STUDY ON THE CONDITIONALITIES STIPULATED IN CONTRACTS FOR STANDARD CAPACITY PRODUCTS FOR FIRM CAPACITY SOLD BY GAS TSOs

Final Study

3 April 2019

Contents

Executive Summary

1) Following two decades of structural transformation, the EU gas market is being transformed from a group of national fragmented markets into a single, unified market place. In consequence, entry-exit gas market areas are developing, where gas flows from entry to exit points over networks operated by unbundled TSOs. The TSOs are responsible for offering network access and coordinating with neighbouring TSOs and other operators of gas infrastructure on the basis of a set of harmonized rules. Additional rules have been developed to implement a coordinated planning of network expansion at a pan-European level, in accordance with the strict obligation to offer all technically available capacity to the market, in the form of harmonized bundled capacity products at the interconnection points between adjacent entry-exit areas.

2) This process of market integration has replaced a much older process for the development of bulk transit infrastructure for the transportation of gas from the points of production, mainly in the former Soviet Union and Norway, and the construction of the LNG terminals for the import of LNG from distant production countries. Such infrastructures were mainly developed under long-term, take-or-pay agreements, often supported by intergovernmental agreements. The new regime is based on non-discriminatory regulated third-party access to the infrastructure within an entry-exit capacity reservation regime. Some TSOs have added new investments to their infrastructure, while others have introduced a series of capacity products designed to offer a more limited access to the entry and exit points in order to smooth the transition from the old point-to-point system to the new entry-exit system.

3) As access to firm entry and exit capacity should be non-restricted, the existence of conditionalities in contracts for standard capacity products may raise concerns, as it has never been looked into properly at EU level. To this end, the Agency is required, by the provisions of the NC CAM[1], for the first time ever and by 6 April 2019, to *"…report on the conditionalities stipulated in the contracts for standard capacity products for firm capacity, having regard to their effect on efficient network use and the integration of the Union gas markets…".*

4) The purpose of our Study is to support this obligation of the Agency. Our results may be categorized in four main areas: a) the consistent collection of all technical and financial data related to the existing conditionalities in contracts for standard capacity products in the EU and the provision of an overview of the types of firm products offered and their conditions, including the development of a database which was populated with the corresponding data; b) the analysis of the effect of these products on the efficient use of gas infrastructure and the integration of the Union gas markets, which was performed through the simulation of the major gas market areas in the EU and a specific CBA case study performed for one of them; c) the consultation of market participants on the results of our findings; and d) the provision of recommendations for improvement, following the assessment of the results of the previous steps.

5) Conditionalities stipulated in contracts for standard capacity products appear in the form of dedicated capacity products or in the form of services provided once the booked firm and freely allocable capacity products are bought. However, these products are used only in a limited number of Member States and, in particular, in Germany, Austria and Luxembourg; in other Member States such

[1] O.J. L 72/1, Commission Regulation (EU) 2017/459 of 16 March 2017, establishing a network code on capacity allocation mechanisms in gas transmission systems and repealing Regulation (EU) No 984/2013.

as Ireland, conditionalities in contracts for standard capacity products are designed but not used. In addition, in Belgium, the Netherlands and the UK, TSOs are offering network users services with conditionalities. According to all TSOs interviewed, the rationale for developing products and services that put conditionalities on the use of standard firm capacity is closely related to the maximisation of the existing capacity and/or the avoidance of investments which would be required to implement freely allocable capacity products throughout an entry-exit system. However, the way conditionalities are applied by TSOs differs between Member States.

6) In Germany, almost half of the total capacity at IPs is offered through conditionalities in contracts for standard capacity products (48% of total standard firm capacity offered by German TSOs in the Gas Year 2017/18). The majority of the offered conditional products concern facilitation of transit flows, through dedicated point-to-point conditional capacity products. Utilisation of the conditional capacity products by network users is high, as on average over 80% of the offered conditional capacity is contracted. According to the German TSOs, this situation is not expected to change, as conversion of conditional capacities to the standard firm capacity product would entail a level of investment of almost EUR 10 billion. On the contrary, more conditional capacity products are expected to be introduced in Germany, following the planned merger of Gaspool and NCG entry-exit zones into a single zone, reflecting the preference of German TSOs for such products over interruptible ones or investment in new infrastructure. Although this approach is different from practices followed by other Member States, such as Italy, where the approach of additional investments was used to address bottlenecks of the network and Austria or Portugal and Spain, where the alternative of new investments is used to transpose conditionalities to firm, freely allocable capacity, conditionalities seem to be an acceptable practice for a number of network users. Perhaps this approach could be revisited in the near future, since tools for efficient capacity development have been gradually added to the EU toolbox: for example, the incremental capacity approach and the ability to share the costs for the reinforcement of the capacity related to cross border flows, by coordinated cross border network planning and cross border cost allocation. Conditional capacity products in other countries are either less prevalent (Austria, Luxembourg, Ireland), or not offered at all.

7) All the above conditional products and services stipulated in contracts for firm capacity are offered to network users at discounts, compared to firm and freely allocable capacity. These discounts differ from country to country and from case to case, depending on the characteristics of the network, the legal framework and the probability of the conditionality occurring. However, the issue of discounts is highly sensitive and has raised a series of discussions, as shown in recent consultation processes on the implementation of the NC TAR[2]. Such discussions are further amplified by the wide range of discounts offered for conditional capacity products and services, which, according to the findings of our assessment, may vary between 10% and 50% for conditional capacity products, but may reach 95% for capacity services, as, for example, in the Netherlands. We believe that the discounts offered for such products and services deserve greater consideration.

8) Despite their confined geographical scope around the Central EU gas market area, the wide usage of conditional products, especially in Germany, combined with the restrictions they impose on access to VTPs, have an important impact on gas market operations.

9) The impact of conditional products on the European gas market functioning has been analysed through the modelling of the EU gas market. Our quantitative analysis is based on historical values of

[2] O.J. L 72/29, Commission Regulation (EU) 2017/460 of 17 March 2017 establishing a network code on harmonised transmission tariff structures for gas.

the EU gas market, namely for the Gas Year (GY) 2016, regarding demand and supply patterns and gas prices from various sources. We have performed an analysis based on a reference scenario and a *high demand scenario*, in order to simulate respectively a normal and a tight demand situation of the EU market. We have compared the gas market outcomes for alternative levels of conditional capacity products between the various market areas: the current pattern of conditional capacity products forms the *base case*, against which we have compared a case in which conditional capacity products are removed (capacity reduction), and a case in which they are replaced with firm, freely allocable ones (capacity upgrade). As revealed by the economic modelling of the conditionalities, the areas most affected by the conditional capacity products are the Gaspool area in Germany and the Central Eastern European area, the areas least affected are Iberia and South Eastern Europe, and the remaining areas experience a low-to-moderate impact.

10) The results of our modelling can be described as follows:

- The higher the level of conditionalities, the higher the impact on market results, since, if the capacity offered as conditional is removed, the impact on simulated spot prices, churn ratio and market concentration increases[3]. It is important to note that removing the conditional capacities, e.g. from the German borders, has a high impact also on adjacent market areas, which initially have little or no presence of conditionalities. To this end, imposition of conditionalities is not only a matter for the TSO who asks for it or the relevant NRA, but should be assessed on a regional basis;
- The shorter the market is, the higher the impact of conditionalities, as confirmed by the amplification and reinforcement of all impacts detected under the high demand scenario in comparison to the reference demand scenario, under the same overall supply conditions. This might also imply the need for the consideration of conditionalities in the case of supply disruptions, when assessing regional preventive action plans, according to the provisions of the Security of Gas Supply Regulation[4];
- The replacement of conditional capacity products by firm, freely allocable capacity increases market integration, as indicated both by the increased churn ratio and the stability of the price variability index, when conditional capacity products are replaced by firm, freely allocable capacity products;
- Upgrading of conditional capacity products to firm, freely allocable products enhances the free flow of gas across the borders, leading to the increased penetration of cheaper gas sources to the market;
- The replacement of conditional capacity products by firm, freely allocable products also results in higher liquidity of the market, as indicated by the increase of the simulated churn ratio in the entry-exit areas considered;
- Conversely, if the capacity currently offered as conditional were not offered by the TSOs at all, the resulting wholesale prices would be higher and the market integration indicator, as expressed by the simulated price variability index, would be worse than in the *base case*.

11) Transforming the conditional capacities into firm, freely allocable capacities presents an overall set of benefits, which has then to be compared to the costs that such a transformation implies.

[3] See Figure 44: Qualitative indicators of impact of alternative scenarios on EU internal market indicators.
[4] REGULATION (EU) 2017/1938 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 25 October 2017 concerning measures to safeguard the security of gas supply and repealing Regulation (EU) No 994/2010.

As recommended below, this requires a sophisticated analysis of the costs that are related to such an upgrade, on a case-by-case basis[5].

12) In the light of our analysis above, we propose the following Recommendations related to the conditional firm capacity products.

