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Annual Report on the Results of Monitoring the Internal Electricity and Gas Markets in 2016

Gas Wholesale Markets Volume

October 2017

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Gas Wholesale Markets Volume

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Executive summary

- 1 Demand in 2016 rose by 7% compared to 2015, reaching 4,962 TWh, mainly driven by improved gas-to-power economics. It is the second consecutive year of demand growth after 4 years of decline. Thanks to its flexibility, gas-fired power generation is playing more and more a crucial back-up role for higher levels of intermittent renewable energy sources. In 2016, imports into the European Union (EU) accounted for 73% of total gas supply, with Russia raising its market share as the main gas supplier to 34% of total supply. Domestic EU production further declined and accounted for 27% of supply.

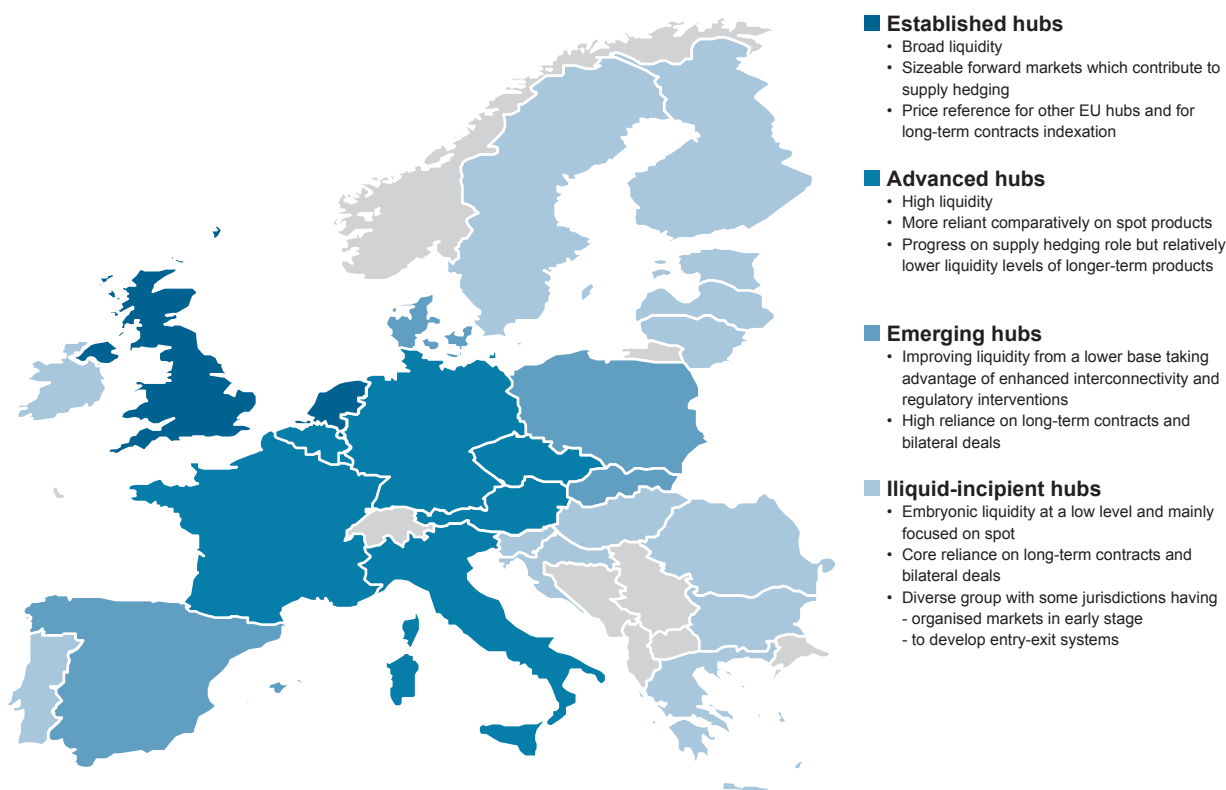
PERFORMANCE OF GAS WHOLESALE MARKETS

- 2 Double-digit year-on-year gas import flow variations include, *inter alia*, more imports from Russia and North Africa and less intra-EU flows originating from the Netherlands. The fact that gas flow fluctuations are accommodated smoothly proves to what extent market participants and consumers in many market areas are flexible in responding to (or anticipating) changing market fundamentals. This signals better market integration and functioning and limited infrastructure bottlenecks.
- 3 Gas prices in Europe in 2016 decreased until the end of the third quarter and saw an upturn thereafter. Price formation is more and more the result of shorter-term gas-to-gas market fundamentals, while the role of traditional long-term contracts continues to lose ground in many market areas. Price developments exhibited similar trends across the main global gas regions of North America, Europe and East Asia. On the whole, differentials between gas prices seem to be more and more converging towards Liquefied Natural Gas (LNG) variable transport costs. Europe is playing a reference role in setting international LNG price(s) as for worldwide LNG producers, the presence of a couple of liquid EU hubs constitute a key benchmark when setting the price of their exports.
- 4 Hub-traded volumes in the EU saw double-digit growth in 2016, with a 20% year-on-year increase. Besides the more advanced gas hubs, also smaller and previously inactive gas markets saw trading volume increases in 2016. Liquidity has improved thanks to gas market dynamics (e.g. over-contracted companies), evolving gas suppliers contracting behaviours and changes in regulation (e.g. Balancing Network Code). Consequently, the role of hubs in physical sourcing and supply exposure management has further deepened. Even though the hub model is spreading and market areas, including in Central and Eastern Europe (CEE) and the Baltic Region, register growing trading volumes, there is still a considerable gap to high wholesale gas market liquidity across the whole of the EU.
- 5 The level of sophistication of hubs in the North West Europe (NWE) region is evident, *inter alia*, from a higher number of market participants active at these hubs and sizeable traded volumes of longer dated products. In particular, the Dutch TTF and British NBP hubs stick out due to their size including sizeable forward markets and for acting as a price reference for various indexes.
- 6 The performance of wholesale markets is assessed via the ACER Gas Target Model (AGTM¹) metrics: (i) the market health metrics look at whether markets are structurally competitive, resilient and exhibit a high degree of diversity of supply and (ii) the market participants needs metrics measure to what extent the state of gas hubs allow for effective market functioning. Overall, the results show an improved performance compared to the first assessment in 2013, but most market areas are still some distance away from the indicative AGTM targets, especially for forward liquidity associated metrics.
- 7 Overall the market health and the market participant needs metrics are strongly correlated. Structural aspects influence the way in which a gas wholesale market can function properly. In general, markets in NWE tend to score better on metrics related to diversity of supply and upstream concentration. This results in better performing hubs. Market participants needs also reveal that TTF and NBP continue to be the EU's best functioning hubs.

1 The ACER GTM envisages a competitive and integrated European gas market constituted of entry-exit market zones with liquid virtual trading points in them; market integration is served by the right amount of infrastructure, utilised efficiently, which enables gas to move freely between market areas to where it is valued highest. AGTM defines a number of parameters for assessing wholesale market performance. See ACER GTM 2014 here: <http://www.acer.europa.eu/events/presentation-of-acer-gas-target-model-/documents/european%20gas%20target%20model%20review%20and%20update.pdf>.

- 8 As such, hubs can be categorised in four groups, as illustrated in Figure i. Compared to 2015, the hubs based in the Czech Republic and Slovakia have been moved into the advanced and emerging cluster, respectively, as their 2016 results are comparable to other hubs belonging to these hub groups. It is also noticeable that quite a few market areas have weak or no hubs dynamics. For those areas, calculations of various AGTM metrics could not be undertaken yet, which indicates that further steps towards implementing the Third Energy Package and/or the AGTM are required.

Figure i: Ranking of EU hubs based on monitoring results - 2016



Source: ACER based on AGTM metric results.

- 9 The AGTM recommends market integration as a way of overcoming poor performance of individual markets². A number of market integration initiatives are already on the table irrespective of the AGTM results and timetable, with the BeLux initiative already concluded.
- 10 In this edition the analysis of selected AGTM metrics also includes the Contracting Parties of the Energy Community (EnC³). Such an assessment has been conducted in collaboration with the EnC Secretariat. In many of these countries, Russian supplies remain the only accessible gas source, mainly due to weak interconnection infrastructure and limited market liberalisation. However, Ukraine seems ahead in implementing structural reforms with the goal fully to implement the EU gas market model. These reforms are intended to promote competition and supply diversification, and further to enhance Security of Supply (SoS).

2 The Agency is of the opinion that the number of hubs and their location is a market decision.

3 The Energy Community is an international organisation dealing with energy policy. It brings together the EU and countries from South East Europe and the Black Sea regions. At present the Energy Community has 9 Contracting Parties: Albania, Bosnia and Herzegovina, Georgia, Kosovo, the Former Yugoslav Republic of Macedonia, Moldova, Montenegro, Serbia and Ukraine.

- 11 Gas sourcing costs reveal that price differences continued to narrow in 2016. For more than half of the market areas, a differential of less than one euro/MWh compared to TTF was noted, TTF being taken as a reference in terms of good market functioning. This indicates that most regions benefit more and more from market-based gas dynamics which has resulted in lower welfare losses. Interestingly, some Member States (MSs) that depend almost solely on one gas source reported in 2016 much lower costs than over the last years. This is explained by the impact of the delayed adaptation of gas pricing in their oil based bilateral long term contracts. Over time, however, these MSs' sourcing costs have been significantly higher than in MSs with broader diversification of supply sources and deeper role of hubs.

MONITORING OF MARKET EFFECTS OF GAS NETWORK CODES

- 12 Under the Third Package, the Agency is tasked, *inter alia*, with monitoring the potential market effects triggered by the implementation of the Network Codes (NCs). Indicators covering specific aspects of the Capacity Allocation Mechanisms Network Code (CAM NC), Congestion Management Procedures Guidelines (CMP GLs) and Balancing Network Code (BAL NC) were analysed. The Agency is of the opinion that market fundamentals and economics are the main drivers explaining varying performance of gas wholesale markets. Regulation should guarantee a fair and non-discriminatory access and transparent market operation. As this is only the second year in which the impact of NC implementation is assessed and not all codes have been implemented yet, it will take some time before a more holistic view could emerge. Furthermore, challenges in the quality of the ENT-SOG's Transparency Platform⁴ data continue to complicate the Agency's monitoring activities.
- 13 The analyses performed in this edition show a growing price interrelation among hubs, particularly among those in the NWE region. Gas market opening and, to some extent, the implementation of NCs are core contributors to this. However, another factor explaining high price convergence levels are long-term capacity and commodity contracting surpluses, which represent sunk costs for many players, and may prompt them to perform hub price-arbitrage around short-run marginal costs (SRMCs).
- 14 Transportation tariffs are overall a pivotal price signalling factor for hub spreads formation. Figure 20 and Figure 21 provide a comprehensive analysis of price spread levels between pairs of adjacent hubs and their relationship with yearly and daily transportation tariffs. In essence, tariffs appear to act in some markets as a de-facto ceiling for hub spreads formation - e.g. in the NWE region where SRMCs placed orders are more common given the above mentioned contracting surplus situation, this resulting in actual hub spreads usually dropping below transportation tariffs. Meanwhile, in other cases, tariffs seem to set the floor reference for hub price spread formation. The economic logic being that traders would want to recover the transportation costs from the spread. However, the existence of capacity congestion or other market access barriers can further increase the gap between hub spreads and transportation tariff values.

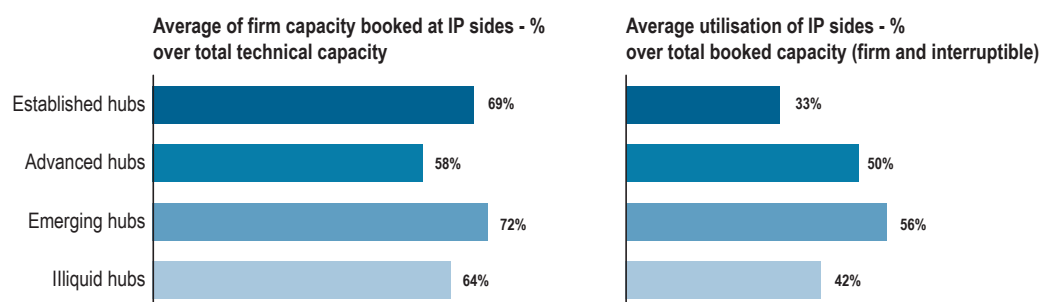
CAM NC

- 15 According to the CAM NC, capacity at Interconnection Points (IPs) must be progressively offered, and booked, as a bundled product. Despite the large volumes offered by the Transmission System Operators (TSOs) at most EU IPs, in 2016, on average only 1% of the capacity offered as bundled was booked. Three elements largely explain the limited interest from the market in buying bundled capacity. First, a capacity mismatch issue, due to legacy long-term capacity contracts bookings still in place at many IPs, usually on one side of the IP, which impedes network users to buy bundled capacity. Amendments to the CAM NC whereby TSOs, *inter alia* will need to offer conversion services could help to solve this issue from 2018 onwards. Second, the obligation brought by the bundled products to enter into a transportation contract with each TSO at the IP brings additional compliance and transportation costs. As long as a network user with capacity on one side of an IP finds a matching party on the other side of the IP, the choice to buy a bundled product would not be economically preferred. Third, limited incentive for any market participant to buy new capacity as the current hub spreads (in NWE) largely hover around the SRMCs of transporting gas between adjacent market areas, i.e. below the transmission tariff.

4 European Network of Transmission System Operators for Gas, Transparency Platform (ENTSOG TP). See: <https://transparency.entsog.eu/>.

- 16 At the IP sides that could be analysed, the average booking over technical capacity ratio in 2016 was around 60%. Figure ii below further breaks this up by hub category. However, results vary dramatically at individual IP level. Some IP directions, mainly those located on the most important gas routes, report higher or even near-100% booking ratios. For the other IP sides, partial booking levels could be explained by the issues related to bundled products and to the uncertainty in the year-on-year changes in transportation tariffs inherent to a revenue-cap system which might set a vicious circle (low bookings for a year lead to under-recovery of revenues for that year which are collected by an increase in tariffs in the next year). These aspects incentivise shippers to enter into swap agreements for capacity utilisation instead of booking new transportation capacity, as booking capacity might bring uncertainty outweighing benefits.

Figure ii: Average capacity bookings of EU interconnection points and their utilisation grouped by hub category in 2016 (%)



Source: ACER based on ENTSOG TP.

Note: Given challenges with the reliability of the ENTSOG TP database the Agency was only able to use data covering 50% of the total ENTSOG TP database for 2016.

CMP GLs

- 17 According to the CMP GLs, TSOs should take several regulatory actions to reduce situations of contractual congestion of capacity at IP sides. The implementation of CMP GLs should as a consequence increase the efficiency in the utilisation of capacity at IPs in the EU. By the end of 2016, only 7 MSs had implemented CMP measures, however, it must be acknowledged that only 9% of the total EU IP sides were contractually congested in 2016 and that, among those, almost one third were physically congested as well and that at more than half of those contractually congested IP sides some CMP measures were already implemented.
- 18 The EU average utilisation ratio of capacity⁵ at the IPs sides for 2016 stands below 50%, the same as over the last two years (see Figure ii above for a break-up by hub category). It appears that IP sides located along key gas routes in both the emerging and illiquid hubs show a higher utilisation ratio than the IP sides at the established and advanced hubs, probably given the lower degree of diversity of supply sources in those areas compared to the most advanced markets. Both CAM and CMP monitoring analyses indicate that Europe might face a situation of overcapacity in parts of its gas transportation networks.

BAL NC

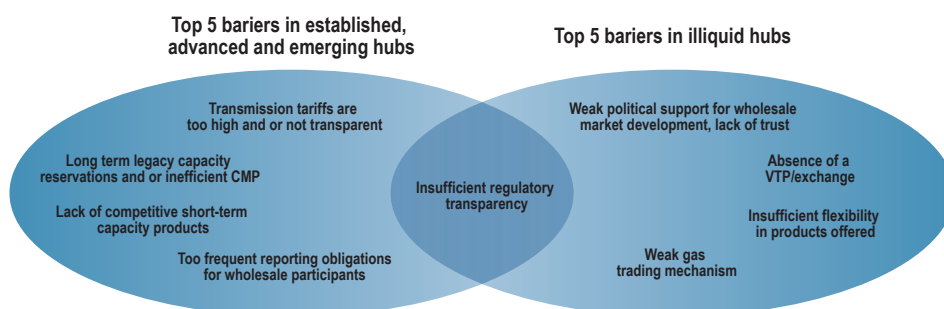
- 19 The analysis of the effects of the BAL NC covers those market areas in the NWE region that have already implemented the code and aims to provide quantitative transparency on the code's objectives. The code seeks to create and foster a market-based balancing regime, hence a pre-condition is the presence of sufficient short-term liquidity in the within-day (WD) and day-ahead (DA) timeframes. As the primary responsibility for balancing in such a system rests with individual network users, the role of the TSO is residual. The code gives considerable freedom to MSs as to how they implement its provisions.
- 20 The degree of TSO involvement in balancing the system can be measured by the number of days a TSO intervenes and by how many actions it takes. Monitoring results show that at TTF, NBP and the Danish GPN hubs the role of the TSO is relatively more limited compared to other balancing zones.

- 21 Reliable and updated information on balancing is central to shipper's confidence in taking positions. In this aspect, the balancing markets in BeLux, the Netherlands, Denmark, France and the UK all provide information that go beyond the minimum requirements of the code. Hence, these market areas, and in particular, the Netherlands, BeLux and France, can be considered as best practice, given their frequent and almost real time updates.

BARRIERS IN GAS WHOLESALE MARKETS

- 22 The Agency also conducted the 'Barriers in Gas Wholesale Markets Survey' among wholesale market participants - mainly shippers, suppliers, traders and energy intensive customers - across the EU on the barriers experienced in gas wholesale markets. It is clear from this survey that similar barriers continue to persist in all MSs, although their intensity or severity differ by MS.
- 23 Figure iii provides an overview of the main barriers by hub classification. The main take-away is that in market areas that house established, advanced or emerging hubs, the focus is more on how market functioning can be further enhanced, while in markets with illiquid hubs the most prevalent barriers are centred on how to kick-start market functioning.

Figure iii: Barriers by hub category



Source: ACER based on the Kantor report on 'Barriers in Gas Wholesale Markets Survey'.

- 24 In conclusion, despite some specific challenges in the sector - i.e. the slack in the gas system both in terms of volumes contracted and long-term booked cross-border capacity and the uncertainty around the future role of gas - the functioning of gas wholesale markets continued to progress in 2016. This is mainly evident from the market-driven development of gas hubs, the gradual advances in supply-side competition, the improved price convergence across market areas, the enhanced interconnection between markets and overall better integration of national markets. However, while most MSs advance, a few MSs seem to have continued challenges to catch up.

Recommendations

- 25 MSs need to complete the transposition of the Third Package into national legislation, as well as jointly agreed initiatives such as the AGTM.
- a) A timely and proper implementation of the gas NCs is essential further to build the Internal Gas Market (IGM). Also, proper market functioning is not helped by a disparate implementation of NCs across MSs, nor does this promote competition. It is advised, where feasible to implement NCs quicker than legally required.
 - b) The results of the market performance assessment on the basis of the AGTM metrics show the need for further progress towards the establishment and improvement of liquid and transparent markets. In the event material gaps - compared to AGTM thresholds - remain over time, market integration projects, as already initiated by some MSs, could contribute to improving the market health and market participants' needs metrics. Apart from the Market Monitoring Report (MMR) assessment, self-assessments by all National Regulatory Authorities (NRAs) are needed to advance the process by identifying the required extent and potential scope of market integration projects. These projects should be pursued on a case-by-case basis, based on a positive cost-benefit relation for the IGM or regional markets.
 - c) The current regulatory model should be allowed time to deliver its positive results and regulatory stability should be encouraged. A sound problem identification (e.g. Quo Vadis project⁶ of the European Commission) is needed before proposing regulatory amendments that would alter the current market design. As a general rule, MSs ought to have market oriented solutions in mind when developing rules. Specific regard should be given to ensuring an equal level field among market participants especially when it comes to new (non-local) market entrants and or small(er) players.
- 26 As indigenous production is declining, MSs need to be vigilant in ensuring a diversified supply portfolio. This is not only a discussion about infrastructure but about ensuring a well-functioning market. A well-diversified supply will further increase upstream producers' competition dynamics, resulting in more competitive EU price formation.
- a) The use of existing (cross-border) infrastructure via enhanced operational cooperation from a regional perspective and via an effective implementation of the provisions of the TAR NC needs to be optimised when any new infrastructure is considered (there is at present limited contractual congestion on IPs). New infrastructure investment is a market-driven process subject to validated Cost-benefit Analysis (CBA) methodologies so as to avoid stranded assets and undue tariff increases for end-consumers.
 - b) In a few MSs there is still a lack of interconnectivity (e.g. critical gaps are to be addressed by bi-directional corridors of Greece-Bulgaria-Romania-Hungary and Poland-Baltics). Remedying this will also improve market functioning.
- 27 Market facilitators and NRAs shall promote further growth in trading activity in gas hubs as this is essential to well-functioning wholesale markets and will lead to better gas-on-gas price formation:
- a) Less liquid hubs could follow the examples and best practices of more developed hubs when establishing rules for trading, whereby emphasis should be on facilitating trade, e.g. the EFET⁷ guidance about the features of a successful Virtual Trading Point (VTP⁸) provides useful insights on facilitating trading activity. In addition, ongoing efforts to build out gas hubs are needed. For example, in order to further foster market-functioning in Iberia, a well performing Mibgas is essential. All measures that are needed

6 See the EC tender about the future market model of the EU gas sector ("Quo Vadis gas market regulatory framework") and the received consultancy papers here: http://ec.europa.eu/energy/studies/energy_en.htm.

7 EFET stands for the European Federation of Energy Traders.

8 The term VTP refers to an entry/exit system where gas can be traded independently of its location and which offers users the possibility of transferring the title of gas and/or swap imbalances. Each VTP has an operator that tracks the ownership of traded gas and handles gas balancing aspects. Trading is facilitated by the establishment of organised exchanges and/or OTC platforms that attract traders by offering different products and services, thus creating a liquidity pull, all of which constitutes a 'gas hub'.

as to ensure its proper functioning in Iberia should be implemented. In particular, the high level measures directed to extend Mibgas use to Portugal.

- b) Wholesale traders, including smaller and foreign ones, are integral in raising liquidity in markets. Therefore rules regulating market access should adhere to proportionality principles (e.g. the option for wholesale traders without a link to distribution not to have to book transmission or storage capacity).
- c) Building on the previous paragraph, relevant authorities should make a clear distinction between retail and wholesale activities and ensure that requirements for obtaining wholesale trading licenses are not cumbersome, i.e. assess the administrative burden versus the objective and relevance of the process (e.g. have financially sound players so that consumer interests are not harmed). Proportionate requirements should be requested from both small new entrants (e.g. level of financial guarantees) and foreign entrants (e.g. language accessibility). Additionally, it is worth exploring the possibility of introducing regional licensing entitlements. The Baltic MSs new licensing regime is a good example.
- d) Regulated end-user prices are to be phased out (the EU, however, allows for supplier of last resort price regulation). In the transition phase, responsible authorities can promote the role of hubs, for example, by indexing any temporary remaining regulated end-user prices to hub prices, by transferring physical delivery points at the flange into VTPs, by releasing gas quantities at production level in order to decrease the incumbent's upstream market share or by unbundling of production from trading.
- e) NRAs are encouraged to getting certified on security aspects to access REMIT⁹ national data. This will also avoid double reporting by market participants and shall give an extra impulse to market surveillance activities to detect potential cases of market manipulation.

28 The Network Codes and Guidelines seem to contribute to market functioning although it is still too early for definite conclusions. At this stage, challenges are still experienced at implementation level, which should be closely monitored by the NRAs:

- a) CAM NC establishes centralised “front desk” platforms for capacity bookings, while issues deriving from lack of harmonisation between adjacent systems remain. NRAs and TSOs should approach CAM NC implementation at a cross-border/regional level and coordinate further the applicable technical decisions (e.g. standardised capacity products, coordination in capacity calculation and allocation, coordination in capacity conversion mechanism).
- b) The shares of booked bundled capacity will remain low for the years to come given the volumes of prevailing unbundled long-term capacity contracts. TSOs shall implement the CAM NC amendments regarding the capacity conversion service to mitigate the capacity mismatch issue. Even if the persistence of unbundled capacity bookings is not a problem per se if there is not a capacity mismatch situation, bundled capacity is deemed essential to facilitate access to, usage and trading of cross-border capacity for network users. The lack of implementation of CMP measures and the difficulties for surrendering and transferring capacity on the secondary market are deemed counterproductive. NRAs and TSOs should implement CMP measures and TSOs should facilitate the transfer of capacity between network users through quicker and better harmonised procedures on both sides of borders. NRAs should monitor TSOs better to ensure implementation of the NCs and GLs according to the spirit of the rules.
- c) NRAs in MSs which already implemented the BAL NC are invited to assess, in consultation with the market, how costly tuning their balancing system towards observed best practices would be. For example, the role of the TSO for balancing at TTF, NBP and at the Danish GPN is relatively more limited compared to the other balancing zones, the Netherlands and BeLux seem to be among the best examples for information provision, whereas Great Britain seems to offer more flexible gas. For example, Germany already modified its within day obligations regime which is applicable since October 2016. However, the timeframe to assess the effectiveness of this change in this MMR was too short in order to be able to conclude if this modification will contribute to observed best practices.

9 REMIT stands for [Regulation \(EU\) No 1227/2011](#) on wholesale energy market integrity and transparency.

- d) MSs implementing the BAL NC after October 2015 could take inspiration from the examples of the MSs which implemented the code beyond the basic provisions. This could be implemented over several years based on a plan periodically consulted with the market. In the meanwhile NRAs in those MSs should implement the basic provisions of the BAL NC as soon as possible and anyway interim measures should end by April 2019.
 - e) The transparency obligations of the Tariff Network Code (TAR NC) should be implemented in due time in order to shed light on the cost reflectiveness and non-discrimination of tariff levels across the EU. The re-alignment of short-term multipliers to TAR NC limits will further integrate hubs. However, the foreseen lead times may delay this process. NRAs could promote this process by critically reviewing those every year in view of wholesale market functioning.
 - f) Stakeholders are encouraged to use the Functionality Platform¹⁰ to raise issues regarding the implementation of Network Codes and Guidelines.
- 29 Security of supply policies need to be balanced, guaranteeing a safe operation of the system while not restraining market competition.
- a) A CBA should be carried out in all MSs to assess the net benefits of SoS measures applying a regional lens and taking into account technical aspects of the specific networks.
 - b) Regulation that reduces the flexibility of the usage of storage facilities is to be discouraged because it adds complexity to the system and imposes additional costs on final consumers¹¹.
 - c) The use of cross-border storage is often hindered and capacity in Underground Storage (UGSs) facilities for SoS is often separated from commercial capacity creating an artificial scarcity in the market. A reduction of regulatory obligations on storage capacity allocation that go beyond security of supply needs will attract new market entrants and further develop hub liquidity. MSs like France, Poland, the Czech Republic and Italy should investigate whether a more market-driven approach could be implemented. The full unbundling of storage products, where this has not yet been offered, shall be promoted in order to facilitate full efficient use of gas storage by shippers.
 - d) Regulators should allow the use of more options to meet SoS obligations: national or cross-border storage, virtual storage (relying on third parties to access their own storage), options to LNG deliveries or even long-term gas supply contracts.
- 30 Enhance further transparency and market consultation processes:
- a) Data reporting and quality difficulties observed with the ENTSG TP need to be urgently overcome. ENTSG should take responsibility for its members data as the current status of the database hinders the possibility to achieve a deeper understanding of the market effects of Network Codes on market functioning. Likewise, NRAs shall take responsibility or should be given the responsibility to enforce data provision requirements, including its quality dimension.
 - b) Responsible authorities are called upon to study the barriers highlighted by market participants in the “Barriers in Gas Wholesale Markets Survey”. Areas of attention besides those of an operational nature elaborated in this volume are: improved and more transparent stakeholder processes, the use of English as a language for operational communication and possibly legal contracts, improved websites with better and more up-to-date information. Best practices could be identified and shared.

10 The platform was launched by ACER and ENTSG to gather potential implementation issues with the gas NCs and allow stakeholders to provide feedback on a range of topics. See: <http://www.gasnfunc.eu/>.

11 A recent EC study about “The role of gas underground storage in the internal market and in ensuring security of supply” concluded that the costs of security of supply related storage measures often exceed benefits. See: <https://ec.europa.eu/energy/sites/ener/files/documents/REPORT-Gas%20Storage-20150728.pdf>.

