importer in the second and third quarters of 2016. However, looking at the whole year, it remained a significant net exporter and – despite falling indigenous production – its annual net exports were actually 15% higher than in 2015. Looking at the country's gas balance, this is explained mainly by a reduction of gas stocks and, to a smaller extent, by falling gas consumption. Net exports were particularly strong in the fourth quarter of 2016, 73% more than in the same period of 2015.

- ENTSO-G data show a bigger, 12% year-on-year increase in EU gas imports in 2016. In the first quarter of 2017, imports increased by 12% year-on-year, rising to the highest quarterly level observed in the last three years. The growth was driven by increasing supply from traditional pipeline suppliers, particularly Russia and Algeria, while LNG imports slightly decreased compared to the same period in 2016.

- In the first quarter of 2017, imports from Russia were 18% higher than in the same period of 2016 and remained close to the record-high level reached in the last quarter of 2016. In addition to increasing gas consumption in the EU, relatively low oil-indexed prices supported gas deliveries from Russia in this period. In January and February, oil-indexed prices were lower than hub prices in Northwest Europe, but in March this trend turned as hub prices dropped. Russia remained the top supplier of the EU in the first quarter of 2017, covering 41% of total extra-EU imports, up from 39% in the same period of 2016.

- Imports from Norway, the EU's second gas supplier, increased by 4% year-on-year in the first quarter of 2017 but the country's market share decreased from 38% to 35%.[11] Within Norwegian supplies, the share of the UK was well above year-ago levels as the outage of the Rough storage site and low LNG imports forced the country to rely more on pipeline imports. During the coming summer, on the other hand, Norwegian flows to the UK are likely to decrease as the UK will have to cope with oversupply because of the low injection demand.

- Imports from Algeria continued to grow strongly: in the first quarter of 2017, pipeline imports from the North African country increased by 65% (exactly the same year-on-year growth as the one observed in last quarter of 2016). On the other hand, imports from Libya decreased by 5% year-on-year. While Algerian supplies to Spain increased by 37%, deliveries to Italy almost doubled (+94%). The renegotiated long-term contract between Eni and Sonatrach is likely to have contributed to the sharply increasing flows to Italy. The combined share of Algeria and Libya from total extra-EU imports was 12% in the first quarter of 2017, up from 9% in the same period of 2016.

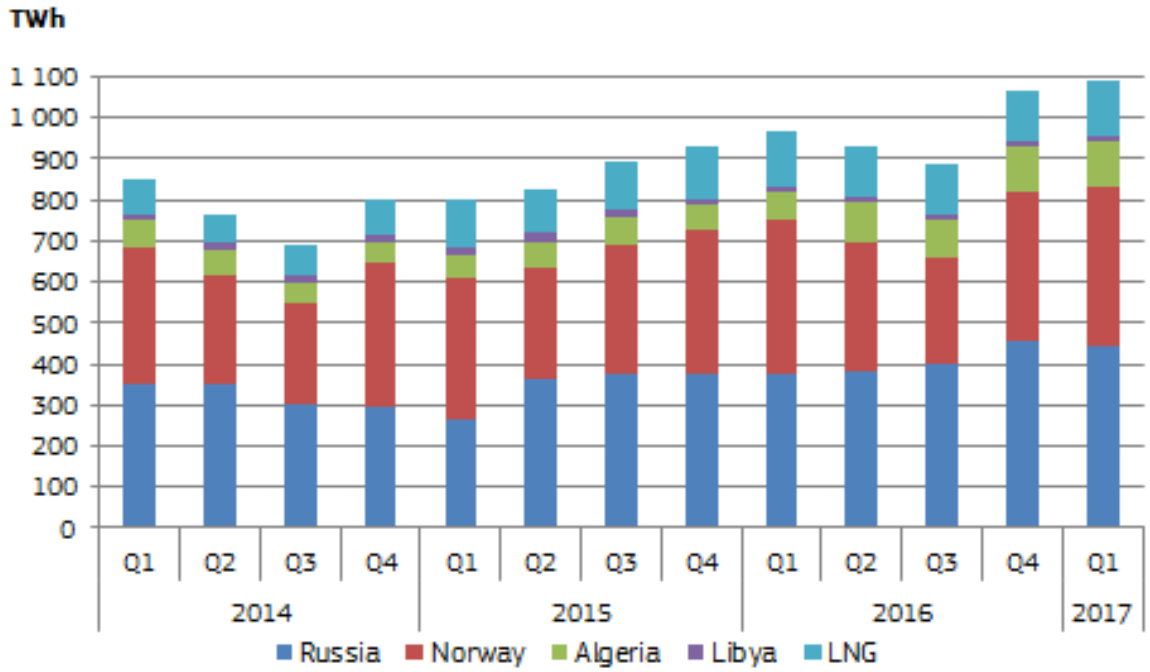
- Imports of LNG slightly decreased in the first quarter of 2017 and covered 12% of total extra-EU gas imports, down from 14% in the same period of 2016 (see further details below).

- The EU's estimated gas import bill was around 20 billion euros in the first quarter of 2017, about 35% more than a year earlier. Both import volumes (1090 TWh) and the average import price (around 18.6 Euro/MWh) were higher than in the first quarter of 2016.

[10] Import dependency is calculated as the quotient of net imports and gross inland consumption, using Eurostat monthly statistics

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

Figure 8. EU imports of natural gas by source, 2014-2017



Source: Based on data from the ENTSO-G Transparency Platform, data as of 8 May 2017
Russian deliveries to Finland are reported from 1 June 2014; deliveries to Estonia and Latvia are reported for a limited period (Narva from 15 June 2015 to 10 December 2015, Varska and Misso Izborsk from 26 May 2015)
Norway to UK flows reported by ENTSO-G include some gas from UK offshore fields, resulting in an overestimation of Norwegian imports.

- In the first quarter of 2017, the volume of Russian imports transiting Ukraine (which includes the Brotherhood Pipeline and the Balkan route) decreased from the high level reached in the previous quarter but Ukraine remained the main supply route of Russian gas to the EU, covering 41% of the total. When compared to the same period of 2016, Ukrainian transit volumes increased by 17%.

- Gas flows on the Nord Stream pipeline represented 30% of total EU imports from Russia in the first quarter of 2017. In absolute terms, volumes were 22% higher than in the same period of 2016. Volumes increased noticeably in January 2017 and, during this month, utilisation was practically 100%, in the wake of the Commission's decision on the revised exemption conditions for the operation of the OPAL gas pipeline. However, following Polish company PGNiG's complaint, the European Court of Justice suspended the execution of the Commission's decision and from February 2017 Nord Stream volumes returned to the levels seen in most of 2016.[12] The increase of Nord Stream flows in January did not happen at the expense of the other routes: gas supplies transiting Ukraine and Belarus also grew compared to December 2016.

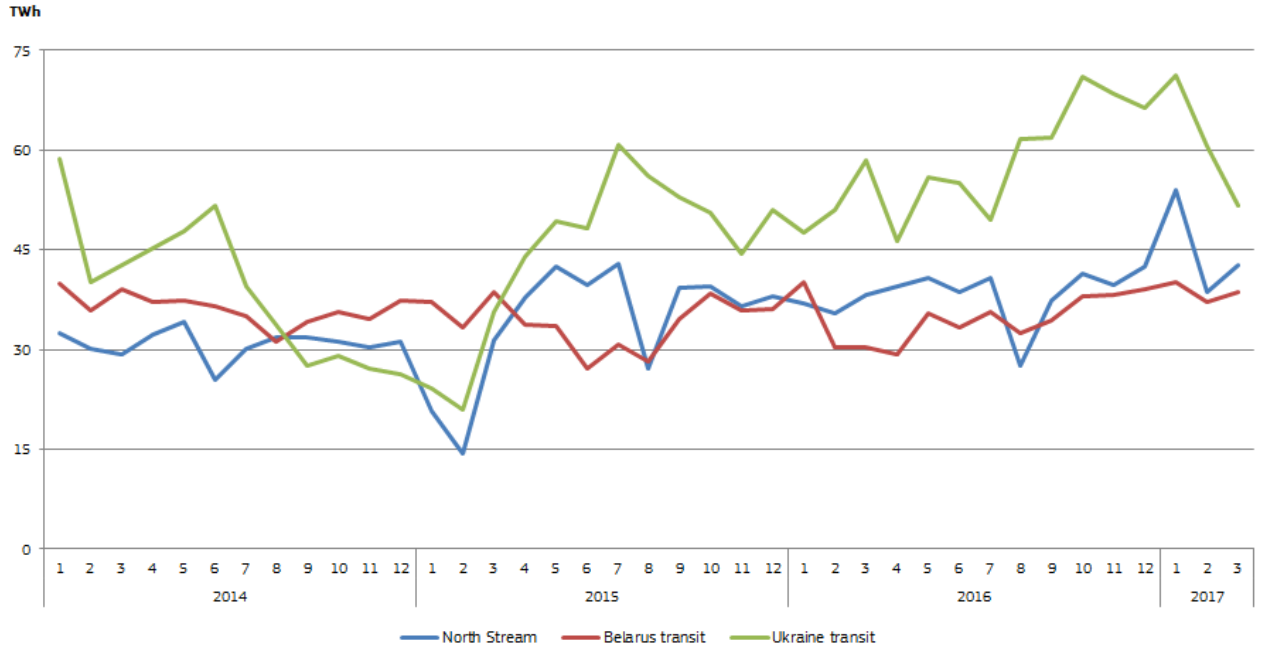
- Gas supplies transiting Belarus increased by 15% in the first quarter of 2017 compared to the same period of 2016 and covered 26% of total EU imports from Russia.

- In March 2017, the Commission invited comments on commitments submitted by Gazprom to address the Commission's long-standing competition concerns as regards gas markets in Central and Eastern Europe. The commitments, including the removal of destination causes and the use of pricing based on Western European hub prices, are expected to help to better integrate these markets, facilitating cross-border gas flows at competitive prices.[13] Interested parties were invited to submit comments by 4 May 2017. The Commission will assess all the comments received before deciding on whether or not to accept the commitments proposed by the Russian company. The Commission has no specific deadline to take its decision.

- In the first quarter of 2017, Ukraine continued to rely on imports from Europe. Gas flows coming from Hungary, Poland and Slovakia reached about 4.2 bcm in this period, almost 60% more than in the same period of 2016 but slightly less than in the last quarter of 2016. The country has not purchased gas from Russia since November 2015 which means that the country pulled through two consecutive winters without Russian supplies. Stock levels remained relatively comfortable: according to Gas Storage Europe, on 31 March 2017 Ukraine had 85 TWh of gas in storage, 12 TWh less than a year earlier.

[12] The Court suspended the decision already in December 2016 but, by that time, OPAL capacity for January 2017 was already allocated.
[13] http://europa.eu/rapid/press-release_IP-17-555_en.htm

Figure 9. EU imports of natural gas from Russia by supply route, 2014-2016



Source: Based on data from the ENTSO-G Transparency Platform, data as of 8 May 2017
Deliveries to Estonia, Finland and Latvia are not included; transit volumes to the Former Yugoslav Republic of Macedonia, Serbia and Turkey are excluded

- After a slight reduction observed in the course of 2016, in the first quarter of 2017 EU LNG imports decreased by 5% year-on-year. The trend was markedly different in Northern Europe and the Mediterranean: imports decreased by more than 50% in the UK (-55%), Belgium (-57%) and Lithuania (-71%) which was largely offset by increases in Spain (4%), Italy (13%), Portugal (331%) and Greece (161%). French imports were basically flat (+1%).

- High spot prices in Asia (see Figure 17) meant that Europe was a less attractive destination for LNG cargoes for most of the 2016-2017 winter. In the liquid and well-connected Northwest European market, LNG was struggling to compete with the Russian and Norwegian pipeline supplies, leading to a decrease of LNG imports. From March, as global LNG prices converged, imports to Northwest Europe rebounded.

- Because of the outage of the Rough storage facility, LNG was expected to play an increasing role in the UK gas supply during the 2016-2017 winter but this has not materialised: in the October 2016-February 2017 period, imports were 77% lower than a year earlier. Instead, the UK was relying more on pipeline imports from Norway and the continent. In March 2017, however, LNG imports were back to "normal", equalling the level reached in March 2016.