Recommendation 1. Follow a case-by-case approach

13) The variety of conditional products offered, even in a limited number of countries, shows that such products have been extensively used by TSOs as a means for transition to the new entry-exit regime, without substantial investments for the upgrade of their network. Since both costs and benefits of conditionalities upgrading or removal are highly case specific, we support a careful consideration of them on a case-by-case basis. Our pilot CBA case, based on the project of DZK upgrade at the Italian-Austrian border, found that benefits on EU market are hard to estimate when the conditional products are not fully used, but the analysis is limited to key benefits of capacity upgrading, and does not consider potentially important benefits regarding security of supply, environmental and social impacts. This is in fact a general point: each project may have its own specific benefits, as well as costs; therefore such benefits should be added to those evaluated by the CBA methodology used in this study, though with particular care to avoid any double-counting. This pilot also suggests the need for a more complex approach for cost and benefit evaluation than that adopted within the scope of this project.

Recommendation 2. Improve the procedure for the evaluation of conditional capacity products and related projects

14) Usually, national procedures oblige the TSO, when developing the network planning, to take into account the need to remove bottlenecks from the network, alongside relevant requests of network users for additional capacity. The processes for network planning and development are typically monitored and approved by national regulatory authorities. Upgrading conditional capacity products to firm capacity with free allocability should be part of this network planning and may have significant benefits in some cases, while their existence may allow new market entrants in some others. Beside the pure price related benefits, investments for upgrading products typically entail other potential benefits, notably on security of supply, but also potential costs, like those associated with the local environmental impact of the required facilities. Therefore, we believe that the right framework for such an evaluation should be similar to that of incremental capacity, as outlined in the NC CAM. Network users' preferences should be thoroughly considered by an upgrading or extension of conditional capacity products, including for new IPs.

15) To this end, we recommend an indicative approach, where the TSOs, NRAs, network users, and also the Agency if appropriate, would consider existing conditional capacity products and the needs of the potential users of the network, when evaluating the revision of national development plans. The process should include an in-depth impact assessment of a potential upgrading of the conditional capacity products on all the market areas that would be affected, including CBA and CBCA analyses where appropriate, since the cost for the upgrade in one network may lead to benefits to adjacent networks. Results should be reported and an approach similar to the economic test of Article 22 of the NC CAM should be followed, which would also allow participation of adjacent TSOs of other affected

[5] We need to note that our analysis does not extend to legal issues, such as whether the existence of conditional capacity products is compatible with the provisions of the NC CAM, which we consider out of the scope of our study.

areas in the capacity upgrade required. The whole process should be approved by the NRAs involved and, when necessary, by the Agency, in the case of disagreement by the NRAs or following their request.

Recommendation 3. Verify pricing rules of conditional capacity products

16) One of the most important findings of our study is the substantial discounts applied to all conditional firm products and services offered by the TSOs, as compared to the tariffs for the firm allocable capacity product. Although all TSOs and NRAs informed us that they considered the discounts cost-reflective, very little evidence has been provided. In addition, some of the market participants with whom we communicated have protested against the lack of transparency in setting the corresponding discounts. Since, as our quantitative analysis has revealed, the existence of conditional capacity products in one market area may affect other market areas, even not directly adjacent to it, we consider that there is a strong case for certainty and transparency when discounts on conditional capacity products are calculated and applied, especially vis-à-vis the interruptible products[6]. Finally, discounts on conditional capacity products should follow the common principles of tariff setting, especially by taking account of the avoidance of distortion of competition, in particular across borders.

[6] Again, this analysis is without prejudice to the compliance of offered discounts for conditional capacity products, vis-à-vis the provisions of the TAR NC, which we consider out of the scope of our present study.

Introduction

17) Regulation (EC) No 715/2009 requires the replacement of point-to-point systems in gas transmission with entry-exit systems. The entry-exit system is a market access model which allows network users to book capacity rights independently at entry and exit points, thereby creating gas transport through zones instead of along contractual paths[7]. Full implementation of an entry-exit system has the following key features:

- Decoupled contracting and utilization of capacity at the system's entry and exit points, so that network users can freely use any entry and exit point of the system, and are not obliged to contract specific paths within the transmission system;
- Unrestricted access to the Virtual Trading Point (VTP), for all network users that have booked firm capacity at either an entry or exit point;
- Free allocability[8] of standard firm capacity products, including short-term products (daily, within-day), to access and hence facilitate trading at the VTP.

18) Full access to the VTP, achieved with application of an entry-exit system, is crucial for the well-functioning of the gas market, as the VTP allows gas trading and transfer of gas title virtually within the entry-exit zone (bilaterally or in organized markets, depending on the market's maturity), instead of traditional trading "at the flange" in physical points of the system. To effectively use the entry-exit system, firm capacity products must allow network users to freely book and independently use capacity at entry and exit points. The ability of the users to use any combination of entry and exit points may lead, in some cases, to congestion within a TSO's network, which, in turn, may require investments from the TSO, with the view to accommodating the resulting flows and avoid reducing capacity provided on a firm basis. In some Member States, TSOs are offering conditionalities in contracts for standard capacity products that restricts the firmness[9] or allocability of capacity, at specific network points where offering firm capacity with free allocability would result in system bottlenecks[10]. The aim for this capacity restriction is to maximise the firm technical capacity and avoid large investments that may not be justified by future flows. Certain TSOs (in Austria, Germany, Ireland and Luxembourg) have put in place a range of firm capacity products that have conditionalities upon which firmness or allocability of capacity may be restricted. These products are referred in this Study as *"Conditional Firm Capacity Products"*. The conditional firm capacity products are usually offered at a discount compared to firm capacity that does not restrict allocability. In other cases (Belgium, Netherlands, UK), TSOs offer services which give to network users the possibility to designate balanced flows from specific entry to exit points, usually for transit purposes, instead of using the transmission services provided by the TSO for firm capacity[11]. These services do not constitute separate capacity products; they are offered to network users that have contracted firm, freely allocable capacity, upon their request, and provided that the TSO is able to provide the requested service. Such services do not offer access to the corresponding VTPs, so they do not allow trading at the VTP. Article 38(4) of

[7] Study by DNV KEMA "Study on Entry-Exit Regimes in Gas", 2013.
[8] With the term allocability we refer to the capability of a network user to nominate at any entry and exit points where they have booked capacity, notably without limitations to accessing the VTP.
[9] The term firmness is defined, in accordance with Regulation (EC) No 715/2009, as the gas transmission capacity contractually guaranteed as uninterruptible by the transmission system operator.
[10] In this Study, we may refer to such products as conditional capacity products or conditionalities
[11] In this Study we refer to these services as "non-firm services".

Regulation (EC) No 459/2017 (NC CAM) requires the Agency to report on the aforementioned conditionalities applied by TSOs:

> *Before 6 April 2019, the Agency shall, in the framework of its monitoring tasks, report on the conditionalities stipulated in contracts for standard capacity products for firm capacity, having regard to their effect on efficient network use and the integration of the Union gas markets. The Agency shall be supported in its assessment by the relevant national regulatory authorities and transmission system operators.*

19) In this context the Agency has requested the Consultant to prepare the "Study on the conditionalities stipulated in contracts for standard capacity products for firm capacity sold by gas TSOs" (henceforth: the Study), aiming to conduct a detailed analysis of conditional firm capacity products offered by gas transmission system operators in the European Union. The Study comprises the following four Tasks:

- Task 1: Provide an overview of the types of firm products offered and their conditions
- Task 2: Analyse the effect of these products on efficient use and the integration of the Union gas markets
- Task 3: Consult market parties and organise a stakeholder event to take stock of market participants' views
- Task 4: Recommend improvements

20) The Study comprises three Chapters. Chapter 1 reports the results of Task 1 and 3, Chapter 2 shows the findings of Task 2 (and partially 3), while Chapter 3 shows the results of Task 4. Several technical details on methodologies, instruments and assumptions used to perform the Study are reported in the technical Annexes.

21) In more detail, Chapter 1 is based on the information that has been collected from NRAs and TSOs, and tries to bring a better understanding as to why conditional firm capacity products are used in the EU Member States. The information was collected by performing structured interviews with the EU NRAs and TSOs, on the basis of a questionnaire (to collect qualitative information) and a data request list (to collect quantitative information), both approved by the Agency. To ensure consistency of the information received, the same questionnaire and data request list were used for all TSOs, and the same questionnaire for all NRAs. We interviewed 26 NRAs (excluding Cyprus and Malta), and 48 TSOs, with all interviews taking place in September and October 2018. A detailed list of the stakeholders surveyed is presented in Annex II. The description of each Member State is based on the information received from the NRA and TSOs (through the questionnaire and data request list), review of documents such as the TSO's network code, standard transmission contract and terms & conditions, as well as analysis of quantitative data collected from TSO websites and booking and transparency platforms. Annex I provides a representation of the transit routes resulting from the use of conditional firm capacity products and long-term transit contracts.