1. Introduction

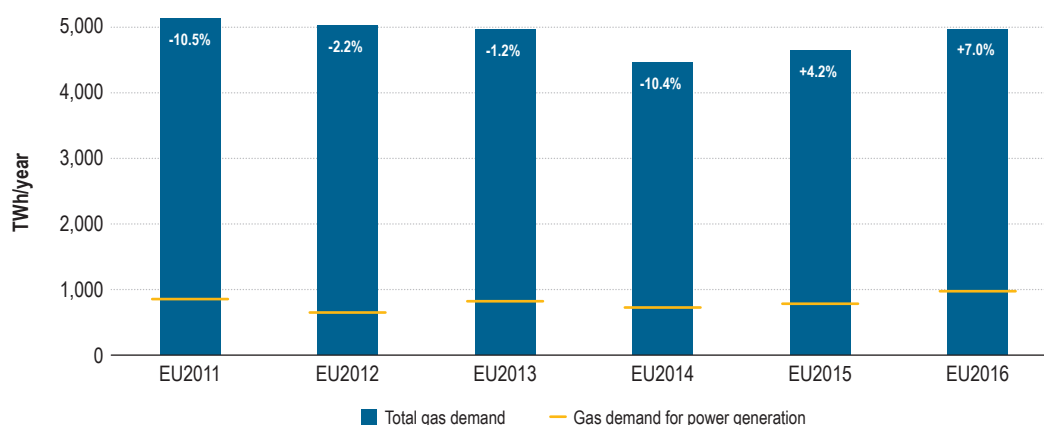
- 31 The Market Monitoring Report, which is in its sixth edition, consists of four volumes respectively on: the Electricity Wholesale Market, the Gas Wholesale Market, the Electricity and Gas Retail Markets, and Consumer Protection and Empowerment. The MMR covers the EU MSs and, for selected topics, also the Contracting Parties of the Energy Community.
- 32 The goal of the Gas Wholesale Volume is to present the results of the monitoring of the state of the European gas wholesale markets and their trajectory towards an IGM. In doing so, it focuses this year on two main themes: it looks in detail at the present market developments and the state of individual gas markets, and it also investigates the possible market effects of the implementation of the gas NCs, an essential piece of legislation of the Third Package.
- 33 In order to analyse the first aspect, the metrics of the AGTM are used. They are intended to assess the structural degree of competition and the well-functionality of gas markets. This year, the Agency covers all the AGTM metrics, complemented by additional analyses. In order to do so, the Agency has drawn heavily on anonymised and aggregated REMIT data. It is to be noticed that for selected AGTM metrics' this volume only displays the results of a sample of MSs. Results for all MSs will be made available at ACER website in a dedicated document.
- 34 The analysis of market effects of the implementation of network codes is the other main theme, and is in its second year. The analyses are more extensive than last year. However, as not all network codes have been fully implemented, it is not feasible yet to come up with a holistic assessment. In the years to come, the review will be further expanded with additional metrics, which will allow a more complete review of the impact of the implementation of NCs. As this is uncharted territory, this kind of monitoring is a learning experience.
- 35 In order to complement the quantitative analyses, this year the Agency conducted a survey among market participants to probe for any remaining barriers to the well-functioning of gas wholesale markets. The results of the survey represent an additional input for the Agency and NRAs in order to determine where to focus their efforts in further developing European gas wholesale markets.
- 36 The Gas Wholesale Volume is sub divided into four analytical chapters. Chapter 2 reviews the main developments affecting gas markets in 2016, while Chapter 3 focuses on assessing the performance of gas markets. Chapter 4 looks deeper into the impact of network codes. The last chapter presents the results of the survey on barriers in gas wholesale markets. The report is preceded with a set of recommendations based on the outcomes of the analytical work performed by the Agency.

2. Gas wholesale market developments

2.1 Demand and supply developments

- 37 EU gas demand in 2016 rose by 7% compared to 2015, reaching 4,962 TWh. It is the second consecutive year of growth after 4 years of decline. Improved gas-to-power economics were at the basis of the increase. They led to more gas-fired power generation which is estimated to have contributed up to 60% of this growth¹². This was at the expense of coal generation that was reduced due to increased coal prices. Up to April 2017 gas demand has continued increasing at a 4% year-on-year rate.

Figure 1: EU gas gross inland consumption – 2016 (TWh/year and % variation yoy)



Source: ACER based on Eurostat.

- 38 While the EU as a whole saw an increase in gas consumption, growth figures varied across the MSs. Yearly demand variations are a reflection of heterogeneous local market dynamics, such as the economic growth rate or the relative importance of coal and gas in the electricity generation mix¹³.
- 39 Thanks to its flexibility, gas-fired power generation is playing more and more a crucial back-up role for higher levels of intermittent renewable energy sources. At the same time, in many parts of Europe a reduction in installed coal generation capacity can be observed. However, reducing the role of gas in power generation to a backup fuel for RES could put downward pressure on total gas consumption. Nevertheless, there are some optimistic forecasts mainly linked to increasing gas use in land and maritime transportation. This could add up to 30 bcm/year in 2025 according to some medium-range estimates¹⁴. However, to date the penetration of these new uses of gas remains limited¹⁵.

12 Source: Eurostat data series nrg_103m.

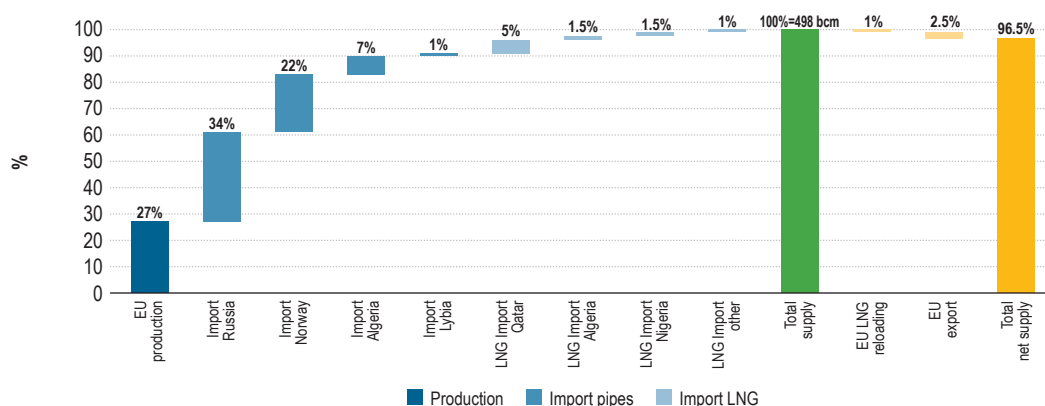
13 E.g. UK gas fired electricity generation rose approx. 50% year on year. Sizeable increases in CCGTs load factors were also recorded in France, Italy, Germany and Spain.

14 See the ACER study about the Regulatory implications of new market developments in the gas supply chain: http://www.acer.europa.eu/official_documents/acts_of_the_agency/publication/regulatory%20implications%20of%20new%20developments%20in%20the%20gas%20supply%20chain.pdf.

15 The number of natural gas vehicles (NGVs) reached 1.3 million units - 98% of them light duty ones - in 2016, accounting for around 3.5 bcm of annual consumption. Large NGVs accounted for 0.43% of EU total vehicles, still far from the 2020 EC ambition of a 5% share of gas-powered light duty vehicles. The penetration varies substantially among MSs, with the largest distribution observed in Italy and Bulgaria, a 2.4% and 2.0% respectively. Regarding the number of compressed natural gas refuelling stations, Italy also leads the ranking with 1,221 stations. Germany hosts the second largest number. LNG infrastructure is more limited, with 113 refuelling stations, (mainly for marine bunkering), located mainly in the UK, Spain and the Netherlands.

- 40 Reliance on external gas imports increased in 2016 to cover for a combination of growing consumption and reduced EU domestic production. The latter was mainly the result of a lower cap, imposed by the Dutch government for safety reasons, on the extraction from the Groningen gas field. It is expected that the share of domestic production could drop to below 20% by 2030¹⁶. Russia raised its supply share to 34% in 2016, further consolidating its position as the main supplier to the EU¹⁷. Gazprom's (and other producers') strategy - to defend market share by offering competitive prices and reviewing contractual supply mechanisms in market areas with competitive pressure - as well as favourable prices for oil-indexed supply contracts during 2016 boosted EU gas buyers' offtakes. Norway, the other key external EU supplier, maintained its 2015 record high export levels.
- 41 The anticipated rise in surplus LNG flowing into Europe proved somewhat slow to materialise in 2016, due in part to robust gas flows via pipelines. LNG imports declined slightly, totalling 12% of EU supplies. Qatar kept its position as a key LNG supplier. Algerian total exports increased not only because of price competitiveness, thanks to the weak underlying oil prices, but also due to more shipments of spot LNG into Europe. The first United States (US) LNG cargoes landed in Europe - in Portugal (in April) . However, only 8% of US 2016 LNG production is estimated to have come to Europe.
- 42 Gas exports from the EU into Ukraine accounted for 11 bcm. Naftogaz has not imported gas from Russia since November 2015¹⁸. Also, various European companies started to use the large and economic Ukrainian underground storage capacity. Ukrainian imports have become an additional factor influencing Central and Eastern European hub prices. Further insights into Ukraine market developments are provided in Section 3.1.

Figure 2: EU gas supply portfolio by origin – 2016 (100 = 498 bcm, %)



Source: ACER based on International Energy Agency (IEA), Eurostat and GIGNL¹⁹.

- 43 The contractual basis of physical supply in most EU MSs is predominantly bilateral long-term contracts²⁰. However, these long-established supply mechanisms in their current format are gradually being phased-out. The progression of EU hubs is eroding their dominance, with shippers focussing on managing supply exposure over shorter time horizons. In addition, the reduction in committed offtake volumes via deal renegotiation and the non-renewal of contracts are gradually occurring and are expected further to continue in the future²¹.

16 The development of shale gas and biogas resources could, however, offset a potential decrease. See: http://www.eurogas.org/uploads/media/Eurogas_Workshop_Long-Term_Outlook_for_gas_to_2035_221013.pdf.

17 According to Gazprom statistics, the company reached an all-time high record of deliveries, with 180 bcm into Turkey and Europe, a 12% rise compared to 2015 figures. See: <http://www.gazprom.com/about/marketing/europe/>.

18 The decision not to import Russian gas seems to be motivated by the stand-off between Gazprom and Naftogaz before the arbitration courts on contractual conditions. According to various market analysts, the Russian gas prices offered were cheaper than EU hub-based gas for most part of the second half of the year.

19 International Group of LNG importers. See: <http://www.giignl.org/>.

20 Significant volumes purchased initially through long-term contractual mechanisms may later be resold on hubs by wholesale companies.

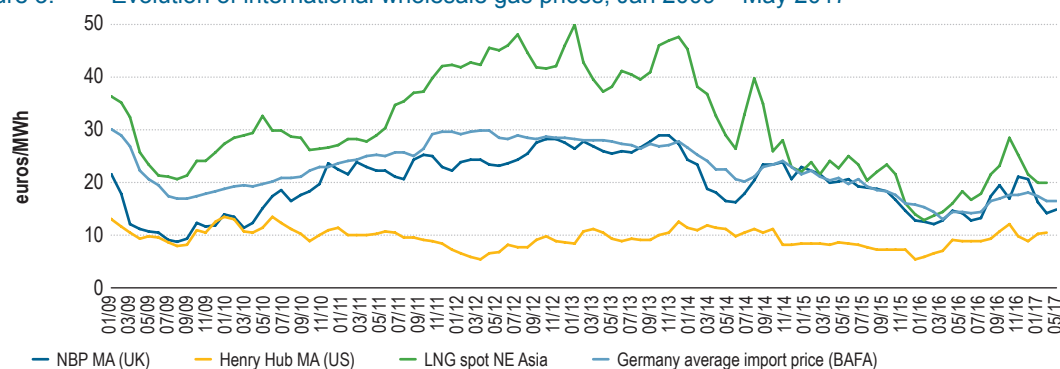
21 E.g. in 2016, Italian Eni announced lower liable volumes from Sonatrach, as well as further price alignments to hub references. Polish state-run PGNiG announced that it would not renew its 10 bcm/year contract with Gazprom after it expires in 2022.

- 44 The International Gas Union (IGU)²² appraises that hub price-linked long-term contracts, together with volumes directly purchased via hubs, account at present for 66% of supplies across Europe. Differences exist between regions and producers²³. Statoil, Gastera and UK producers shifted to hub orientation earlier and in a more pronounced way. Gazprom, Sonatrach, other key producers and several LNG exporting companies tend to prefer long-term bilateral contracting with a higher presence of oil-price indexation. Nevertheless, Gazprom's actual pricing is the result of a system of formulaic adjustment and rebates granted where hub pricing constitutes an essential reference. This adaptation to the new market reality is the result of enhanced upstream competition, the development of hubs, improved interconnection and legal actions²⁴.

2.2 Price developments

- 45 Gas prices in Europe saw two distinct phases in 2016, with falling prices until the end of the third quarter and an upturn thereafter. Weaker gas demand, lower oil prices, high gas storage levels and general oversupply explain the declining prices. By the end of the third quarter, prices saw a reversal of this trend. This recovery was mainly supported by growing gas consumption for gas-fired power generation. Limited EU LNG deliveries coupled with rising Asian spot prices, an increase in US gas prices feeding into EU ones²⁵ and coal price increases were all contributing factors. The prices of oil-indexed long-term contracts were relatively competitive throughout 2016 and, in fact, they dropped below hub prices in the last part of the year. In the first months of 2017 prices continued to rise, but then started to decrease again from March. Weather patterns and oil price movements were relevant fundamentals behind their evolution.
- 46 Price developments showed similar trends across the three key global gas regions of North America, Europe and East Asia. On the whole, price differentials seem to be converging to (LNG) variable transport costs. However, distinct regional market fundamentals also play a role²⁶. Intensified inter-hub price hedging activities are promoting international price alignments. Figure 3 provides an overview of the evolution of international gas wholesale prices using representative indexes.

Figure 3: Evolution of international wholesale gas prices, Jan 2009 – May 2017



Source: ACER based on ICIS Heren and BAFA²⁷.

- 22 See IGU 2017 report results per EU region: http://www.igu.org/sites/default/files/node-document-field_file/IGU_Wholesale%20Gas%20Price%20Survey%202017%20Digital_0.pdf.
- 23 E.g. according to IGU, gas-on-gas price formation is deemed to apply to 91% of supplies in the NWE region (Benelux, Denmark, France, Ireland, Germany and the UK); it drops to approx. 58% in the CEE region (Austria, the Czech Republic, Hungary, Poland and Slovakia), 32% in the Mediterranean area (Greece, Italy, Portugal and Spain – Italian specific gas-on-gas share is deemed however around 70%, after the renegotiations in Russian and Algerian supply contracts) and is very limited in the SSE region (Bulgaria, Croatia, Romania, and Slovenia).
- 24 In April 2015, the EC formally charged Gazprom with alleged abuse of its dominant position in Central and Eastern Europe. At the start of 2017, as part of efforts to settle the antitrust case, Gazprom made a proposal to link further its gas contract prices in Central and Eastern Europe to “competitive benchmarks”, including Western European hubs, and to eliminate gas reselling restrictions. The EC has initially stated that the proposal addresses the identified competition concerns. See: http://europa.eu/rapid/press-release_IP-17-555_en.htm Gazprom also continues to undertake auctions; in March 2016, it offered 0.5 bcm for the Baltics, and in September, 2 bcm at the Greifswald and Baumgarten interconnections.
- 25 US Henry-Hub prices, adjusted for liquefaction, shipment and regasification costs (~3-4 euros/MWh) provide an additional signal for EU gas price formation.
- 26 For example, the degree of influence of coal in setting gas hub prices or the seasonal supply flexibilities is somehow different between the US and the EU markets. Also, recovering Asian demand – observed since the last quarter of 2016 – can put pressure on the price of spot LNG deliveries in the region. Moreover, there is also some lead time for the LNG supply chain to respond to regional markets spot price signals; as such inter-regional price volatility can appear.
- 27 German Federal Office for Economic Affairs and Export Control.

- 47 Europe plays a reference role in setting international LNG price(s). On the one hand, Europe's liquid trading hubs²⁸, surplus regasification capacities and the ease with which suppliers find customers in Europe's power generation market for their gas positions have made the Continent a global LNG market of last resort. As such, for worldwide LNG producers, the EU liquid hubs constitute a key benchmark when setting the price of their exports. Furthermore, EU LNG terminals' capacity for cargo reloading and the shipment diversion optionality influences, from Europe, the price formation of markets in Asia and South America. Overall, this situation connects with the trend of international LNG markets increasingly becoming more flexible and short-term oriented. Moreover, EU gas hubs' price formation is becoming more influenced by gas-to-coal switching economics. Correspondingly, gas demand by the power sector substantially determines both the volumes of surplus spot LNG being absorbed and the usage of long-term supply contracts flexibilities.

2.3 Infrastructure developments

- 48 Notwithstanding significant improvements in interconnection levels across the EU in recent years²⁹, pockets of regional gas markets still exhibit insufficient levels of interconnectivity, which is detrimental to market developments. According to the EC, gas infrastructure gaps are mainly to be found in the South-South East (SSE) region, but also in the CEE and Baltic regions, albeit to a lesser degree³⁰.
- 49 In any event, new infrastructure investment should be a market-driven process. For example, the CAM NC amendment establishes that "capacity expansions shall be considered economically feasible if an economic test is passed (...) i.e. a predefined level of network users' commitment is necessary to invest". These tests are also a safeguard against stranded assets.
- 50 While the cost recovery of an investment occurs over a longer period, the trend in capacity and commodity contracting is shifting towards the short(er)-term. This coincides with the progressive expiry of long-term legacy contracts³¹. This may eventually have a profound impact on the market since the increase in price convergence observed in recent years has been underpinned to a certain degree by long-term contract surpluses. A higher reliance on short-term contracting may well widen gas hub spreads again, near transportation costs.
- 51 Against this background, a broad debate in the industry focuses on the appropriateness of EU gas interconnection levels, cost remuneration models and plausible price differentials. At the end of 2016, the EC launched the so-called Quo Vadis consultancy study to test the robustness of the regulatory regime in the medium-term. The aim is to explore a set of potential regulatory scenarios to test the future sustainability and competition levels of EU gas markets.
- 52 The perspective of waning domestic production is pushing European market participants and governments to diversify their external supply capabilities. Possible new pipelines are on the drawing board, either along established supply axes or via new gas corridors.

28 The sizeable forward liquidity of - selected - EU hubs provide price optionality for global LNG producers, e.g. these can sell gas forward in Europe to guarantee a minimum return, but can buy back volumes near to delivery to place them in more profitable global markets if conditions are favourable.

29 E.g. CEE region has significantly advanced its supply adequacy in recent years, following the entry into force of Regulation 994/2010 on the security of gas supply measures, as well as the commissioning of Nordstream.

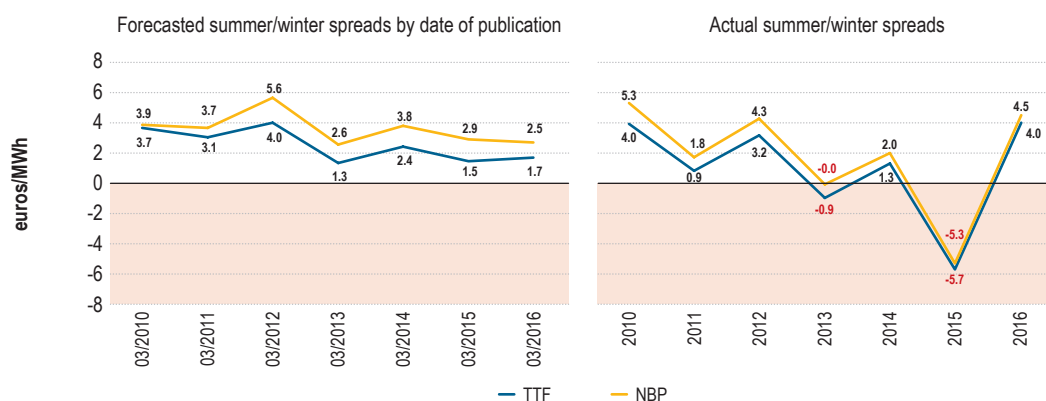
30 The list of Projects of Common Interest (PCIs) 2016 provides an overview of infrastructure proposals. See: http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=OJ:JOL_2016_019_R_0001&from=EN. The above-cited regions are characterised by a higher number of PCIs (e.g. the Romanian-Hungarian-Austrian corridor, Bulgaria-Greece or Polish-Lithuanian interconnector) and received a higher level of grants to date. At the EU level, there is also a target of enabling access to LNG, either via LNG terminals or indirectly via pipeline corridors for all MSs by 2025.

31 EU midstreamers are shifting away from (re)contracting long-term capacities. On the other hand, major non-EU producers seem to be the only ones booking long-term transportation capacity to underwrite their future gas sales.

UTILISATION ANALYSIS OF UNDERGROUND STORAGE FACILITIES

- 53 40% of EU UGS capacity remained unused during the storage year 2016/17 compared to an average of 35% during the last five storage years. Despite the partial closing of the Rough UGS site in Great Britain and the imposed cap on the Groningen production, a situation of overcapacity in storage facilities can be observed across EU MSs, as already highlighted in the MMR 2015. Despite of a higher level of stocks in storage at the beginning of the storage year 2016/17 (due to the negative actual summer winter spreads during the storage year 2015/16), the final levels of stocks registered on March 2017 were in line with the levels registered in the previous years.
- 54 However, when looking at the storage indicators, it is important to keep in mind that in many MSs storage bookings and the maintenance of certain amount of stocks during the year reflect security of supply obligations imposed on market participants, rather than market dynamics. Obligations of such type can distort market dynamics in several ways, as highlighted in the 'Barriers in Gas wholesale Markets Survey': 1) in some MSs only suppliers of regulated end customers can book, or have priority to book, storage capacity, de facto excluding any other market participants willing to access storage and hence giving a competitive advantage to the incumbent (e.g. in Bulgaria, Czech Republic, Romania); 2) obligations established in some MSs for all market participants to book capacity in storage are seen as a barrier to market access, this measure also tends to favour the incumbent because the complexity and financial impacts of those obligations tend to hinder newcomers and small players (e.g. Poland); 3) inflexible rules on storage utilisation for security of supply purposes may discourage their efficient utilisation (e.g. in France end customer suppliers must book capacity in storage at bilaterally negotiated and uncompetitive tariffs; in Italy holders of storage capacity are obliged to respect minimum and maximum values as decided by the Government and import fees have to be paid by shippers even if they do not hold storage capacity in order to keep the cushion gas for storage in stock). The abovementioned measures tend to have as effect to exclude newcomers and/or small players from entering the market as the obligations imply compliance cost and costs for buying and operating booked storage volumes.
- 55 As such, storage bookings and utilisation at European levels are highly influenced by MSs' security of supply policies and not just by market fundamentals. Another element influencing the level of storage bookings are the long-term capacity contracts for storage, which are a lock-in for storage capacity holders given the declining economic profitability of holding capacity in storage facilities.
- 56 The current oversupply scenario and the relatively flatter demand patterns across the year seem to contribute to gradually narrowing the forecasts of winter/summer spreads evolution, as Figure 4 shows. However, more rapidly evolving gas-on-gas fundamentals may make it more challenging for participants accurately to forecast the winter/summer spreads and the ability to assess hub prices variability. As a result the gap between price forecasts and actual prices seem to be gradually enlarging.

Figure 4: NBP and TTF forecasted and actual summer/winter spreads 2010 – 2017 (euros/MWh)



Source: ACER based on Platt's data.

Notes: 1) Ex-ante graph: for every storage year, the forward summer/winter spread is calculated as the difference between the Season+2 prices (covering the period from October "Y" to March "Y+1") and Season +1 prices (covering the period from April "Y" to September "Y"), as observed on average on March "Y". 2) Ex-post graph: for every storage year, the ex-post summer/winter spread is calculated as the difference between the average of the actual spot prices during the period from October "Y" to March "Y+1" and the average of actual spot prices during the period from April "Y" to September "Y".

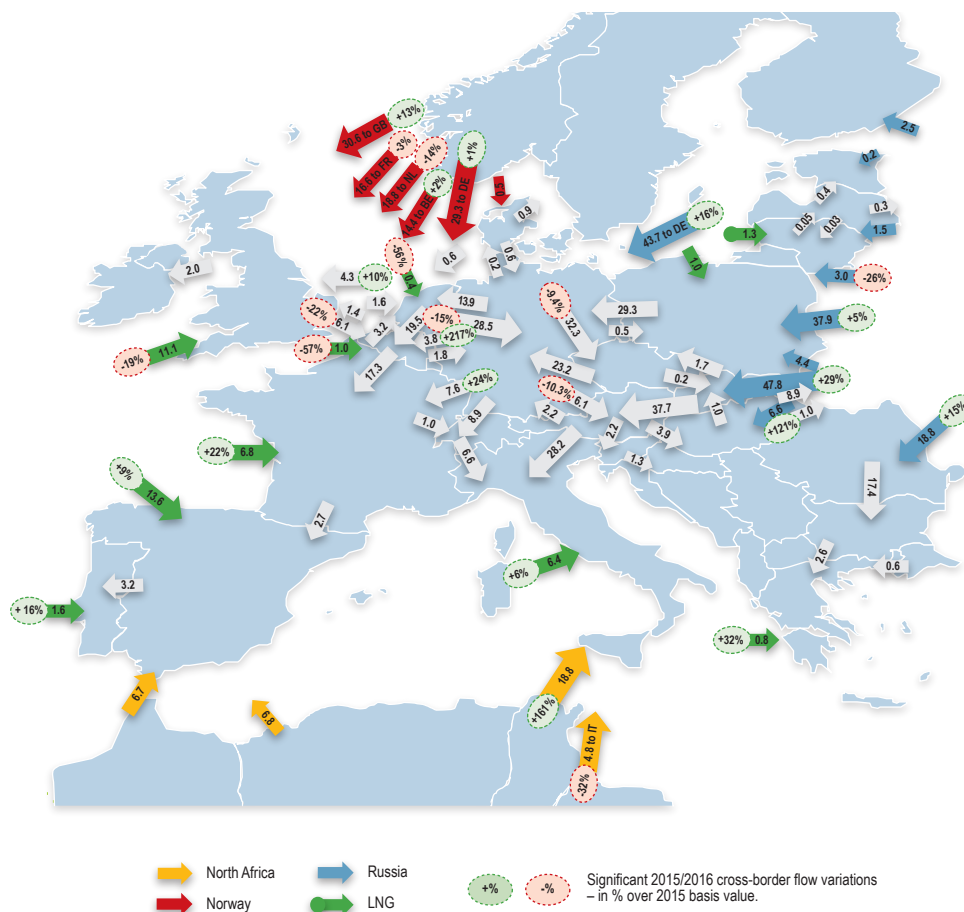
- 57 Given these developments, the role of UGS is evolving. As already highlighted in last year's MMR, the dynamics of injection and withdrawals indicate a shorter-term orientation for portfolio optimisation and balancing. According to GSE AGSI+ data³², storage injections and withdrawals day-to-day variations in the storage year 2016/17 were at times higher than in the previous storage year. Another important observation is the increased counter-direction of flows into and out of storage facilities within a season: increased volumes of injections are registered in winter months and increased volumes of withdrawals are registered in summer months, signalling a positive trend of more flexibility provided by storage facilities.
- 58 The increased volatility registered over the last years in the spot prices is one of the main factors explaining the lower level of accuracy of the forecasted summer-winter spreads: forecasts are mainly based on the oversupply market sentiment while day-ahead prices are more and more reactive to short-term market dynamics and variations. More into details, the current gas oversupply and the enhanced cross-border interconnection seem to diminish the need for storage bookings and utilisation for security of supply. In some MSs specific provisions related to storage facilities result in artificially higher stocks. From a pure market perspective factors like the narrowing winter/summer spreads, high storage tariffs which make storage bookings and utilisation for season arbitrage uncompetitive and enhanced IP capacity keep the absolute storage stock at modest levels.
- 59 Two scenarios could be identified in the years to come. If security of supply obligations in most MSs are softened following a more market-based approach, the market will decide on the role of storage as a more short-term optimising tool rather than as a tool to benefit from summer-winter spreads, so that the most flexible storage facilities will be the prevailing assets chosen by market players. Alternatively, if a status quo of current security of supply measures related to storage bookings and utilisation remains, then this begs the question about how much storage capacity needs to be operational without economic justification, and at what cost.

32 GSE stands for Gas Storage Europe. AGSI+ is its data transparency platform See: <https://agsi.gie.eu/#/>.

PHYSICAL GAS FLOWS ACROSS EU BORDERS

60 As in previous MMR editions, the Agency analysed EU gas cross-border flows in 2016 and their year-on-year variation. Figure 5 provides an overview.

Figure 5: EU cross-border gas flows in 2016 and main differences from 2015 (bcm/year)



Source: ACER based on IEA (2016).