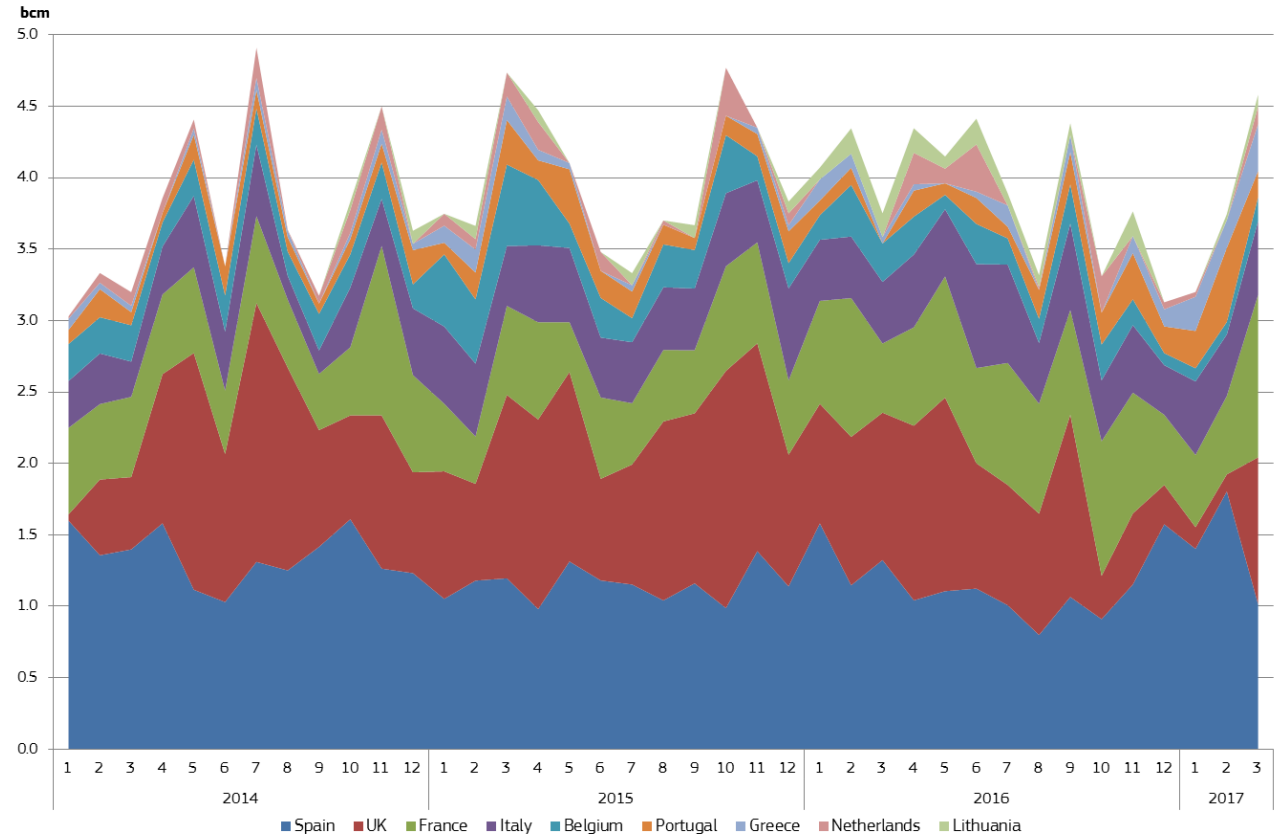
- The Dunkirk LNG project, France's fourth LNG terminal, started commercial operations on 1 January 2017. According to tanker tracking data, the terminal received a single cargo, arriving from Qatar, in the first quarter but imports ramped up from April 2017.

- Croatia's Krk terminal, which is expected to be completed in 2019, received €102 million of EU support from the Connecting Europe Facility in February 2017. The project will bring diversification in a region currently dominated by Russian supply, thereby improving energy security and price competitiveness.[14]

- In January 2017, another Member State was added to the list of LNG importers: Malta has received its first cargo at the Delimara terminal's floating storage unit (FSU). The regasified LNG will feed a new 215 MW power plant and an existing 149 MW power plant. Once fully operational, the ElectroGas Malta LNG-to-Power Project will be the primary source of power for the country. Until now, Malta's electricity sector was relying on an oil-fired plant; the new LNG project will facilitate the reduction of generation costs and emissions.[15] According to tanker tracking data, the country already received LNG from a number of countries, including Equatorial Guinea, the Netherlands, Singapore and the US.

[14] http://europa.eu/rapid/press-release_IP-17-280_en.htm
[15] http://www.electrogas.com.mt/

Figure 10. LNG Imports to the EU by Member State



Source: Bloomberg/Poten & Partners
Imports to Malta and Poland are not included

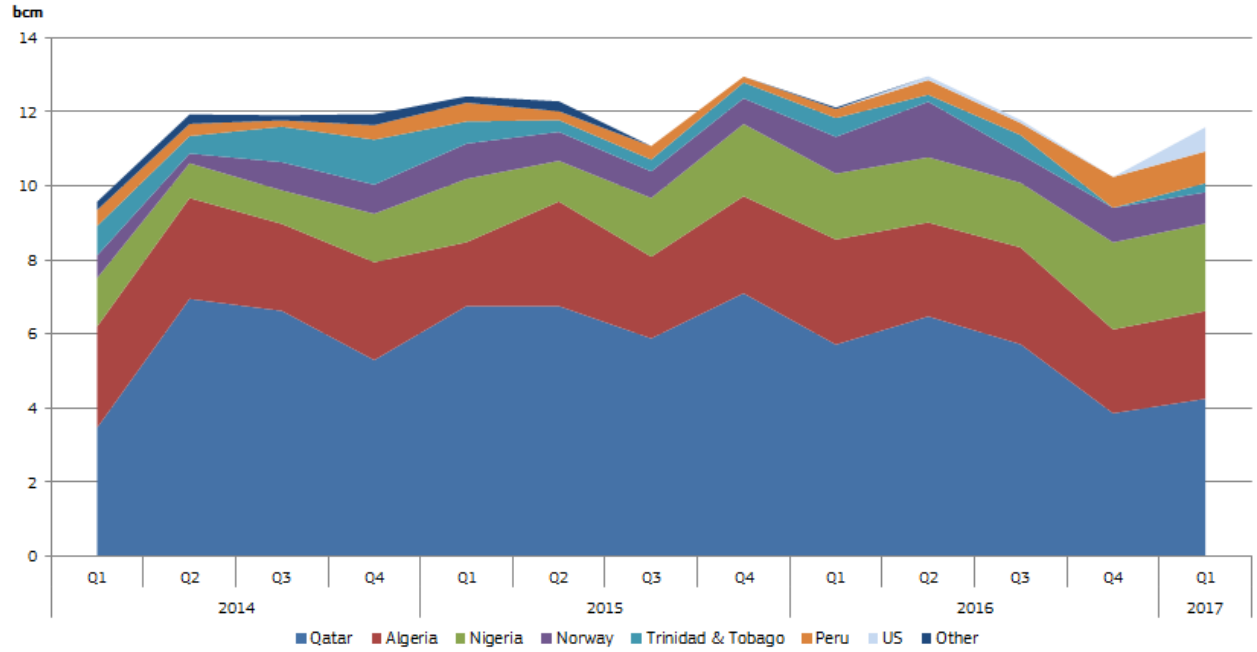
- In the first quarter of 2017, Qatar remained the main LNG supplier of the EU but, like in the previous quarter, its market share remained below 40% (37%). Qatari LNG output decreased from the last quarter of 2016 and an increasing share of exports was directed to Asia and the Middle East. Qatar was followed by Algeria (20%), Nigeria (20%), Peru (7%) and Norway (7%). In this period, the US became the sixth LNG supplier of the EU, covering 6% of LNG imports; in terms of market share, this is a tenfold increase compared to the whole year of 2016 when it was 0.6%.

- In the first quarter of 2017, Qatar had a dominant role in the Belgian (100%), Dutch (59%), Italian (100%) and UK (88%) markets. Algeria was the largest supplier of France (41%) and Greece (86%) while Portugal's main supplier was Nigeria (57%). Norway was the sole supplier of Lithuania. Spain had the most diversified portfolio: it received LNG from all seven suppliers of the EU, with Nigeria having the biggest market share (29%).

- While the share of Qatari gas from total EU LNG imports recently decreased, it is likely to increase in Poland. In March 2017, PGNiG announced the signing of a side agreement to the existing long-term contract with Qatargas, under which annual imports will increase to 2 million tonnes per year from 2018.[16]

[16] http://en.pgnig.pl/news/-/news-list/id/pgnig-signed-a-strategic-agreement-with-qatargas/newsGroupId/1910852?changeYear=2017&currentPage=2

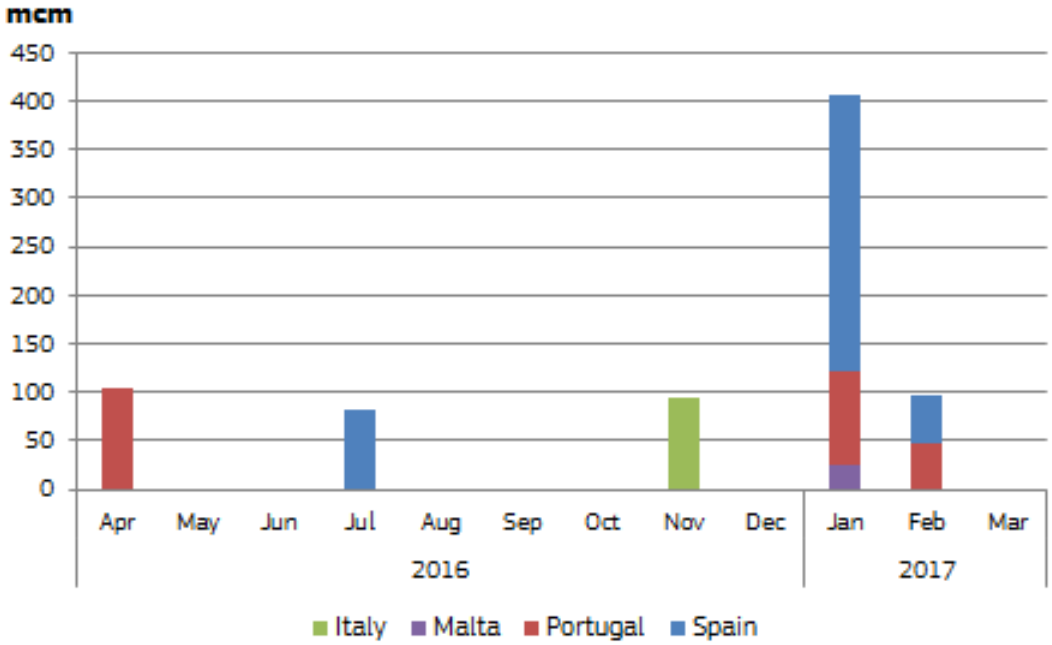
Figure 11. LNG Imports to the EU by supplier



Source: Bloomberg/Poten & Partners
Imports to Malta and Poland are not included; imports coming from other EU Member States (reexports) are excluded

- In the beginning of 2017, there has been a significant increase in the volume of LNG imports coming from the US. While in the whole 2016 only 3 LNG cargoes were reported, in the first quarter of 2017 alone 6 vessels were discharged in EU ports. Spain received 4 cargoes, Portugal 2 and Malta 1.[17] US exports to the EU totalled 500 million cubic meters in the first three months of 2017, representing 12% of total US LNG exports in this period.

Figure 12. EU LNG imports from the US from April 2016 to March 2017



Source: US Energy Information Administration

[17] According to tanker tacking data reported by Thomson Reuters, one cargo was shared between Portugal and Spain (the vessel called at Sines and then at Barcelona) while the vessel discharging part of its load in Malta continued its journey to Jordan.

1.4 Storage

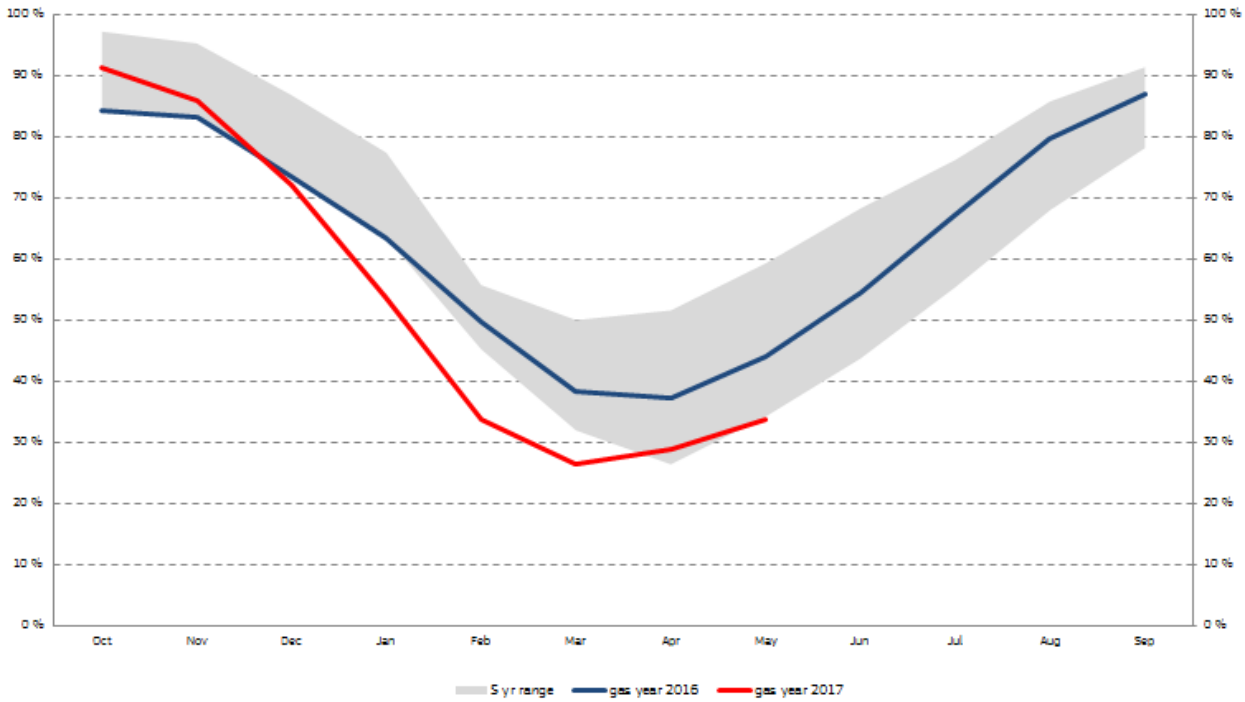
- At the beginning of the 2016-2017 winter season, storage levels were near to maximum capacity: the quantity of stored gas peaked on 9 October 2016 at nearly 960 TWh, equivalent to 92% of storage capacity. In the fourth quarter of 2016, however, withdrawals were much stronger than in the same period of 2015, driven by colder temperatures and an increased gas use in the power sector. By 31 December 2016, the average filling rate fell to 64%, 6 percentage points lower than a year earlier and below the 5-year range.