22) Chapter 2 assesses the quantitative impact of conditional products on the outcomes of the European gas market and in particular on market integration. The impact is assessed by a quantitative as-if simulation. Our approach in analysing the aforementioned impact is to simulate alternative market scenarios, using each time different capacities for the interconnection infrastructure, as implied by alternative approaches to conditional capacities. In particular we test a *base case*, which reproduces, for each entry-exit area, a share of conditional products over the total firm products offered by TSOs in line with actual ones. Then we have tested two alternative cases in which the capacities offered under conditionalities in the *base case* are removed by the market or upgraded to

firm capacity with free allocability. This Chapter proposes also a framework for cost-benefit analysis of conditionalities upgrading, as a pilot study, for a specific case. The chosen case is focused on the upgrade from DZK to FZK at the entry Arnoldstein on the Trans Austrian Gasleitung (TAG), located in Austria. In particular, the case study addresses the upgrade of DZK entry Arnoldstein to FZK by 11,190,000 kWh/h. The Study also benefited from several comments from NRAs and stakeholders, collected through a workshop and a small survey for network users. NRAs comments are used to enrich consideration throughout the Study, while the methodology and the results of the survey with stakeholders are reported in Annex V.

23) The Chapter 3 draws conclusions and recommendations.

1. Overview of the types of firm products offered, their conditions and their importance per market area and Member State

24) This Chapter provides an overview of the types of firm products offered and their conditions. It is based on the information that has been collected from NRAs and TSOs. The information was collected by performing structured interviews with the EU NRAs and TSOs, on the basis of a questionnaire (to collect qualitative information) and a data request list (to collect quantitative information), both approved by the Agency. A detailed list of the stakeholders surveyed is presented in Annex II.

1.1. Conditionalities on firm capacity products offered by EU TSOs

25) In this Section we identify the Member States in which conditionalities restricting firmness and allocability of capacity are in place, and describe the different types of conditional products and services that have been recently offered by EU TSOs, in the last quarter of 2018.

1.1.1. Overview of firm capacity products

26) Through our analysis, we have identified the cases in which EU TSOs apply conditionalities in contracts for standard capacity products for firm capacity, in the form of dedicated products or services, as well as cases in which the use of capacity may be limited due to the existence of transit pipelines or contracts. On this basis, the EU Member States can be grouped into the following four categories:

I. Member States offering conditional firm capacity products
II. Member States providing non-firm services that affect allocability
III. Member States with dedicated transit pipelines and/or legacy long-term contracts for which the provisions of NC CAM are not applied[12]
IV. Member States without conditionalities currently in place

27) In Figure 1 we map the existence of conditionalities in the EU. Conditional products and services are offered in Western Europe, whereas dedicated transit pipelines and legacy long-term contracts are still in place in Central and South-Eastern Europe. Details on how conditionalities are applied in each Member State are provided later in this Chapter. Annex I provides a graphical representation of the transit routes resulting from the use of conditional firm capacity products and long-term transit contracts.

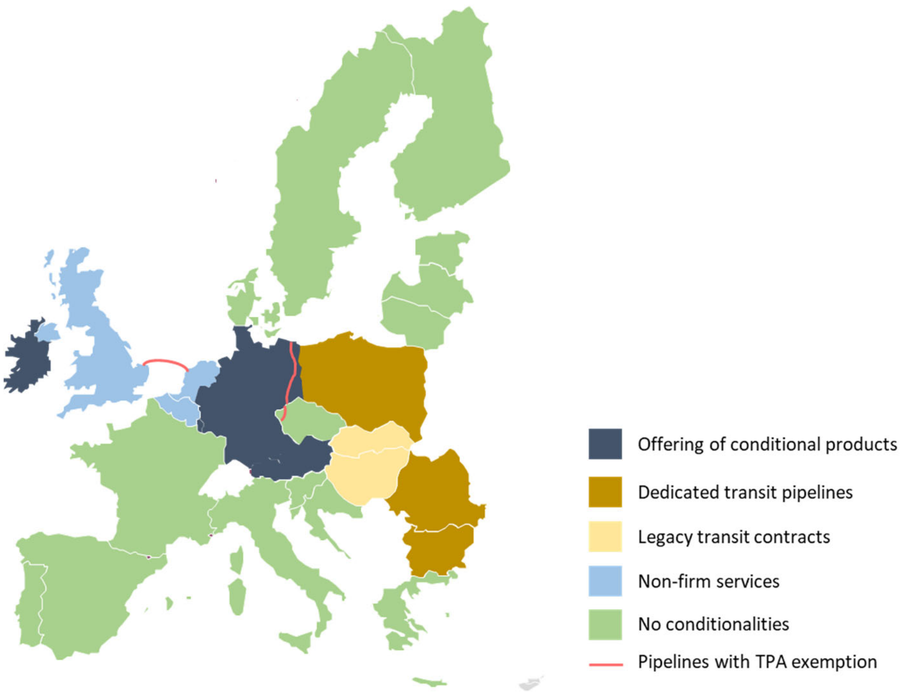
1.1.2. Offering of firm capacity with free allocability

28) The majority of EU TSOs are offering firm capacity with free allocability[13], at all or some of their interconnection points with neighbouring EU Member States[14]. Firm capacity with free allocability (FZK) refers to the basic firm capacity product that guarantees the possibility to use the contracted capacity under all normal operational conditions (excluding only predefined cases of

[12] Not including cases in which transit pipelines are fully applying the entry-exit regime and transmission contracts are fully in line with NC CAM, or cases in which exemption to third-party access has been provided by the pertinent authorities, in accordance with Directive 2009/73/EC.
[13] TSOs that are only offering firm capacity with free allocability define it as "firm capacity". For reasons of clarity and consistency, we refer to this product as firm capacity with free allocability throughout the Study.
[14] With exception of Creos (LU), Fluxys Deutschland (DE), LBTG (DE), NEL (DE) that only have conditional firm products in place at their IPs, as explained in Section 1.2.1.

emergency), and provides allocability of the capacity without restrictions. The interviews with TSOs have confirmed that, in accordance with the standard transmission contract, under normal operation of the system the firm capacity with free allocability is not restricted in any situation.

Figure 1: Application of conditionalities in EU Member States in 2018



1.1.3. Restrictions in firmness and allocability

29) Through our survey with the NRAs and TSOs, we have identified the following firm products restricting firmness and allocability being offered in the EU[15]:

- Conditional firm capacity with free allocability (bFZK): Capacity product that restricts the possibility to use the contracted capacity to a set of predefined external conditions (related to temperature or physical gas flows within the network). Any additional capacity is offered on an interruptible basis. Allocability of the conditional capacity is provided without restrictions. The bFZK capacity product is applied as firm with free allocability, as long as the conditions of interruption are not applied.
- Firm capacity with dynamic allocability (DZK): Capacity product that guarantees the possibility to use the contracted capacity at the corresponding entry or exit points, under all normal operational conditions (excluding only predefined cases of emergency), but allocability depends on whether there have been appropriate capacity assignments[16] at one or more physical exit or entry points of the system, which have been predetermined by the TSO. Any additional use, including additional accessibility to the Virtual Trading Point, is offered on an

[15] It is noted that the abbreviations of the German TSOs for conditional products are used in the Study, as these abbreviations are commonly understood by TSOs and stakeholders in the EU.
[16] Appropriate capacity assignments refer to the network user having balanced nominations at the entry and exit points designated for the use of the DZK or BZK product.

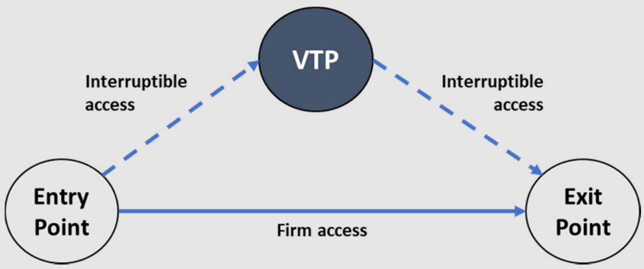
interruptible basis. The DZK capacity product offers point-to-point[17] use of capacity on a firm basis for specific entries and exits of the system, and use of capacity on interruptible basis for all other network points, including the VTP. Details on the application of the DZK product are presented in Box 1.

- Firm capacity with restricted allocability (BZK): Capacity product that guarantees the possibility to use the contracted capacity at the corresponding entry or exit points, under all normal operational conditions (excluding only predefined cases of emergency), but allocability depends on whether there have been appropriate capacity assignments at one or more physical exit or entry points of the system, which have been predetermined by the TSO (i.e. specific entry-exit routes at which BZK products are available have been defined by the TSO). Any additional use, including access to the VTP, is not possible. The BZK capacity is a point-to-point use of capacity on a firm basis for specific entries and exits of the system, with restrictions to access other network points. Details on the application of the BZK product are presented in Box 2.

Box 1: Application of DZK capacity product

The DZK capacity product is a product that allows transportation of gas on a firm basis between a combination of an entry and exit point (interconnection points or other types of network points) that have been predefined by the TSO. Deliveries to or withdrawals from other points of the system, including the VTP, are allowed on an interruptible basis (Figure 2).