Note: MSSs' domestic production is not included in the map. The reported Norwegian flows into Denmark originate from off-shore fields that are only connected to the Danish system.

- 61 Most of the notable flow changes were driven by the enhanced price competitiveness of Russian supplies, which resulted in a 14% rise in imports from Russia, with increases on each of its main pipe supply corridors. North African supplies were also more price competitive, as illustrated by its sourcing to the Italian market at the expense of NWE hubs purchases, which resulted in lower gas flows into Italy via Switzerland or Austria into Italy.
- 62 Additionally, exports from the Netherlands into Germany dropped significantly as a result of lower Groningen gas field output quotas. UK imports from the Continent rose significantly due to the Rough storage outage. Norwegian flows remained flat year on year, as did aggregated LNG imports³³. The fact that year-on-year changes in gas flows, in the face of changing market fundamentals, can occur smoothly shows to what extent many markets have become flexible and liquid.

33 According to LSOs data, aggregated gas send-outs through EU LNG terminals fell by approx. 4%. Regasification dropped in UK, Belgian, and Dutch terminals, but increased in France, Greece, Italy, Portugal and Spain. EU cargo reloads rose year on year. See also: http://www.giignl.org/sites/default/files/PUBLIC_AREA/Publications/giignl_2017_report_0.pdf.

3. Gas Target Model: assessment of EU gas markets' performance

63 This chapter assesses the performance of the gas wholesale markets in the various MSs, chiefly using AGTM metrics. First, the 'Market health' metrics are calculated in order to evaluate whether gas markets are structurally competitive, resilient and exhibit a sufficient degree of diversity of supply. The well-functioning of gas hubs is assessed later by the 'Market participants' needs' criteria. Table 1 summarises the AGTM metrics and their numbering.

Table 1: List of AGTM metrics

Market participant needs metrics	Market health metrics
1. Order book volume	5. Herfindahl-Hirschmann Index
2. Bid-offer spread	6. Number of supply sources
3. Order book price sensitivity	7. Residual Supply Index
4. Number of trades	8. Market concentration for bid and offer activities
	9. Market concentration for trading activities

Source: ACER Gas Target model.

3.1 Assessment of the level of competition in EU gas markets and their resilience: AGTM market health benchmarks

64 The AGTM comprises three metrics related to market health: diversity of supply origin, supply-side market concentration and the Residual Supply Index (RSI)³⁴. These metrics evaluate the degree of competition in MSs gas markets and their resilience to gas producers' market power.

65 Figure 6 presents in a combined manner the values for these three metrics. It illustrates that the gas wholesale markets of France, BeLux and the UK were the leading ones in 2016 in meeting the thresholds for these three metrics. Other markets, such as the Netherlands, Germany, Slovakia, Spain and Italy, are in relative close range. The diversification of supplies seems to be the most challenging indicator for MSs to meet³⁵. MSs that either host or are sufficiently interconnected to well-functioning hubs, those with less concentrated domestic production and/or those that benefit from a flexible supply source, i.e. LNG, exhibit lower HHI values.

66 Concentration on the supply side was mostly comparable to last year, despite a sizeable rise in hub-traded volumes. This is also explained by methodological aspects; the metric looks at the primary origin of the gas declared as either imported directly from producing countries or purchased from an adjacent market hosting a competitive hub³⁶. However, it does not take into account subsequent secondary sales that may occur within the domestic market. Modest LNG imports, declining indigenous production, the need to honour legacy contracts and the rise in imports from Russia were the main reasons behind the 2016 results. It is an instructive exercise to compare supply-side concentration levels with the market shares of final gas sales by downstream company³⁷. Supply-side concentration can still be compatible with competitive retail markets, particularly if a dynamic midstream market, sustained by well-functioning hubs, allows end-suppliers to source their gas in a competitive manner.

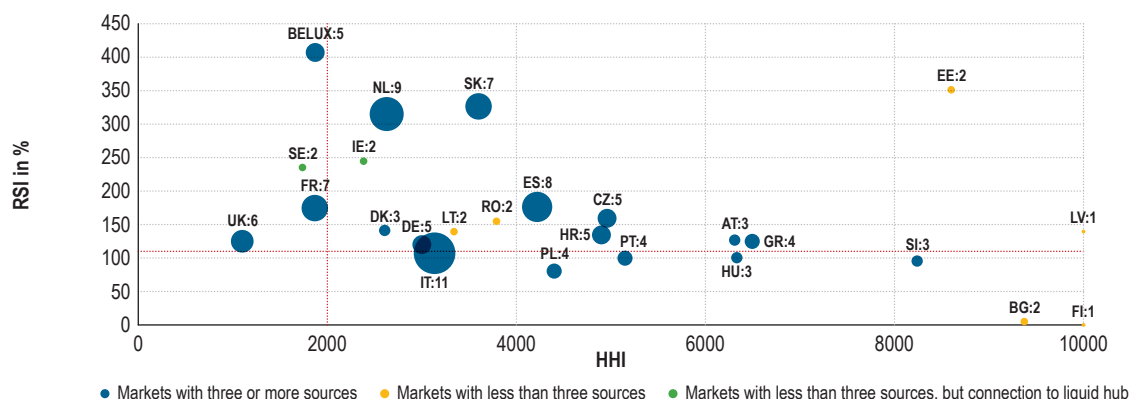
34 AGTM recommends 1) at least three distinct origin sources; – origin sources are defined as “the gas- producing country or a country hosting a liquid hub from where gas is purchased; 2) The market concentration of companies on the supply-side as measured by the Herfindahl-Hirschman Index (HHI) should be lower than 2000; 3) The market should have the capacity to meet yearly demand without its largest upstream supplier, which equates to an RSI greater than 110%. Metrics are gauged in accordance with the methodology established at the AGTM Annex 3. Note that market health concentration metrics will be assessed under the market participant needs' epigraph.

35 Transparency of information on market shares of upstream producers is limited in many markets. Also, the as-sumptions made may affect the calculations, so the results have to be treated with some caution. The utilisation of REMIT data will provide more precision in future assessments. Therefore, this MMR does not attempt to interpret the thresholds of the AGTM by the letter.

36 The market shares of the upstream companies selling gas from the respective country are assigned in accordance with the desktop research methodology used for the GTM 2014. Shares are derived from production statistics and shareholder structure of export facilities. The declared imports from a market with a liquid hub and with minor domestic production (i.e. Germany, Austria, Italy, France and Belgium) are accounted in proportion to the concentration of the market hosting the hub.

37 See, for example, MMR 2015 executive summary Figure 4.

Figure 6: Overview of EU MSs AGTM market health metrics – 2016



Source: ACER based on ENTSOG capacity data, Eurostat, NRAs and Frontier Research.

Note: RSI - Y-axis – measures the percentage of MSs demand that can be met without an entry capacity reliant on the largest supply origin³⁸. The HHI value – X-axis – measures the concentration of companies on the supply side (see MMR 2015 Annex 1 for further details on the approach). The bubble size represents the number of distinct supply origin sources. The blue colour represents three or more supply sources, yellow represents less than three.

67 As shown in Figure 6, 13 MSs met both the diversity of supply and the RSI criteria³⁹. In these MSs, even though supply-side concentration may be, in some cases, higher than recommended, the main supplier is believed to be sufficiently exposed to potential competitors to discourage it from trying to set “uncompetitive” prices. However, for those MSs where the RSI is below the threshold – i.e. Hungary, Poland, Portugal, Slovenia – and for those MSs with a unique or one clearly dominant source – Latvia, Finland, Bulgaria – the largest supplier is pivotal. This means that competitors cannot replace this player and, as such, the latter can exert market power over price formation.

68 In this MMR edition, the market concentration and diversity of supply metrics have been calculated also for selected Contracting Parties of the EnC with the assistance of the EnC Secretariat. In many of these countries, Russian supplies remain the only accessible supply source. This situation is still due to limited interconnection infrastructure and limited market liberalisation. This results in high market concentration levels in many of these markets⁴⁰.

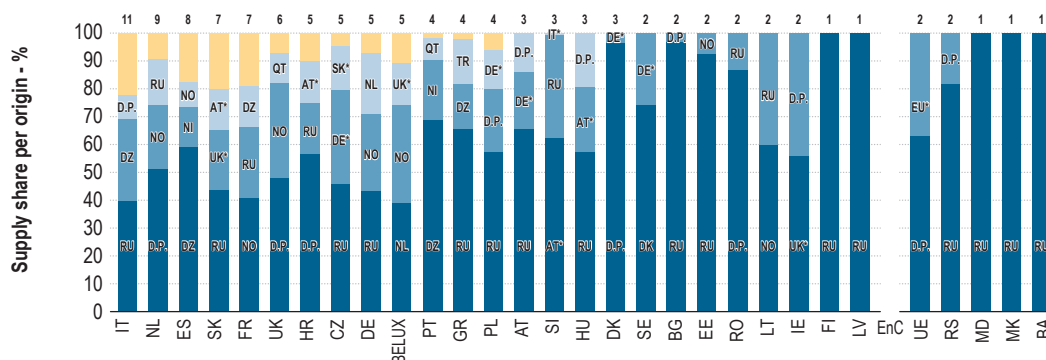
69 Figure 7 shows the diversity of supply origins per EU MS and also for selected EnC Contracting Parties.

38 RSI gauges pipeline, LNG and domestic production supply capacity not controlled by the largest supplier. It is intended to quantify the competitive strength of the market. RSI disregards storage, but accounts for transits. The feasibility of physical volumes being acquirable is not evaluated, which could result in an overestimation of the RSI.

39 MSs whose gas transmission system accommodate significant transit flows – e.g. Slovakia, Belgium, the Netherlands and the Czech Republic – perform the best for this metric. In addition, MSs with significant LNG regasification capacities relative to current demand, like Spain, the UK and Greece, also score high for the RSI.

40 E.g. Moldova 9.948, Serbia 7.048, FYR of Macedonia 5.862 for the HHI index. Concentration data for these three EnC Contracting Parties refer to the market shares of the wholesale companies active in their domestic markets (i.e. midstreamers), not to supply-side players. For Ukraine, its HHI figure would be 2.335. However, concentration data for this country refer to the market shares of companies delivering final gas into Ukraine. This means companies producing indigenous gas or EU companies from whom Ukrainian midstreamers purchase gas.

Figure 7: Estimated number and diversity of supply sources in terms of the geographical origin of the gas – 2016 EU 28 and selected EnC Contracting Parties



Source: ACER based on Eurostat, IEA, British Petroleum, NRAs and EnC Secretariat.

Note: D.P. means domestic production. Yellow means 'other sources'. The asterisk refers to MSs with liquid organised markets where the gas has been purchased. For UA, the "EU" label origin corresponds to purchases from EU companies. These are deemed to comprise mostly Russian but also Norwegian gas geographical origin. At Denmark, D.P. share also includes the Norwegian off-shore fields connected to the Danish network.

- 70 The diversity of supply sources metric saw few changes compared to 2015. Hence, a significant disparity in terms of supply diversification continues across the EU. Those better interconnected MSs, those hosting better functional hubs and/or those with access to LNG exhibit the greatest richness in number of gas sources. Beyond meeting the three different sources criterion, it is important that the three distinct sources account for sizeable volumes to foster competition (e.g. Poland and Slovakia formally meet the criteria, but exhibit Russian market dominance).
- 71 Overall, the results for the three market health metrics are closely interrelated among themselves as they measure interdependent aspects. Moreover, they are also strongly linked to the metrics gauging the quality of hubs' well-functioning, which will be presented in the next section. Market health metrics reveal structural aspects that influence the way in which gas wholesale markets function.
- 72 Finally, even if the metrics are presented at MS level, it is important to apply a regional lens when analysing the results. Even when taking into account individual MS specificities, some regional aggregation can be done: the NWE region seems the most resilient; Mediterranean MSs benefit from the flexibility that LNG provides; the CEE region is progressively diversifying its supplies away from their historical Russian supplier, while most states in the SSE and Baltic regions depend on a single supplier and as such can benefit from certain infrastructure investment, as well as enhanced regional cooperation.

Regulatory developments in the Ukrainian gas wholesale market

- 73 Among the EnC Contracting Parties, Ukraine has embarked on progressive structural reforms aiming to transpose the EU gas market model. These reforms are intended to promote competition, supply diversification and security of supply. As previously mentioned, Ukraine did not import gas from Russia in 2016. The country relied on its domestic production and on EU bilateral imports, mostly via the interconnection with Slovakia⁴¹.
- 74 The implementation of the Third Package is slowly progressing in Ukraine. However, not all preconditions are in place for a functional and integrated market to emerge. On the positive side, in January 2016 a newly established VTP commenced operation. Its goal is to facilitate trading and to make the operation of the system more transparent. However, at present, most trading is still done via bilateral contracts. Thus far, the two active exchanges have had very low liquidity.

41 Detailed statistics on produced and supplied volumes, prices, infrastructure utilization and companies' shares are accessible at the Naftogaz transparency portal and in NRA (NEURC) reports: e.g. <http://www.naftogaz.com/www/3/nakweben.nsf/0/09FC633ECCD B6E03C22580BC0050C79E?OpenDocument> or <http://www.nerc.gov.ua/?id=24476>. Imports via Slovakia are attributed mainly to the incumbent Naftogaz, which controls most of this corridor capacity (although it may resell it to third-party shippers); meanwhile, rising flows across Hungary and Poland are believed to be assigned more to private companies.

- 75 One of the main obstacles on the road to full market liberalisation is the slow process of unbundling of the gas TSO, Ukrtransgaz (UTG), from the incumbent Naftogaz. Legally, they are unbundled, but the EnC Secretariat considers that the independence of network operation needs to be further improved in order to avoid inherent conflicts of interest⁴².
- 76 The implementation of the gas NCs – CAM, CMP and Interoperability at those IPs adjacent to EU MSs – should provide preconditions for full market integration. Therefore, the process of introducing NCs as a legal obligation for the EnC members has been launched. The Energy Community and the Madrid Forum have called for reciprocal NCs application⁴³. The partial implementation of the new balancing rules has not yet contributed to increased liquidity in the wholesale market. For the physical balancing of the system, UTG relies on its own storages and linepack. Users' commercial positions are balanced only on a monthly basis and they are still offered a 15% tolerance level. This hinders trading for balancing purposes. There is an ambition to establish a daily balancing regime during 2017.
- 77 Regarding capacity, UTG allocates IPs entry capacity, offering diverse duration products. Auctions are held only if aggregated requests exceed offers. In 2016, only monthly and daily products were contracted, but none via auctions. The allocation process seems overall to be transparent.
- 78 A transmission tariff methodology compatible with the TAR NC is gradually being implemented. Entry-exit tariffs are charged at IPs for accessing the VTP, with postage-stamp tariffs used for domestic exits. Cost-reflectivity is a relevant element to consider, as the levels of IP exit tariffs – above the average tariff levels of the CESEC region⁴⁴ – are deemed one of the major obstacles to regional market integration.

3.2 Assessment of the functioning of EU gas hubs: AGTM market participants' needs benchmarks

- 79 The second group of AGTM metrics assesses the level of development of gas hubs, including the availability of cost-effective wholesale market risk hedging.

3.2.1 Gas volumes traded

- 80 Overall traded volumes saw double-digit growth at most EU gas hubs in 2016, amounting to a 20% overall rise year on year. Modest decreases were observed only at the Belgian Zeebrugge Beach (-4%)⁴⁵ and the Polish VPGZ (-3%) hubs. The increasing role of hubs in physical sourcing and exposure management operations has continued to support liquidity growth. An oversupplied market, the increased use of hub-indexations for bilateral supply contracts and the selling at hubs of surplus volumes by over-contracted EU companies are all structural factors supporting hub development. Large industrial buyers are also increasingly sourcing gas directly from hubs.

42 This statement arises from considerations from selected stakeholders and market intelligence reports processed by the EnC Secretariat.

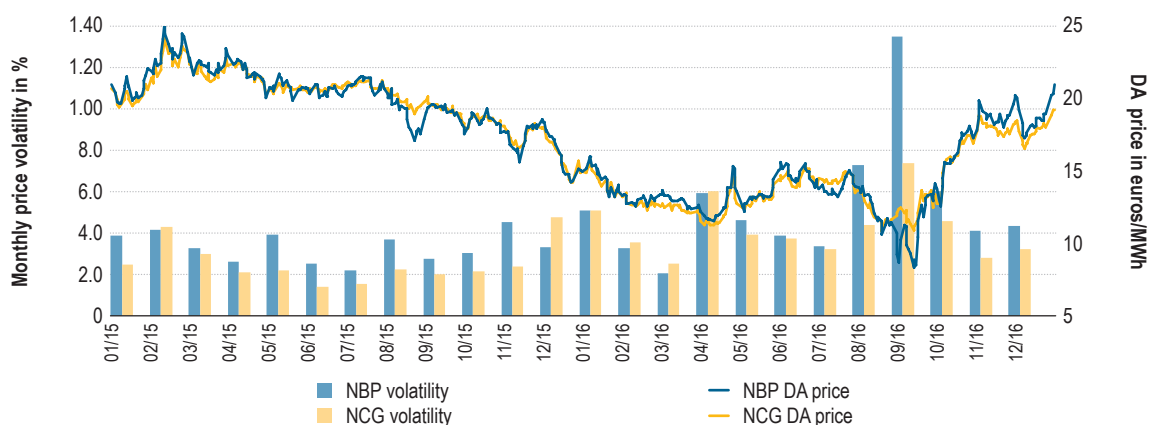
43 In February 2017, NRAs from Bulgaria, Greece, Hungary, Poland and Romania signed an agreement to apply EU NCs with eight non-EU countries, including Ukraine.

44 The Preconditions for Market Integration Compatible Gas Transmission Tariffs in the CESEC Region, a CESEC Discussion Paper, May 2016. E.g. See: https://ec.europa.eu/energy/sites/ener/files/documents/Gas_transmission_tariff_CESEC_final_10_05_18.pdf.

45 On the other hand, traded volumes at the Belgian virtual ZTP hub rose by approx. 50% year on year. Also at the Lithuanian GET exchange traded volumes significantly decreased year on year (circa 50%).

- 81 Interestingly, increased hub liquidity in 2016 was also influenced by an upward trend in price volatility (for an example, see Figure 8 below). The dramatic evolution of the oil prices, the UK's Rough storage facility maintenance works⁴⁶ – and overall lower gas storage stocks across the Continent at the end of the year, which reduced supply flexibility – the Dutch Groningen field production caps, euro/pound exchange rate fluctuations, French nuclear power stations challenges, weather-driven supply squeezes and swing demand from gas-fired power stations were cited as the main factors. Periods of higher volatility sparked interest in speculative trading, as well as the need for market participants to reposition and hedge their forward risks⁴⁷.

Figure 8: Day-ahead gas prices and price volatility evolution in selected EU hubs – 2013 – 2016



Source: ACER based on Platts and ICIS Heren.

Notes: To conduct the volatility analysis, the logarithmic returns of daily gas hub settlement prices are first gauged. The standard deviation of returns is then calculated and multiplied by the square root of total trading days in a year. The value is expressed as a percentage.

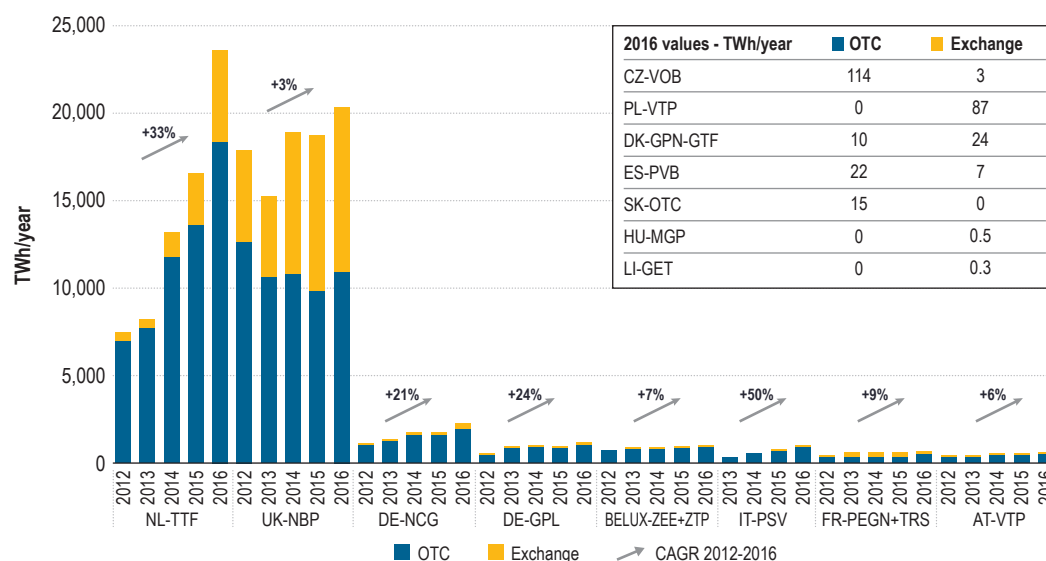
- 82 Figure 9 compares the traded volumes at EU gas hubs⁴⁸ in the last five years. OTC brokering remains the most common trading mechanism, although exchange-trading is growing fast. In developed hubs, traders usually use aggregator screens, which can contrast best bids and offers among different brokers, and increasingly also from exchanges, helping to detect even the smallest spread opportunities.

46 The full suspension of injections at Roughs storage at the end of June boosted the first increase in volatility, as the market struggled to cope with the resulting oversupply. Secondly, the loss of system flexibility made the market more prone to peaks that could normally have been smoothed out by the storage operation.

47 As EU long-term supply contracts price indexation looks further into hub references, volatility exposure gains in relevance; high volatility may prompt participants to engage in hub price risk management transactions to limit their positions and cover their value at risk. Also, suppliers may need to cover their price positions as their customers demand more and more floating prices linked to hub references.

48 And overview of natural gas exchanges, OTC brokers and VTPs operating in Europe is documented in the Agency's REMIT 2016 Annual Report, Figure 24. See: http://www.acer.europa.eu/official_documents/acts_of_the_agency/publication/remit%20annual%20report%202016.pdf.

Figure 9: Traded volumes and CAGR at EU hubs via market platforms – 2012 to 2016 (TWh/year - %)



Source: ACER based on REMIT data, Trayport and hub operators.

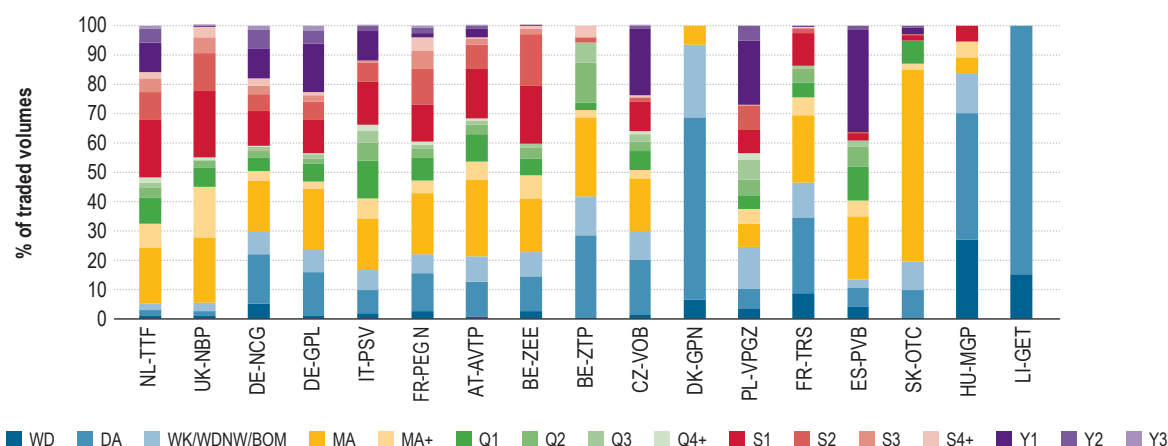
Note: Statistics solely refer to volumes traded via transparent market platforms with a price reference and some kind of product standardisation; OTC refers to physically settled volumes traded among parties via brokers – with either the parties managing credit risk or trading being cleared by the broker – and exchange execution denotes those volumes supervised and cleared by an organised central market operator. In some markets, sizeable volumes are traded, although not on transparent market platforms. These bilateral deals or swaps can also lack a price reference (e.g. Spain, 434 TWh in 2016).

- 83 As Figure 9 illustrates, the progression of TTF with a CAGR of 33% is impressive⁴⁹, and it alone has attracted the bulk of liquidity increase of EU gas hubs in recent years. Moreover, in 2016, TTF overtook NBP for the first time as measured by traded volumes⁵⁰. The two German hubs and the Italian PSV also grew significantly. In the case of PSV, the recent organisation of underground storage auctions is considered to be a major cause of liquidity on the curve.
- 84 Higher liquidity of NWE hubs - and more explicitly of TTF and NBP - is the result of an earlier and more pronounced uptake by market players', including Dutch, British and other EU-external gas producers, in leveraging hubs. But it is also the result of the growing interest in hub trading of market participants from nearby regions that look first into the most liquid hubs for hedging operations. In general, this is facilitated by enhanced interconnection capacity and NCs implementation favouring more flexible capacity allocation. Also inter-hub price arbitrage operations across Europe are growing, lifting the liquidity of other hubs.
- 85 Liquidity increased along the entire curve. Prompt and near curve products, i.e. from month-ahead to season-ahead delivery durations, constitute the largest share of traded volumes (Figure 10). These products not only assist the supply portfolio and risk hedging over the prompt horizon, but also tend to attract most of the speculative trading as these products tend to be more price-volatile as well as offer a good number of counterparties. Season(s)-ahead and year(s)-ahead products posted sizeable increases year on year (e.g. traded volumes more than doubled at Italian PSV or German NCG for the front year contract), evidence of the increasing role of hubs in managing forward exposures. Spot products are mainly used for physical portfolio optimisation close to delivery, short-term price arbitrage and/or balancing purposes. The figure below exemplifies these numbers for EU hubs.

49 See an analysis of the underlying reasons for TTF progression in MMR 2015 case study 1.

50 Since the UK voted to leave the EU at the end of June, TTF has extended its volume lead over NBP every month.

Figure 10: Breakdown of traded volumes per product at EU hubs – 2016 (% of traded volumes)



Source: ACER based on REMIT data.

Notes: Values consist of OTC broker and exchange trade. As an illustration of the relative number of trades per product, at the Austrian AVTP circa 45,000 DA trades were registered during 2016 meanwhile 6,500 MA, 1,000 SA and 150 YA ones. See also AGTM metric results presented in Figure 15.

- 86 This setting begs the question of how many hubs a well-integrated EU gas market needs. According to most market analysts, there may be no need for a hub in each MS with established forward markets. The likely scenario might be a few hubs excelling in forward liquidity – a process favoured by market mergers as proposed in the AGTM – meanwhile, the other hubs take a pronounced role in spot markets to sustain balancing regimes. However, in the end, market forces should dictate the best configuration of hubs.

3.2.2 Gas target model market participants' needs metrics

- 87 For this edition of the MMR, the Agency calculated the market participants' needs metrics for the whole of 2016⁵¹. These metrics were established to evaluate to what extent the state of hub development in MSs allows for the effective operation of gas wholesale markets. However, metrics can be assessed only for those markets hosting transparent trading venues⁵². Data reported under REMIT, for the whole of the 2016 calendar year, specifically data on orders placed and trades executed in trading venues within the framework of a standard contract⁵³, were used in anonymised and aggregated form.
- 88 In last year's MMR, the same set of metrics was analysed using trade data going from November 2015 until April 2016. Overall, the results of the two exercises are consistent, apart for some variations that are most likely due to the seasonality effect⁵⁴. Generally speaking, a gradual enhancement of AGTM market participants' needs metrics can be seen since their first evaluation for the year 2013. However, most hubs are still some distance from the metrics' indicative targets set in the AGTM⁵⁵. This can be mainly explained by the fact that the targets were based on the average results of the leading TTF and NBP hubs in 2013. Aspects such as "first mover" advantage in attracting liquidity and the sizeable Dutch and UK domestic production sold at those hubs make it unlikely that most other EU hubs will achieve these targets in the near future. Nevertheless, the relative progression of other hubs indicate that market functioning is continuing to improve.

51 Some figures along the section may only encompass a sample of selected hubs results. Results covering all MSs will be made available in a dedicated AGTM metrics memorandum at ACER website.

52 Transparent trading venues refer to organised wholesale market places, either exchanges or OTC deals facilitated via brokers. AGTM Annex 3 further clarifies the metrics methodology and provides a definition of technical concepts. A glossary is available on page 8.