- January 2017 was rather cold in most of Europe, boosting gas demand and prompt prices; as a result, withdrawals continued to be strong at the beginning of the year. Record high gas use in the electricity sector and low LNG imports also contributed to a greater reliance on stocks. From mid-February, withdrawals slowed down in the wake of higher temperatures and increasing LNG imports. The injection season started earlier than usual: EU stock levels bottomed out already on 28 March.

- On 31 March 2017, the average filling rate was only 26%, compared to 36% a year earlier. Storage levels were particularly low in Austria (15%), Belgium (14%) and the Netherlands (15%) while in Italy, where withdrawals are capped by the government, the filling rate was well above the EU average (39%). In case of Belgian and Dutch facilities, high gas demand from the UK contributed to strong withdrawals this winter. Relatively low stock levels at the end of winter should mean higher injection demand during the summer of 2017.

- In the UK, the future of the Rough facility, the country's main gas storage site, continues to be uncertain. Withdrawals were resumed in December 2016 but for most of the time withdrawal rates were restricted, thereby increasing UK gas demand from mainland Europe during the winter. On 16 February, Centrica, the operator of the site announced that injections will not resume until at least 30 June 2017 while on 12 April the company said the site will not be available for injection during the 2017-2018 storage year.[18] This means that, during the coming summer, the UK will again rely on the Belgium-UK Interconnector pipeline to carry surplus gas to Europe. In fact, already in mid-March, the Interconnector switched to carrying gas from the UK to the continent.

Figure 13. Gas storage levels as percentage of maximum gas storage capacity in the EU



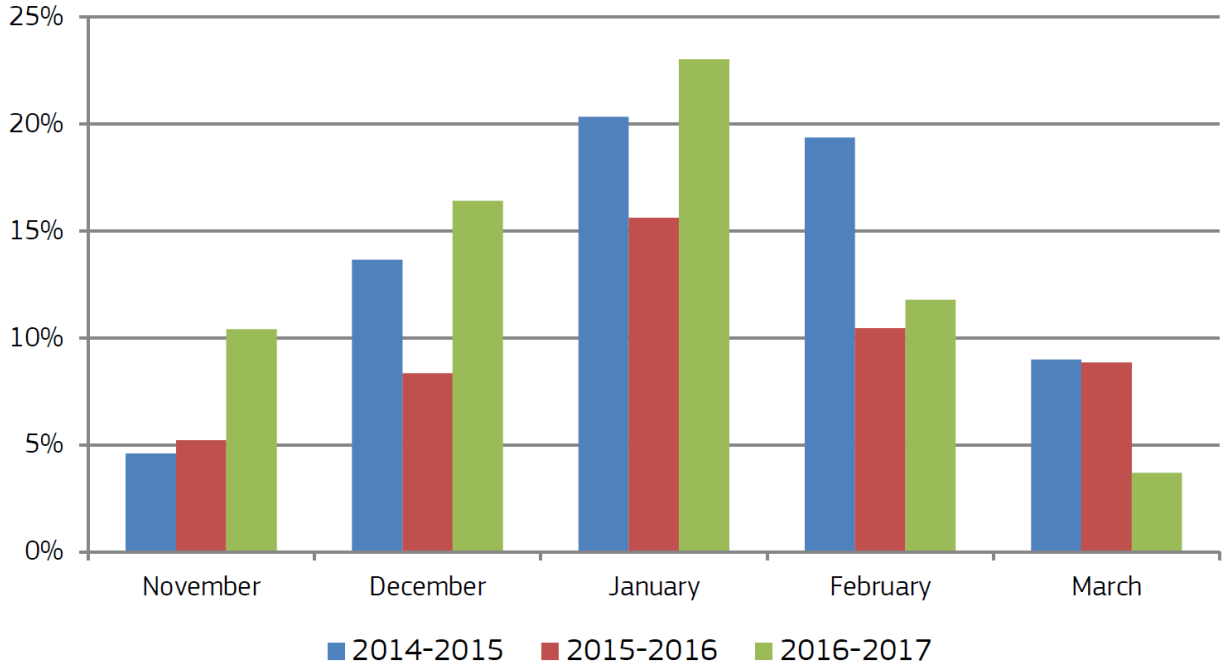
Source: Gas Storage Europe AGSI+ Aggregated Gas Storage Inventory, extracted on 16 May 2017. See explanations on data coverage at https://agsi.gie.eu/#/faq.
The 5-year range reflects stock levels in gas years 2012-2016. The graph shows stock levels on the 15th day of the given month.

- During the past winter, withdrawals were stronger than usual, and much stronger than a year earlier. In the November 2016 - February 2017 period, the average filling rate of EU storage facilities decreased by 62 percentage points (from 91% to 29%). In

[18] http://www.centrica-sl.co.uk/regulation/remit/2017-23a

the same period of the 2015-2016 winter, withdrawals were equivalent to only 40% of storage capacity (the average filling rate decreased form 84% to 44%). In turn, withdrawals in March 2017 were quite low.

Figure 14. Gas withdrawals from EU storage facilities expressed as percentage of storage capacity



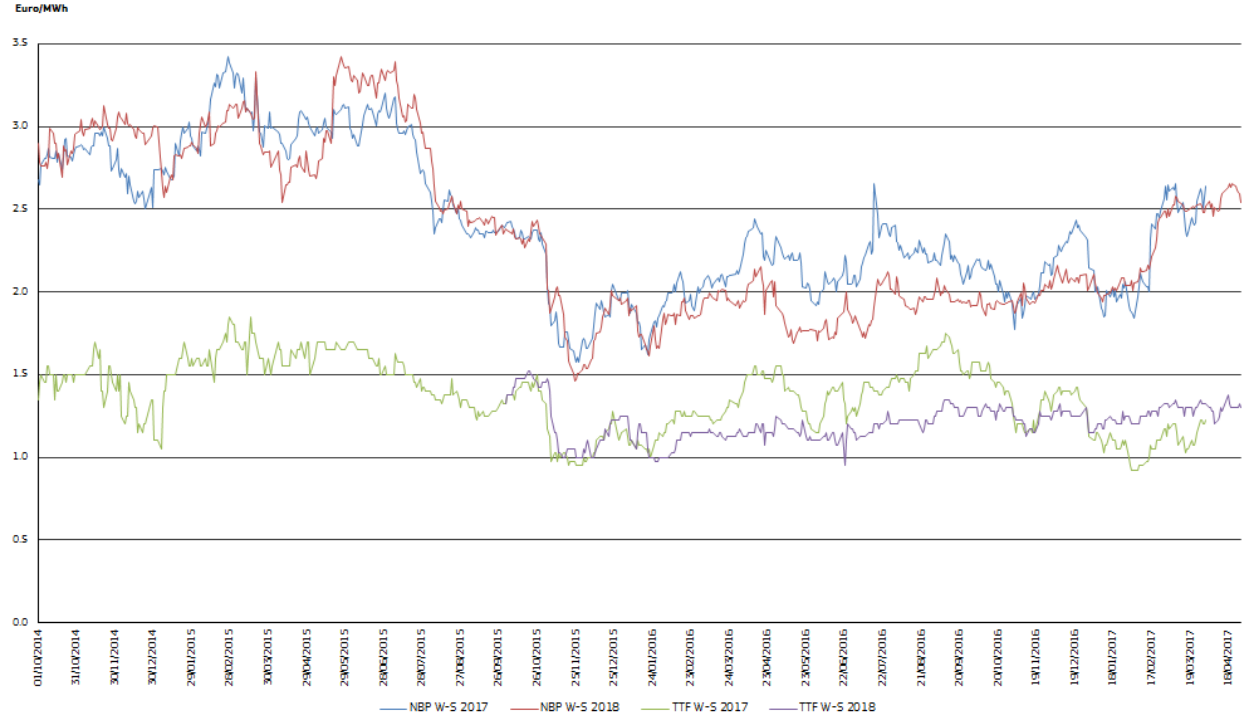
Source: Gas Storage Europe AGSI+ Aggregated Gas Storage Inventory, extracted on 16 May 2017; calculations of DG Energy. See explanations on data coverage at https://agsi.gie.eu/#/faq.

- Figure 15 shows that seasonal spreads have been relatively high in 2014 and the first half of 2015 but started to fall in July 2015, dropping to as low as 1.5 Euro/MWh on the NBP and 1.0 Euro/MWh on the TTF. Among other factors, low seasonal price spreads probably contributed to the muted storage injections in 2015.

- From early 2016, spreads slightly recovered but remained below the 2014 levels. On the NBP, seasonal spreads averaged 2.3 Euro/MWh in the first quarter of 2017, 0.3 Euro/MWh more than in the same period of 2016. On the TTF, the average seasonal spread was 1.2 Euro/MWh in the first quarter, more or less the same as a year earlier.

- There seems to be some divergence in the latest development of seasonal spreads in the Netherlands and the UK. Depleting Dutch stocks indicate a higher injection demand during the coming summer while Groningen output is expected to decrease to comply with the annual cap (after relatively high output in winter), thereby increasing summer prices and lowering the winter-summer spread. In the UK, in turn, the continued woes of the Rough storage facility mean low injection demand and oversupply in summer and a tighter market in winter, thereby increasing the seasonal spread. After Centrica's announcement on 16 February that injections at Rough will not resume until at least 30 June 2017, the difference between the winter 2017-18 price and the summer 2017 price increased from 2.0 Euro/MWh to 2.3 Euro/MWh in a single day and two weeks later reached 2.6 Euro/MWh.

Figure 15. Winter-summer spreads in the Dutch and British gas hubs



Source: Platts
W-S 2017 refers to the difference between the winter 2017-18 price and the summer 2017 price; W-S 2018 refers to the difference between the winter 2018-19 price and the summer 2018 price

2. Wholesale gas markets

2.1 The broader energy commodity picture: comparisons between oil, gas and coal prices in the EU

- The decision of OPEC and non-OPEC producers to reduce output provided some support to oil prices at the end of 2016. However, despite the high level of compliance of OPEC members with the agreed cuts (the compliance of non-OPEC producers was less impressive), prices failed to rise consistently and significantly above the 50 USD/bbl level in the first quarter of 2017. From March, prices started to decrease as increasing drilling activity, growing output and rising stock levels in the US raised doubts about the imminent rebalancing of the global oil market. The high level of stocks accumulated over the last two years and the increase of US shale oil output limit the potential for a significant price rise in the short term.