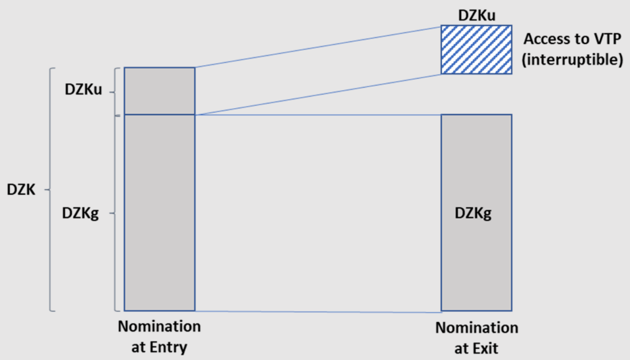
Figure 2: Illustrative example of DZK flows



The use of the DZK product for an entry-exit combination is as follows. The injection on a firm basis at the entry point is allowed with a matching withdrawal at the allocated exit point (“allocation constraint") and the withdrawal at the exit point is allowed with a matching injection at the allocated entry point (“allocation constraint“). Injection at the entry point without the corresponding withdrawal at the allocated exit point or a withdrawal at the exit point without the corresponding injection at the allocated entry point is available on an interruptible basis. The TSO has the right to interrupt the transportation service wholly or partially, if the allocation constraint at the entry or exit points is not met. The firm DZK share (DZKg) shall be the minimum nomination at the entry and exit point. The interruptible DZK share (DZKu) shall be the difference between the DZK share and DZKg. Consequently, the VTP will be accessible on an interruptible basis for the DZKu share of the DZK (Figure 3), i.e. the TSO reserves the right to restrict, partly or fully, the use of DZK capacity to access the VTP, and allow only balanced DZK nominations for the predefined entry-exit combination.

[17] In this Study, the term “point-to-point” is used to indicate the difference between conditional products / services and freely allocable firm capacity. It refers to products and services for which the TSO has predefined a combination of an entry and an exit point (without however defining the exact route between the entry and exit point).

Figure 3: Illustrative example of DZK application



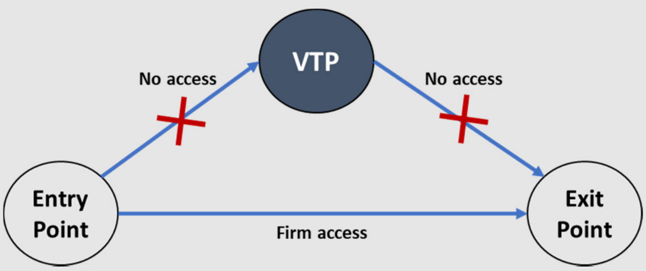
Thus, the TSO does not need to ensure that full FZK capacity is granted, but reserves the right of interrupting flows to IPs and domestic exit points whose capacity has been sold as DZK. Network users may still sell at such points or at the VTP but run the risk of interruption, which could force them to mobilise other spot supplies, probably at significantly higher costs, including from storage.

This does not follow the normal functioning of the entry/exit system, the booking of entry capacity automatically grants access to the VTP, where gas can be traded and allocated (by the buyer in case of trades at VTP) to whichever exit points, both at borders and within the market area. Therefore, in fully functional entry-exit systems entry is booked separately from exit, possibly by different network users, and no condition is attached to the booking of any entry point capacity.

Box 2: Application of BZK capacity product

The BZK capacity product is a product that only allows transportation of gas on a firm basis between a combinations of an entry and exit point (interconnection points or other types of network points) that have been predefined by the TSO. No deliveries to or withdrawals from other points of the system, including the VTP, are allowed (Figure 4).

Figure 4: Illustrative example of BZK flows



The use of the BZK product for an entry-exit combination is as follows. The injection on a firm basis at the entry point is allowed with a matching withdrawal at the allocated exit point ("allocation constraint") and the withdrawal at the exit point is allowed with a matching injection at the allocated entry point ("allocation constraint"). If the allocation constraint at the entry or exit points is not met, then the TSO has the right to adjust the injection or deliveries, following the "lesser rule" or fully restrict the transportation of gas (depending on the TSO's terms and conditions for the transportation service).

As in the case of DZK, this does not follow the normal functioning of the entry/exit system, since it provides only a point-to-point services to the network user.

30) Table 1 provides an overview of the offered conditional firm capacity products in the EU.

Table 1: Overview of conditional products and services

Product/Service	Conditionalities	Typical rationale of provision	Offering TSOs (all network points[18])	Offering TSOs (at IPs)
Conditional firm capacity with free allocability (bFZK)	Capacity usage restrictions apply under temperature and flow conditions in the network (pre-defined by the TSO or qualitatively defined by the TSO)	Technical restrictions in the transmission system affecting operation and security of supply	▪ **DE** (Fluxys TENP, GRTgaz Deutschland, Gastransport Nord, Nowega, ONTRAS, OGE, Thyssengas) ▪ **LU** (Creos)	▪ **DE** (Fluxys TENP, GRTgaz Deutschland, Gastransport Nord, Thyssengas) ▪ **LU** (Creos)
Firm capacity with dynamic allocability (DZK)	Firm only if nominated equally from a predefined entry to a predefined exit (otherwise interruptible). Access to VTP may be interrupted by TSO	Designed to facilitate flows to specific exit points (e.g. power plants), while allowing access to the VTP, when connectivity between TSOs of the same market area is limited (particularly useful provision for exits to power generation)	▪ **DE** (Fluxys Deutschland, NEL, Gascade, GRTgaz Deutschland, Gastransport Nord, LBTG, ONTRAS, OPAL, OGE, terranets) ▪ **AT** (Gas Connect Austria[19], TAG)	▪ **DE** (Fluxys Deutschland, NEL, Gascade, GRTgaz Deutschland, Gastransport Nord, LBTG, ONTRAS, OPAL) ▪ **AT** (Gas Connect Austria, TAG)
Firm capacity with restricted allocability (BZK)	Restricted only to point-to-point usage, for predefined network points, without possibility to access the VTP	Allows transit flows between specific points, avoiding creation of bottlenecks in the system	▪ **DE** (Fluxys TENP, Gasunie Deutschland, ONTRAS, OGE) ▪ **IE** (GNI[20])	▪ **DE** (Fluxys TENP, Gasunie Deutschland, OGE) ▪ **IE** (GNI)

31) Furthermore, non-firm services that are being provided by TSOs, as a means for network users to transport gas point-to-point, by designating balanced flows from specific entry to specific exit points, include shorthaul, wheeling and operational capacity usage commitments[21]. These services share some common characteristics:

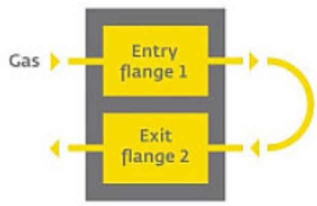
- A network user may request these services only after having booked firm capacity with free allocability at the designated combinations of entry and exit points;
- The nominations for the use of these services are distinct from those for the standard transmission service. Nominations at entry and exit combinations have to be balanced.
- Access to other network points and the VTP is not possible. As a result, the services are requested by network users that do not have an interest in trading at the VTP, but rather in the delivery of gas to specific exit points.
- The services are offered at considerably lower prices compared to the standard transportation service.

32) A description of each service is provided below:

[18] Network points include interconnection points, exits to transmission consumers, exits to distribution, entries from production, entry/exits with UGS.
[19] DZK offered by Gas Connect Austria is being phased out, and only few DZK contracts remain.
[20] South-North CSEP IP Exit, at which conditional product is offered has not been commercially used to-date, and therefore Ireland is considered as a country without conditionalities currently in place.
[21] This Study focuses on conditionalities on firm capacity products, and does not explore the issue of user flow commitment agreements.

- Shorthaul[22]: Point-to-point service provided by the TSO in order for a network user to feed gas into a specific entry point and withdraw matching gas volumes from a specific exit point of the TSO's network (including IPs or other types of network points). The distance between the entry and exit points may be a factor for providing the shorthaul service; in the Netherlands the distance is limited to 50 km, while in the UK there are no distance restrictions, although some proposals under consideration include a 60 km limit. Access to the VTP is not allowed; in the UK, network users applying for shorthaul may access the VTP, but in this case they lose the relevant commodity charge discount, while in the Netherlands users applying for shorthaul must provide balanced nominations at the corresponding physical entry and exit points, so access to the VTP is always denied.
- Wheeling: Point-to-point service provided by the TSO to network users for direct transmission of gas between two adjacent interconnection points, located within the same physical connection facility (Figure 5). These facilities constitute single network nodes where several different upstream or downstream TSOs or networks are connected. Wheeling allows network users to move the gas between such TSOs, to transfer gas between different sections of the node or pipeline, and access other parts of adjacent transmission systems and market areas. With the use of wheeling, access to the transmission system and the VTP is not possible.

Figure 5: Schematic representation of wheeling service



- Operational Capacity Usage Commitments ('OCUC'): Point-to-point service provided by the TSO to network users for balanced transportation of gas between predefined combinations of entry and exit IPs. Access to any other network points or the VTP is not possible, as nominations at entries and exits for the use of OCUC have to be matching, or are rejected by the TSO. The service is used by network users aiming to transit gas through the system.

The Table 2 below provides an overview of these offered services.