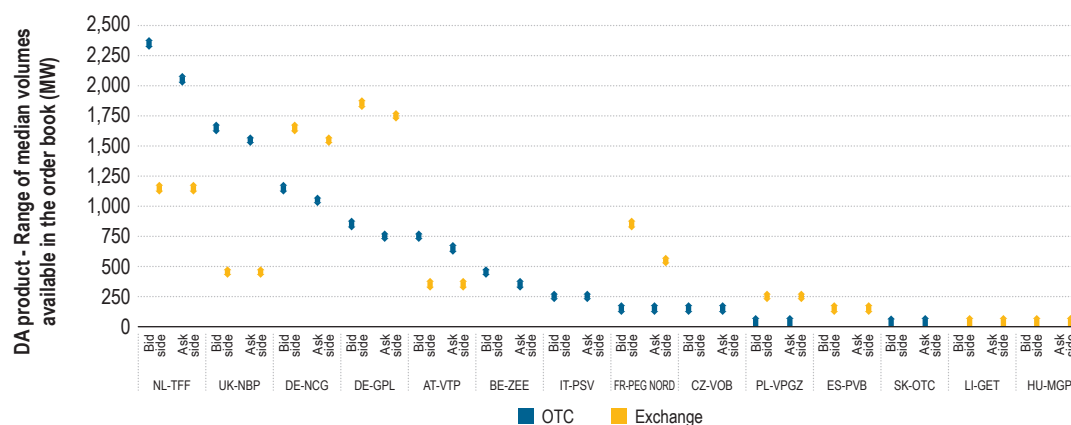
53 From October 2015, all orders placed and trades executed at organised gas wholesale market places and within the framework of a standard contract are collected under REMIT. From April 2016, orders for transmission capacity and for non-standard contracts concluded outside organised markets are also reported. AGTM Market participants' needs metrics are built solely on the basis of standard contracts.

54 For example, during the period December 2015 – March 2016, there was a significant price decrease (– see reasons in section 2), – leading in turn to position taking that supported liquidity.

55 See 2013 metric results and indicative thresholds values on AGTM pages 24 and 21. See link on footnote 25.

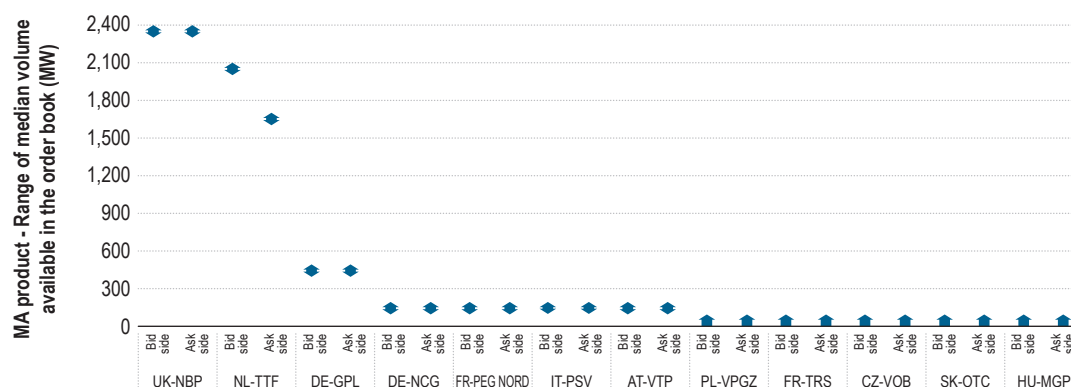
89 Figure 11 to Figure 13 appraise AGTM metric number 1, which measures the order book volumes made available, on average, during the day⁵⁶. The purpose of this metric is to assess hubs' liquidity in terms of instant volume accessibility, and is calculated for hub products of different duration. A higher range of available order volumes entails a more advanced role of hub. More specifically, sufficient volume availability for longer-dated products implies that the hub plays a more entrenched role in supply hedging and forward exposure management.

Figure 11: Available median bid and ask-side volumes in the order book during the day for Day-Ahead products in selected EU hubs in ranges of MW – 2016



Source: ACER based on REMIT data.

Figure 12: Available median bid and ask-side volumes in the order book during the day for Month-Ahead products in selected EU hubs in ranges of MW – OTC and exchange aggregated – 2016

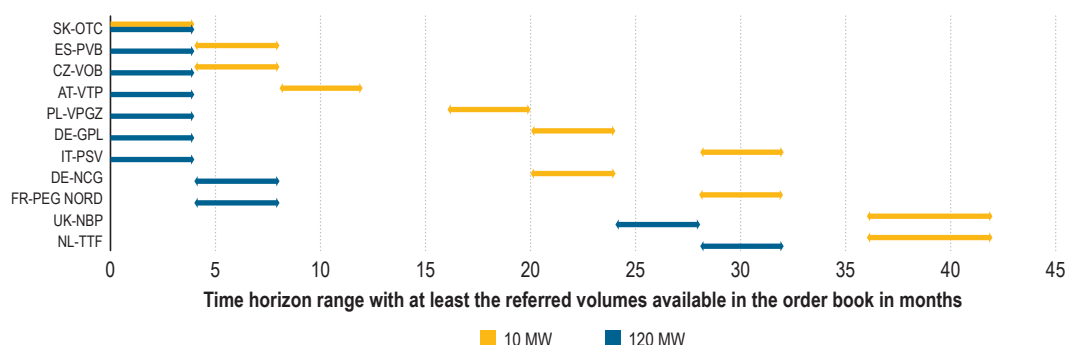


Source: ACER based on REMIT data.

Notes: OTC and exchange aggregated. For NCG and GPL German hubs, only OTC values.

90 Figure 13 does not explicitly show the amount of order book volumes made available, instead it shows the maximum time horizon, expressed in months, until when market participants can access the order book gas deliveries via forward products for 10 MW and 120 MW respectively.

Figure 13: Order book horizon in months for bids for forward products for different blocks of MWs – 2016



Source: ACER based on REMIT data.

Notes: OTC and exchange aggregated (for NCG and GPL German hubs only OTC). In the 2015 edition, all AGTM metrics were analysed using trade data from November 2015 until April 2016. The order book horizon metric for forward products on NBP and TTF, for 120 MW, then led to a range of 35–40 months. The plausible reason for this deviation is the impact of the months sample on the calculations⁵⁷, but also that more volumes are negotiated in winter months.

- 91 The trading unit notation ‘MW’ used in the figures refers to the delivery of 1 MWh of (gas) energy content during each hour of the product time duration (e.g. a 10 MW traded day-ahead product equals 240 MWh of energy content). At most hubs⁵⁸, there is a comparatively higher instant order book volume availability for products for the spot timeframe. However, delivery periods for spot products are shorter and, as such, the absolute transacted energy content is higher for near curve products (a breakdown of absolute traded volumes at EU hubs was presented in Figure 10). Spot products usually attract more counterparties and add up to a higher number of trades, as they serve to cover physical positions close to delivery dates, and also to back short-term price arbitrage. The longer-dated products are less frequently transacted, hence attracting comparatively fewer active participants⁵⁹. Figure 15 looks deeper into these aspects.
- 92 Figure 14 shows the orders’ bid-ask spreads at selected hubs for both spot and prompt products. It also differentiates between orders placed at broker platforms and exchanges. In general, spot products have lower bid-ask spreads than products traded along the curve. This can be explained by the higher number of participants and trades for spot, as well as shorter and close to delivery periods. Moreover, for longer timeframe transactions, there is some need to compensate for the financial cost incurred.
- 93 A comparison of trading mechanisms indicates that bid-ask spreads tend to be slightly higher at exchanges than on OTC platforms, although this does not apply to all cases. This is in line with the higher order book volume availability provided by OTC brokers for most EU hubs⁶⁰. However, the operation of trading markets is becoming increasingly more intricate and, for example, trading screens facilitate a permanent comparison of orders between different trading venues and markets, leading to orders price alignment. In this sense, most hubs constantly exhibit matching prices at exchanges and OTC.

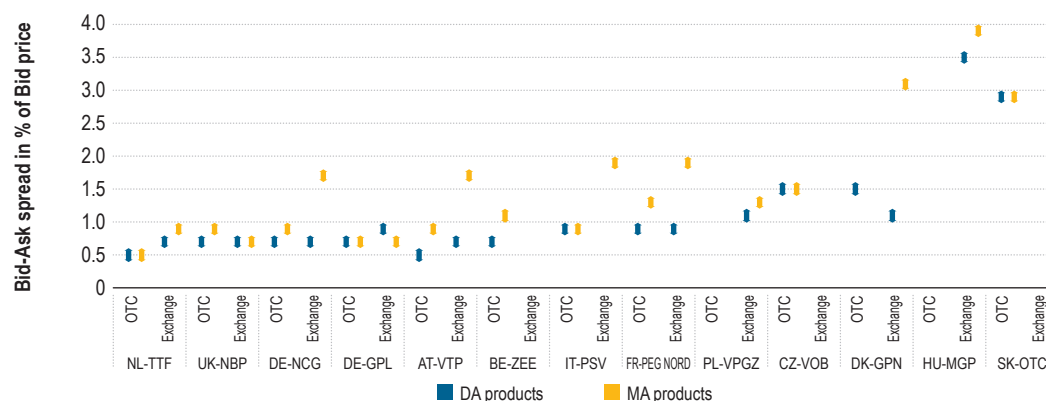
57 E.g. a calendar year 3 product traded beginning February 2016 accounts for a 47 months horizon until its last day of delivery (11 months of 2016 + 36 months from 2017 until the end of 2019) meanwhile, if it is traded at beginning December 2016, it would account for 37 months.

58 In the case of NBP and TTF, the gap between products is not very high.

59 Major suppliers, big portfolio shippers, relevant financial institutions. Financial costs, linked to collateral coverage, are also deemed to have a diminishing impact over long- curve liquidity.

60 Again, no rule fits all; for example, E.g. in France, PEG Nord, or the German NCG and GPL hubs, more order volume availability is habitually found at the exchange, even also occasionally for curve products – although in this case, higher traded volumes are customarily registered OTC. Beyond the methodological aspects and REMIT data reporting factors, this is arguably explained by the existence of market makers placing and maintaining orders at the exchange during the whole day. For the spot timeframes, another reason is the prioritisation of exchanges for balancing operations that the BAL NC introduces.

Figure 14: Bid-ask spread: measure of the average delta between the lowest ask-price and the highest bid-price expressed as a percentage of the highest bid-price across the day – 2016



Source: ACER based on REMIT data.

Notes: GPL, NBP, NCG, PEG Nord, PSV and TTF values are based on a sample of trading days. For forward products, sufficient liquidity, i.e. more than 60% of days showing orders, is requested to show bid-ask spread metric values. The bid-ask spread is affected by swings in the commodity price⁶¹, which affects year-on-year metric variations.

94 Overall results indicate that TTF and NBP feature the highest order book volume availability and, above all, the broadest liquidity time horizons. As depicted in Figure 14, their calculated bid-ask spreads for curve products are also among the lowest. This is in line with the leading role that TTF and NBP hubs play in Europe for supply hedging and financial trading⁶². They also exhibit a higher number of counterparties (see Figure 17), as they attract substantial market interest from producers and market participants from neighbouring countries. Also, they are commonly used across the EU as a reference for long-term supply contracts' hub price indexations. Also, their liquidity benefits from the indigenous production volumes sold via hubs.

95 In terms of performance, other advanced hubs, i.e. the German⁶³, Italian, French, BeLux⁶⁴, Austrian and Czech hubs, follow TTF and NBP at a distance. The values for metrics for spot products are more aligned⁶⁵ with those of TTF and NBP. In general, liquidity in spot products shows an upward trend also linked to the launch of new balancing mechanisms around trading platforms. However, the results of the metrics for prompt and near-curve products are comparatively weaker than for the established hubs. Even so, prompt liquidity is rising as these products are increasingly purchased for physical supply and also to hedge the financial positions of supply contracts. For forward far-curve products, the metrics' gap is wider, as TTF and NBP continue to attract most liquidity.

61 Day-ahead average daily prices at NWE hubs in 2013 were 27.4 euros/MWh, whereas the average in 2016 was 14.2 euros/MWh. The metric methodology could be reconsidered by looking at the absolute bid-ask gap instead of as a percentage of the swinging commodity price.

62 According to market analysts, the role of financial players is more prominent in NBP, whereas TTF is relatively used more by the trading arms of the big European energy suppliers and also seems to benefit from trading in euro as this avoids any currency risk. Hedging of LNG contracts has gained ground in recent years.

63 On April 2017, the German Ministry of Energy announced the intention to merge the two German hubs, GASPOOL and NCG, at the latest by April 2022.

64 ZTP hub serves since October 2015 the VTP resulting from Belgian and Luxembourgish market zones integration.

65 In the case of German hubs, DA orders volume availability and the number of trades are sizeable and fully comparable – even higher at exchanges – to TTF/NBP. This is linked to supply portfolio optimisation and balancing operations negotiated directly at German trading venues. For prompt and forward products, order volume availability is also relevant; however, the number of concluded prompt and forward trades is comparatively lower; arguably, high order volume availability is an outcome of the active role of market makers in the exchanges, but fewer trades are explained by the fact that many participants active in the German market still hedge their medium- and long-term positions on the more price-competitive TTF, or may even also use swaps as delivery approaches. German L-gas liquidity dampened, however, in what according to some industry players is linked to the introduction of gas quality conversion fees.

- 96 Although order book volume availability is lower, the Danish, Polish, Spanish and, more recently, the Slovak (e.g. +67% traded volumes in 2015/2016) hubs show some improving performance. Poland and Denmark⁶⁶ feature the highest liquidity at their exchanges, whereas Slovakia and Spain⁶⁷ give a more preeminent role to OTC-brokering. However, the role of long-term supply contracts and bilateral deals is still highly relevant in these markets, and while organised trade is gradually gaining ground, transparent trading venues still have some way to go, particularly for curve products.
- 97 In markets like Hungary⁶⁸ or Slovakia, traded volumes surged year on year, albeit from a low base. Gas sourcing by Ukraine is one of the main reasons. However, absolute marketed volumes at these trading platforms are still low. This is due to the pre-eminence of bilateral deals, and is also a consequence of market participants looking at more liquid markets (e.g. Austria⁶⁹) for gas sourcing and hub hedging activities. In Romania, relevant prompt and forward products are negotiated on selected days on the hub⁷⁰, but there is not yet enough continuity to conclude that a daily transparent price signal has emerged.
- 98 Wholesale gas trading in the Baltic region is largely executed bilaterally. Lithuania hosts the most dynamic organised market, showing gradual growth sustained by the rising importance of LNG volumes. The Ministries and TSOs of the three Baltic MSs agreed in 2016 to merge their markets into a single Baltic-wide hub by 2020. The merged market would consist of a unique entry-exit tariff system with a common tariff regime and an inter-TSO compensation mechanism⁷¹. As a short-term measure, a pricing model for integrated entry and exit points is planned for 2018. This should boost liquidity. Finland could also join, pending completion of the Baltic Connector pipeline. In addition, liquidity could further benefit from the construction of the bidirectional GIPL pipeline linking Lithuania and Poland.
- 99 Finally, a number of markets, i.e. Bulgaria⁷², Croatia, Greece⁷³, Ireland, and Slovenia do not yet have adequately functional transparent trading venues, although most of them⁷⁴ have established virtual trading points and/or balancing platforms. As referred above neither Estonia nor Latvia hosts functional platforms but since mid-2017 they are leveraging the Lithuanian GET exchange after the merging of the three Baltic market platforms.
- 100 Figure 15 displays the number of trades executed at hubs, another AGTM metric, and also how far into the future products are traded. The results demonstrate again the more advanced role of TTF and NBP for forward trading, as significantly more trades and broader horizons are reported at those hubs. The total number of trades concluded for day-ahead products is usually higher at all hubs, as the number of operations for physical portfolio optimisation and balancing purposes, but also short-term price arbitrage, is operationally higher.

66 In Denmark, DA exchange liquidity is sizeable sustained in GPN's status as developed balancing platform. Prompt and forward liquidity is comparatively much lower, however though; this is deemed to be an outcome of the prevalence of long-term supply contracts in Denmark (Dong being the key supplier) coupled - with a shift of hedging activities to more liquid adjacent hubs.

67 In Spain, most platform trade is concentrated at OTC broker level. The MIBGAS exchange has been operational since December 2015 and is assisting in the deployment of the new balancing system. A transparent daily gas price signal is also judged essential for securing fair competition in the electric pool, given the relevant weight of CCGTs in the Spanish electricity generation mix. At the beginning of 2017, a market maker was appointed to assist the exchange in raising its liquidity.

68 The exchange currently attracts the large bulk of Hungarian traded volumes. Since 1st October 2016, shippers have also been able to balance their daily positions at the Hungarian CEEGEX exchange platform, including within-day products.

69 Bundled capacity auctions were introduced at the beginning of 2017 at Mosonmagyaróvár IP between Austria and Hungary. This is expected to facilitate imports and boost Hungarian trading figures.

70 For example, at the beginning October 2016, the Romanian Commodities Exchange reported trading 5 TWh of gas within two days, which is more than the 4.5 TWh traded in the platform in the previous nine months. This is due to obligations imposed on indigenous gas producers to sell gas at the exchange.

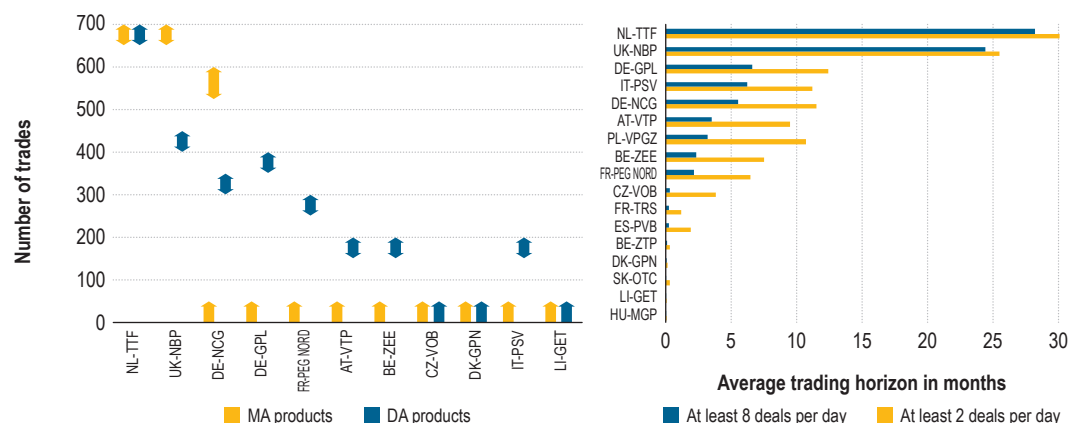
71 Estonian, Latvian and Lithuanian TSOs have introduced from July 2017 an implicit capacity allocation model of cross-border capacity linked to exchange trading. The model will start with day-ahead products, but could be expanded to longer-dated ones. Complementarily the Estonian and Latvia trading platforms were merged in July 2017 into the GET exchange. At present, some challenges to transport gas via IPs from Estonia across Latvia/Lithuania are perceived, related to the accessibility of capacity in the Latvian grid. Those are considered to be a barrier to enlarged regional market integration by market participants as discussed in the 'Barriers in Gas Wholesale Market survey'.

72 In Bulgaria, there are projects for creating a "Balkan gas hub" that could foster gas trading in the SSE region by taking advantage of interconnection infrastructure projects either under development or planned.

73 For example, in Greece, DEPA, the public gas corporation, has to offer 10% of its supply via dedicated auctions open to third-party gas suppliers and final user companies.

74 The features of VTPs and the roles of trading platforms vary among these MSs. Bulgaria and Greece still need to make progress in some fundamental aspects. See ACER Balancing report country assessments for an exhaustive review of VTP characteristics. See: http://www.acer.europa.eu/official_documents/acts_of_the_agency/publication/acer%20report%20on%20the%20implementation%20of%20the%20balancing%20network%20code.pdf.

Figure 15. Number of trades executed trades (daily average) for DA and MA products and average trading horizon in months for different number of daily trades in selected hubs – 2016

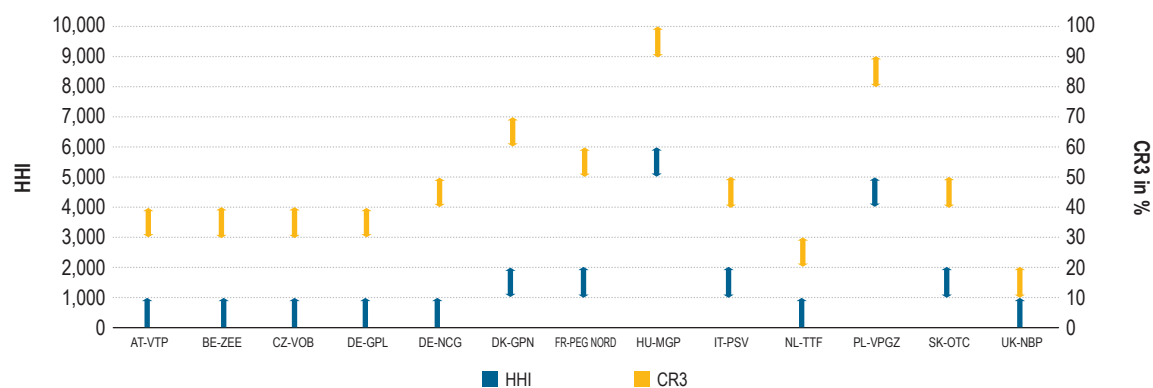


Source: ACER based on REMIT data.

Note: Metric values combine OTC and exchange trading mechanisms. Intragroup trades may also be comprised.

101 The AGTM metric 9 looks at hub concentration levels by analysing the market shares of companies active in gas trading on transparent organised markets. Figure 16 measures the market concentration of finalised transactions. Both HHI and CR3 (market share of the three largest players) are shown. While not part of the AGTM 9 metric, CR3 is added, as it provides extra insight when interpreting concentration levels at hubs. While most hubs score well in terms of HHI – levels below 2000 are generally considered as indicating sufficient diversification – CR3 shows that in many markets a few players are responsible for a significant share of transactions.

Figure 16: Market concentration ranges of finalised transactions of MA products for selected EU hubs for the selling side – 2016



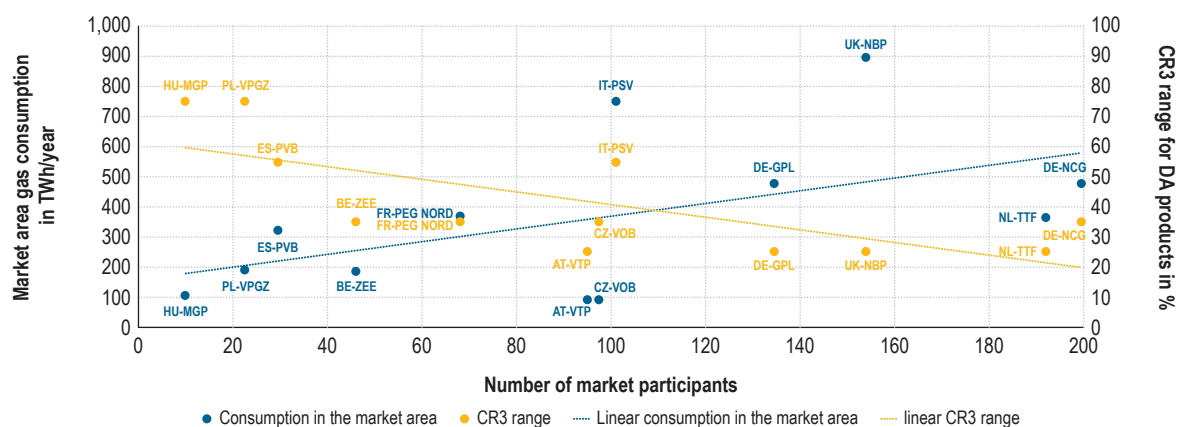
Source: ACER based on REMIT data.

Note: Values for OTC and exchange trading mechanisms combined. Intragroup companies may be reported separately, i.e. actual concentration levels could be higher.

3.2.3 Active players on EU gas hubs

102 The insights from metric 9 can be supplemented by looking at the total number of companies that entered into at least a single trade - any possible product is considered - at a hub in 2016. As Figure 17 illustrates, the number of such active hub participants is partly connected to the size of the market, but also to how well the hub functions. Also, hub concentration tends to be higher in those markets with fewer active participants.

Figure 17: Number of market participants at selected EU gas hubs and interlinks with consumption and concentration indicators – 2016



Source: ACER based on REMIT data.

Note: Values for OTC and exchange trading mechanisms combined. Intragroup companies may be reported separately, i.e. the actual number of independent participants could be lower. The graph sums up the distinct companies that have made at least one single trade, although not all of them may be regularly trading actively. Linear refers to the trend line corresponding to a first degree equation.

103 The results indicate that trading concentration is relatively low in most assessed markets, given the active presence of a large number of participants. Concentration is higher for forward products, as these attract fewer active players than prompt and spot operations. For forward markets, the concentration is typically higher on the selling side than on the buying side – as is also the case for the total number of active participants – although this is not valid for all markets. Developing hubs, such as in the CEE region (e.g. Poland, Slovakia, and Hungary), show comparatively higher concentration levels than NWE hubs. High concentration makes it more likely that hub price formation is strongly influenced by a limited number of players.

3.2.4 Classification of EU gas hubs and self-assessments by NRAs

104 Based on the foregoing analysis, EU hubs can be categorised in four groups as is illustrated in Figure i at the Executive Summary. As discussed there and compared to 2015, the Czech Republic has been moved into the advanced group and Slovakia into the emerging cluster. Their results for most indicators suggest that they overlap with the respective hub groups; e.g. for the Czech Republic hub, absolute volumes traded – particularly if considered in relation to MS demand – volume-shares per product duration and hub concentration metrics are more closely aligned to the advanced hubs group than to the emerging one.

105 As will be further analysed in the 'Barriers in gas wholesale markets' chapter 5, and particularly for emerging and illiquid/incipient hubs, the persistence of long-term supply contracts is still a limiting factor for hub liquidity⁷⁵; reselling restriction clauses⁷⁶, but also supply flexibilities are generally present in such contracts, and this restrains volume hedging operations through hubs. The degree of market dominance of the incumbent(s) and the lack of transparency are among other factors exacerbating the extent of the challenge. Complementarily, trading companies engaged in speculative trading are more active in the most liquid markets, where they find more counterparty opportunities, and showing in contrast much more limited presence in emerging hubs.

⁷⁵ However, the management of long-term contracts price exposure positions at hubs – particularly if these are hub-indexed – may however have some influence on liquidity.

⁷⁶ EC/Gazprom's latest commitments to allow for gas reselling could improve this situation in the future. See footnote 24.

- 106 The results of the assessed metrics fit in the context of the AGTM proposing that, if material gaps remain over time, potential market integration projects⁷⁷ might be needed to achieve hub functioning objectives in most EU market areas. CBAs should validate the feasibility of deeper market integration measures. The next paragraphs provide a summary of the market status self-assessments performed by NRAs in the context of the AGTM.
- 107 In the context of the AGTM, NRAs in a number of MSs have already carried out self-assessments⁷⁸ most of them also published the results and conducted a public consultation. Several other NRAs stated that they expect to complete the self-assessments still in 2017⁷⁹ while it needs to be considered that due a lack of sufficiently organized and transparent markets, results for several hubs may focus on market health metrics only. In summary, the results of the self-assessments are in line with the assessment of EU gas hub functioning in this MMR.
- 108 Most NRAs who carried out the self-assessments indicated potential actions that could lead to an improvement of gas hub functioning. These actions range from market making agreements (in Iberia for MIBGAS⁸⁰) to the implicit allocation of capacity (e.g. between Spain and Portugal, and between Lithuania, Latvia and Estonia) to market integration projects, both at national level (merger of the two zones in France by 1 November 2018, creation of a common market zone for the Danish transmission and upstream system) and at regional level (implementation of an action plan for the Baltic regional gas market between Lithuania, Estonia, Latvia and Finland, the creation of a joint balancing zone between Denmark and Sweden in 2019, possible BBL interconnector merger with TTF market area as well as initial discussions regarding market integration initiatives involving Austria). In Germany a merger of the two market areas by 1 April 2022 was decided by law independently of the outcome of the self-assessment of the NRA.