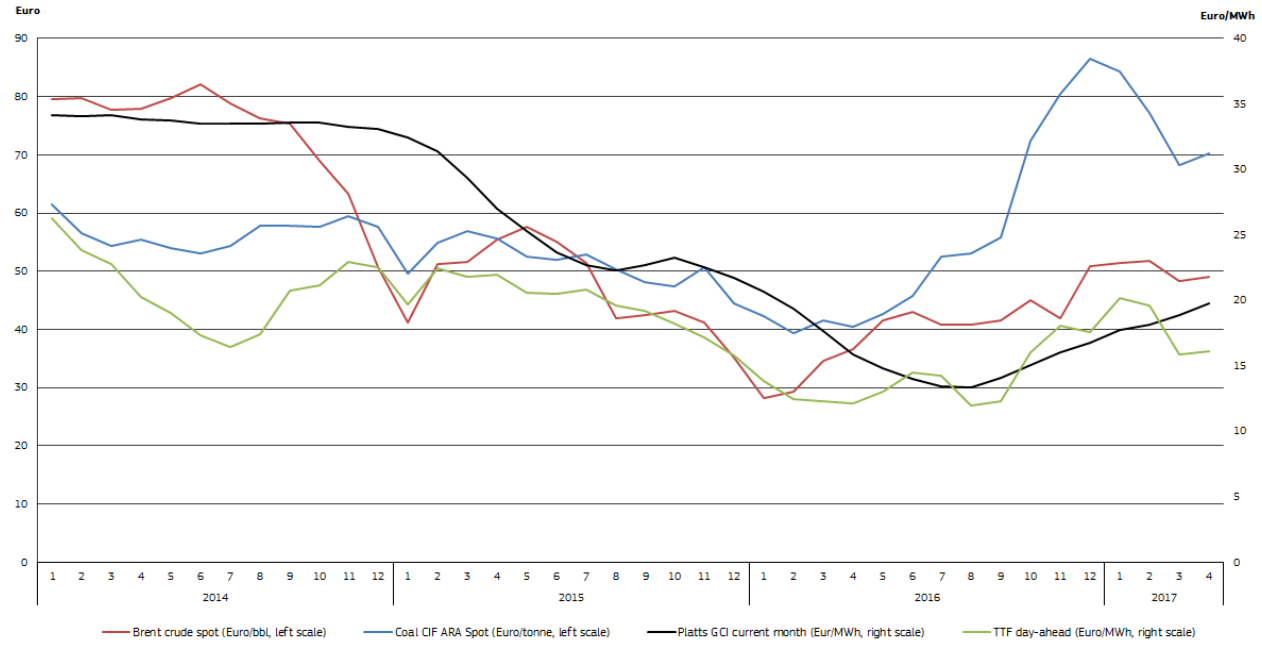
- After a gradual decrease seen in 2015 and most of 2016, the TTF spot price started to grow in the last quarter of 2016. In January 2017, the average price exceeded 20 Euro/MWh, the highest level since mid-2015, before dropping below 16 Euro/MWh in March. In the first quarter of 2017, the average price was 18.5 Euro/MWh, 44% higher than in the same period of 2016.

- In contrast to the previous year, the 2016-2017 winter was characterized by a distinct peak of gas hub prices in Europe. A number of factors contributed to this, including the relatively cold weather, the outages of several French nuclear reactors, low LNG imports in Northwest Europe and uncertainty about the Rough storage site in the UK. As a result of strong withdrawals, storage levels were lower than usual, causing some supply concerns, thereby also contributing to increasing prices. By March, mild weather and growing LNG imports eased such concerns and prices started to fall.

- Due to the typical 6-9 month time lag structure used in the pricing formulas, oil-indexed prices bottomed out in August 2016 and started to grow gradually afterwards. In spite of this increase, for most of the past winter they remained lower than hub prices, thereby contributing to the strong increase of Russian and Algerian imports in this period. From March 2017, however, oil-indexed prices clearly exceeded hub prices. Platt's North West Europe Gas Contract Indicator (GCI), a theoretical index showing what a gas price linked 100% to oil would be, averaged 18.2 Euro/MWh in the first quarter of 2017, 0.3 Euro/MWh less than the TTF. In the last quarter of 2016, this difference was 1.3 Euro/MWh.

- Driven by market tightness in Asia after China introduced measures restricting domestic coal output, coal prices increased significantly in the second half of 2016. In December, the CIF ARA spot price averaged 86.5 Euro/ton, the highest level since 2011. Prices eased in the first quarter of 2017 as temperatures warmed and Chinese production increased, but remained rather high (the CIF ARA spot price averaged 76.6 Euro/ton), thereby helping the relative competitiveness of gas.

Figure 16. Spot prices of oil, coal and gas in the EU



Source: Platts

2.2 International gas markets

- Figure 17 displays an international comparison of wholesale gas prices. In the last few years, prices have been on a declining trajectory in all regions but this trend seems to have come to an end in the second part of 2016.

- In 2015-2016, Japanese LNG prices traded on average 1.1 USD/mmbtu higher than TTF, the Dutch gas hub but in certain periods the premium has practically disappeared. During the past winter, strong demand in Asia and a number of production outages supported Japanese prices and, as a result, the difference significantly increased and in December 2016 reached 3.3 USD/mmbtu, a level not seen since 2014. In the first quarter of 2017, Japanese landed prices averaged 7.2 USD/mmbtu which means that the average premium over TTF was 1.4 USD/mmbtu. In January, at the height of winter, Asian spot prices got close to 10 USD/mmbtu but have been on a downward trend since then.

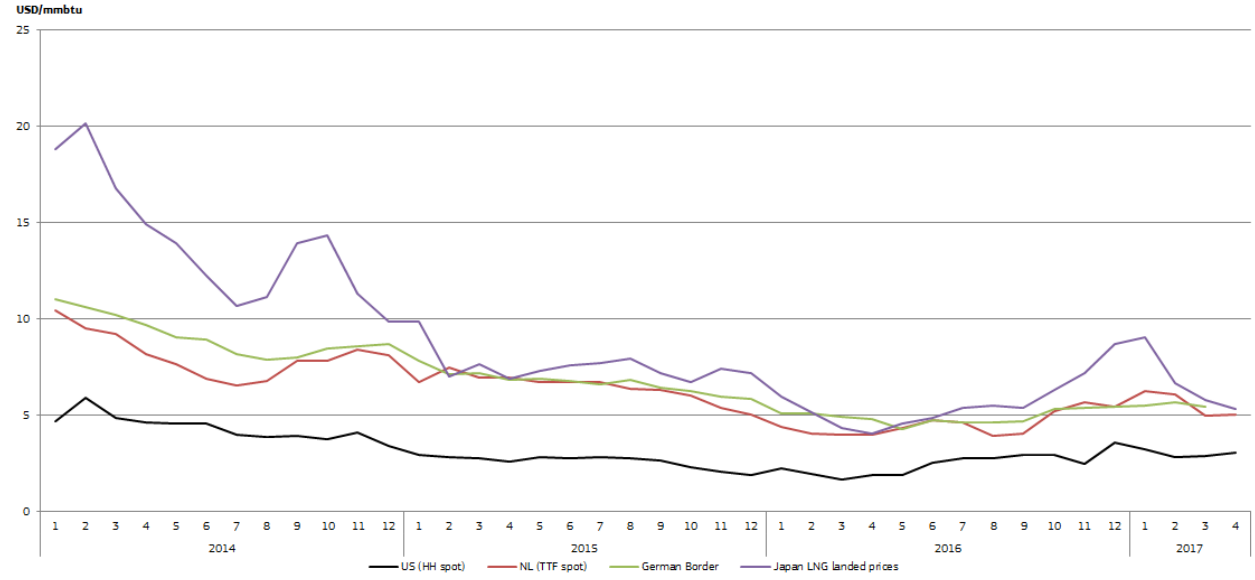
- After years of gradual decrease, European gas prices started to grow from October 2016 and the TTF averaged 5.8 USD/mmbtu (18.5 Euro/MWh) in the first quarter of 2017. The average German border price was slightly lower: 5.5 USD/mmbtu (17.7 Euro/MWh), helped by relatively low oil-indexed prices in January and February.

- The Henry Hub price has been on the rise since April 2016, supported by rising demand in the power generation sector (driven by high summer temperatures, the retirement of coal plants and nuclear outages), increasing exports (to Mexico and by LNG), as well as relatively low storage injections during summer. In the first quarter of 2017, the price slightly decreased from a peak reached in the end of December 2016 as gas output increased and temperatures were above average, thereby reducing demand from heating and power generation. In this period, the average price was 3.0 USD/mmbtu, 1.0 USD/mmbtu (51%) more than in the same period of 2016.

- There has been a convergence of international gas prices in most of 2016 but this trend has reversed in the last quarter of the year when both European and Asian prices grew substantially. Convergence resumed from February 2017. The ratio of the Japanese LNG price and US Henry Hub decreased to 2.0 in March 2017 while it was 2.9 in November 2016.

- The average NBP/Henry Hub ratio decreased to 1.7 in March 2017 from 2.3 in November 2016. In absolute terms, the differential was 2.1 USD/mmbtu in March 2017, down from 3.2 USD/mmbtu in November 2016.

Figure 17. International comparison of wholesale gas prices



Sources: Platts, Thomson-Reuters, BAFA

2.2.1 LNG markets

- Spot LNG prices decreased significantly in 2014 and early 2015 in both Asia and Europe, driven by weak demand in Asia and increasing global supplies, and compounded by the fall of oil prices. The decrease was steeper in Asia and, as a result, the premium of Asian LNG prices over European ones, which regularly exceeded 5 USD/mmbtu in previous years, practically disappeared.

- For most of 2015 and early 2016, spot prices in Asia were higher than those in Europe and this difference increased significantly in December 2016 and January 2017 driven by high winter demand and supply outages in Asia. In the first quarter of 2017, prices averaged 6.0 USD/mmbtu in the UK, 6.7 USD/mmbtu in Spain, 7.2 USD/mmbtu in Japan and 7.0 USD/mmbtu in China. The Japanese benchmark of oil-indexed LNG prices was slightly higher, averaging around 7.4 USD/mmbtu in the first quarter.

- During the 2016-2017 winter, Asian LNG prices were supported by increasing demand and a number of disruptions, including an outage at Train 1 of Australia's Gorgon facility lasting more than a month (from late November to early January). In December, the difference between the Japanese and UK price reached 3.2 USD/mmbtu, the highest level since 2014 and remained high in January 2017 (2.5 USD/mmbtu). Prices eased from February as demand weakened while Australian and US output continued to grow. Train 3 of the Gorgon LNG project began production in late March 2017.[19]

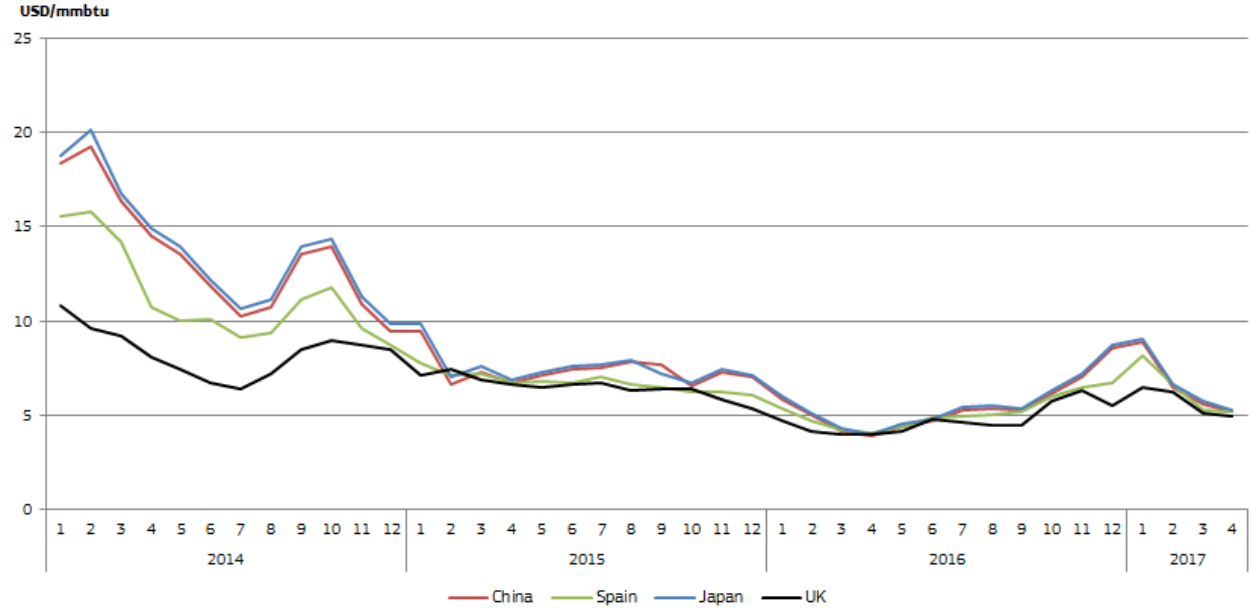
- After a slight annual decrease in 2015, Asian LNG demand picked up in 2016, driven by higher consumption in China and India. In the first quarter of 2017, imports increased by 28% in China, by 19% in Korea, by 12% in Japan, while imports decreased by 5% in India, all compared to the same period in 2016. Latin American imports continued to be weak, decreasing by 28% year-on-year.[20]

- In Korea, a number of nuclear reactors were coming on line, including those halted after last year's earthquake and a new reactor in the Shin Kori plant, but the country's oldest reactor will be permanently shut down on 19 June 2017.[21] In the long run, the new government plans to move away from coal and nuclear, towards gas and renewables. As a result, the country's LNG imports could increase by more than 50% by 2030.[22] In Japan, two reactors were restarted at the Takahama plant in May and June 2017, respectively, thereby increasing the number of operating reactors to five.[23] Furthermore, a court cleared the way for the restart of two additional nuclear reactors at the Genkai plant by March 2018.[24] These developments are likely to moderate the country's LNG demand.

- US LNG exports continued to ramp up in the first quarter of 2017, reaching 4.2 bcm, 89% more than in the last quarter of 2016. Asia (33%) caught up with Latin America (33%) as the main destination; they were followed by the Middle East (15%). 12% of US LNG exports was destined to the EU and another 7% to Turkey. Looking at individual countries, the three largest buyers of US LNG were Mexico, Jordan and Japan.[25]

- Significant new LNG capacities are expected to come on stream in 2017, mainly in Australia and the US. With its liquid hubs, underutilised LNG terminals and gas-fuelled power plants, Europe is well placed to absorb additional LNG supplies as the global market is moving towards oversupply.