Table 2: Overview of conditional products and services

Product/Service	Conditionalities	Typical rationale of provision	Offering countries (TSOs)
Shorthaul	Point-to-point service offered separately than capacity (the user needs to book capacity at the relevant points to access the service). A discount on the tariff is applied in case the service is used. Combinations of entries and exits may include IPs or other network points. A distance criterion may be set for the provision of the service, requiring linked	The service aims to facilitate the operation of the system, by providing incentives to network users that seek to transport large loads to nearby points, and avoid economic incentives for these loads to build dedicated pipelines bypassing the system	▪ **DE** (bayernets[23]) ▪ **UK** (National Grid) ▪ **NL** (Gasunie[24])

[22] In the UK also referred to as Optional Commodity Charge.
[23] Bayernets is currently providing a shorthaul service, however it is being offered with the same process as a BZK product (with corresponding booking at the PRISMA Booking Platform). According to BNetzA, this service will be converted to a BZK product.
[24] Expected to be phased out in 2020.

	entries and exits not to exceed a maximum distance (e.g. 50 km in Netherlands, plans for 60 km in UK where no distance limit is currently in place). The user does not have access to the VTP.		
Wheeling	Point-to-point service offered separately than capacity (the user needs to book capacity at the relevant points to access the service). The tariff for wheeling is very low, as it only covers fixed costs of the TSO for providing the service. Predefined combinations of network points with very short distance. The user does not have access to the VTP.	The service aims to provide incentives to network users that wish to deliver and withdraw gas at the same border station, and not to enter the market area	▪ **BE** (Fluxys) ▪ **NL** (Gasunie) ▪ **AT** (Gas Connect Austria[25])
Operational Capacity Usage Commitments (OCUC)	Point-to-point service offered separately than capacity (the user needs to book capacity at the relevant points to access the service). A discount on the capacity charge is applied in case the service is used. The TSO provides the service at combinations of entry and exit IPs. The user does not have access to the VTP.	The service aims to provide incentives to network users that seek to use the transmission system for transit purposes, and not to enter the market area. .	▪ **BE** (Fluxys)

33) Further to the products and services limiting firmness and allocability described above, there are also cases in which long-term legacy contracts and/or dedicated transit pipelines are still in place, resulting in the use of capacity for specific entry and exit points under different rules than those defined in the Third Energy Package. In particular, in Bulgaria, Poland and Romania, the TSOs are operating dedicated transit pipelines with capacity mostly booked through legacy long-term contracts. In other countries, despite the existence of long-term transit contracts through which capacity is booked at IPs, the application of NC CAM and of capacity allocability are not impacted. In Hungary, transit contracts are in place only between IPs with third countries (Ukraine and Serbia), thus out of scope of NC CAM. In Slovakia, the existing transit contracts are a small part of the system's entry and exit capacity.

[25] Wheeling service is offered by Gas Connect Austria at Überackern, only on interruptible basis.

1.2. Current and planned application of conditionalities

34) In this Section we provide a country-by-country analysis of Member States where conditionalities are stipulated in the contracts for standard capacity products for firm capacity sold by TSOs, and of Member States where dedicated transit pipelines and/or legacy long-term contracts are still in place. The analysis of each Member State is based on information received through structured interviews with the EU NRAs and TSOs; targeted review of documents such as the TSOs' network codes, transmission contracts and terms & conditions; and examination of quantitative data on conditional capacity and tariffs, collected from TSO websites, booking platforms and ENTSOG's transparency platform.

1.2.1. Member States with conditionalities stipulated in contracts for standard capacity products for firm capacity

I. Austria

35) Gas Connect Austria (GCA) and Trans Austria Gasleitung (TAG) are the two operators of the gas transmission system in Austria. There are long-term contracts still in force at entry and exit points (that were used for transit purposes in the past), which however apply the same contractual terms compared to the standard transmission contracts.

Offering of conditional firm capacity

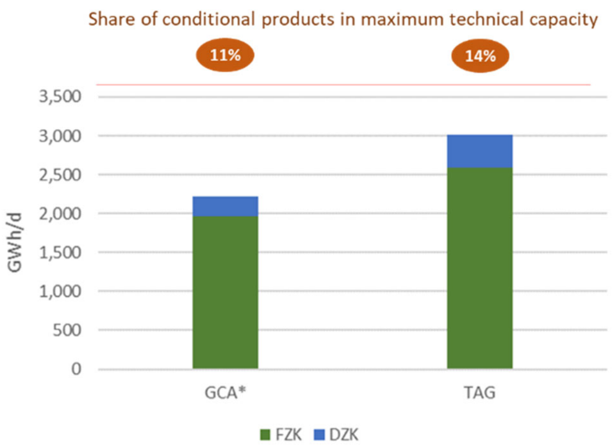
36) GCA and TAG have offered a firm capacity product with dynamic allocability (DZK) at the key European IPs of Oberkappel, Überackern (GCA) and Arnoldstein (TAG). However, as explained in detail below, both TSOs are in the process of converting the conditional product at the three IPs to firm and freely allocable capacity (FZK). Use of DZK has already ceased at the Oberkappel IP, only past DZK contracts remain at the Überackern IP, and offering of conditional capacity at Arnoldstein is foreseen to decrease by the end of 2019, with introduction of an FZK product. Until the conversion of DZK to FZK at each of the three IPs, all technical capacity of these IPs is available only through the conditional product. But overall in the Austrian transmission system, DZK technical capacity corresponded to a small part (of the total technical entry and exit capacity at all the IPs in Austria, only 13% in Gas Year 2017/18 (Figure 6). GCA is also providing a wheeling service between the Überackern IPs ABG and Sudal, but only on interruptible basis[26].

37) As shown in the map of Figure 7, conditionalities are applied at the neighbouring systems with Germany (entry to and exit from Austria) and Italy (only entry to Austria).

38) Historically, the DZK products in Austria came about as follows. Existing firm point-to-point capacity contracts were converted into firm entry/exit contracts, whereby access to the VTP in principle had to be given on a firm basis if this was technically possible, and if not, at least on an interruptible basis (as was the case for e.g. for Überackern). The aim was that existing capacity rights under existing point-to-point contracts should be retained, i.e. not be degraded from firm to interruptible. The calculation model applied in Austria therefore defined rules as to how existing contracts were to be treated in the event of insufficient technical possibilities, i.e. where only interruptible VTP access was possible (the TSOs at that time prioritized the WAG over the Penta West pipeline).

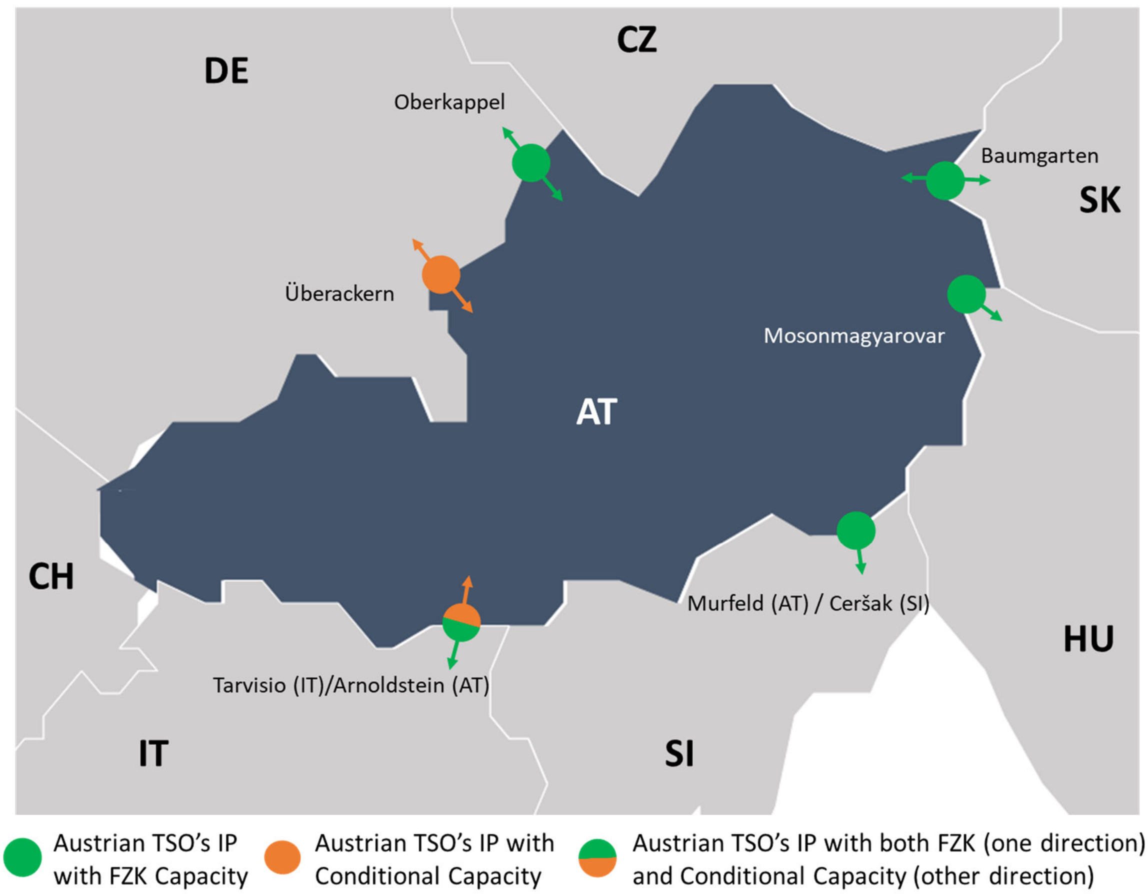
[26] As the service is not provided on a firm basis, it is not examined further in the Study.