3.3 Assessment of suppliers' sourcing costs

- 109 As shown on Section 2.2, EU gas hub prices dropped during the first six months of 2016 to their lowest values for six years, and saw a recovery in the second half of the year. These price variations were rooted in changing gas market fundamentals. This indicates that hub gas price formation is driven by gas-to-gas forces. Bilateral supply contract prices underwent similar fluctuations, reflecting the specifics of their formulas and indexations.
- 110 In 2016, LNG is deemed to have set orientation prices in many EU markets, whereas major pipeline producers are believed to have still kept their ability to retain market share at the expense of lower margins. Transportation costs also continue to play a notable role in the final selling price formation⁸¹.
- 111 Like every year, the Agency assessed the gas sourcing costs in EU gas markets on the basis of its own proprietary methodology, which takes into account both hub product and long-term contract prices⁸². Yearly average results are presented in Figure 18.
- 112 Average prices continued to decrease in 2016. Compared to 2015, decreases by more than 20% were observed in many market areas. In addition, the spread between direct hub sourcing and long-term gas contracts sourcing is narrowing. The rationale for this is twofold: lower oil prices impacting oil-indexed gas contracts, and hubs more directly used in supply contracts' indexations – or alternatively, providing orientation for price renegotiations⁸³. In recent years, markets where gas hubs play an important role and those markets that are connected to them have typically shown decreasing sourcing costs.

77 See Section 4.5 of the AGTM. See footnote 2.

78 Austria, Denmark, Germany, Lithuania, Portugal, Slovakia, Spain, Sweden, The Netherlands, Great Britain.

79 Belgium, Czech Republic, France, Italy, Luxembourg, Poland.

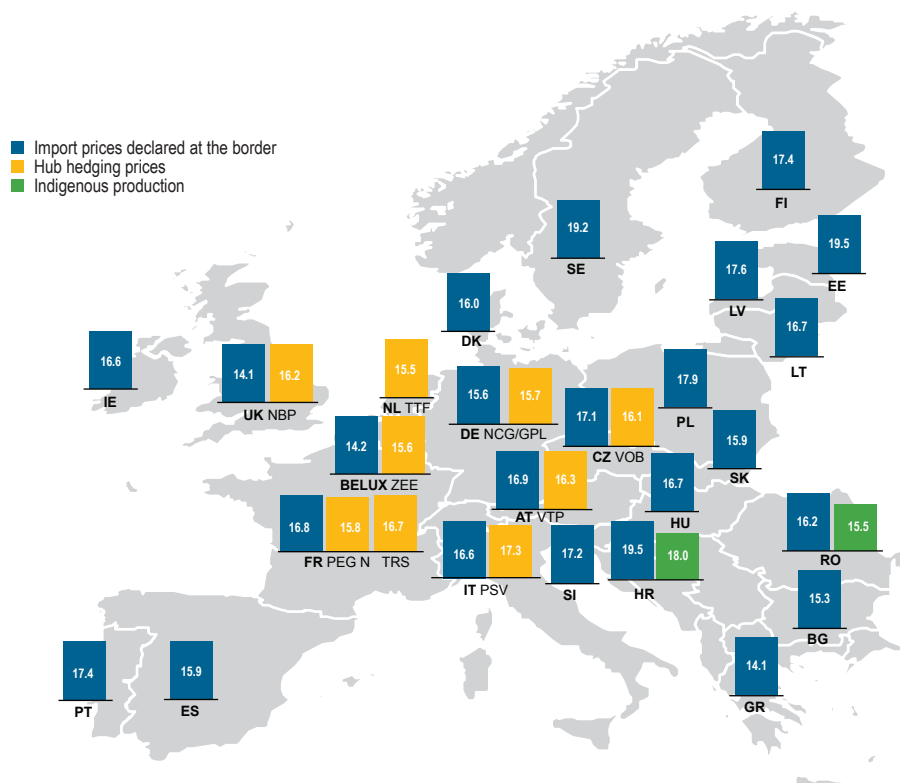
80 In order to further foster market-functioning in Iberia, a well performing Mibgas is essential. All measures that are needed as to ensure its proper functioning in Iberia should be implemented. In particular, the high level measures directed to extend Mibgas use to Portugal.

81 Depending on the location of the market, competition between supply sources may be hindered by full-cost recovery transmission charges; for LNG producers, transportation costs are believed to be a more final price-determining factor, while pipeline producers such as Gazprom are deemed to have a higher selling price minus production costs surplus.

82 See MMR 2014 Annex 6 for details on the general methodology and specific data used for selected MSs.

83 Long-term contracts also provide as well orientation for hub price formation, so there is a close interdependence between sources.

Figure 18: EU MSs assessed gas suppliers' sourcing prices – 2016 yearly average (euros/MWh)



Source: ACER based on Eurostat Comext, Platts, IGU, and NRAs.

113 In general, declining sourcing price differentials across EU markets suggest that most regions are progressively benefiting from more robust supply-side competition, which also compels midstreamers to optimise supply and demand portfolios more efficiently⁸⁴. In 2016, MSs that depend more on oil-indexed contracts saw some of the lowest average sourcing prices (e.g. Greece, Bulgaria)⁸⁵. This is a reverse of the situation in previous years when these MSs tended to have substantially higher sourcing costs compared to MSs sourcing via hubs, as the former are more exposed to non-gas-to-gas fundamentals.

⁸⁴ More competition among supply options is at the expense of producers, but also midstreamers' margins, which leads to more competitive prices for end-users.

⁸⁵ Particularly for the last months of the year, oil-indexed contracts were generally assessed as cheaper than hub sourcing prices.

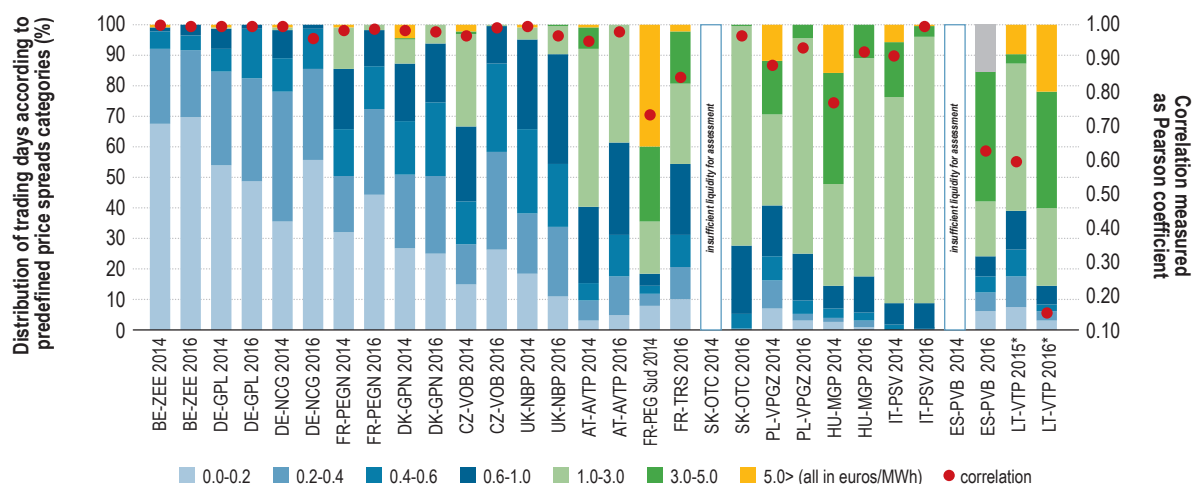
4. Impact of Network Codes on market functioning

4.1 Gas hub price metrics

4.1.1 Price convergence and price correlation among EU gas hubs

- 114 The implementation of NCs is expected to contribute to gas markets' integration. Therefore, this section starts by looking at the spot price dynamics between the most liquid EU wholesale markets⁸⁶. It specifically measures the level of price convergence and price correlation among hubs. However, full price convergence may not be feasible nor efficient; e.g. infrastructure investment costs - recovered via tariffs - or market areas' diverse fundamentals may justify the persistence of some price differences even in a properly integrated market.
- 115 The growing price interrelation among EU hubs continued in 2016, due to shared fundamentals. Yet, market specifics and/or sporadic events may lead to prices moving independently of each other. The size and frequency of these movements is related to the degree of markets' integration.
- 116 Figure 19 shows both convergence - as a measure of the percentage of days when price spreads between TTF and selected hubs were within defined bands - and price correlation levels. TTF is taken as reference, as this hub provides some of the most important EU-wide price signals. It is to be noted, however, that transportation costs, e.g. linked to physical distance, may influence absolute hub price differences.

Figure 19: Levels of Day-Ahead price convergence between TTF and selected hubs year on year – 2014 - 2016



Source: ACER based on Platts, ICIS Heren and hub operators' data.

Notes: Spreads in euros/MWh are calculated as the absolute price differential between pairs of hubs, independent of discount or premium. Different categories were determined in order to calculate the distribution of price spreads among hub pairs. The distribution was made over the total number of trading days in a year. Correlation is measured using the Pearson product-moment coefficient, i.e. the covariance of the two distinct hub prices divided by the product of their standard deviations. Lithuanian price analyses are based on a combination of day-ahead hub products and – for those days when day-ahead products were not traded – specific products traded ex post of delivery for balancing purposes were used as a proxy.

- 117 As Figure 19 illustrates, the level of price convergence is highest between NWE⁸⁷ hubs, which is due to similar market fundamentals such as structural fostering of hub trade assisted by accessible and lower-priced interconnection capacity. The early implementation of CAM and CMP NCs has also contributed, as the various stipulations help to smoothen out potential demand or supply shortages across market areas. This results in more synchronised and less pronounced price movements across the whole region.

86 Not all MSs can be included in the analyses. Markets without a reference price for all the trading days in 2016 were not included in the price metrics analysis. This was not obtained for Latvia, Estonia, Finland, Sweden, Ireland, Portugal, Romania, Bulgaria, Greece, Slovenia and Croatia.

87 This is not only valid for the displayed analysis against TTF, but also for the rest of combinations of hub pairs.

- 118 Absolute price alignments are not uniformly robust across all regions. CEE hubs⁸⁸ exhibit improving, albeit still lower, price convergence levels, a reflection, among other things, of the weaker interconnection capacity in the region, lower liquidity levels at those hubs and persisting trading barriers. This is even more the case for the embryonic hubs of the SSE region.
- 119 In the South West, the Spanish PVB and the French TRS stood out in 2016 for a lower price correlation not only with TTF, but also between themselves. Transportation enhancements, as well as an easier accessibility to non-used capacity, are needed to enable the prices to converge more. The Lithuanian market was the least correlated with TTF due to its low level of pipeline interconnectivity with the most relevant EU markets.

4.1.2 Relationship between transportation tariffs and price spreads across EU hubs

- 120 The previously denoted scenario of long-term (capacity and commodity) contracting surpluses has contributed to price convergence at European hubs. As historically acquired capacity and excess contracted commodity represent sunk costs for many market players, they tend to do inter-hub price arbitrage trading around the short-run marginal costs they incur when moving gas between adjacent markets⁸⁹. Particularly in the NWE region, this context has led to a situation whereby spread levels tend to fall below transportation charges.
- 121 The flipside of this scenario is that there is little or no economic incentive for new players to acquire new physical capacity to engage in price arbitrage between hubs, as transportation costs are higher than the spreads⁹⁰. This also explains the low bookings of purchased bundled day-ahead capacity, as will be further illustrated in section 4.2.1.
- 122 Hence, transportation tariffs are a pivotal price signalling factor for hub price spread formation. The type of direction may be dissimilar across regions, however. Between most NWE hub pairs' tariffs appear to act as a de facto ceiling. As discussed, many trading offers are placed in reference to SRMCs and below the full transportation tariff. Players with a contracted surplus may be willing to place orders even below the transportation tariff level, something that other trader would find unprofitable. This setting also disciplines the hub offered prices for other market participants, such as financial players who may not book physical capacities and are active in spread-trading ahead of physical flows. As a result spreads among the NWE region hubs hover within a range limited between SRMCs and yearly transportation tariffs.
- 123 Among other hub pairs, spreads can more frequently exceed transportation tariffs, thereby creating, in theory, opportunities for profitable price arbitrage via booking of short-term capacity. If hubs are competitive, with many shippers contending for such opportunities, actual spreads should not rise significantly above transportation costs. Therefore, when spreads are consistently above tariffs, this could indicate that either there is no sufficient transportation capacity or that capacity is not efficiently used, and/or that there is low liquidity for selling gas into the entered market. Other types of trading barriers could also exist.
- 124 The relationship between yearly and daily transportation tariffs and hub price spreads is analysed in depth for various EU hub pairs in Figure 20. The bars in the figure illustrate the distribution of the percentage of trading days when hub spreads fell into defined euros/MWh ranges. Meanwhile the markers' values show on the one hand the cost of the transportation between hubs and on the other - its relative positioning – indicates the percentage of days when the spreads fell under or over these tariff. For example, when looking at the German NCG and Czech VOB hubs (4th bar), during circa 70% of the days of the year NCG traded at a lower price than its Czech counterpart. For most of these days the spread was below 0.4 euros/MWh. Furthermore, the price spread between the two hubs was always below the daily transportation costs of 0.66 euros/MWh and also on most days below the yearly transportation costs of 0.44. euros/MWh. Complementarily, for all days when the Czech

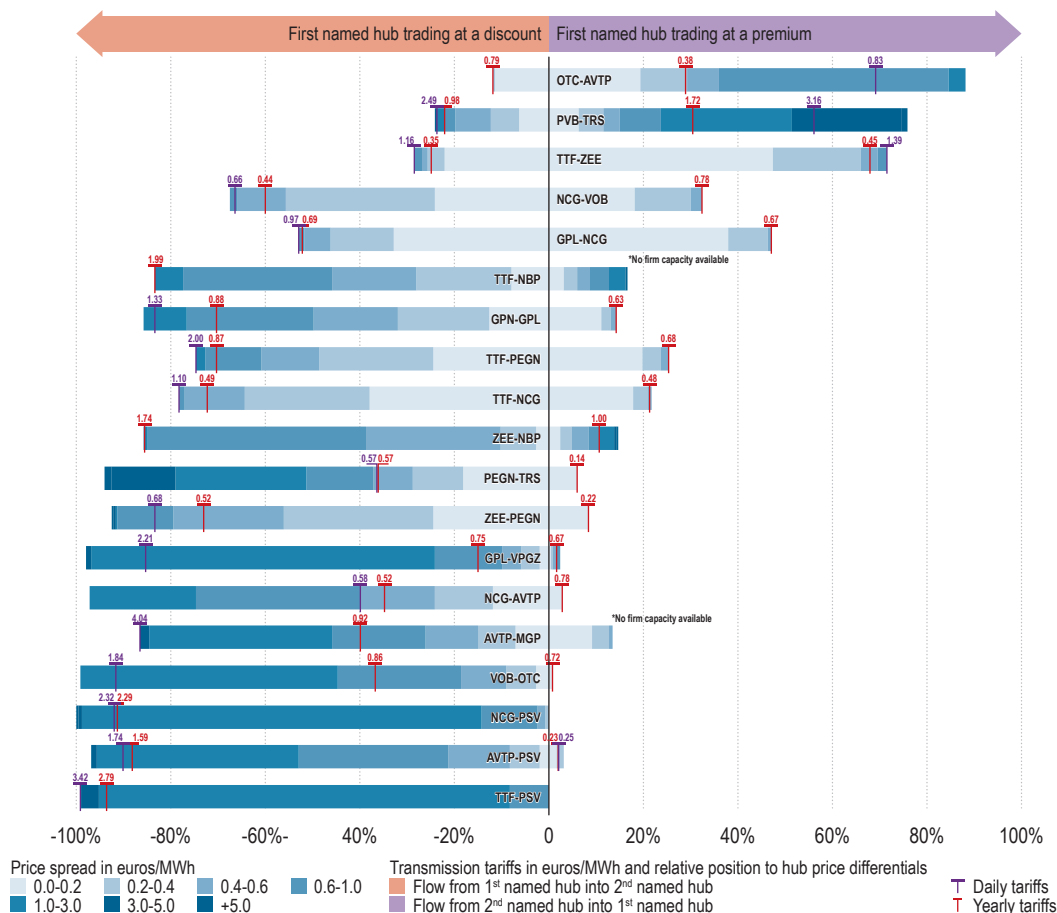
88 E.g. Poland, Hungary, Slovakia. Note, however, that the Czech hub VOB shows stronger price alignments vis-à-vis new hubs, particularly with German hubs. Slovak and Hungarian hubs show the highest correlation with the Austrian hub.

89 E.g. transmission capacity variable charges, trading platforms fees or other proportional cost for operating to be summed up to the overall expected profits for engaging in such operations.

90 As an illustration of this, at the BBL interconnector between the Netherlands and the UK, a significant number of the prevailing long-term capacity contracts expired in December 2016. The spare capacity is now being offered at PRISMA; however, the tight NBP-TTF price spread has left little incentive for short-term arbitrage, as transportation costs proved too high to incentivise bookings. As a result, flows from the Netherlands into the UK have also significantly dropped since the beginning of 2017.

hub traded at a discount (around 30% of the times, see right side of the bar) the hub spread was consistently under the Czech into Germany yearly transportation tariff of 0.78 euros/MWh.

Figure 20: Day-ahead price convergence levels in EU hubs compared to daily and yearly transportation tariffs – 2016



Source: ACER based on Platts and hub operators data for prices and ENTSOG TP for transportation tariffs.

Notes: For hub pair TTF-NBP, transportation tariffs for exit direction UK have not been assessed, despite backhaul capacity being offered across BBL. For completion, capacity from Hungary into Austria is available since 2017 but is not considered for 2016 figure analyses. For the yearly tariffs the assumption made is that gas is flown constantly through the whole year. This assumption leads to an estimation of their lowest value – see also the notes to Figure 31 at Annex 1. The actual charges (for the capacity component) are however impacted by the specific stakeholders' load factors, those being determined by demand distribution and peak values along the period; as a result the definite paid tariffs could be slightly higher than those shown. Day-ahead transportation tariffs shown correspond to the highest reserve price multiplier applicable to the capacity part across the year, plus the commodity fee, if any. At some IPs (e.g. NCG-AVTP, PEGN-TRS, TRS-PVB) short-term capacity auction premiums are frequently witnessed. As such, price spreads at these hub pairs may have been closer to the actual short-term transportation costs for a larger share of days than shown in Figure 20.

125 As Figure 20 confirms, price spreads between most NWE hub pairs are regularly below yearly transportation tariffs for the different reasons discussed above. However, between other hub pairs in the CEE region, the South West region – e.g. PEGN-TRS and TRS-PVB – and also between NCG-AVTP and NCG-PSV there is a significant number of days when hub spreads exceed yearly transportation tariffs – e.g., more than half of the days between the German NCG and the Austrian AVTP⁹¹, a specific situation due to physical congestion at the interconnecting IPs.

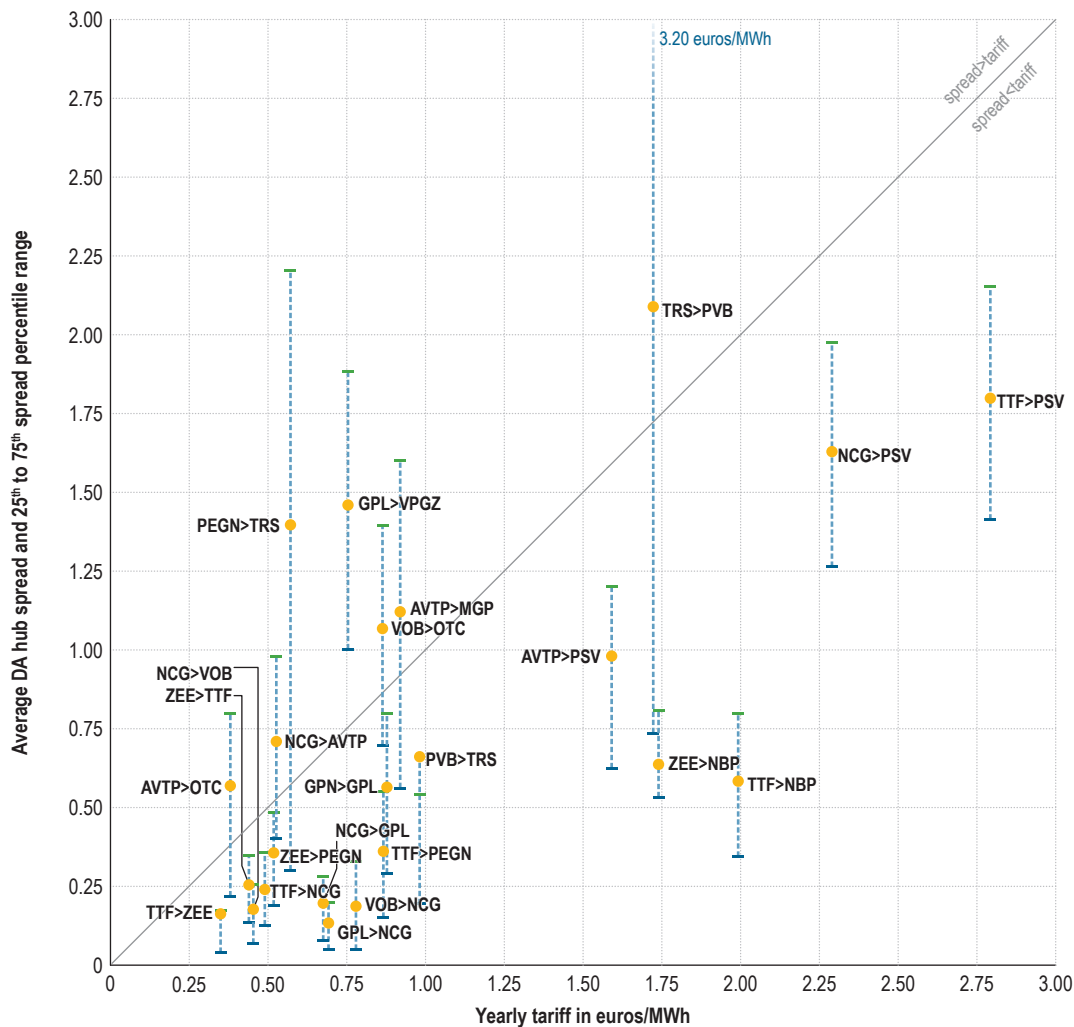
126 As Figure 20 also details, day-ahead transportation tariffs in most cases are higher than yearly capacity product tariffs. This is because short-term multipliers are usually applied to incentivise bookings of longer products. In some instances (e.g. German GPL- Polish VPGZ, Austrian AVTP with Hungarian MGP and Slovak hubs), hub

91 The analysis in Figure 20 shows the highest reserve price of day-ahead capacity products through the year. Among NCG-AVTP, short-term capacity auction premiums are common. In reality, spreads were closer to the cost of short-term transmission for the greater share of 2016 days than Figure 20 suggests. See also figure notes.

price spreads are usually higher than yearly transportation tariffs, a situation that should be an incentive in principle for arbitrage. But when daily tariffs are considered, the profitability of the arbitrage opportunities falls as high short-term tariff multipliers are often applied. The new TAR NC has set limits to the level of short-term tariff multipliers, as high multipliers may in some cases be detrimental to competition. It is to be born in mind that daily tariffs are the actual charges paid to conduct hub arbitrage on the spot, and as such, higher short-term multipliers tend further to increase the actual spreads.

127 These considerations are further exemplified in Figure 21, which correlates hub price spread levels and transportation tariffs for various EU hub pairs.

Figure 21: Day-ahead price spreads compared to yearly transportation tariffs – 2016



Source: ACER based on Platts and hub operators' data for prices and ENTSG TP for transportation tariffs.

Notes: the yearly transportation tariff value corresponds to the cost of transportation from the lower priced into the more expensively priced hub (see arrow). For each hub pair, the yearly average day-ahead price spread is indicated by the yellow dot. Note however that at some IPs (e.g. NCG-AVTP, PEGN-TRS, TRS-PVB) short-term capacity auction premiums are frequently witnessed. As such, price spreads at these hub pairs may have been closer to the actual short-term transportation costs. The spread range from the 75th (green marker) and 25th percentiles (blue marker) is shown by the dotted line.

128 As Figure 21 shows, most NWE hubs day-ahead spreads are regularly below yearly transportation tariffs. Moreover, for several of these pairs (e.g. TTF-ZEE, NCG-GPL), both hubs have traded at premiums to each other for prolonged periods throughout the year, an evidence of price dynamism sustained in spot markets functioning comparably well; a contributing factor is the lack of (absolutely) clear dominant flow directions, which facilitates gas swaps between hubs.

- 129 For those other pairs where spreads are regularly above transportation tariffs – e.g. PEGN-TRS, GPL-VPGZ, AVTP-MGP, TRS-PVB and others – it is usually the case that one hub trades throughout the year at a premium over the other. There could be multiple reasons for this.
- 130 One element is that for these pairs, surplus legacy contracts play another role. It may be that one or a few incumbent players could still be over-contracted, but for a number of reasons they do not face enough competition to place orders around SRMCs. In such a situation, inter-hub placed orders would be taking into account full transportation costs.
- 131 Contractual or even physical capacity congestion could be another important reason⁹². In the former case, an improper implementation of CAM and CMP NC / GLs could hinder competition. Also, lower liquidity at the entered hub could trigger higher spreads, as the market parties could be asking for higher prices in the absence of enough competition or lack of counterparties. Finally, other market barriers could exist as discussed in Chapter 5.
- 132 The reasons for sustained price spreads above transportation costs is relevant as depending on the reason addressing these issues would require either solutions that focus more on making capacity availability on a short-term basis (via the coordinated implementation of CAM NC and CMP GLs – or occasionally via investment in new transportation capacity) or solutions that focus mainly on making the hub more attractive to market participants by addressing structural aspects and barriers to market entry.
- 133 Finally, it remains to be seen if in the years to come, if and when legacy commodity and capacity contracts surpluses terminate and the system becomes more reliant on short-term capacity contracting, spreads may still rise over transportation tariffs in certain market areas⁹³.

HOLISTIC CASE ANALYSIS

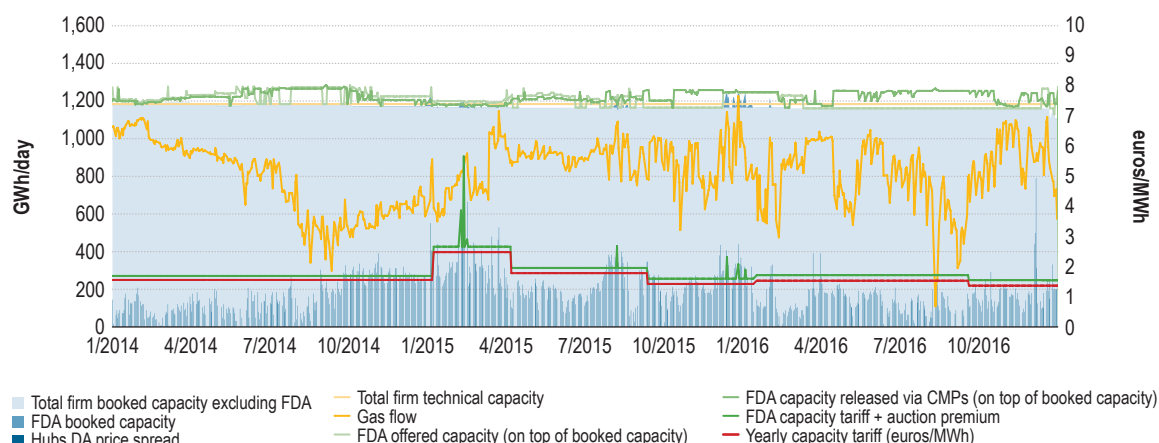
- 134 Quantifying the specific market effects brought about by implementing individual NCs is challenging, as separating regulatory effects from market fundamentals is complex. Nevertheless, - and in connection with the links between transportation tariffs, hub price spreads and capacity utilisation aspects highlighted above - this section digs into a number of so-called “holistic cases” in order to show the main operational factors at IPs and, more explicitly, to elucidate the interrelation between the CAM and CMP NCs with other broad market functioning metrics.
- 135 This type of analysis has been performed for a sample of four cross-border IPs⁹⁴. At these IPs, there seems to be a connection between price spread levels and transportation tariffs, as well as some correlation among spreads and registered physical flows (or nominations). The higher the spreads between the interconnected hubs, the more flows are usually nominated in an attempt to take economic advantage of the price difference.
- 136 Figure 22 below focuses on the Arnoldstein – Tarvisio IP between Austria and Italy.

92 In fact all MSs borders above the line, except for the Czech-Slovak one, were identified as contractually congested in the ACER 2017 Monitoring Report on Contractual Congestion at EU Interconnection Points. See: http://www.acer.europa.eu/Official_documents/Acts_of_the_Agency/Publication/ACER%202017%20Implementation%20Monitoring%20Report%20on%20Contractual%20Congestion%20at%20Interconnection%20Points.pdf.

93 As debated in section 2.3. a wide debate - framed via the EC Quo Vadis project - is ongoing about potential future adaptive measures. This discussion goes beyond the scope of the MMR.

94 Cross-border IPs have been selected in accordance with the potential relevance of the analysis, and broad coverage of EU regions, but also availability of data. The list includes Mallnow (DE-PL), Oberkappel (DE-AT), Tarvisio (AT-IT) and Zelzate (NL-BE) IPs.