Figure 18. Spot LNG prices in the EU and Asia



Note: Landed prices for LNG
Source: Thomson-Reuters Waterborne

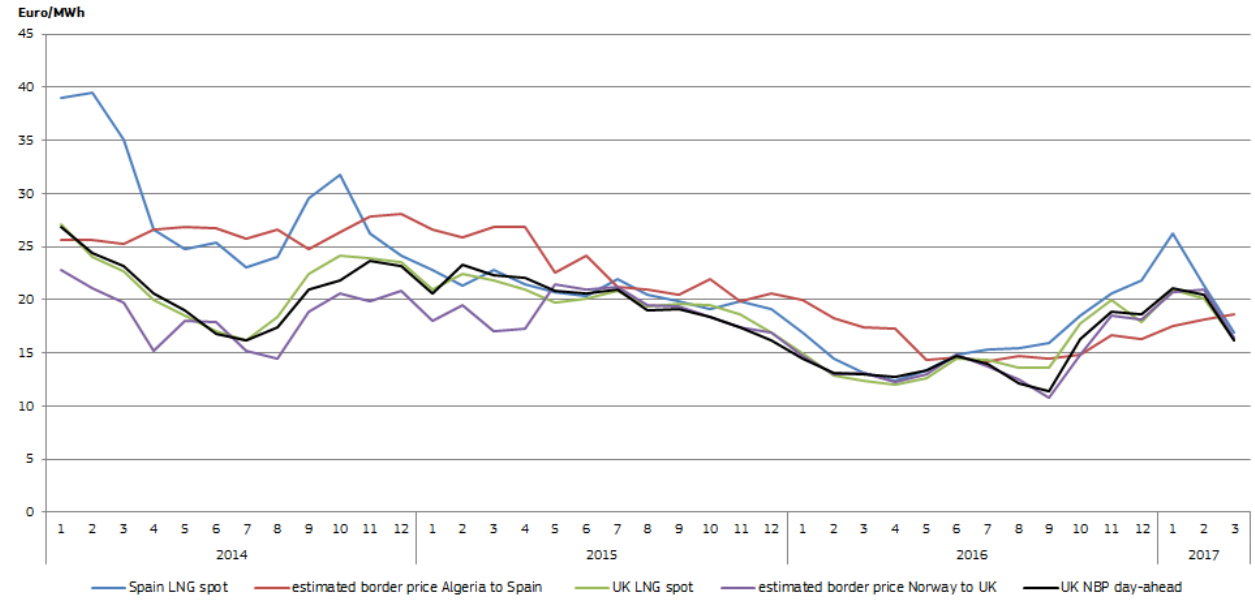
[19] https://www.chevronaustralia.com/news/media-statements/2017/03/28/lng-production-starts-from-gorgon-train-three
[20] Source: Commission calculations based on tanker movements reported by Thomson Reuters
[21] http://www.world-nuclear-news.org/C-Final-shutdown-approaches-for-Koreas-oldest-reactor-0906175.html
[22] http://af.reuters.com/article/energyOilNews/idAFL4N1IK078
[23] http://www.world-nuclear-news.org/C-Japan-puts-fifth-reactor-back-into-operation-0606174.html
[24] http://www.reuters.com/article/us-japan-nuclear-court-idUSKBN19404S
[25] http://www.eia.gov/dnav/ng/ng_move_expc_s1_m.htm

- Figure 19 displays the evolution of spot LNG prices paid in the UK and Spain and estimated border prices for pipeline imports from Norway and Algeria, which account for the major part of pipeline imports in the UK and Spain, respectively. The evolution of the day-ahead prices on the UK NBP hub is also presented. The fall in LNG prices has helped to narrow the gap between the prices of pipeline and LNG imports in the EU, the significant differences seen in previous years having disappeared in mid-2015.

- In the UK, spot LNG prices closely follow the NBP price but, unusually, in September 2016 the average LNG price was 2.3 Euro/MWh above the average NBP price. The gap narrowed to an average 0.6 Euro/MWh in the last quarter of 2016 and practically disappeared in the first quarter of 2017. For a long time, the estimated price of Norwegian imports was below the NBP price but the difference largely vanished from May 2015, indicating that Norwegian export prices are now clearly linked to European hub prices. In the first quarter of 2017, the estimated price of Norwegian imports was on average 0.1 Euro/MWh above the NBP price.

- In previous years, there have been seasonal differences in the price development of Algerian pipeline imports and spot LNG in Spain: LNG had a high premium during the winter months but was cheaper than Algerian pipeline gas in the summer. In the 2014-2015 winter, however, LNG prices plummeted and, until mid-2016, remained below the price of Algerian pipeline imports. From the second half of 2016, however, LNG was more expensive than the pipeline gas coming from Algeria as the price of the latter was pushed down by the lagged effect of falling oil prices. In January 2017, strong weather-driven demand pushed LNG prices up: on average, spot LNG prices were 8.7 Euro/MWh more expensive than the estimated price of Algerian imports. However, by March the price of pipeline gas exceeded that of LNG. In spite of the relatively high LNG prices, Spanish LNG imports increased by 4% in the first quarter of 2017 compared to the same period of 2016.

Figure 19. Price developments of LNG and pipeline gas in the UK and Spain



Note: Landed prices for LNG. Source: Platts, Thomson Reuters, European Commission estimates based on Eurostat COMEXT data

2.3 European gas markets

2.3.1. Wholesale markets in the EU

- In the first quarter of 2017, liquidity on the main European gas hubs decreased: total traded volumes amounted to around 12,400 TWh, 8% less than in the same period of 2016. This is still about 9.5 times more than the gas consumption of the seven Member States covered by the analysis in this period. Traded volumes decreased year-on-year in the Belgian (-25%), French (-19%), German (-16%) and UK (-16%) hubs which was partly offset by increases in the Austrian (10%), Dutch (1%) and Italian (8%) hubs.

- While liquidity decreased year-on-year in January and February, traded volumes in March were higher than a year earlier. Analysts suggested that the lower liquidity in the first two months of the year is explained by the particularly strong trade in early 2016 when record-low oil prices forced market participants to adjust positions and by tight seasonal spreads limiting activity on the front season delivery contract. Trade of the day-ahead contract was supported in January by increasing weather-driven gas demand.[26]

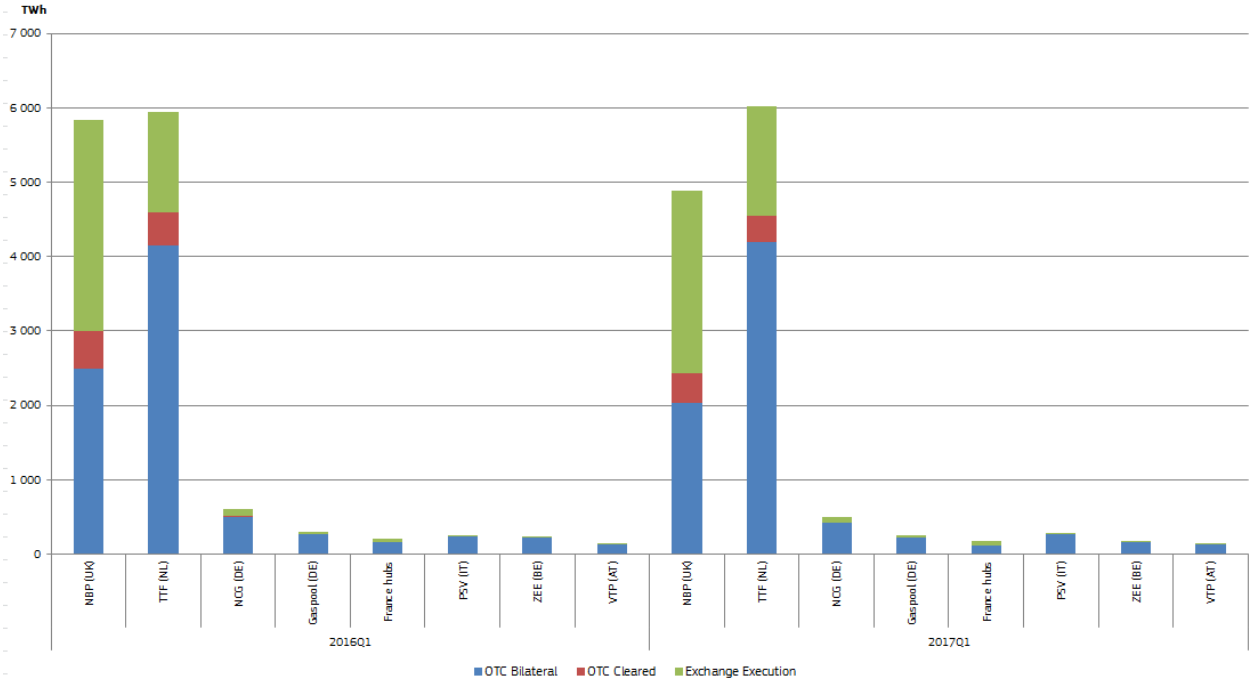
[26] ICIS Heren European Gas Markets, 15 February 2017

- While in the first quarter of 2016, TTF and NBP volumes were of similar magnitude, covering 43% and 44% of hub traded volumes, respectively, in the first quarter of 2017 TTF alone covered almost half (49%) of hub traded volumes while the share of NBP decreased to 39%.

- On the UK NBP hub, half of total traded volumes were executed directly on an exchange in the first quarter of 2017. This share was 25% on the Dutch TTF hub, 29% at the French hubs, 16% at the German hubs, 12% at the Austrian hub but only 1% at the Belgian and Italian hubs. In most hubs, the share of exchange trade was higher than a year earlier.

- At EU level, OTC markets remained the main trading venue but their share slightly decreased from 68% in the first quarter of 2016 to 67% in the same period of 2016. 9% of OTC volumes were cleared at a clearinghouse in the first quarter of 2017, down from 10% in the same period of the previous year.

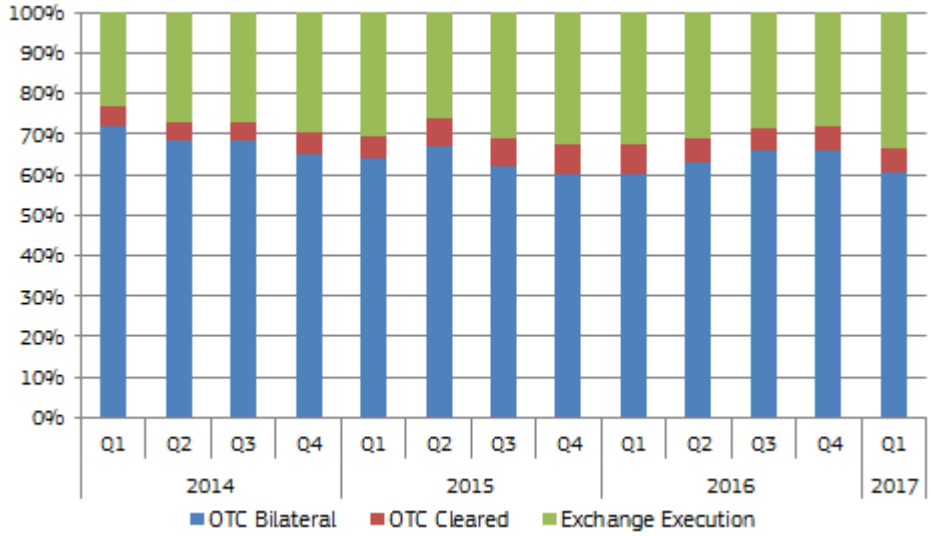
Figure 20. Traded volumes on the main European gas hubs in the first quarter of 2016 and 2017



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

- In 2014-2015, exchanges gradually gained ground: while in the first quarter of 2014 their share from total traded volumes was 23%, by the first quarter of 2016 it increased to 33%. This trend seems to have turned in the second half of 2016 when the share of exchange-traded volumes decreased to 28% but in the first quarter of 2017 it rebounded to 33%. The share of cleared OTC volumes was 6% of total traded volumes in the first quarter of 2017, down from 7% a year earlier.

Figure 21. The share of traded volumes on the main European gas hubs



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Source: Trayport Euro Commodities Market Dynamics Report

2.3.2. Wholesale price developments in the EU

- Between February 2015 and April 2016, day-ahead hub prices showed a continuous decreasing trend as low oil prices and steady LNG supply put downward pressure on European hub prices. During the 2015/2016 winter, higher-than-average temperatures also weighed on demand and thus on prices, compounded by robust pipeline imports from Russia, Norway and Algeria, and relatively high storage levels at the end of the withdrawal season.