Figure 6: Average daily maximum technical firm free allocable and firm conditional capacity of Austrian TSOs for Gas Year 2017/18, aggregate for all IPs



* For GCA DZK capacity concerns capacity that was booked until 2014, after which offering of the product ceased
Source: Austrian Gas Grid Management AG

Figure 7: Cross-border IPs in Austria at which conditional firm capacity products are available (Gas Year 2017/18)[27]



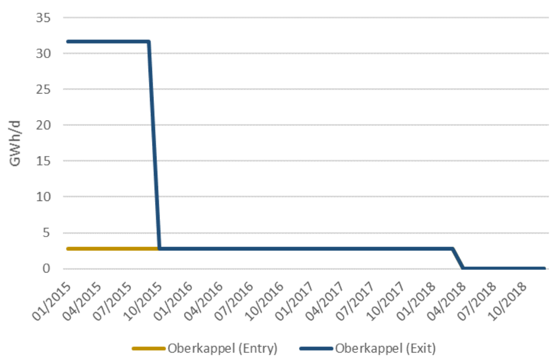
Note: DZK product use at Oberkappel stopped in April 2018. DZK products are no longer offered at Überackern, only existing contracts remain.

Source: Austrian Gas Grid Management AG

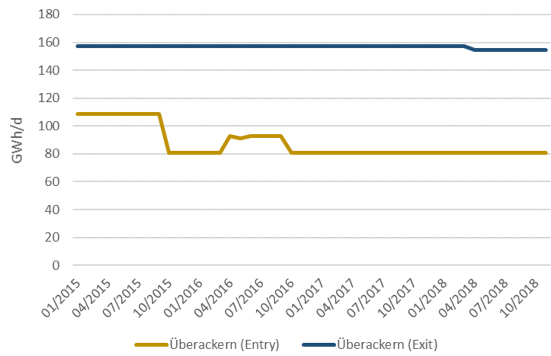
[27] The map depicts only the conditional capacity situation on the Austrian side of each IP. The products offered on the other side of the IP are not presented.

39) Nowadays, conditional products are no longer being offered by GCA, and currently only few DZK contracts signed in the past remain until their expiry. DZK contracts at Oberkappel expired April 2018, while at Überackern there are still DZK contracts in place, with the last one set to expire on 1 October 2027. Figure 8 presents the situation with DZK booked capacity at the two IPs for the calendar years 2015 – 2018.

Figure 8: Average daily booked DZK capacity at Oberkappel and Überackern IPs in the period 2015 - 2018



Oberkappel IP



Überackern IP

Source: CGA

40) This was a result of the merging of GCA and BOG (responsible for WAG pipeline) in 2014, after which GCA started selling capacities as FZK through the tool of competing auctions permitted under EU NC CAM. The tariff for DZK was discounted by 10% to FZK, so in the new situation the tariff changed. Before the merger of BOG and GCA, the FZK capacity was not offered through competing auctions but allocated between the two formerly mentioned TSOs, on the basis of contractual agreements, i.e. existing transport obligations and contractual agreements between the TSOs. Unused station capacity was then offered as DZK to the extent possible. This changed after the merger through the enhanced TSO cooperation, leading to GCA offering capacities as FZK.

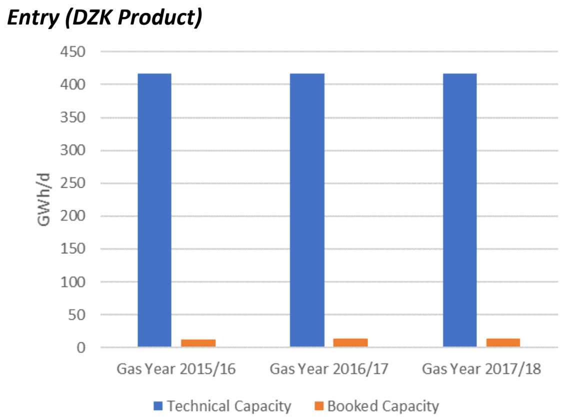
41) A question can be raised, whether this example of transition from DZK to FZK through use of competing auctions is more widely applicable. According to our view, this would need to be determined case by case. In the Austrian case, DZK was a tool to bring existing firm point-to-point contracts into the entry/exit model, in a "Y-shaped" network situation. The DZK was then replaced by FZK, through using competing auctions[28].

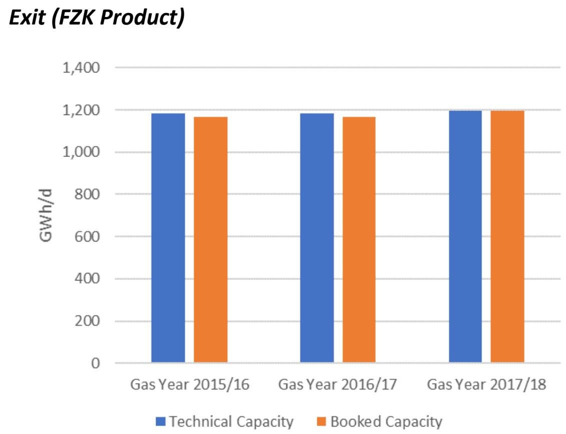
42) Furthermore, TAG invested in the conversion of DZK to FZK at the Arnoldstein IP (further details are provided in Paragraph 2.5). This conversion concerned upgrade of the existing DZK capacity to FZK capacity, and creation of new non-competing FZK capacity at Arnoldstein entry point. The project (which is a precondition of an incremental capacity project of GCA) is foreseen to be completed by Q4 2019 by TAG.

43) As shown in Figure 9, for the last 3 gas years, the booking of the DZK product at the Arnoldstein IP entry (the only firm product offered at that direction of the IP) has been very limited. On the other hand, FZK capacity at the IP exit has been almost fully booked.

[28] Auctions in PRISMA booking platform for competing capacity, defined in accordance with Articles 3.14 and 8.2 of NC CAM.

Figure 9: Average daily maximum firm DZK capacity and daily booked DZK capacity at the Arnoldstein IP per Gas Year (note: in the two graphs below y-axis is on a different scale)





Source: TAG website

Characteristics of conditional firm capacity

44) The DZK product was offered by GCA until 2014 and has been offered by TAG through the PRISMA booking platform. The options for the duration of DZK capacity booking are the same applied for FZK capacity (annual, quarterly, monthly, daily, and within-day). The entry and exit combination of points in which DZK is applied are the following:

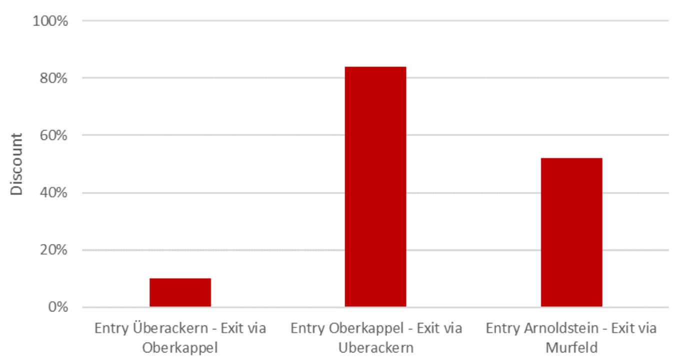
- Entry: Überackern – Exit: Oberkappel
- Entry: Oberkappel – Exit: Überackern
- Entry: Arnoldstein – Exit distribution area
- Entry: Arnoldstein – Exit: Murfeld
- Entry: Distribution area – Exit: Baumgarten
- Entry: Distribution area – Exit: Oberkappel

45) These DZK based connections are applied due to bottlenecks along the system that do not allow gas entering the system at Überackern, Oberkappel or Arnoldstein, with the entry points' full capacity, to reach VTP Austria.

Discounts applied for conditional products

46) Discounts have been applied for the DZK product, as shown in Figure 10 below.

Figure 10: Illustrative discounts for DZK product offered in Austria as of May 2018



Source: E-control article 3, Gesamte Rechtsvorschrift für Gas-Systemnutzungsentgelte-Verordnung 2013, Fassung vom 03.05.2018 (decision of 3 May 2018 by Austrian NRA)

Expected future developments

47) As mentioned above, the Austrian TSOs are in the process of phasing out the offering of the DZK conditional product. No new DZK products are offered by GCA since 2014, while TAG will change the provision of DZK capacity, and introduce also an FZK product, after completion of the required infrastructure, foreseen in Q4 2019.

II. Germany

48) The German gas grid is one of the most complex, and unique (bordering with 9 grids of neighbouring Member States) in Europe. German transmission system is hence by nature transiting, thus conditional products form an important (see Figure 11 further) part of the existing arrangements to assure reliable operation of the 2 entry-exit zones, NCG and Gaspool, respectively. Annex III provides details on the products offered by each TSO.

Offering of conditional firm capacity

49) All German TSOs are either already offering, or are planning to offer, at least one conditional capacity product. The Table below provides a high-level picture of the products each TSO is offering, or planning to offer, at any type of network points (cross-border IPs, market area IPs, connections to storage, exits to distribution systems, exits to transmission consumers, entries from production areas).