Figure 22: Holistic study of CAM and CMP market effects at Arnoldstein – Tarvisio IP (AT->IT, Austrian exit side)



Source: ACER based on Platts, ENTSOG TP, TSOs data and PRISMA.

Note: All IP tariffs included, also Snam supplementary charges. CMP released capacities correspond to the Austrian side.

- 137 As Figure 20 showed, the Italian PSV hub trades most of the year at a premium with respect to its Austrian counterpart. Day-ahead spread levels are determined by market fundamentals but are also impacted by the level of the transportation tariffs. Figure 22 shows that on most of the (infrequent) occasions when AVTP-PSV hub spreads were above transportation tariffs, day-ahead capacity bookings via PRISMA were made⁹⁵. Under these circumstances, physical⁹⁶ spot hub price arbitrage becomes profitable. Moreover, during some of these days, premiums were paid on top of the auction reserve tariff. Additionally, a share of the booked short-term capacities were contracted using the capacity volumes released via implemented CMPs, demonstrating a positive market effect from the implementation of these GLs.
- 138 In any event, and as the next section will expand further, Day-Ahead capacity is still contracted in very limited amounts across the EU, Arnoldstein / Tarvisio IP being a valid example. The European gas system is still heavily dependent on long-term capacity bookings, although capacities at some IPs are also progressively booked on a medium-term basis (i.e. month, quarter ahead). The analysis also shows that the Arnoldstein / Tarvisio IP is not physically congested, implying that flows are customarily below technical capacity⁹⁷. What the data also shows is that before the November 2015 CAM NC implementation, there were more frequent instances when Day-Ahead price spreads surpassed tariffs, this coinciding, however, with a situation of physical capacity availability. This would have been a potential sign of contractual congestion coupled with the non- or inefficient⁹⁸ application of CMPs. The CAM NC code implementation, together with ENI's release of long-term booked capacity through periodical auctions, is deemed to be correcting this situation, and at present flow levels seem better correlated with hub price differentials.
- 139 In addition to the Arnoldstein / Tarvisio case, other IPs holistic cases have been analysed by the Agency. Even if it is not possible to show in detail in this document the full picture of the analyses, some specific insights can be extracted, as shown in the summary below⁹⁹.

95 I.e. see FDA booked capacity series, the area plotted on top of total firm booked capacity.

96 I.e. the contracting of short-term capacity products for underlying the flows from one hub into another.

97 Backhaul nominations from Italy into Austria are rarely received.

98 CMPs could be applied but the high cost of the offered released capacity could limit the acquisition of secondary capacity by third market players.

99 Note that at all three borders the listed IPs are not the only ones; this could somehow affect the overall border analysis. The analyses correspond to the flow direction indicated by the arrow.

Table 2: Summary of holistic case studies main findings for selected EU IPs

Zelzate IP – NL ↔ BE	Oberkappel IP – DE > AT	Mallnow IP – DE > PL
<ul style="list-style-type: none"> • High booked / technical and low used / booked capacity ratios • Insignificant volumes contracted short-term • Short-term tariffs consistently above DA hub spreads -> those deemed to signify SRMCs • Flows volume and direction tend to be price sensitiveⁱ 	<ul style="list-style-type: none"> • Physically congested on many occasions throughout the year • Legacy long-term contracts and congestion restrict the short-term price arbitrage • Flows size and direction tend to be price sensitive • Some DA capacities purchased using the volumes released by the application of CMPs 	<ul style="list-style-type: none"> • Flow levels are high and stable from Poland into Germanyⁱⁱ • Polish VPGZ usually trades at premium. Spreads frequently above yearly tariffs but not for daily ones • FDA bookings show some good responsiveness to price-spreads dynamics • Only unbundled DA capacities offered on separate platforms which makes arbitrage more challenging • Some released DA capacities via CMPs being purchased

Source: ACER.

Notes: i) although some nominations are routinely made independently of spread levels and in both directions. These could be the result of longer-term supply contracts or of obligations arising from other contracted curve hub products. Moreover, more hub price arbitrage is executed via locational swaps and spread trade ahead of physical flows, which is thought to reduce the price sensitivity of final physical flows. ii) From 2014, reverse physical flows were enabled, contributing to Polish supply diversification. Shippers routinely nominate gas with a direction opposite to the dominant West direction. Overall gas swap operations and the netting of flows are common practices.

140 The section that follows expands further on the market effects of the recently implemented gas NCs

4.2 Market effects of NCs implementation

141 Under the Third Package, the Agency is tasked, inter alia, with monitoring the state of implementation and the market effects triggered by gas network codes¹⁰⁰. In this section, the Agency looks at possible economic effects brought about by the CAM NC, the CMP GLs and, for the first time, the BAL NC¹⁰¹. An assessment of the effects of the other gas NCs, like Tariffs and Interoperability, will be progressively added in future MMR editions. The assessment relies on the transport data available on the ENTSG TP, on the auction reports of the Booking Platforms, on REMIT data and on ENTSG data on balancing actions provided to the Agency.

142 The Agency is of the opinion that the key drivers behind the varying performance of gas wholesale markets are economic and market-fundamentals, e.g. supply and demand developments, structural competitiveness, infrastructure aspects, etc., with regulation also playing a part. The rules established in the Third Package guarantee a fair and non-discriminatory network access and transparent market operation; as such, the gas NCs provisions can be considered as promoting competition, ensuring a more equal level playing field and contributing to improving market well-functioning.

143 Moreover, in a scenario in which global gas markets are becoming more closely interlinked and where market fundamentals may rapidly evolve, drawing a clear line between effects deriving from changes in fundamentals as opposed to those deriving from reforms in the regulation is challenging. Therefore, the analyses presented in this section should be read together with the present market context.

100 Article 9(1) of the Regulation (EC) No. 715/2009.

101 The Agency, supported by the consultancy CEPA, defined the relevant indicators to monitor the effects of the network codes. These metrics were discussed in a public consultation with stakeholders in 2015: <http://www.acer.europa.eu/Media/News/Pages/ACER-publishes-study-on-how-best-monitor-the-effects-of-the-implementation-of-the-network-codes.aspx>.

4.2.1 Assessment of market effects of the CAM NC and the CMP GLs

- 144 As shown in Figure 7, most MSs do not have gas production, or such a production only covers a very small part of their consumption. As such, gas is mainly sourced from other countries through IPs. For this reason, transparent and market-based rules to access the transportation system are crucial to ensure a level playing field.
- 145 The CAM NC establishes a set of rules to harmonise the allocation of transportation capacity across EU MSs. Its implementation has been mandatory since November 2015¹⁰². According to the CAM NC, the booking of transportation capacity ('capacity') is managed through allocation platforms via market-based competitive auctions. At the moment, there are three allocation platforms, covering different areas: PRISMA (which auctions capacity at the IPs in Western, Southern and Central European MSs¹⁰³), RBP (in the Eastern European MSs¹⁰⁴), and GSA (on the Polish sides of the IPs and at the interconnection point between Poland and the Czech Republic).
- 146 According to the majority of participants in the 'Barriers in gas wholesale markets survey', the increased level of transparency and harmonisation in transportation capacity booking is acknowledged as an important achievement of the CAM NC, considering that just a few years ago such a system was not in place in all MSs and that the platforms and rules for capacity allocation were heterogeneous and considered one of the greatest barriers to fair market access¹⁰⁵. Thanks to the implementation of the standardised and transparent provisions of the CAM NC, more participants are deemed to have entered European markets in recent years.

CAM NC: Bundled products

- 147 The CAM NC establishes that capacity at EU IPs must be progressively offered as a bundled product. Bundled entails that the allocation of capacity on both sides of the IP occurs as a unique capacity product purchased at a single allocation platform. This is to apply to both new capacity and to existing unbundled capacity upon the expiry of the current contracts. This measure is expected to increase the amount of capacity booked, because both sides of the IPs can be booked with a single procedure.
- 148 Figure 23 shows, for each product category, from daily to a full gas year capacity, the volumes of bundled products offered in 2016 and the volumes allocated¹⁰⁶. At present, very limited volumes are sold as bundled capacity.

102 A number of European MSs have chosen to implement a large number of the NC provisions before the mandatory implementation date.

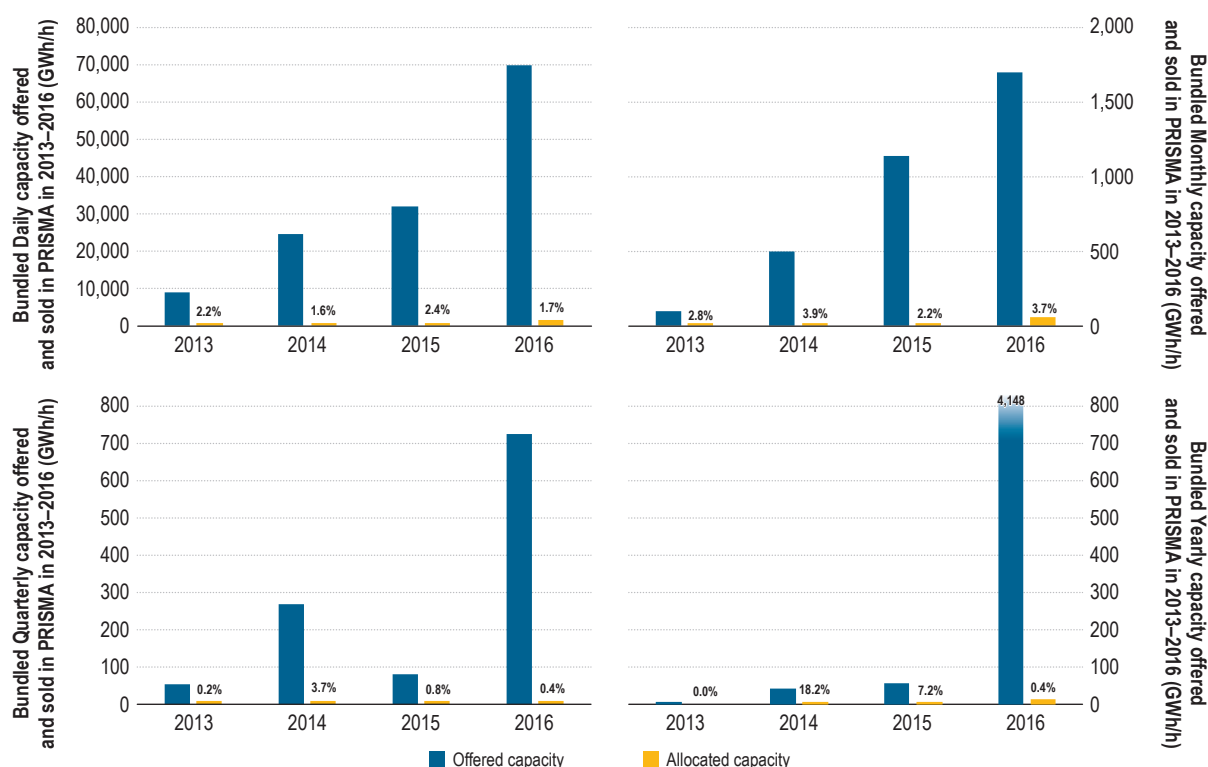
103 Portugal, Spain, France, Germany, Belgium, Luxembourg, Netherlands, UK, Ireland, Denmark, Czech Republic, Austria, Italy, Slovenia.

104 Slovakia, Hungary, Croatia, Romania, Bulgaria, Greece.

105 Before the implementation of the CAM NC, capacity was allocated in MSs via varying procedures, some of them not fully market based like the first-come-first-served. In some cases, those procedures gave priority to the incumbent. The CAM NC also overcame difficulties created by the utilization of cubic meters as unit of allocation by establishing that capacity must be offered in kWh, i.e. if the calorific values differed at each side of the IP the use of cubic meters created operational complications.

106 Volumes have been split by capacity product in order to avoid double counting of the volumes offered and not allocated and then offered again for a product in the shorter timeframe (e.g. volumes not allocated in the gas year auctions and then offered into the quarterly, monthly and daily auctions).

Figure 23: Marketable and allocated Daily, Monthly, Quarterly and Gas Yearly bundled capacity for European cross-border IPs on the PRISMA platform – 2013 – 2016 (GWh/year and as a percentage of the respective products technical available capacity)



Source: ACER based on PRISMA reports.

- 149 Volumes of booked bundled capacity are less than 1% of total EU IPs technical available capacity. Several factors may explain this low interest by market participants, among which the most important are: 1) the current market conditions at the majority of IP sides, according to which cross-border capacity is more expensive than market spreads (as analysed in Section 4.1.2); 2) the capacity mismatch challenge¹⁰⁷ and the lack of a standardised and efficient conversion mechanism offered by the TSOs; 3) the TSOs' lack or insufficient transparency on the evolution of technical capacity calculation, as perceived by the network users in the 'Barriers in gas wholesale markets survey'; 4) the lack of standardised capacity products at some borders; and 5) the high shares of long-term capacity bookings which in the current market conditions are not fully utilised. While acknowledging the important achievements deriving from the implementation of the CAM NC in Europe, participants to the 'Barriers in gas wholesale markets survey', however, consider that the current CAM NC provision of mandatory capacity bundling removes flexibility in the absence of contractual congestion.
- 150 In general, the issues with the network codes and framework guidelines implementation, experienced by market participants and reported in the 'Barriers in gas wholesale markets survey', relate mainly to the differences between present day gas market conditions ('oversupply' and 'sizeable unused capacity') and those at the time of their drafting ('golden age of gas', scarcity of transportation capacity)¹⁰⁸.

¹⁰⁷ According to CAM NC, TSOs need to maximise the offer of bundled products, which leads to circumstances where network users holding unbundled capacity bookings on one side of an IP may not find the equivalent unbundled capacity on the other side of the interconnection because only bundled capacity is offered, or because unbundled capacity is offered only if and when bundled capacity is sold out. This problem is the "capacity mismatch issue". If those network users want to transport gas across such an IP, and they cannot book the corresponding unbundled capacity on the other side, they are left with buying bundled capacity while also paying for unbundled capacity that they cannot use (except if interruptible capacity is on offer). This case applies to several IPs (e.g. Obergailbach/ Medelsheim, Zelzate).

¹⁰⁸ According to the 'Barriers in gas wholesale markets survey' participants, in the event of congestion, mandatory bundling avoids the situation of a shipper buying capacity on one side of the border, but failing to buy the capacity on the other side. However, as there are only a few congested IP sides in Europe, and never on both sides of a single border, the bundling of capacity removes flexibility and increases transmission costs; see footnote 107 on the capacity mismatch problem.

- 151 At present, the role of the booking platforms in harmonising the legal and contractual frameworks is limited. According to the 'Barriers in gas wholesale markets survey', market participants consider those platforms only as a front-end for capacity allocation. They do not help in overcoming difficulties related to the perceived lack of coordination among TSOs for common capacity calculation and allocation, and for consistent terms and conditions to streamline the costs of hub-to-hub trading¹⁰⁹. Also, in several countries, only a single entity can buy bundled capacity on both sides of a border, which could hamper trade¹¹⁰. Progress is being made with the creation of Virtual Interconnection Points (VIPs) (which is an obligation under the CAM NC) at the borders between Spain and Portugal and between Spain and France; and with projects to create VIPs between Belgium and France and between Belgium and the Netherlands. However, overall implementation is still very limited in Europe as a whole.
- 152 The capacity mismatch problem quoted in the 'Barriers in Gas Wholesale Markets Survey' by all the participants active in NWE and CEE derives from a legacy of long-term capacity contracts still in place at the majority of the IPs, often on one side only. This capacity mismatch problem impedes shippers to buy bundled capacity when they have already had bought unbundled capacity in the past on one side of the IP, without incurring a loss.
- 153 The amendments to the CAM NCs, whose effects will be observed starting from 2018, are expected to solve some of the challenges listed above, especially the capacity mismatch problem. The amendments establish two measures to solve the mismatch problem: 1) the obligation of TSOs to offer a conversion service for yearly, quarterly and monthly auctions as of January 2018¹¹¹ and 2) the possibility for TSOs, in the case of capacity mismatch, to offer the capacity - for all the products duration – both as bundled (for the part that matches on both sides) and as unbundled (for the remaining part). Those provisions are expected to increase the efficiency of the allocation, hence they would lead to increased volumes of capacity allocated over IPs.
- 154 In an effort to harmonise the capacity allocation rules and conditions across EU MSs, the CAM NC also obliges TSOs to offer standard products with a different duration: from multi-annual products to within-day products. The original auction calendar sets fixed dates for each product¹¹². Given the lack of flexibility provided for yearly and quarterly products, the amendments introduce changes to the timings and frequencies of the products offered so as to accommodate the flexibility requested by network users¹¹³. Those changes are likely to increase and make more efficient the volumes of capacity booked starting from 2018,

109 For instance, survey participants explained that at the IP Wallbach, Switzerland/Germany, there has been a quarterly auction with a low quarterly technical capacity offered. This resulted in shippers being obliged to pay a premium. However, just after the auction, the technical capacity for the monthly product was higher than for the quarterly product. If the buyers knew in advance that more capacity was available on the monthly auction, they would not have paid a premium, and would instead have waited for the monthly auctions. Also, the transparency of several TSOs concerning the way technical capacity is set is considered as insufficient (e.g. when two exit points of two countries are dependent on a single bottleneck upstream, TSOs have to choose whether to put more capacity on one exit or another). It was also pointed out that technical capacities can frequently change in Germany and in the Netherlands and shippers are often excluded by any decisions on those aspects.

110 It requires the duplication of trading licenses, and can be inconsistent with the internal organisation and compliance requirements of shippers.

111 ENTSOG is to finalise the conversion model by October 2017, releasing network users booking bundled capacity while holding mismatched unbundled capacity at the same IP side from capacity charges (except auction premia) on the newly acquired bundled product, which is redundant with the unbundled one in their portfolio.

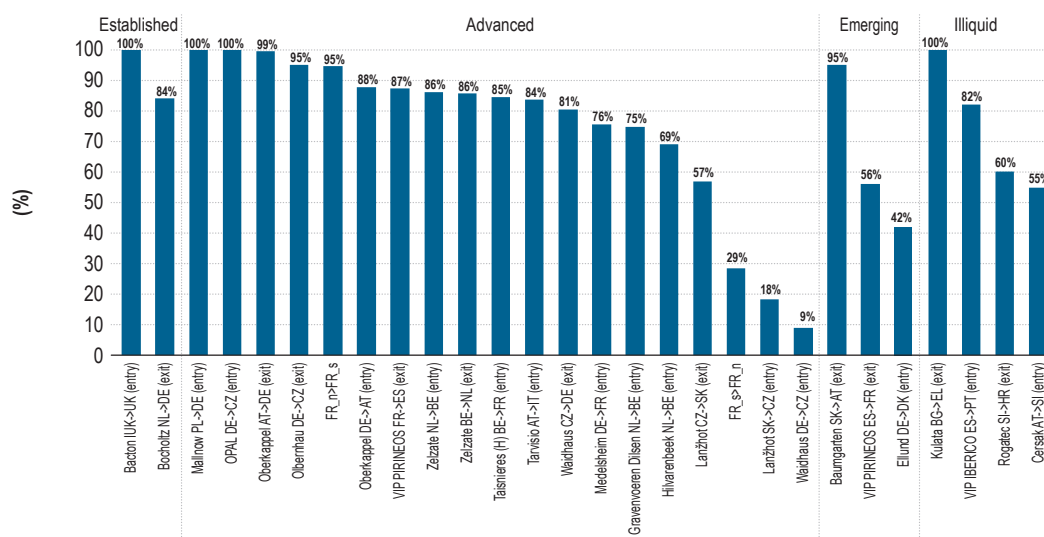
112 Yearly capacity is auctioned once a year in March; quarterly capacity is auctioned once a year in June; monthly capacity is auctioned once a month on the last Monday of the previous month; daily capacity is auctioned once a day the previous day; within-day capacity is auctioned several times every day.

113 The amendments to the CAM NC establish that the auctions for yearly capacity will be held in July instead of March (closer to the start of the gas year or the calendar year bought) and the auctions for quarterly capacity will be held four times per year, rather than only once a year in June.

CAM NC: Capacity booked and its breakdown

- 155 The implementation of the CAM NC in Europe was expected to increase the efficiency of capacity booking and capacity utilisation. Figure ii in the Executive Summary, provides an overview of the average firm capacity booked as a percentage of technical capacity at the European IP sides in MSs grouped according to the development stage of their hubs.
- 156 The average booking ratio across all the hub groups in 2016 was around 60%. Results vary dramatically when looking at individual IPs. Some IP directions, mainly those located on the most important gas routes, benefit from more market interest hence report higher ratios as is presented in Figure 24, which shows the booking ratios at selected IP sides in 2016. Most of the IP sides selected are located along important gas routes in Europe and, as such, are almost fully booked. The others are included also to provide an overview on less booked IP sides.

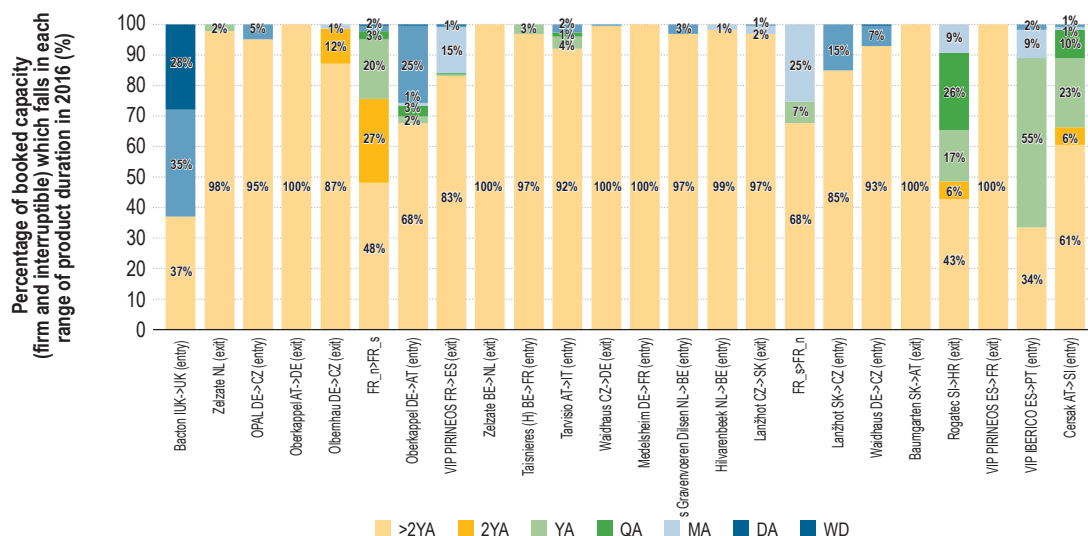
Figure 24: Average ratio of firm capacity booked over total technical capacity at selected EU interconnection points sides per hub group in 2016 (%)



Source: ACER based on ENTSG TP.

- 157 The high levels of capacity booked at certain IPs, and in general at the majority of the IP sides even if not fully booked, could be explained mainly by the high share of long-term capacity booked years ago, when more favourable market fundamentals and forecasts were in place. At those IPs where capacity bookings are low, this is explained mainly by the lower attractiveness of the route where they are located. For the other IP sides, partial booking levels could be explained by several factors, beyond those causing the low bookings of bundled products, mentioned in (149): 1) the uncertainty over the capacity tariffs paid by all long-term capacity holders in the following years, the general low booking levels; 2) frequent changes in transportation tariffs inherent to a revenue cap system, aspects which might set a vicious circle. These aspects incentivise shippers to enter into swap agreements for capacity utilisation instead of booking new transportation capacity, as capacity booking might bring more uncertainty than benefits.
- 158 This could indicate that Europe might face a situation of overcapacity in parts of its gas networks, also considering that contractual congestion is registered only at 9% of EU IP sides (see further below for CMP GLs market effects). It should, however, be noted that when determining technical capacity, peak capacity needs are used.
- 159 Figure 25 illustrates the breakdown of capacity products at selected IP sides in 2016 according to their duration from the longer timeframe to the within-day timeframe.

Figure 25: Breakdown of capacity products at selected EU interconnection points sides in 2016 according to their duration (%)



Source: ACER based on PRISMA platform and ENTSOG TP.

At the majority of the IP sides analysed, most of the capacity for 2016 was booked more than two years ahead (before 2014)¹¹⁴. This trend is completely independent of those IPs' booking ratios (shown in Figure 24) and of their level of capacity utilisation (showed in Figure 28). Long-term supply contracts have traditionally played a key part in a shippers' hedging strategy. Their share in a shipper's portfolio depends, inter alia, on the price attractiveness of the long-term contract tariffs against the usually higher price of short-term multipliers. Long-term contracts are generally not considered as an issue for market competition, provided that effective CMP market-based measures are in place.

CMP GLs: Additional capacity made available through each CMP measure

According to the CMP GLs, TSOs should take several regulatory actions to reduce situations of contractual congestion of capacity at IP sides, as opposed to physical congestion¹¹⁵. In order to understand the role of the CMP GLs, it is important to clarify that physical congestion cannot be remedied by applying the CMP GLs, and should be addressed, where it is efficient to do so, by infrastructure expansions or, in some instances, via contractual arrangements, such as flow commitments or, if possible, through the offers of interruptible capacity. The CMP GLs establish that TSOs have to reduce contractual congestion through a set of four measures: Over-subscription and buy-back (OSBB)¹¹⁶, surrender of capacity¹¹⁷, Long term use it or lose it (LT UIOLI)¹¹⁸ and Firm day-

¹¹⁴ At three IP sides the share of capacity booked from year ahead to within day was more than half of the capacity booked for 2016, but, even in those cases, the share of capacity with a duration shorter than one year is still low.

¹¹⁵ "Contractual congestion" means a situation where the level of firm capacity demand exceeds the technical capacity; "physical congestion" is a situation where the level of demand for actual deliveries exceeds the technical capacity at some point in time. Contractual congestion is assessed taking into account the auction premia at the non-offer of firm capacity by the TSOs.

¹¹⁶ Over-subscription and buy-back is a measure whereby in the firm capacity auctions a TSO offers additional capacity (in addition to the technical capacity) based on its calculation on the average utilisation of capacity booked by shippers at that specific IP side. If all the capacity booked is nominated for a given day or hour at an IP side where the TSO has offered OSBB capacity, the TSO will buy back the capacity oversubscribed at the market price. This is the most market-based and dynamic of all the CMP measures, as the TSO should make dynamic calculations of capacity booked, but not to be used, and should not be risk-averse in their capacity allocation, as they will have to buy back capacity at the market price in case all the booked capacity is nominated by shippers on a specific day or hour.

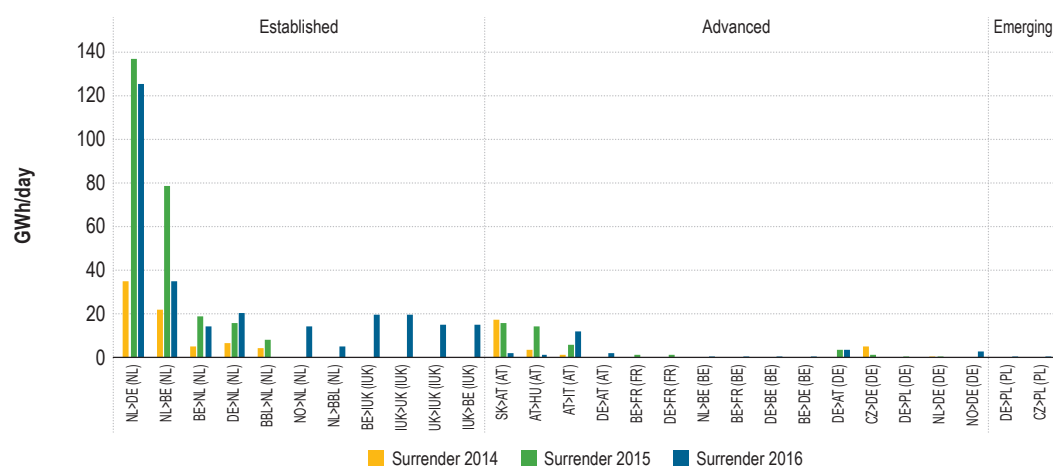
¹¹⁷ Via the "surrender of capacity" mechanism, network users can notify the TSO of capacity that is not needed for resale. The TSO will auction this capacity in the standard capacity auctions.

¹¹⁸ Long-term use it or lose it (LT UIOLI) was not implemented by any MSs by 2017. It establishes that if a network user holding long-term capacity does not use it for capacity hoarding purposes and if there is market demand for that capacity, the TSO will withdraw the capacity from the shipper and such capacity will be offered to the market.

ahead use it or lose it (FDA UIOLI)¹¹⁹. The Agency publishes every year the “ACER annual report on contractual congestion at interconnection points”. The latest report¹²⁰ provides an overview of where and how those different measures are implemented across EU MSs and on the contractually congested IP sides. The Agency’s Report does not assess a potential misuse of capacity (“capacity hoarding”) by individual shippers, as this would require an in-depth analysis based on individual network users’ data, which is not public, and rather a task for NRAs¹²¹. The analysis evaluates the additional capacity volumes made available through each CMP measure.