- From the second half of April 2016, hub prices started to increase, helped by a combination of factors: a late cold spell in Northwest Europe, increased storage injections, growing oil prices, the decision on the Groningen output cap and a number of outages affecting Norwegian infrastructure. In France, a strike affecting the country's LNG terminals in late May and early June also contributed to tighter supplies and higher prices. In August, day-ahead prices returned to the downward trend, helped by falling seasonal demand, high stocks, lower oil prices and increasing Norwegian imports

- From September 2016 to January 2017, hub prices significantly increased. At the Dutch TTF hub, the average day-ahead price in January 2017 was 68% higher than in August 2016. A number of factors contributed to the price increase, including the cold weather (especially when compared to the previous year), strong demand in the power sector, depleting stocks, the outages of several French nuclear reactors, low LNG imports in Northwest Europe and uncertainty about the Rough storage site in the UK.

- In January 2017, a prolonged cold snap across a large part of Europe boosted gas demand and prices. As storage withdrawals were much stronger than a year earlier, there were concerns about possible supply tightness towards the end of the winter, particularly if temperatures remain low. However, such fears have not materialised as February and March was relatively mild and, as a result, prices decreased from the January highs. A significant rise in LNG imports in March also contributed to falling prices.

- During the past winter, gas at the UK hub traded at an usually high price compared to mainland Europe: in the November 2016-February 2017 period, the average difference compared to the Dutch TTF hub was nearly 1.0 Euro/MWh. Low stock levels after the outage of the Rough site, the UK's largest storage facility and low LNG imports caused supply tightness in the UK and the country had to rely more on pipeline imports from Norway and mainland Europe. Increased import flows were fostered by the relatively high prices in the UK.

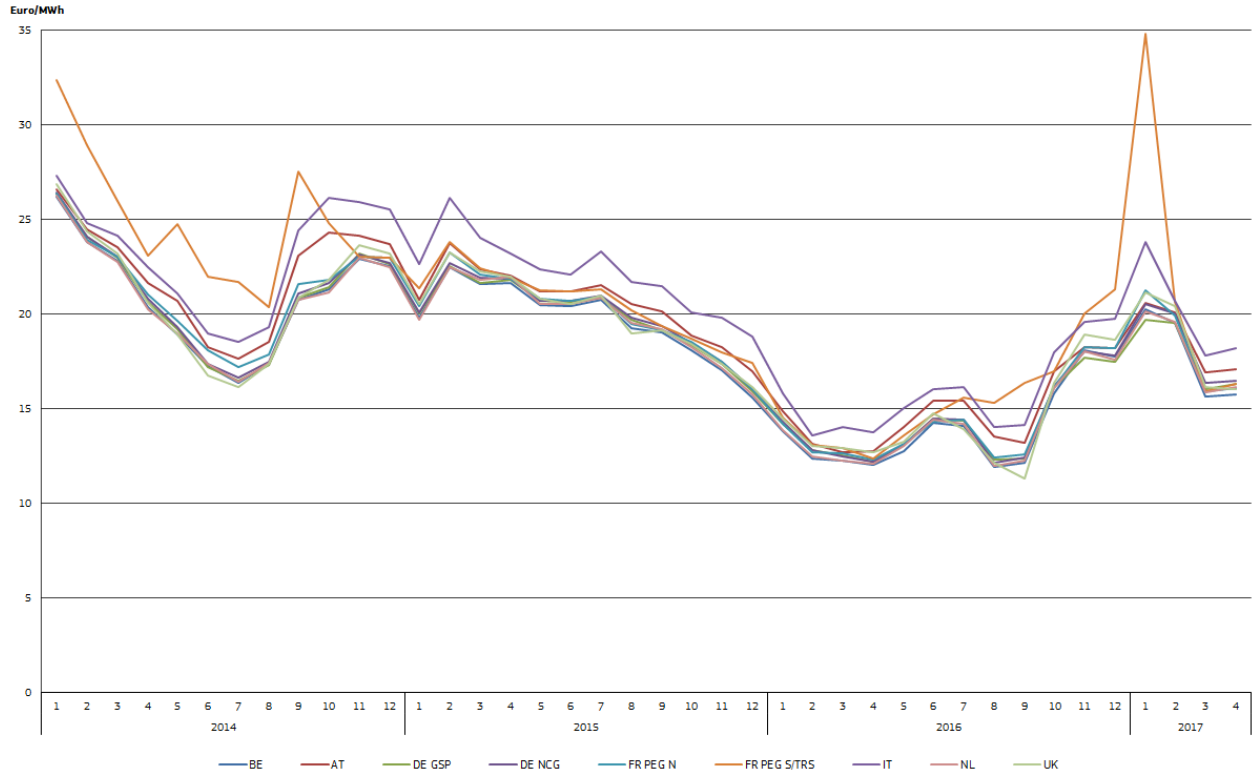
- In January-February 2017, European hub prices averaged around 20 Euro/MWh, the highest level since 2015. In March, prices decreased to 16-18 Euro/MWh as temperatures rose. Compared to the first quarter of 2016, average prices were 40-50% higher in the first quarter of 2017.

- Prices at the Italian PSV hub remained relatively high in the first quarter of 2017, with an average premium of 2.3 Euro/MWh above TTF, the Dutch hub. On the 10th of January, the price at the Italian hub reached 40.0 Euro/MWh, the highest level since 2012,

due to high demand driven by unusually low temperatures. In this situation, the Italian Ministry of Economy declared the alert state and started monitoring the level of storage sites.[27]

- In France, the premium of TRS over PEG Nord reached exceptional levels, averaging 13.5 Euro/MWh in January 2017 when high seasonal demand coupled with low LNG imports (and the persistent capacity restrictions on the north-south pipelines within France) caused supply tightness in the Southern part of the country. In this period, LNG supplies from Algeria, France's main LNG supplier, were hindered by technical issues. Under such circumstances, prices had to increase substantially and for a sustained period in order to attract LNG cargoes from the high-priced Asian market. On the 20th of January, the difference between TRS over PEG Nord reached a record 23.0 Euro/MWh. By early February, milder weather and additional LNG cargoes allowed the situation to ease and the premium of TRS over PEG Nord has practically disappeared.

Figure 22. Wholesale day-ahead gas prices on gas hubs in the EU



Source: Platts

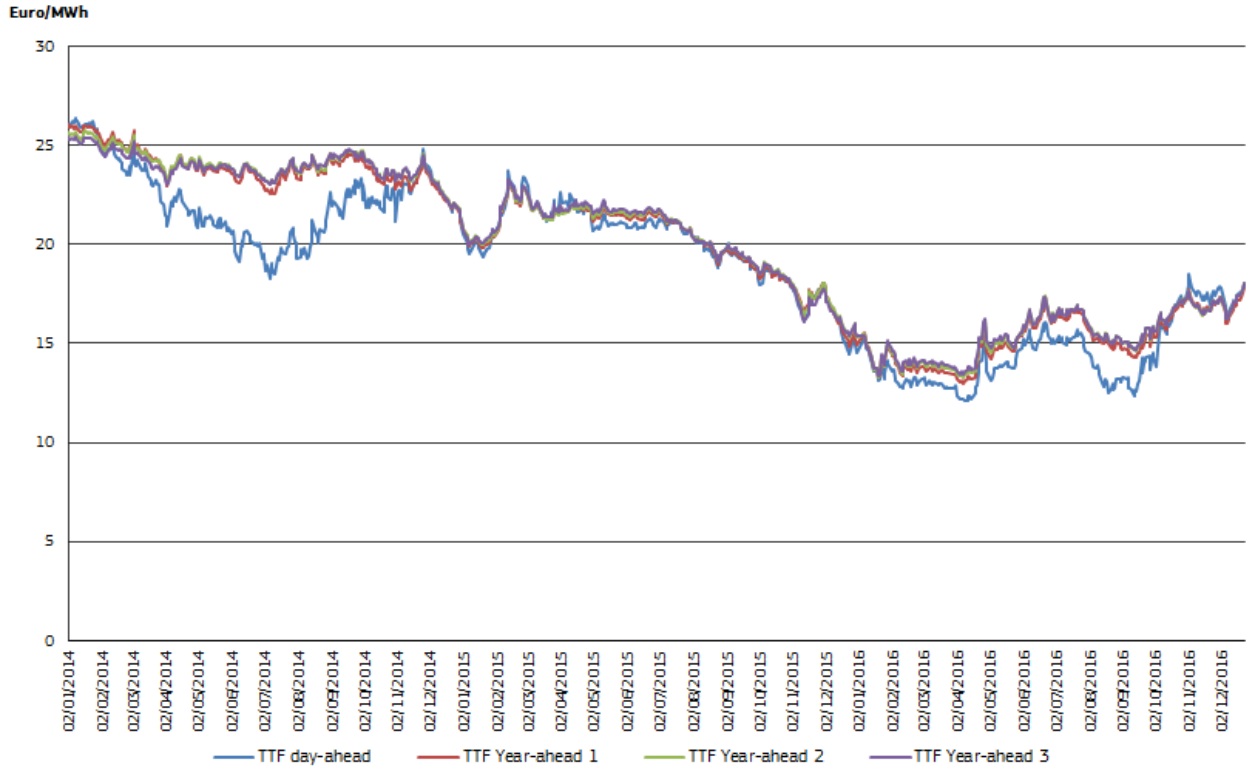
- Figure 23 looks at the development of forward prices one, two and three years ahead in comparison to the development of the day-ahead price on the Dutch TTF. For most of 2014, there has been a situation of contango[28], whereby closer to the present date prices are lower than prices for future deliveries. With seasonally high stock levels and ample physical supply, spot prices significantly decreased in the first half of the year, while higher forward prices reflected the general uncertainty about future developments, in particular the Russia-Ukraine conflict.

- Day-ahead and forward prices have been more or less at parity in 2015 but in 2016 the forward curve moved higher. In 2016, the year-ahead price was on average 0.7 Euro/MWh more expensive than the day-ahead price but in certain days of August the difference exceeded 2 Euro/MWh. In this period, the oil price rise which started in late January 2016 provided support to forward prices.

- In the last quarter of 2016, this premium of forward prices over day-ahead prices have practically disappeared. In fact, from mid-October to mid-February 2017, day-ahead prices have been consistently higher than year-ahead prices. In January-February 2017 the difference averaged 1.0 Euro/MWh as day-ahead prices were supported by below-average temperatures.

[27] ICIS Heren European Gas Markets, 16 January 2017
[28] See the glossary for a definition of contango

Figure 23. Forward gas prices on the Dutch gas hub



Source: Platts

2.3.3. Comparing the prices of different contracts for gas in the EU

- Figure 24 compares a selection of estimated border prices of gas deliveries from the main exporters to the EU – Russia, Norway, and Algeria.

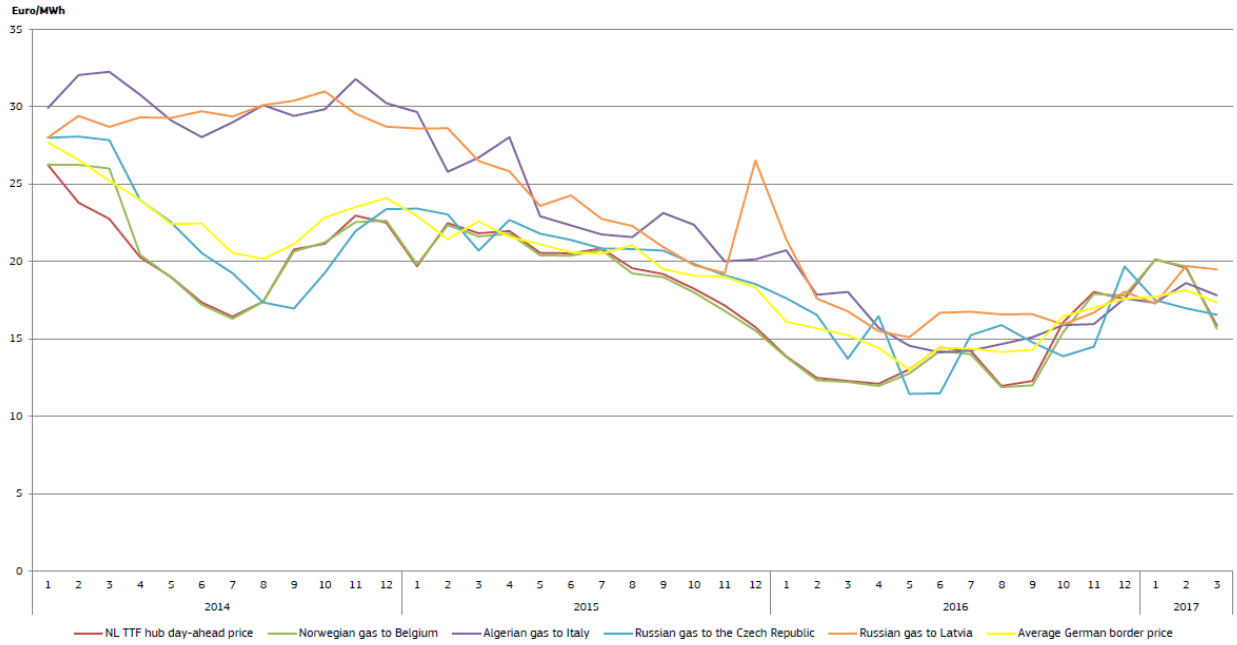
- Estimated border prices showed a clear declining trend over 2015 and the first half of 2016. Driven by the oil price drop observed in the second half of 2014, oil-indexed prices fell faster than hub-based prices, leading to a significant price convergence in mid-2015. From the last quarter of 2015, however, the difference between the prices of various contracts increased again, although not to levels seen in previous years.