Table 3: Capacity products offered by German TSOs at all types of network points

Type	Product	Bayernets	Fluxys Deutschland	Fluxys TENP	Gascade	NEL	OPAL	GRTgaz Deutschland	Gastransport Nord	Gasunie Deutschland	Lubmin-Brandov Gastransport	Nowega	Open Grid Europe	ONTRAS	Terranets	Thyssengas
Firm	FZK	✓		✓	✓		✓	✓	✓	✓		✓	✓	✓	✓	✓
Conditional	bFZK			✓				✓	✓			✓	✓	✓		✓
	DZK		✓		✓	✓	✓	✓	✓		✓		✓	✓	✓**	✓***
	BZK	✓*		✓						✓			✓	✓		

✓ Product offered at one or more IPs ✓ Product offered only at network points other than IPs

(Bayernets is offering shorthaul service, treated as a BZK product[29], ** terranets began offering the DZK product as of 1/10/12018, *** DZK product of Thyssengas is still under consideration)*

Source: Interviews with TSOs

50) The TSOs and NRA identified the efficient use of the network and maximization of capacities, to avoid unnecessary investments in infrastructure, as the main reasoning for offering conditional capacity. The TSOs stressed their view that investments would be required for system expansions and upgrade, in case all firm capacity to be offered was firm and freely allocable. In the 2013 TYNDP, the

[29] The shorthaul service is provided by Bayernets following the same process as BZK (booking of BZK capacity at PRISMA Platform). According to BNetzA there are plans to change this service to BZK, due to the application of NC TAR. In the rest of the analysis we consider this as a BZK product.

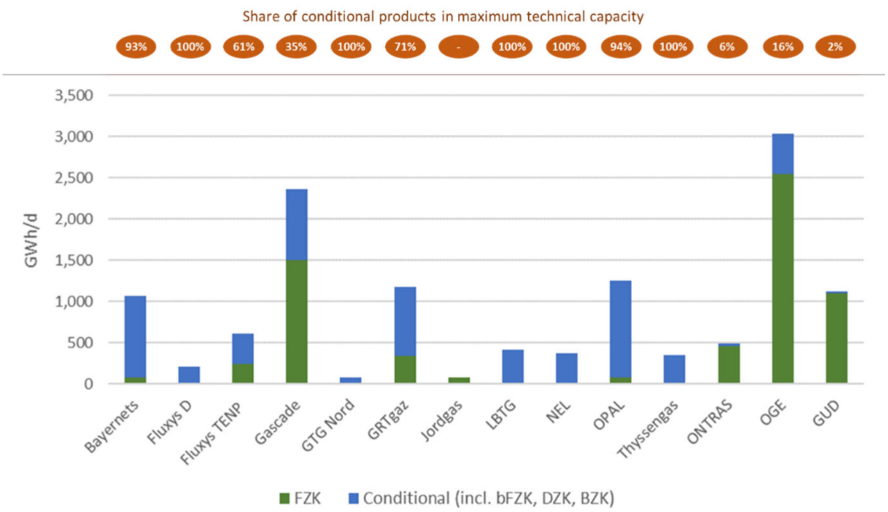
German TSOs calculated that approximately EUR 10 billion would be needed to fully avoid conditional products and convert them to firm products with free allocability[30].

51) The share of conditional products in the capacity made available by each TSO differs, but still most TSOs are offering significant part of their capacity as conditional. Figure 11 below presents the average daily firm maximum technical capacity in Gas Year 2017/18 by each TSO, as free allocable and as conditional (aggregate of bFZK, DZK and BZK products), at all entry and exit interconnection points, including cross-border points with neighbouring Member States and points between German TSOs. Bayernets, Fluxys Deutschland, LBTG, NEL, GTG Nord, OPAL and Thyssengas are offering all or the largest part of their capacity at interconnection points as conditional. For the German TSOs with the largest capacity, OGE and Gascade, conditional maximum technical capacity at interconnection points amounted to 16% and 35% of total respectively.

52) The portfolio of conditional firm capacity products offered by each TSO is different, depending on the characteristics of the transmission system usage (Figure 12), with DZK and BZK being the mostly provided products.

53) The rationale for offering products appears to be linked to the type of services fitting the client portfolio – e.g. OPAL is publicly known for its important import/transit character, as shown in the Table below.

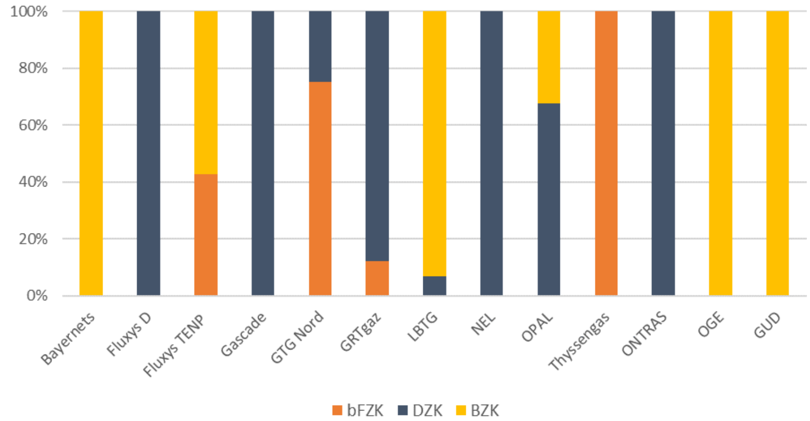
Figure 11: Average daily maximum technical firm free allocable and firm conditional capacity of German TSOs at IPs for Gas Year 2017/18



Source: TSOs' websites

[30] Transmission system operators 2013 gas network development plan: https://www.fnb-gas.de/en/network-development/ndp-2013.html. Given that the calculations are not up-to-date, the TSOs have noted that increase of steel prices since then makes it likely that a current estimate would be even larger.

Figure 12: Mix of conditional capacity products offered by German TSOs at IPs in Gas Year 2017/18



Source: TSOs' websites

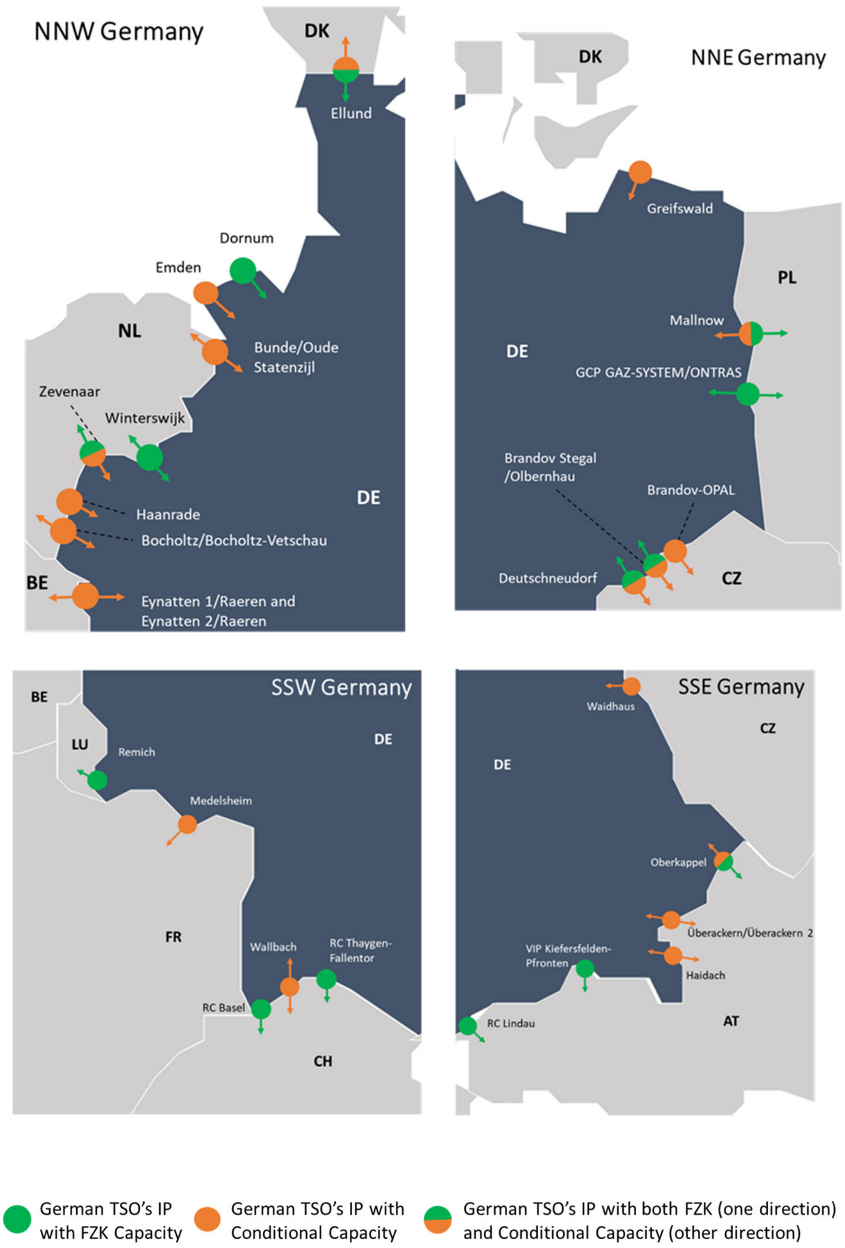
Table 4: Extent to which different types of network users using the firm capacity products offered by OPAL (1: None – 5: High)