- 162 By the end of 2016, CMP measures had been implemented in only 7 EU MSs, where, except for the Netherlands, such measures resulted in very limited volumes of additional capacity being made available. Measures such as OSBB and surrender of capacity could be implemented by EU TSOs at all their IP sides independently of whether they are contractually congested to ensure a maximum availability of capacity to the market and to reduce the risk of contractual congestion occurring.
- 163 The lack of, or weak, harmonisation between adjacent systems, the lack of or insufficient implementation of congestion capacity measures and the lack of or weak regional perspective in regulatory decisions and coordination were mentioned among the top 5 or 10 barriers in the established, advanced and emerging hubs, while illiquid hubs seem to face more structural issues than the implementation of the NCs and CMP GLs.
- 164 In 2016 only 9% (23) of the CMP-relevant IP sides were found by the Agency to be contractually congested. At those IPs the implementation of FDA UIOLI is required. At more than 13 IP sides FDA UIOLI already applies while at some other IPs congestion was temporary (due to construction works or to be solved by a market merger by 2018). Also, at most of the congested IP sides (14), congestion was not the result of demand of capacity exceeding its offer, but of the lack of firm capacity offered for at least one month. Physical congestion occurred at eight contractually congested IP sides.
- 165 The implementation of surrender mechanisms could be a helpful tool for shippers to optimise the utilisation of capacity by releasing booked and unused capacity. The analysis of volumes of capacity surrendered over the years show that improvements are still required. Capacity was surrendered in very few markets.

Figure 26: Average daily volumes of capacity surrendered by network users from 2014 to 2016 (GWh/day)



Source: ACER based on ENTSOE data.

119 Firm day ahead use it or lose it (FDA UIOLI) are restrictions to renominations addressed to shippers holding a volumes of capacity higher than 10% of the total technical capacity of an IP side. The implementation of the FDA UIOLI is not automatic. NRAs should require TSOs to apply the FDA UIOLI mechanism at IPs where, based on the Agency Congestion Report, it is shown that demand exceeds supply, at the reserve price when auctions are used, in the course of capacity allocation procedures for products for use in either that year or in one of the subsequent two years, (a) for at least three firm capacity products with a duration of one month, or (b) for at least two firm capacity products with a duration of one quarter, or (c) for at least one firm capacity product with a duration of one year or more; or (d) where no firm capacity product with duration of one month or more has been offered. FDA UIOLI is the primary congestion management measure in Germany and Austria, as it applies by default to all the IP sides (even those not congested).

120 Latest edition: http://www.acer.europa.eu/Official_documents/Acts_of_the_Agency/Publication/ACER%202017%20Implementation%20Monitoring%20Report%20on%20Contractual%20Congestion%20at%20Interconnection%20Points.pdf.

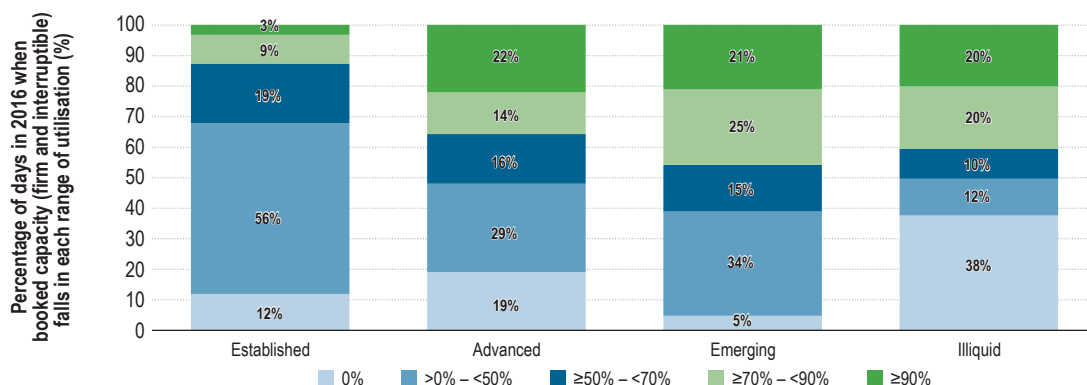
121 The Agency already assists regulators in this task by providing the list of congested IP sides, filtered by country, for a closer assessment.

- 166 One of the elements that could explain the low success of the capacity surrender mechanism across EU MSs might be that the capacity surrendered by network users is allocated only after the TSO's available capacity is allocated in the auction, as established by the CMP GLs. In a situation of scarce volumes of new capacity booked and of oversupply, network users might consider this as a poor option.
- 167 The capacity surrender mechanism is an alternative to the secondary trading of capacity between market participants (either bilaterally or via secondary platforms). In the 'Barriers in gas wholesale markets survey', market participants highlighted that there is currently a need for a centralised platform for secondary trading that could offer the possibility of posting and closing anonymous deals and managing the credit risk. The current secondary capacity trading platform in PRISMA does not seem to guarantee the anonymity of market participants or central risk compensation. The availability of PRISMA or any other centralised platform as a secondary capacity trading platform would not sufficiently facilitate the process, considering the perceived non-standardised and non-harmonised process for transferring capacity across EU MSs. In some MSs, the capacity transfer procedures and timings set by some of the TSOs were reported to have had counterproductive effects¹²², and several cases of delays by the TSOs in the transferring of capacity in the secondary market were identified¹²³. The overall impression of market participants is that, by making secondary markets unattractive, TSOs effectively present themselves as a more convenient reference source for the procurement of cross-border capacity, while preventing market participants from efficiently exchanging capacity in the secondary market.

CMP GLs: Utilisation of capacity booked

- 168 To conclude the analysis of the CMP effects, Figure 27 and Figure 28 below shows the level of capacity utilisation by hub groups and at selected IP sides in 2016. The EU average utilisation ratio for 2016 stands below 50%, with differences at hub group level. Differences in utilisation ratios exist across EU market zones; the underlying reasons for these variations are found in a combination of factors already listed in the CAM NCs effects section.

Figure 27: Commercial utilisation of firm and interruptible booked capacity at interconnection points sides in 2016 per hub development group (%)

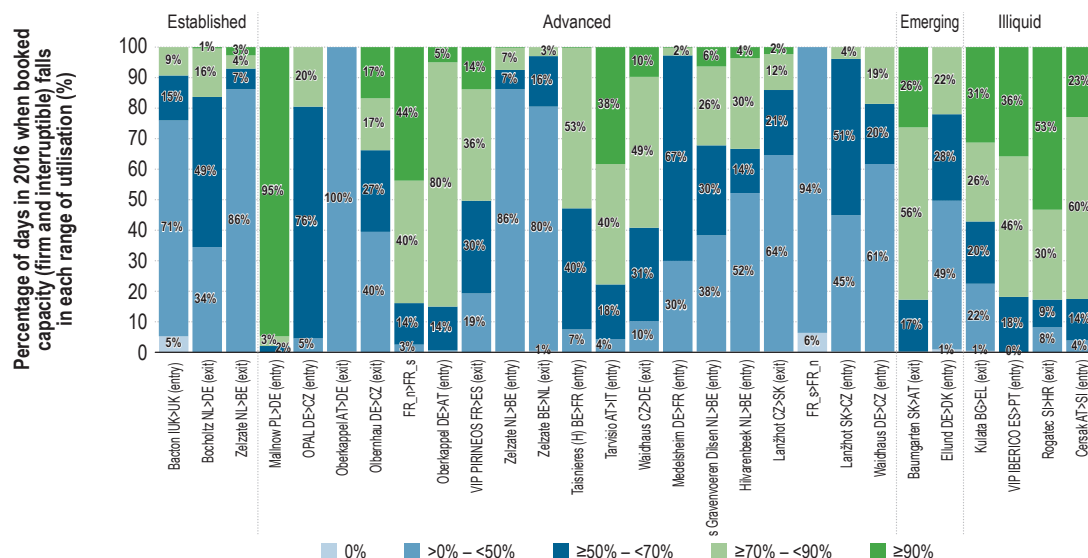


Source: ACER based on ENTSOG TP.

Note: Given challenges with the reliability of the ENTSOG TP database, the Agency was only able to use data covering 50% of the total database provided by ENTSOG for 2016, corresponding to 177 out of 269 of those IP sides indicated by ENTSOG as CAM relevant (the total CAM relevant IP sides as established by ACER and ENTSOG are 366). Data for 91 out of 177 IP sides shown do not cover a full year. Data for Luxembourg, Sweden, Estonia, Lithuania, Latvia, Finland, Cyprus and Malta were not provided by ENTSOG.

- 122 Several examples were provided. Some TSOs only allow the transfer of a 5-years capacity contract as a whole, rather than allowing also the transfer of parts of it. Some TSOs offer the "Transfer of Usage" (the possibility to nominate capacity in the name of another shipper) while others offer only a "Transfer of Contract" (full transfer of the capacity), while both services should be allowed. Some TSOs set some constraints on the price at which capacity can be resold, linked in particular to the application of short-term multipliers, even if the capacity sold is booked for a longer period, so that the transfer of secondary capacity can result in charging the highest multiplier by the TSO to the entity to whom the capacity is transferred. Some TSOs apply the 10% FDA UIOLI threshold also to shippers buying secondary capacity, who find themselves exposed to firm day-ahead use it or lose it on their portfolio, even if their share of capacity at that IP side remains below the 10% threshold.
- 123 The UK (NG) was identified as applying the best practice, with almost instantaneous secondary capacity transfers, followed by Belgium (Fluxys) and the Netherlands (GTS). In the Czech Republic (Net4Gas) extensive documentation is requested by the TSO and the procedure takes at least five days; in Italy (Snam Rete Gas) the procedure requires two weeks.

Figure 28: Commercial utilisation of firm and interruptible booked capacity at selected EU interconnection points sides in 2016 (%)



Source: ACER based on ENTSG TP.

Note: both Figure 27 and Figure 28 show the percentages of days in 2016 when firm and interruptible booked capacity were commercially utilised, taking into account the shippers' renominations, as the "allocation" field was not always filled-in in the ENTSG file. Utilisation is divided into five ranges: days when the utilisation was 0%, days when utilisation was <50%, days when utilisation was between 50% and 70%, days when utilisation was between 70% and 90%, and days when utilisation was between 90% and 100%.

169 Figure 27 and Figure 28 show that during 2016 the number of days when capacity was highly utilised was limited for almost all hub groups and for almost all the IP sides included in the analysis, independently of their booking ratios (Figure 24 above) or of the share of long-term vs. short-term capacity products (Figure 25 above).

170 In addition, the absence of CMP measures in the majority of MSs, especially in terms of surrender of capacity, and the difficulty faced by network users in some MSs to release capacity into the primary auctions might incentivise network users to enter – if feasible - into swap agreements.

4.2.2 Assessment of market effects of the Balancing NC

171 For safety and operational reasons, the gas transportation network must be balanced, meaning that the overall volume of gas taken off a gas network shall match the volume of gas entered in it in order to keep the network at the correct pressure. The BAL NC seeks to create a market-based balancing regime by devolving most of the balancing responsibility from the TSO to individual network users. It promotes the creation of balancing markets where: i) TSOs procure products for balancing from network users through market-based procedures and ii) network users trade imbalance positions on a non-discriminatory basis.

172 The desired outcome is that network users are primarily responsible for balancing both their position and the overall system position, and this leaves the TSOs with a small, but critical, residual coordination and management balancing management role. The BAL NC also provides some flexibility in order to reflect local physical and commercial circumstances in terms of regulatory preparedness, metering of the gas volumes injected and withdrawn, IT systems and market environment.

- 173 The BAL NC¹²⁴ establishes that the only condition in order for the code to be fully implemented in a balancing zone is the presence of sufficient short-term liquidity in both the within-day and in the day-ahead timeframes. Due to the lack of liquidity, or insufficient short-term liquidity, several TSOs applied for a postponement of the implementation of the BAL NC to April 2019. This allows time to improve the levels of short-term liquidity by applying the so-called 'interim measures' established by the code. Even for these balancing zones, the BAL NC required the implementation by October 2015 of a series of elements and steps considered essential to ensure an overall market development¹²⁵.
- 174 This section analyses the potential market effects of the implementation of the BAL NC in selected balancing areas where the code was implemented by October 2015¹²⁶ and for which data of sufficient quality could be extracted from ENTSOG's files and the REMIT database. The period covered is one gas year starting from the BAL NC implementation binding date, i.e. from the first of October 2015 to the first of October 2016.
- 175 The section aims to give a state of play by focussing on the level of TSO intervention for balancing, but it is too early to derive definitive conclusions. The TSO intervention is analysed through two indicators: the TSOs' balancing actions and the share of TSOs' trades in the short-term markets.

1) LEVEL OF TSO INTERVENTION FOR BALANCING PURPOSES: NUMBER OF ACTIONS AND DAYS

- 176 The development of short-term (and long-term) liquidity at hubs depends on several structural factors. The BAL NC is deemed to function in markets where short-term liquidity is present and aims to facilitate the further development of these short-term markets. It does this by creating market-based balancing systems and attributing only a residual balancing role to the TSO.
- 177 A low level of TSO interventions is the outcome of the effective implementation of the BAL NC provisions. The code supports the procurement of sources for balancing, by network users and the TSO, primarily using a liquid short-term wholesale gas market. Prior to the code, approaches to gas balancing varied widely across Europe and flexible gas resources were often contracted by TSOs or incumbents without being accessible to the market. The procurement often involved long-term balancing services¹²⁷. Therefore, the code establishes that, if TSO intervention is needed, it is based on the procurement of short-term standardised products (STSPs)¹²⁸ from the whole market reflecting the short-term value of flexibility established between willing buyers and sellers based on their individual assessments of risks and opportunities at a specific moment.
- 178 Figure 29 shows the level of TSO intervention in selected balancing areas where the BAL NC was fully implemented by October 2015, as observed during the gas year 2015/2016.

124 Latest edition of the Agency's BAL NC implementation monitoring report: http://www.acer.europa.eu/official_documents/acts_of_the_agency/publication/acer%20report%20on%20the%20implementation%20of%20the%20balancing%20network%20code.pdf.

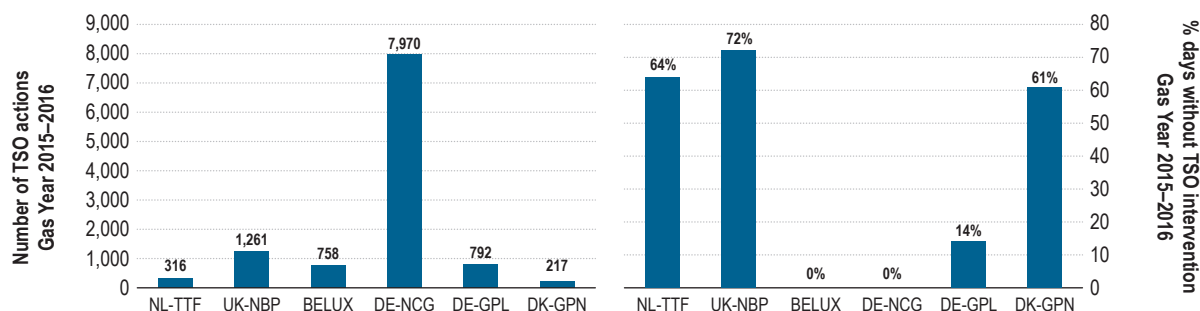
125 Such as increased transparency and increased quality and frequency of information provisions provided to network users, the introduction of trade notifications (information from network users to the VTP operator regarding their commercial positions), functioning renominations for every hour of the gas day and, after that, the creation of a trading platform.

126 Implementation is MS- specific; other deadlines were/are October 2016 and April 2019.

127 According to the BAL NC, balancing services are products that the TSO can procure for balancing purposes with a maximum allowed duration of one year. They are procured via auctions run by the TSO, not on a trading platform. BAL NC establishes that their procurement and usage should be minimised and based on strict conditions, because they are not representative of the real-time situation when balancing resources are needed, being procured with a much longer notice period. Before the BAL NC, these products had no limit on their duration and could also be procured via non-competitive procedures.

128 Short-term standardised products are day-ahead and within-day gas products that the TSO should procure for balancing purposes on a trading platform (which is open to all market participants). The procurement of STSPs reflect the real needs of the system, as they are close to the delivery period; the TSO's balancing should be mainly based on them. STSPs can be: 1) title, 2) temporary title, 3) locational, and 4) temporary locational products. Title products have the highest ranking in the merit order.

Figure 29: Number of balancing actions triggered by the TSO and percentage of days without TSO balancing actions at selected balancing zones in the gas year 2015 - 2016



Source: ACER based on ENTSG data.

Notes: Data for the balancing services at the German hubs consider only calls for the utilisation of those products and do not consider the volumes of contracted balancing services, as these were not included in ENTSG data. Data for the French balancing zones are not shown because of partial data on balancing actions from ENTSG's data (in France within-day title STSPs and balancing services can be procured by the TSOs for balancing).

- 179 The balancing zones shown in Figure 29 have implemented slightly different balancing designs, as allowed by the BAL NC¹²⁹. TTF applies system-wide within-day obligations; NBP and the Danish GPN apply a full end-of-day regime; BeLux applies a combination of end-of-day regime and system-wide within-day obligations; NCG and Gaspool apply a combination of portfolio-based within-day obligations and end-of-day regime¹³⁰. Also, at TTF, NBP, BeLux and GPN, the TSO can balance the system exclusively via within-day title STSPs to be procured at the trading platform. At NCG and Gaspool, balancing can be carried out by each market area manager (MAM)¹³¹ via balancing services and within-day and day-ahead STSPs (title, locational, temporary title and temporary locational) procured both on the trading platform (at the national hub or in an adjacent market, like TTF) and on the balancing platform¹³².

129 BAL NC establishes A) a full end-of-the-day regime or B) three types of within-day obligations. A) In a full end-of-day cash-out regime, a network user is cashed-out for any imbalanced volumes at the end of the day, and its position is set to zero, independently of the system's status. Information is not provided to shippers on a real time basis (as for zones with system-wide WDOs) as TSO provide shippers with at least two forecasts on the system's status during the day. B1) System-wide WDO (BeLux, NL): designed to provide incentives for network users to keep the transmission system within its operational limits. A shipper is cashed-out for imbalanced volumes only when the system is forecasted to exceed its safety levels and the shipper's position is forecasted to increase the imbalance of the system. The cash-out charges and reset of the shipper's position is then strictly linked to the fact that the shipper's position actively contributes to the imbalance of the system beyond the safe limits, thus triggering a TSO balancing action in the market. The real-time updates by the TSO allow the shipper to change their positions quickly in order for the TSO not to trigger balancing actions. If the TSO triggers a balancing action, shippers are cashed out only for the quantities equal to the volumes needed to restore the system to safe levels ("causer pays" approach). In the NL, at the end of the gas day only a cost-reflective end of the day linepack fee applies, allowing users to carry on their imbalance volumes for the next day, as much as those volumes help the system to be balanced. In BeLux an additional full end-of-day fee applies to any imbalance volumes; B2) Portfolio-based WDO (AT, DE): designed to incentivise network users to keep their individual position during the gas day within a pre-defined range. During daily intervals (in Austria every hour, in Germany every hour until October 2016, then a new WDO system of cumulative hourly imbalances was implemented, see footnote 131) shipper's injections and withdrawals must be equal (net position must be zero) independently of the system status, otherwise a within-day cash-out fee applies to the imbalanced volumes. When balancing actions are necessary, they are triggered by the market area manager, in Austria not every shipper is allowed to provide the MAM with balancing volumes. Both in Austria and Germany, an additional fee applies to any residual imbalance volume at the end of the day; B3) Entry/exit based WDO (BG): designed to provide incentives for network users to limit the gas flow or the gas flow variation under specific conditions at specific entry-exit points.

130 The analysis presented in this paragraph for both NCG and GPL does not completely reflect the current balancing rules in Germany as it covers until the 30th of September 2016 while, since October 2016, new balancing rules apply to the portfolio-based WDO regime. Those amendments were implemented to make the portfolio-based WDO regime less restrictive for network users and were mainly related to both the introduction of cumulative portfolio hourly within-day obligations (within day charges are only levied when the MAM acts on both sides of the market - global title products buy and sell - and these trades generate costs for the MAM; the charge is calculated as the quotient of the costs for the flexibility balancing gas weighted by quantity and the quantity of flexibility balancing gas) and to changes to the within-day tolerances for intraday metered customers (tolerance is 7.5% of the daily offtake quantities and applies for each hour of the gas day).

131 Market Area Manager (MAM). The market area manager carries out balancing functions on behalf of the TSOs at the German hubs (NCG and GPL).

132 The establishment of a balancing platform is an interim measure provided by the BAL NC. The balancing platform is managed by the TSO exclusively for balancing purposes, and it is a place where the TSO can procure products which are not standardised (e.g. very specific locational products). As such, it differs from a trading platform, because the TSO is the only counterparty in all the transactions. Instead, a trading platform is usually an exchange, where within-day and day-ahead standardised products are traded, and where the TSO is one participant among the others and not the central counterparty.

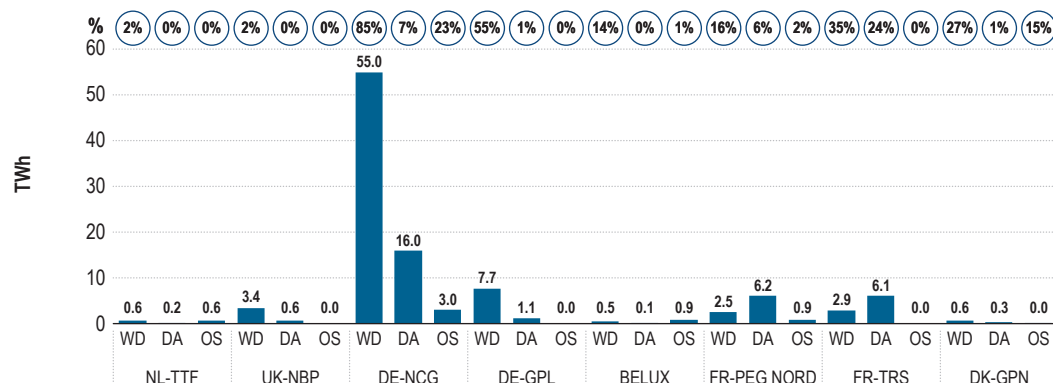
- 180 Results show that at TTF, NBP and at the Danish GPN, the role of the TSO for balancing is relatively more limited compared to the other balancing zones analysed, albeit there are some differences, as explained below. Limited TSO actions were triggered at TTF (300), which were concentrated in a limited number of days, while more TSO actions were triggered at NBP (1,200), despite it being a full end-of-day balancing system where TSO intervention within the day should normally be a rare event. This difference could be explained by the fact that at NBP, the TSO tends to purchase gas only up to the volumes needed to push the market in the right direction. In the Netherlands and in Denmark, the local TSO action aim to bring an imbalanced market back into the green safety buffer. TSO intervention was limited in 2016, also reflecting the size of these markets.
- 181 In the balancing areas in Germany, the MAMs intervened very frequently in the market. Pro memorie, this level of intervention also relates to gas quality conversion in that market. At NCG, the MAM intervened on a daily basis, several times a day. At Gaspool, the number of balancing actions triggered by the MAM was lower than at NCG, but still high compared to other balancing zones, and balancing actions were triggered every day, as in BeLux¹³³.
- 182 For NCG and Gaspool, several factors could explain the need for the TSOs to trigger balancing actions more often than in other balancing zones, such as: i) the liquidity for balancing products is spread among the trading and the balancing platforms (on the latter, different and specific locational products are traded) and among different balancing products; ii) restrictions set by portfolio-based within-day obligations in place during the observed period, which would also require more TSO intervention, especially for locational products.

2) LEVEL OF TSO INTERVENTION FOR BALANCING PURPOSES: SHORT-TERM LIQUIDITY

- 183 In a market with extensive use of title STSPs, access to flexible gas and access to network flexibility, less TSO intervention is deemed to be needed if the TSO provides shippers with correct, reliable and updated data for balancing. In that way, shippers will balance their positions by procuring gas from the market, independently of the balancing system implemented in a single zone, also in order to optimise short-term shifts in market conditions.
- 184 The development of a short-term market requires a high level of TSO transparency and reliable and frequent updates and forecasts of the system's and shippers' status in order to increase the market reliability on trading gas volumes along the entire trading curve, which BAL NC implementation would underpin. A transparent balancing system increases shippers' confidence in short-term trading and incentivise shippers' trust in taking positions. Upon the delivery of a contract (of any duration), a shipper should count on a transparent and market-based framework also in the daily and within-day timeframe.
- 185 Figure 30 shows the volumes of TSOs actions and the share of them compared to the total volumes in the market in the gas year 2015-2016 related to the three different types of short-term products reported by market participants (TSOs included) via REMIT within-day (WD), day-ahead (DA) and "Other Spot" (OS).

133 The frequent TSO's actions in BeLux are mainly due to the inclusion in the analysis of data for both the high-calorific and the low-calorific zones.

Figure 30: TSO share over total market share of short-term products and their correspondent volumes at TTF, NBP, NCG, GPL, BeLux, PEG Nord, TRS and GPN in the gas year 2015–2016 (% and TWh)



Source: ACER based on REMIT data.

Note: No exact definitions of within-day and day-ahead products are provided by the Third Package. For practical REMIT reporting purposes, market participants are not obliged to label their trades as “within-day” or “day-ahead” and are not requested to label each trade as “for balancing purposes” or “for trading purposes”. For this graph, the following categorisations are used: WD trades: volumes of products traded in the gas day “D” with start of delivery on gas day “D” and end of delivery on gas day “D+1”¹³⁴; DA trades: volumes of products traded on the gas day “D” with start of delivery on gas day “D+1” and end of delivery on gas day “D+2”¹³⁵; OS trades: volumes of products traded on the gas day “D”, with start of delivery on the gas day “D+1” and end of delivery on the gas day “D+1”¹³⁶.

- 186 In balancing systems other than those implementing portfolio-based within-day obligations, the quality of information provided to the market could be an element influencing the level of short-term liquidity in the market - at least in terms of share of TSO volumes over market volumes - rather than the specific type of balancing system implemented. Reliable and updated information on balancing and clear cash-out rules increase shippers’ confidence that network users will take positions to balance their portfolios and to optimise short-term market movements without the risk of incurring high or unknown imbalance costs.
- 187 In the Netherlands, BeLux, GPN, PEG Nord, PEG Sud and the UK the information provisions models implemented go beyond the minimum requirements of the BAL NC in this field¹³⁷, albeit there are some differences in the practical implementation.
- 188 At the Dutch TTF, the TSO provides information (forecasts and updates) to the public and to network users¹³⁸ on a real-time basis (287 times per day, one every 5 minutes) and the final allocation of measures to network users for a given gas day are provided just 15 minutes after the end of the same gas day. In the Netherlands, the market volumes of short-term trades are higher than in any other European hub and the share of the TSO’s short-term trades is almost nil, as shown in the Figures above.
- 189 At BeLux, forecasts and updates are provided hourly¹³⁹ and these also constitute the final hourly allocations, with no need for confirmation on the following day or days. This positive aspect can be seen in the Figures above showing volumes of within-day trades in line with the size of the market. The same is true of the more limited TSOs’ volumes. Also at the French balancing zones the updates are provided every hour, but the final allocation are received 10 days after the end of the month. At those zones, the level of TSO intervention is limited.

134 Definitions included in ACER’s Transaction Reporting User Manual (TRUM) document.

135 Definitions included in ACER’s Transaction Reporting User Manual (TRUM) document.

136 Definition not included in ACER’s Transaction Reporting User Manual (TRUM) document, but volumes still reported.

137 At those balancing zones the “base case” model is implemented and its implementation goes beyond the BAL NC basic requirements. The base case model should be considered as the default information provision model of the BAL NC. The code also allows for some deviations from the “base case” (“variant 1” and “variant 2”). Variant 1 and variant 2 models are, progressively, less advanced models than the base case.

138 Both for daily metered and for non-daily metered points.

139 Both for daily metered and for non-daily metered points.

- 190 At GPN updates on non-daily metered customers are provided 5 times per day, the limited volumes of within-day liquidity reflect the size of the market and the level of TSO intervention shows a balancing market on its trajectory for a more market-based approach. At NBP, updates and forecasts¹⁴⁰ are provided 4 times per day, and final allocations are provided 15 days (for entry points) and 5 days (for exit points) after the end of the month. NBP registered the highest market within-day trades in 2016 among the balancing zones selected for this analysis, and almost no TSO intervention.
- 191 All those balancing zones seem to set best practices in terms of information provisions, especially the Netherlands, BeLux and France given their frequent and almost real time updates. In terms of volumes of short-term trades, the Netherlands and the UK register the highest volumes among the balancing zones analysed. However, it must be noticed that the level of short-term liquidity in a zone mainly transcends balancing *per se*¹⁴¹.
- 192 Given the small sample, it is not yet feasible to draw hard conclusions from this analysis on the efficiency of balancing systems. However, it transpires that, in terms of the role of TSOs as intended by the code, in some systems they seem to play a more residual balancing role. Starting from the next edition of the MMR, the analysis will also include those balancing zones where the NC was implemented by October 2016.