- The oil price rise starting in the end of January 2016 is reflected in oil-indexed prices from the summer of 2016 while hub prices continued to fall. As a result, in the third quarter of the year oil-indexed prices became noticeably more expensive than hub prices. In the last quarter, however, hub prices sharply increased and other contracts have grown to a lesser extent. As a result, unusually, the Dutch TTF price was the highest in this period among those depicted on Figure 24, exceeding even the typically oil-indexed prices of Russian gas to Latvia and Algerian gas to Italy.

- In the first quarter of 2017, both hub prices and oil-indexed prices increased compared to the last three months of 2016. Hub prices were supported by a relatively cold winter while oil-indexed prices grew in the wake of the gradual rise of oil prices during 2016. The different prices have been rather volatile, often moving in the opposite direction but, looking at the average quarterly prices, there was no significant discrepancy between hub prices and oil-indexed prices.

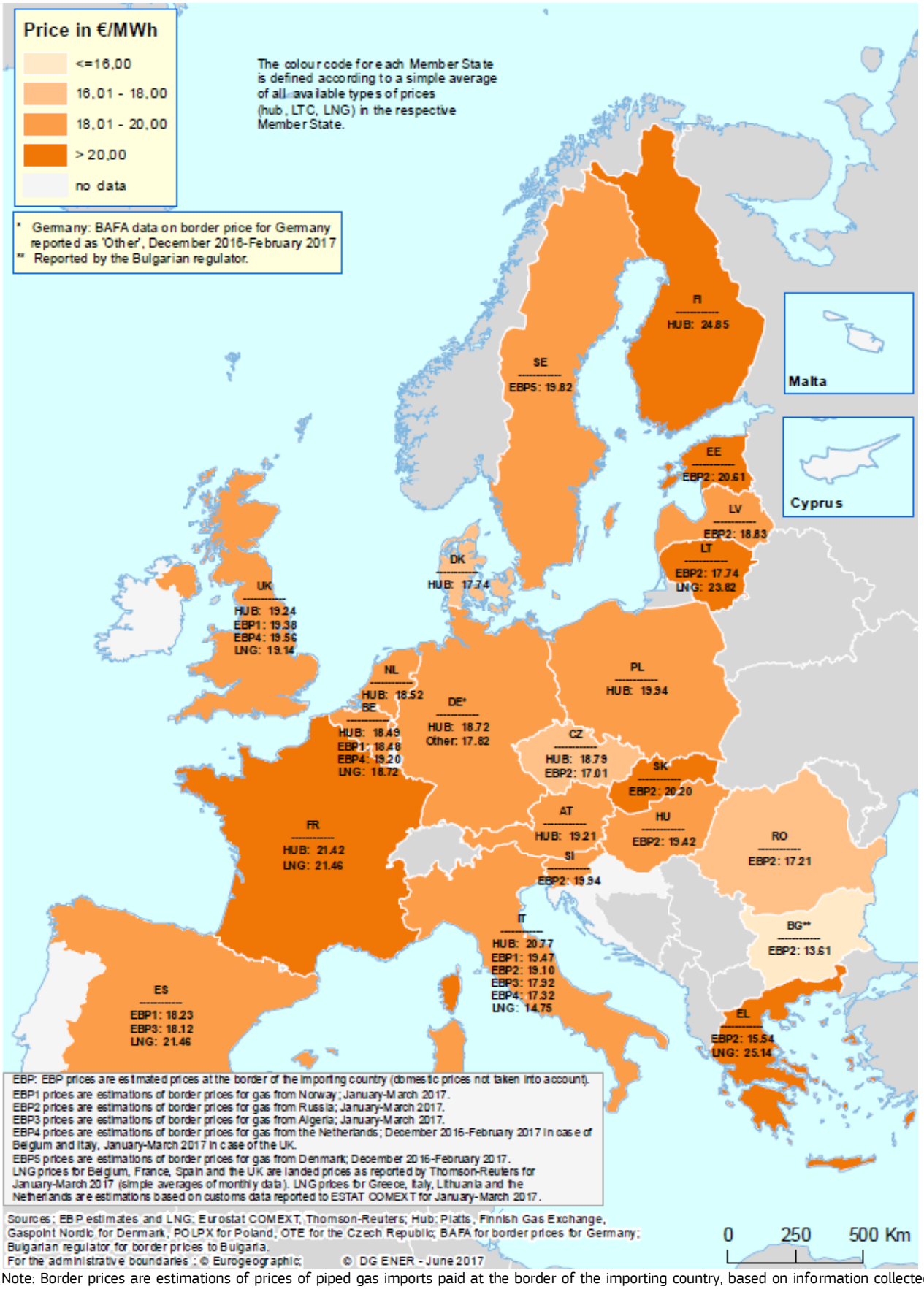
- In December 2016, the difference between the highest and lowest price depicted on the graph decreased to 2.1 Euro/MWh, the lowest level in the last 4 years. Since then, we can see some divergence, with this difference increasing to 3.8 Euro/MWh in March 2017.

Figure 24. Comparison of EU wholesale gas price estimations



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

Map 1. Comparison of EU wholesale gas prices in the first quarter of 2017



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

3. Retail prices in the EU

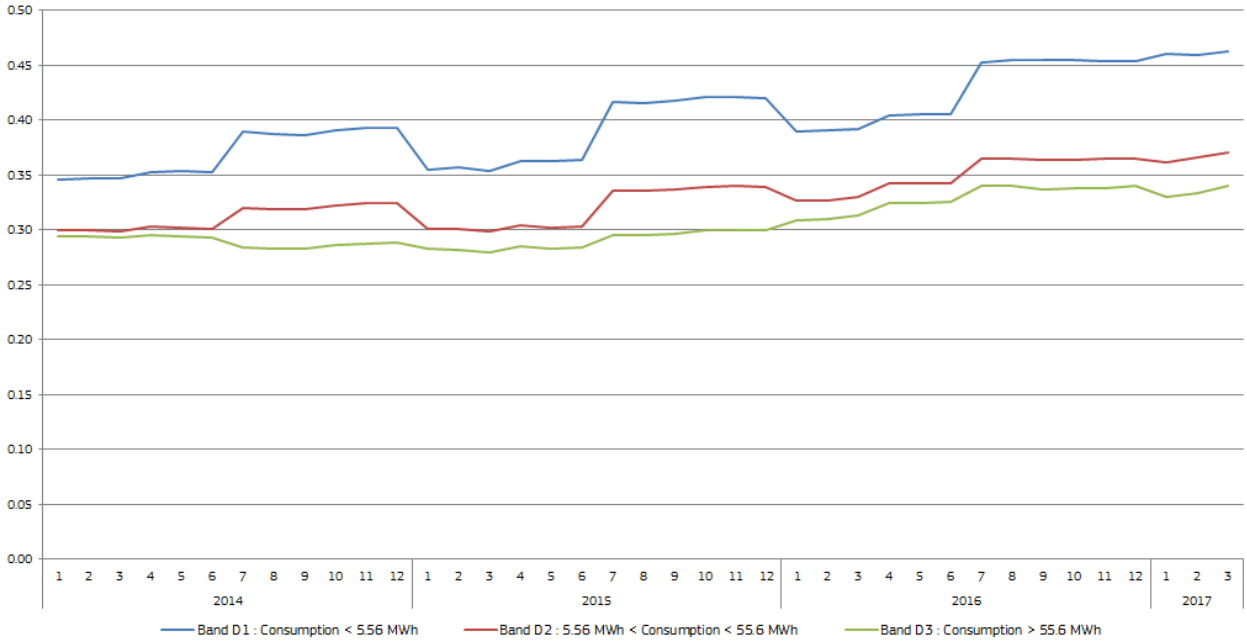
- Figures 25 and 27 show the convergence of retail gas prices for household and industrial consumers, using as a metric the relative standard deviation[29] of the prices in individual Member States. Monthly retail prices are estimated by using half-yearly prices from Eurostat (with the latest available figures relating to the second half of 2016) and Harmonised Consumer Price Indices (HICP) for the household prices and Producer Price Indices (PPI) for industrial consumers.

- For household consumers, the estimated average retail price (including all taxes) showed an increasing trend since 2010 but peaked in 2014, with a slight decrease in 2015 which accelerated in 2016. In the most typical consumption band, D2, the estimated average price (including all taxes) in March 2017 was 6.1 Eurocents/kWh, 3% lower than a year earlier. In this period, the estimated price decreased in about half of the Member States.

- In contrast to converging wholesale prices, retail prices for households show a slightly diverging trend, as shown by the increase of the relative standard deviation since 2014. Moreover, observed price differences are higher for the consumers with lower annual consumption.

- There are still significant differences in retail gas prices across the EU: in March 2017, the estimated household price in consumption band D2 varied between 3.2 Eurocent/kWh in Romania and 11.5 Eurocent/kWh in Sweden, resulting in a price differential ratio of 3.5 between the cheapest and the most expensive Member State. While this ratio is rather high, it shows a declining trend since March 2012 when it was 4.8.

Figure 25. Relative standard deviation of gas prices paid by household consumers in EU Member States



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

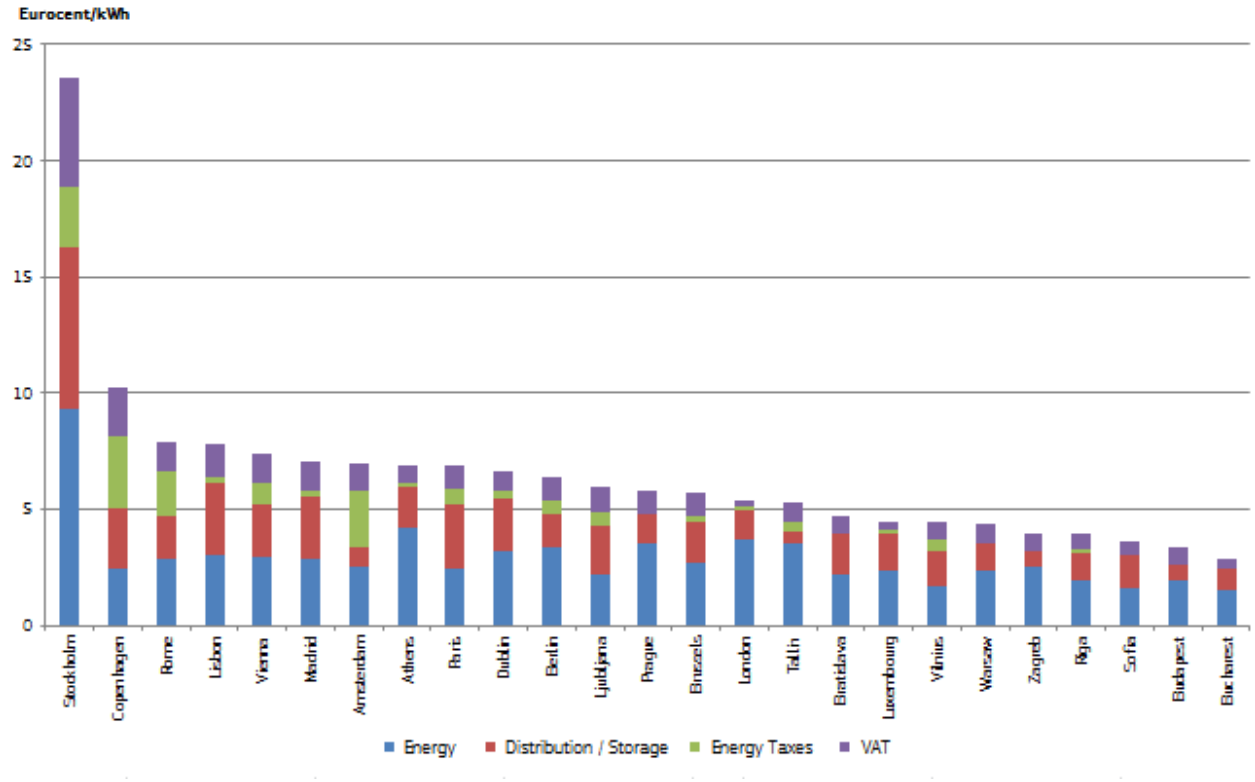
- Figure 26 shows the level and the breakdown of residential end-user gas prices paid by typical households in 25 European capitals in March 2017. On average, 48% of the price covers the energy component, while the rest covers distribution/storage costs (28%), energy taxes (8%) and VAT (16%).[30]

- There are significant differences across Member States, with the share of energy cost ranging from 24 to 70%, the share of distribution/storage costs ranging from 9 to 40% and the share of taxes ranging from 8 to 52%. In Amsterdam and Copenhagen, taxes make up more than half of the price while in London and Luxembourg their share is less than 10%. For 7 of the 25 capitals covered, the price does not include an energy tax component.