4.2.3 Benchmark of cross-border tariffs.

- 193 The network code on harmonised transmission tariff structures (TAR NC) was adopted in March 2017. The code proposes a more homogenous approach to gas transportation tariffs and has transparency and cost-reflectivity¹⁴² at its core. Besides enhancing transparency, the code is likely to alter tariff levels at numerous EU cross-border IPs in the future; as tariff values drive (in part) IPs capacity utilisation and have also an impact on spread levels between hubs¹⁴³; therefore a key future market effect of the TAR NC could be linked to changes in tariffs/flow and locational spread patterns.
- 194 Tracing the evolution of cross-border tariffs is therefore of utmost relevance. The TAR NC establishes that all charges are to be published on ENTSOG's TP in a standardised manner. Also, in accordance with the code, a simulation of all the costs for flowing 1 GWh/day/year at any IP is to be provided. However, this will be effective only for the gas year 2018¹⁴⁴. Therefore, and in preparation for monitoring its market effects, the Agency has calculated for the last three years the tariff values per border side. The situation for 2017 is displayed in Figure 31.

140 For daily metered points, because the GB transportation grid does not have non-daily metered points.

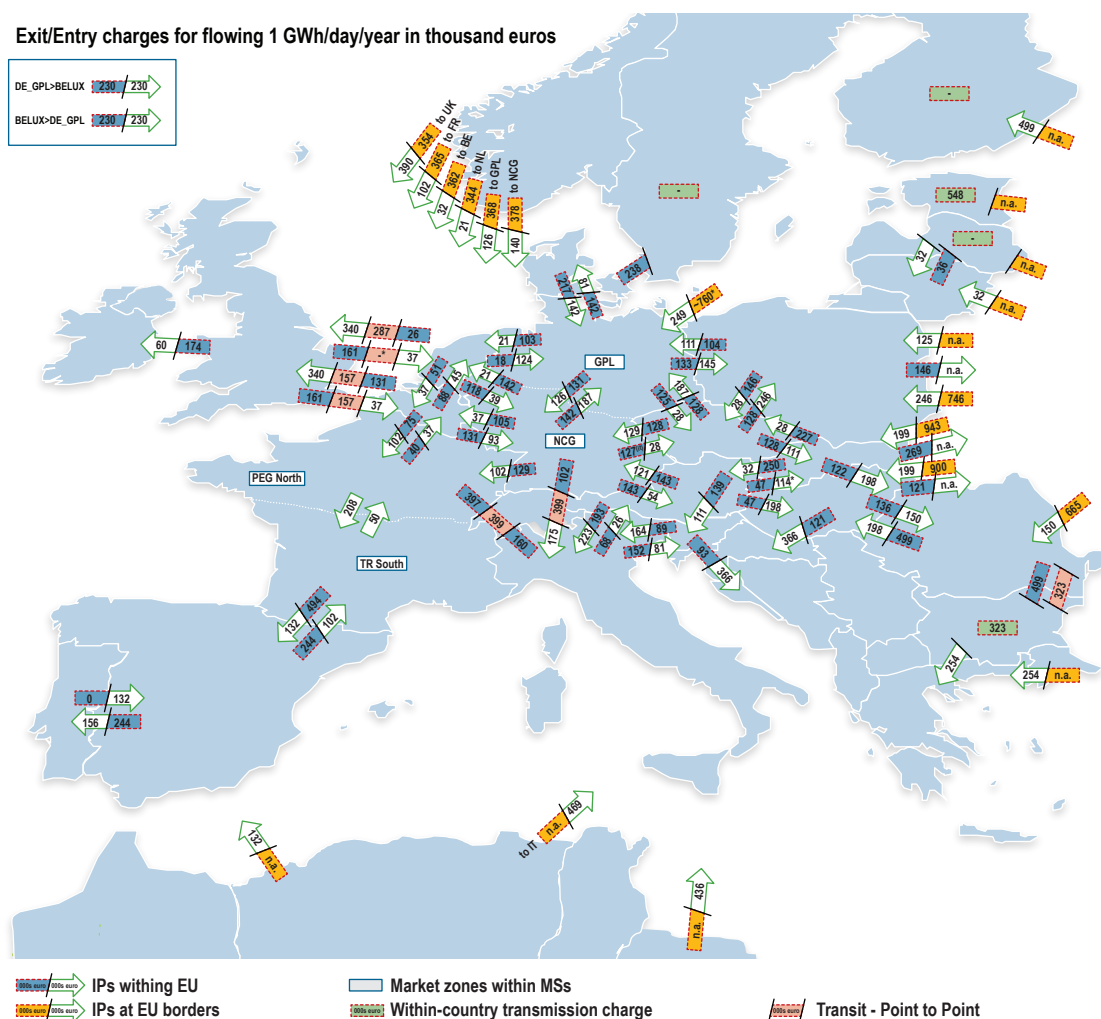
141 Other factors influencing the levels of short-term liquidity in a market or balancing zone are for example: the market economics and fundamentals, if a hub is a first mover, the presence of infrastructure, the presence of physical and contractual congestions, the absence of barriers in wholesale markets (e.g. excessive and unclear regulation, absence of political support, lack or not enough transparency).

142 Tariffs reflect individual regulatory choices and are a function of differing network drivers, and as such they can vary significantly across EU cross-border points.

143 See, for example, an assessment of the topic in the REKK CESEC tariff benchmarking study. See: footnote 44. Section 4.1.2 discussed in detail the relationship between tariffs and spreads.

144 The code transparency provisions enter into force in October 2017, but will be effective prior to the annual gas auction, which takes place in March for the gas year 2018-2019. Moreover, the re-calculation of the tariffs in accordance with the cost-allocation models determined by the code may not enter into force until 2021.

Figure 31: Benchmark of average gas cross-border transportation tariffs – April 2017



Source: ACER based on ENTSOG, and individual TSOs (2017).

Notes: See Annex 1 for a clarification of the methodology and important notes.

4.2.4 Assessment of potential welfare gains

- 195 The implementation of NCs should contribute to enhanced cross-border competition and EU gas markets' integration. This should have a positive impact on MSs sourcing cost differentials. On the basis of the sourcing price levels shown in Figure 18, an assessment of the gross welfare losses at EU level is made. The exercise provides a theoretical estimate of the potential savings that could be achieved if all suppliers' in the EU had comparable gas sourcing costs as the TTF hub¹⁴⁵.
- 196 The gross welfare losses in 2016 reached a level of 3.5 billion euros¹⁴⁶. Estimated losses have decreased significantly - by more than 60% - since the Agency started this analysis in 2012. This improvement has been due mainly to four factors: demand reduction, incorporation of hub price indexation elements in long-term gas contracts, the drop in oil prices, and improved price convergence among EU hub products.

145 See MMR 2014 Section 5.3.3 for further clarifications of the methodology.

146 For some MSs, several sourcing mechanism are considered; see Figure 18. For several market areas, and/or for some of those sourcing mechanisms, prices moved below the TTF reference during the year. Therefore, gross welfare losses are delimited within a range, depending on the combinations considered.

- 197 This analysis, which is largely more theoretical in nature, disregards multiple factors such as contractual obligations, potential storage, demand-supply constraints, transportation costs and capacity availability. If the gross welfare losses analysis were to be calculated using a one-size-fits-all hypothetical transportation tariff fee of 1 euro/MWh, even considering sufficient capacity to source gas demand from TTF (or at a similar price) elsewhere, welfare losses would drop to around 1 billion euros¹⁴⁷.
- 198 Building on these results, a related analysis consists in looking at the net welfare gains that could be captured by optimising the available IP cross-border capacities by exploiting wholesale price spreads between markets. The hypothesis is that companies sourcing gas in lower-priced market areas have an incentive to acquire capacity and expand their sales business into adjacent higher-priced gas zones. The facilitation in capacity acquisition that the CAM and CMP NCs offer should be beneficial to achieve this. Over time, this increased level of competition would result in increased convergence among EU suppliers' gas sourcing prices, hence delivering welfare gains to final consumers.
- 199 These calculations are somewhat theoretical¹⁴⁸, in nature as suppliers' ability and willingness to compete in adjacent areas could be challenging. A shortage of proper and flexible enough sourcing mechanisms to purchase gas at lower price markets, a lack of a suitable granularity of capacity contracts and/or variable transportation costs per product duration or the lack of sufficiently liquid organised markets and/or of trading counterparties are all possible factors¹⁴⁹.
- 200 The results show that if all physical unused capacities were used following sourcing costs gap signals – after discounting annual transportation charges – aggregated EU net welfare gains would amount to less than 0.4 billion euros, even assuming that the pricing strategy¹⁵⁰ adopted by market entrants foregoes any profit taking. If the analysis were performed on the basis of available contractual capacity or on the basis of capacity available over peak monthly utilisation, the net welfare gains would be even lower. The level of estimated net welfare gains reveals that MSs sourcing prices are significantly converging and that the remaining price gaps may not always be enough to cover for the transportation charges.

147 The use of a one-size-fits-all hypothetical tariff fee is a theoretical assumption. As a real case illustration, the cost difference between sourcing gas from the TTF and PSV hubs is estimated at a range of 1.1 to 1.8 euros/MWh in 2016, meanwhile, the actual transmission charge (yearly capacity product) is around 2.3 euros/MWh. In any case, if the gas sourcing cost gap is less than the transmission tariffs, this does not imply that price convergence has been achieved.

148 See MMR 2014, Section 5.3.3., for further details on the methodology. IPs physical capacity utilisation figures were obtained from IEA statistics. See: <https://www.iea.org/gtf/>. ENTSOE TP data were not fully complete for a significant number of IPs. Note that the exercise is based on physical reported flows, not on nominations.

149 Moreover, the potential displacement effect on initial sourcing prices in one area if purchased volumes change is an element not considered in this hypothetical exercise.

150 The pricing strategies of the new entrants' affect the total level of assessed EU welfare gains: in this sense, new entrants' profits constitute in this sense a transfer to suppliers from the theoretical EU maximum gains.

5. Barriers in gas wholesale markets

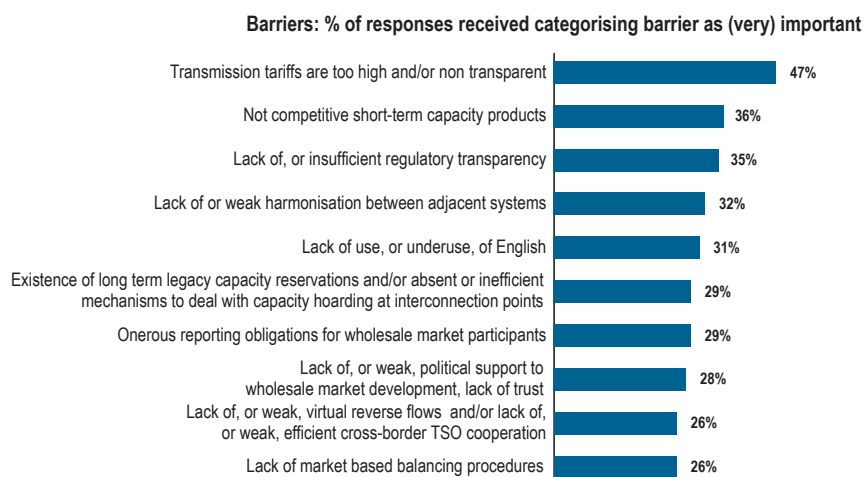
201 This chapter is based on the results of a survey conducted by a consultant among market participants - chiefly shippers and traders - during October-December 2016. The questionnaire covered all MSs and probed for remaining barriers in gas wholesale markets. The outcome of the survey encompasses trading aspects, markets' accessibility and even retail competition barriers, as they all have close links with the functioning of gas wholesale markets. The report presenting the results of the survey can be downloaded from the Agency's website¹⁵¹. The goal of the survey was to complement the MMR analysis and assess what challenges remain on the path to the IGM.

202 In this chapter, clarity is provided on the main barriers that persist in the EU gas market, with the survey being one input. It is closely linked to analyses conducted for the other chapters of the gas wholesale volume.

5.1 Overall conclusions drawn from the survey

203 The generally shared opinion among stakeholders is that gas wholesale markets are functioning better and better, although there are still barriers in all MSs that hinder their functioning. Figure 32 presents an overview of the main barriers across all MSs, as identified by the respondents in the survey.

Figure 32: Overview of main barriers as cited by market participants



Source: Kantor report on Barriers in gas wholesale markets survey.

204 It is worth noting that market participants do not seem to put the overall EU gas wholesale regulatory framework into question. They are also of the opinion that the implementation of secondary legislation, i.e. the gas network codes, is progressing. Many barriers and comments relate to 'rule level' types of regulation or administrative requirements, often linked to very specific situations in individual MSs. Needless to say, however, that these barriers can indeed have an important impact on the activities of market participants.

205 Another interesting observation is that similar barriers seem to be recurring in most MSs, although their intensity or severity differ by MS. A clear example concerns stakeholder involvement processes. Whereas in some MSs stakeholders call for longer response times or for the involvement of more players in the process, in other MSs the severity of the problem is greater, going from lack of clarity in the set-up of, for example tariff methodology, to the absence of a stakeholder process at all.

- 206 A clear distinction of the type of barrier can be made according to the level of hub development. Where hubs are illiquid or incipient, other barriers are seen as more prevalent (see Figure iii in the Executive Summary). In advanced or emerging hubs, the barriers relate more to how market functioning can be further enhanced, while in some illiquid hubs market areas the focus is still centred on how to kick-start market functioning.
- 207 This would concur with the message that gas wholesale markets work better and better, although the actual state is MS-specific and the gap between better and worse performers is still significant. The state of market functioning as also described in previous MMRs seems to be reflected in the results of the survey.
- 208 There is also a call further to build and refine gas market rules, where needed, so as to advance market functioning. Noteworthy in this respect is that this should be done at the EU and / or regional level. National market-focused approaches in an IGM context usually do not yield the right answer when the free flow of gas or sufficient levels of competition across the EU is in question. Consumers are better served when a regional mind-set and approach are taken into account.

5.2 Review of main barriers

- 209 This part attempts, where feasible, to link barriers highlighted by market participants with the results of the analysis presented on other parts of the MMR. This will be done in a non-exhaustive way. Given the European nature of this report, national challenges raised in individual MSs (e.g. licensing) are not covered. NRAs can cover these in their national monitoring and address them where appropriate. Other barriers like 'a lack of use of English' are not quantifiable, but it is common knowledge that access to critical information in English increases transparency.

INSTITUTIONAL

- 210 Weak political support for gas wholesale market development is the most fundamental concern in some MSs with illiquid/incipient hubs, as this might be to the benefit of incumbents. Its clearest and most dramatic expression is the lack of some of the most essential legislative building blocks of the Third Package. For example, in Bulgaria and Romania, the entry/exit system has not been implemented yet and in the same MSs, but also in Greece, a VTP is not in place.
- 211 Regulated end-user prices are believed to distort the gas wholesale market. Progress to eliminate them can be slow and the lack of a functioning wholesale market may be used as an argument not to liberalise the retail market. In those MSs where prices are not or barely cost reflective, this often transcends purely energy policy concerns¹⁵².
- 212 As a whole, and as it is evident from this report, MSs where there is little political support for liberalisation tend to perform weakly overall on all dimensions of gas wholesale markets functioning. In these MSs, many AGTM metrics (e.g. trading metrics) cannot still be calculated, as a hub has not been established yet. Moreover, and related to this, limited progress can be observed in these MSs over the years – and this year's MMR confirms this. Thus, the gap with the other MSs (e.g. in terms of volumes traded on hubs, diversity of gas supplies) is becoming wider. For some MSs, the engagement with the EC, ENTSOG and the Agency could unlock the process.
- 213 Insufficient regulatory transparency is a recurrent theme in the survey. Several transparency issues at NRA level were highlighted affecting many MSs to various degrees: i) unduly short consultation periods or the absence of a minimum notice period; ii) the application of different periods and procedures for different consultations; iii) NRA and or TSO not publicly consulting amendments to network codes other than with a limited number of associations; iv) NRA and or TSO sharing network amendments with one association before consulting them with the public¹⁵³. Some 'extreme' cases were also highlighted, where consultation on important topics is rarely held or is held over very short periods¹⁵⁴.

152 See retail volume of the MMR covering 2015.

153 Examples provided for the different categories were: i) e.g. Austria, Belgium, Bulgaria, Hungary, ii) Italy, iii) Netherlands, iv) Germany, v) Czech Republic, Poland, Slovakia.

154 E.g. in Latvia, Bulgaria (where transportation contracts are amended by the TSO without consultation/negotiations with market participants), Greece and Slovakia.

- 214 In this respect, the UK system tends to be seen as best practice, as, for example, any market participant can submit proposals at any time to amend and improve the network codes, thereby setting up a continuous and efficient dialogue between TSOs, the NRA and market participants. Efforts by NRAs and TSOs to publish as many decisions as possible in English also help, but only in a majority of MSs does this occur in a systematic way.
- 215 The feedback provided by the survey should be set against the limited means provided to several NRAs¹⁵⁵ or legal restrictions. In some MSs, the usage of another language apart from the national one is administratively not allowed. However, the publication of such documents in English under a banner that it carries no legal weight should be an option to pursue. Some NRAs appear to be underfunded, so they may face challenges in providing easy access to up-to-date information on, for example, a website, or as a result lack the means to organise a fully-fledged stakeholder process for all their decisions. However, NRAs and the Agency should further do what is in their power to enhance regulatory transparency.
- 216 Respondents to the survey also call for enhanced levels of cooperation among NRAs and TSOs, as well as regional cooperation. In an EU energy market, which is increasingly transnational in nature, gas topics should be looked at through a regional lens (see also last year's MMR recommendations¹⁵⁶). A purely national regulatory approach does not necessarily result in the best deal for consumers. This comes to light most clearly on cross-border issues, where NRAs should ensure alignment between adjacent systems.
- 217 While market participants raise concerns about regulatory transparency, they are called upon to use means already at their disposal. Stakeholders can already directly contribute to transparency via specific channels. The Functionality Platform¹⁵⁷ is a case in point. It was launched a year ago by the Agency and ENTSOG. It allows any stakeholder, not just European associations, to submit issues regarding the implementation of Network Codes and Guidelines. However, the Platform has not been used so far.

NETWORK CODES

- 218 A recurrent topic is transportation tariffs. Stakeholders claim that they could be set in a more transparent manner¹⁵⁸, especially when they are deemed too high. The discussion on tariff is intertwined with the expiry of long-term contracts and the uncertainty this may create around the future remuneration of TSOs. This MMR is not the place for elaborating on future levels of tariffs on which various proposals are circulating (e.g. the 'Quo Vadis' study contracted by the EC¹⁵⁹).
- 219 From a monitoring perspective, an indication of the economic relevance of cross-border tariff levels can be derived from comparing them with hub spreads. Section 4.1.2 deals with this aspect: when tariffs exceed hub spreads, there is no incentive to book new capacity and entering into arbitrage trades. Also, as Section 4.2.1 proves, there is at present ample capacity available on many EU IPs, so from the market perspective the actual value of short-term capacity is low¹⁶⁰. However, one should take into account that the TAR NC foresees a transition period for lowering the multipliers for short-term capacity products. Hence, it may take some years before they are brought to these lower levels (if MSs strictly follow the transition timing).
- 220 The Agency agrees with the view of market participants that long-term contracts do not constitute a barrier to market access or development if effective market-based CMPs are implemented. The needs of hedging and the attractiveness of long-term contracts against the risk of higher short-term multipliers are some of the factors behind the typically large share of long-term contracts in a shipper's portfolio. As long-term contracts are part of the shippers' hedging strategies, short-term multipliers should not prevent the short-term utilisation of capacity,

155 See: <http://www.acer.europa.eu/Media/Press%20releases/ACER%20PR-05-16.pdf>.

156 See: http://www.acer.europa.eu/Official_documents/Acts_of_the_Agency/Publication/ACER%20Market%20Monitoring%20Report%202015%20-%20KEY%20INSIGHTS%20AND%20RECOMMENDATIONS.pdf.

157 See: <http://www.gasncfunc.eu/>.

158 In general, an increase in transparency levels in tariff settings was requested by all participants for all MSs, in terms of the elements for the tariffs setting (Austria, Bulgaria, Slovakia), amounts and forecast of additional charges to transportation tariffs (Italy, Germany), information on tariff methodology (Bulgaria, Greece, Romania), and further efforts to attain NRA's full independence for tariffs approval (Spain).

159 See footnote 6.

160 However, there are other elements that define what the level of a cross-border tariff ought to be, i.e. fair TSO remuneration.

as this discourages short-term optimisation and price convergence at times when shippers are increasingly less likely to book long-term products.

- 221 While lower demand makes IPs' congestion less likely, market participants do have questions about the implementation of the CMP Guidelines. As explained in Section 4.2.1, the lack of implementation and suboptimal coordination of CMP measures and the lack of a commercial approach by TSOs that would help shippers maximise the usage of already booked capacity seem to constitute the main challenges. At those few IPs where contractual congestion is registered, the already foreseen increase in physical capacity is likely to eliminate it, while at just few of the congested points CMP GLs still have to be implemented. It is worth noting that, even though no contractual congestion was registered in the Netherlands in 2016, most market-based CMP measures in the form of the oversubscription and buy-back procedures are implemented there and account for 93% of EU volumes.

TSOS

- 222 There is also a call for enhanced levels of cooperation among TSOs, in particular at regional level. Contractual congestion is registered at a few points in Europe. However, even where CMP measures have been implemented, one of the most important barriers in gas trading consists in the different ways in which these measures are implemented by different systems at each IP side. This approach makes the CMP measures themselves less effective.
- 223 Another barrier experienced by market participants is the obstacles posed by the TSOs to the secondary trading of capacity; this happens in different ways: via the non-flexible procedures and timings for the release of capacity to the TSOs into the primary auctions and via the non-flexible procedures for approving bilateral secondary trading of capacity. In the latter case, the examples of the TSOs in Great Britain, the Netherlands and Belgium are given as benchmarks, as the transfer of capacity is almost instantaneous.
- 224 Further cooperation could also be envisaged regarding the calculation of capacity to be offered and on the bundling of capacity, as the CAM NC has been designed for different market conditions, and today there is a challenge to bundle capacities on many EU borders due to historical contracts¹⁶¹. The amendments to the CAM NC, whose effects will be observed starting from 2018, are deemed to help improving the situation.
- 225 Further examples were provided on the different degrees of implementation by TSOs, LSOs (LNG system operators) and SSOs (Storage system operators) of the gas regulation on transparency (type of data, their frequency and reliability). It was acknowledged that the transparency provisions of the gas regulation are implemented in all the MSs, but not with the same quality levels and, as such, with a lot of discretion. Lack of publication of some data even though at times not required by the NC (e.g. within-day flows, balancing information) by several TSOs¹⁶² and low accuracy of data are noted¹⁶³, or, in some cases, data are published but are difficult to read and/or only in the national language¹⁶⁴. In other MSs, no information on gas flows was published for several months¹⁶⁵, or information on services provided by infrastructure operators is not transparent.
- 226 To overcome these differences, it was suggested to publish more accurate transportation data on the ENTSOG TP and to make it mandatory to publish accurate data on storage and LNG facilities on GIE AGSI+ and on GIE ALSI, respectively¹⁶⁶.
- 227 Another challenge is the low transparency concerning the evolution of technical capacity calculated and offered by the TSOs. Participants suggest a more transparent discussion with stakeholders on how technical capacity is determined.

161 In 2017, ENTSOG is working on a capacity conversion model to address the issue.

162 E.g. the TSOs in Austria, Bulgaria, Croatia, Denmark, Germany, Italy, Ireland, Poland, Romania, Spain.

163 E.g. the TSO in the Netherlands.

164 E.g. the TSO in Spain.

165 E.g. the TSO in Hungary.

166 At present, the publication of such information is voluntary.

5.3 Overcoming barriers

- 228 It is clear from the above that a perceived barrier can have different implications for market participants. Either the barrier is such that it hinders competition and deters companies from entering that market, or even makes existing players leave. This works to the detriment of the end-consumers. Alternatively, the barrier poses a challenge to the execution of normal business activities, but still allows for (some level of) competition in that market.
- 229 Barriers that hinder market entry should be tackled as a priority, as these will have the main impact on the functioning of gas wholesale markets. Admittedly, these may be the most challenging for a MS to address. In this group the following critical barriers can be noted: weak political support for Third Package implementation, lack of a VTP, lack of an entry-exit system, existence of regulated end-user prices, inability to book gas storage capacity, and lack or insufficient implementation of NCs and GLs. Overcoming any of these will kick-start a functioning wholesale market, or give it a much needed boost.
- 230 The other group of barriers include weak transparency on transport tariff setting, weak regulatory and market operators' transparency, weak cross-border/regional cooperation among TSOs and/or NRAs, and lack of alignment of adjacent systems. Addressing any of these barriers will further enhance the existing level and depth of competition in the gas wholesale market.

Annex 1: Methodology and notes for the tariffs benchmark exercise

This annex clarifies the methodology and the important notes of Figure 31: Benchmark of average gas cross-border transportation tariffs – April 2017 and was executed using publicly available data and in close collaboration with ENTSO-G and TSOs who have validated most IPs charges.

Charges for simulated flows were estimated on the basis of a yearly duration firm capacity contract signed in April 2017, using units of measurement published by TSOs. In those cases when tariffs units were not published on a yearly basis and/or they differ per period length, direct conversions were performed. The assumption is made that the gas energy content is flown continuously though the yearly period¹⁶⁷. The tariffs reflect individual regulatory choices by MSs, for instance in terms of allowed total TSO revenues, regulatory rates of return, and valuation of the regulatory asset base. Any network tariff will always be a function of potentially differing network cost factors, such as network size (length/distance), configuration, maximum capacity, flows, topology, density, and other structural or regional factors. They are also a function of possibly diverging national cost allocation policies, which are at the moment being coordinated through the TAR NC. Cross-border tariff variability across Europe is not in itself a cause of concern, provided that tariffs result from a fair and transparent calculation mechanism.

The exercise is performed on the basis of the Entry/Exit tariff model, in place in most EU MSs. In addition, the map also includes the MSs with transportation tariffs comprising the service of cross-border entry into the MS plus the exit within the MS. Transit is signposted for IPs applying point to point charges for flows between borders (e.g. across Switzerland). Tariffs do not reflect different purchasing power and, for those countries not in the Euro area, they are exposed to currency fluctuations.

The simulation as shown on the map includes published commodity and capacity charges that represent the greater part of final costs. Other charges may not have been consistently included for all IPs – e.g. aspects as gas quality conversion, metering, odourisation, supplements linked with the balancing rules or with the quality of nominations or others.

At those market zones borders featuring more than one cross-border IP - but with dissimilar tariffs - a single charge was appraised per border as the weighted average according to offered capacity per IP and/or distinct TSO. At some zones, for example in and out German market zones cross-border flows may attract different charges depending on the IP and/or TSOs.

In certain instances, more than one TSO may be offering capacity in a given IP where the total aggregated capacity is published but the capacity split among TSOs isn't. The assumption has been made in those cases that capacities are uniformly shared between TSOs. In certain instances differences in tariffs may arise per gas quality (high vs low calorific value). The map does not differentiate this aspect and all calculations are done on the basis of the energy content.

At Slovak IPs only a range of potential E/E tariffs can be provided by the TSO since the final price is a function of booked capacity. The values displayed in the map correspond to maximum possible rates; they could be reduced under a function of capacity bookings. At the BBL interconnector the BBL TSO recovers all costs associated with the Interruptible Reverse Flow - in direction UK into the Netherlands - by means of a fix subscription fee than can be adjusted ex-post. NordStream displayed costs are educated guesses on the basis of market intelligence reports assessments.

¹⁶⁷ E.g. when the entire IP charge is expressed in volume units (e.g. Bulgaria BGN/1,000 m³), and also for the tariff commodity component that several TSOs apply, the assumption made is that the volume equivalent to the simulated energy content (i.e. 365 GWh/year) is flown constantly along the yearly period. This would equal to a capacity load factor of 100%. This supposition leads to an estimation of cross-border charges lowest value. The actual paid charges (for the capacity component) are however impacted by the specific stakeholders' load factors, those being determined by demand distribution and peak values along the period; as a result the definite paid tariffs could be slightly higher than those shown.

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