[29] The relative standard deviation is calculated by dividing the standard deviation with the average. It shows the extent of variability in relation to the mean of the sample.
[30] Note that these are arithmetic averages.

- In 18 of the 25 capitals, prices were lower in March 2017 than a year earlier, with the biggest decreases in Sofia (-18%) and Lisbon (-16%). At the other end of spectrum, prices increased by 27% in Tallinn and by 21% in Athens.

Figure 26. The breakdown of gas price paid by typical household customers in European capitals, March 2017



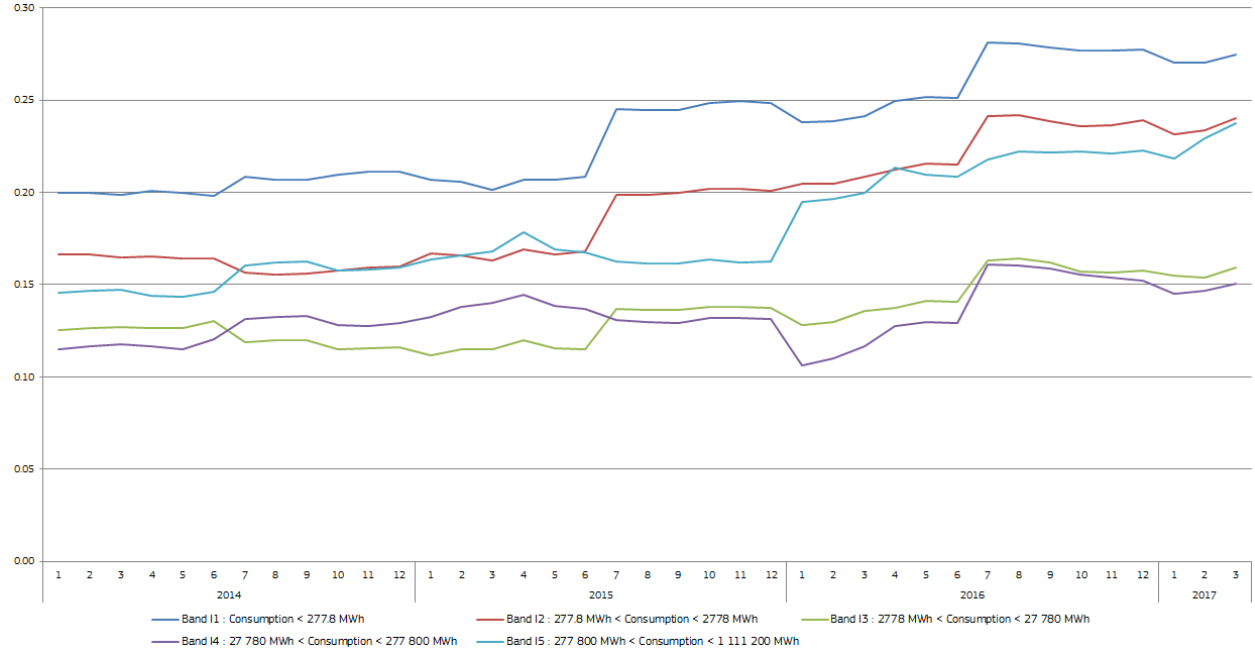
Source: VaasaETT

- Estimated industrial prices started to decrease already in 2014, and the trend continued in 2015 and 2016. The average estimated price (VAT and other recoverable taxes excluded) in consumption band I4 was 2.46 Eurocent/kWh in March 2017, 3% lower than a year earlier but slightly more than at the end of 2016. Prices decreased in this period in about two thirds of the Member States. Bulgaria (-18%), the UK (-13%) and Croatia (-13%) experienced the biggest decreases while Greek consumers had to cope with the biggest increase (22%). Since December 2013, the average estimated price decreased by 29%.

- For industrial customers, the relative standard deviation has been significantly lower than in the case of households, indicating smaller price differences across Member States. However, in most consumption bands the standard deviation grew since mid-2015, implying that price differences increased in this period.

- In March 2017, Bulgaria had the lowest estimated industrial price in consumption band I4 (1.63 Eurocent/kWh), while the highest price was observed in Sweden (3.57 Eurocent/kWh), resulting in a price differential ratio of 2.2 between the cheapest and the most expensive Member State of the EU. This represents an increase from the beginning of 2016 when this ratio was only 1.7.

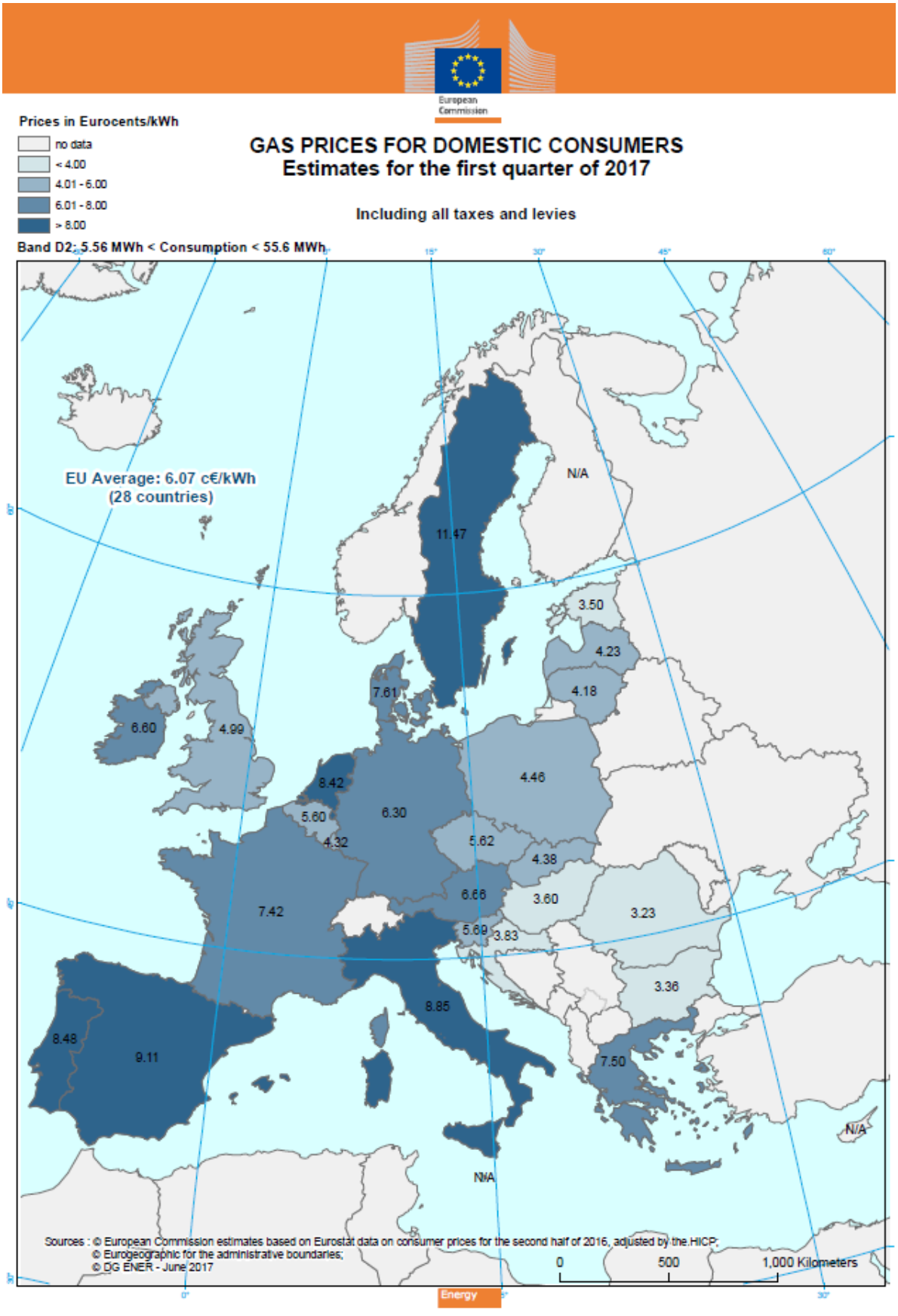
Figure 27. Relative standard deviation of gas prices paid by industrial consumers in EU Member States



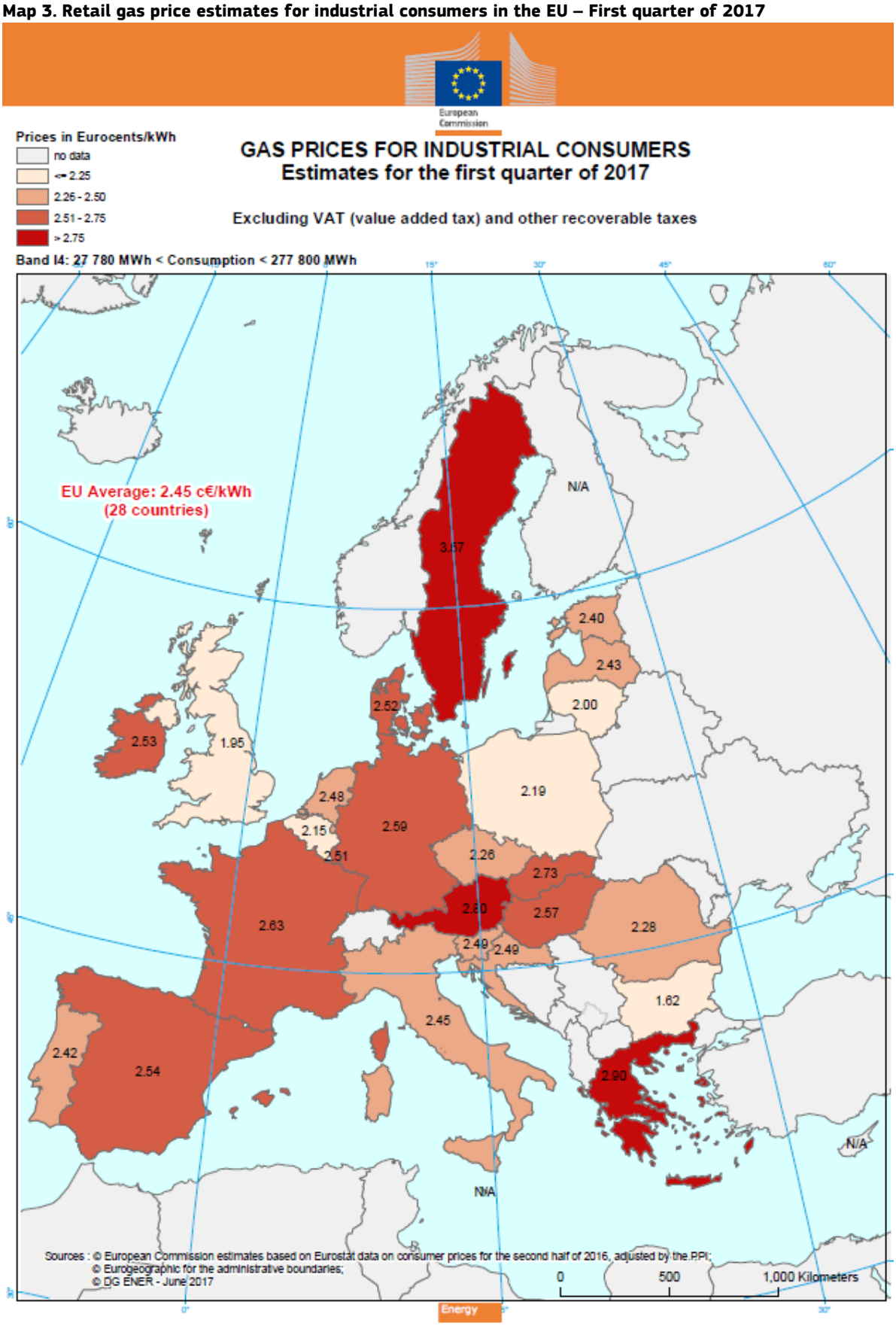
Note: Excluding VAT and other recoverable taxes.
Source of data: European Commission estimates based on Eurostat data on industrial prices adjusted by the PPI

- Maps 2 and 3 show the estimated retail gas prices paid by households and industrial consumers in the first quarter of 2017.

Map 2. Retail gas price estimates for households in the EU – First quarter of 2017



Map 3. Retail gas price estimates for industrial consumers in the EU – First quarter of 2017



4. Glossary

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

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

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 Euro/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. The FAPD chart provides detailed information on adverse flows. It has two panels: The first panel estimates the ratio of the number of days with adverse flows to the total number of trading days in a given period. It also estimates the monetary value of energy exchanged under adverse flow conditions (mark-up) compared to the total value of energy exchanged across the border. The mark-up is also referred to as "welfare loss". A colour code informs about the relative size of FAPD events in the observed sample, going from green if less than 10% of traded days in a given period are FAPDs to red if more than 50% of the days are FAPDs. The second panel gives the split of FAPDs by sub-category of pre-established intervals of price differentials. It represents the average exchanged energy and relative importance of each sub-category on two vertical axes.

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.