	Firm capacity with free allocability	Firm capacity with dynamic allocability	Firm capacity with restricted allocability (non-regulated transit)
Producer/importer	5	5	5
Supplier	1	1	1
Trader	1	1	1
Transit user	5	5	5
Final customer	1	1	1
Storage user	1	1	1

Source: Interview with OPAL Gastransport GmbH & Co. KG

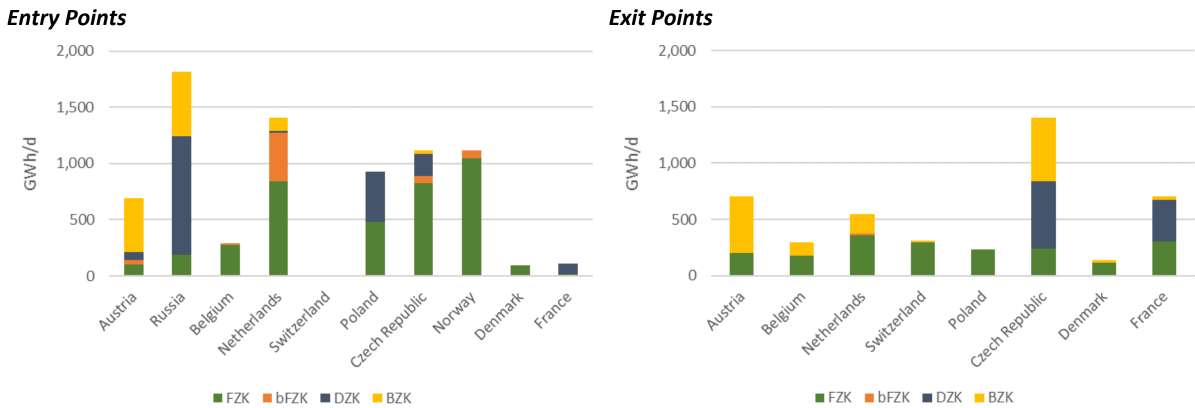
Figure 13: Cross-border IPs in Germany at which conditional firm capacity products are available[31]

[31] The map depicts only the conditional capacity situation on the German side of each IP. The products offered on the other side of the IP are not presented.



Source: TSOs' websites

Figure 14: Average daily maximum technical capacity of firm products of the German TSOs at the entry and exit IPs with neighbouring systems for Gas Year 2017/18



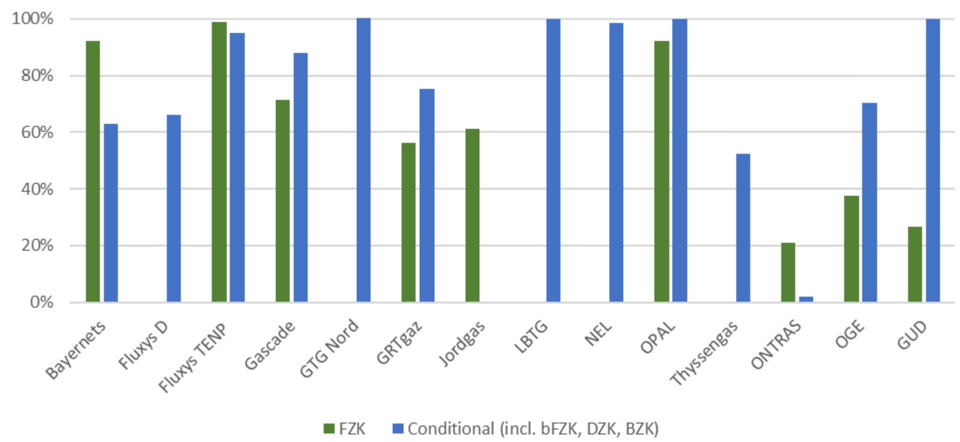
Source: TSOs' websites

54) As shown in the map (Figure 13), the German TSOs are offering one or more conditional products in at least one entry/exit interconnection point with every neighbouring Member State (with the exception of Luxembourg). Figure 14 presents the average daily firm capacity offered at the entry and exit points with neighbouring countries, per capacity product, in Gas Year 2017/18.

55) Some German TSOs (Gascade, GRTgaz Deutschland, Thyssengas, and OGE) are offering conditional products at market-area interconnection points, connecting their system with other German TSOs. Furthermore, conditional products are also provided at other network points, including entry/exit to storage (Bayernets, Gascade, GTG Nord, Thyssengas, ONTRAS, and OGE), entries from production (ONTRAS), exits to transmission consumers (Bayernets, Thyssengas (planned for 2021), and OGE), especially power plants. Further details on the network points at which the TSOs are offering conditional products are presented in Annex III.

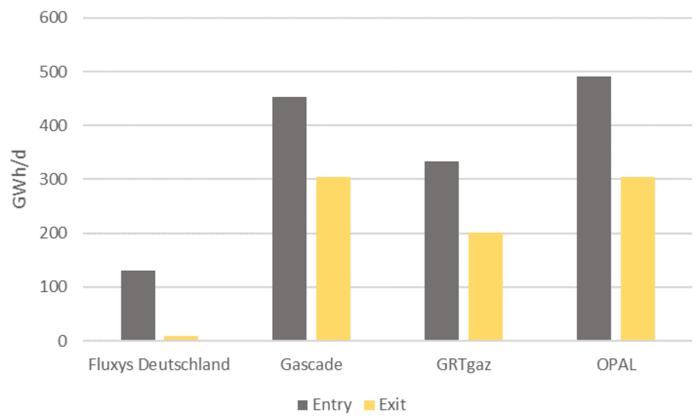
56) In most transmission systems the network users are contracting the largest part of the conditional capacity offered by the TSO (Figure 15). As shown by the difference of average daily booked capacity at entry and exit IPs in Figure 16, the interest of network users for DZK products is not only for transit flows crossing the TSOs' systems, but also for delivering gas internally in the system (including DZK deliveries to designated domestic points, or interruptible access to the VTP and other points).

Figure 15: Share of offered capacity booked by network users at IPs in Gas Year 2017/18



Source: TSOs' websites

Figure 16: Average daily booked capacity of DZK at entry and exit IPs Gas Year 2017/18, for selected TSOs[32]



Source: TSOs' websites

Characteristics of conditional firm capacity

57) Each TSO is offering conditional products with different characteristics, especially concerning the types of points at which they are offered, the products' duration and the particular conditions applied[33]. There are TSOs that clearly define (usually in the terms & conditions for network access) the situations under which the conditional firm capacity products will be (or may be) interrupted. There are, however, also TSOs where the conditions of interruption are based on qualitative criteria applied by the TSO, or the flow situation in adjacent systems; in these cases, the network users are not provided ex-ante with fully comprehensive information on the conditions under which their products would be interrupted. The Table below provides details on how each TSO is offering conditional products.

Table 5: Characteristics of conditional capacity products provided by each German TSO

Product	Duration	Allocation Mechanism	Conditions of Application[34]
Bayernets GmbH			
Shorthaul (BZK)	Annual, quarterly, monthly, daily, within-day	Offered as a BZK product, through separate auctions at PRISMA	Capacity is firm under every condition, but restricted to point-to-point usage, available for specific entry and exit points (Überackern I and II, Kiefersfelden-Pfronten and USP Haidach). Use of the contract requires booking of BZK capacity at the relevant points. This is different from the application of shorthaul in Netherlands or UK, in which cases the network users' book FZK capacity, and may ex-post request the service. To use this product, the network user must assign the relevant capacity to a balancing group dedicated for BZK. This group must be balanced.
Merit Order: There is no merit order of interruption. Shorthaul (BZK) and FZK are treated the same.			
Fluxys TENP GmbH			
bFZK	Annual, quarterly, monthly, daily, within-day	Auction	Subject to usage restrictions under specific temperature and flow conditions in the network. In case the forecast of the previous day for the average daily temperature is: i. Below 0°C: Firm freely allocable in the entire NCG

[32] Only TSOs offering DZK capacity at both entry and exit cross-border IPs are depicted.
[33] Currently, BNetzA is carrying out proceedings aiming at a further standardisation of capacity products. See: https://www.bundesnetzagentur.de/DE/Service-Funktionen/Beschlusskammern/1_GZ/BK7-GZ/2018/2018-0001bis0999/2018_0001bis0099/BK7-18-0052/BK7-18-0052_Verfahrenseinleitung.html?nn=361360
[34] Conditions of application are based on the Special Terms & Conditions of each TSO.

Product	Duration	Allocation Mechanism	Conditions of Application[34]
			ii. Between 0°C and 8°C: 46.67% of the bFZK is considered as FZK. The remaining 53.33% is subject to reduction or interruption in case the physical gas flows at predefined connections with OGE's system exceed a certain limit, which will be defined by OGE on the basis of the nominations at NCG iii. Above 8°C: the bFZK is subject to reduction or interruption in case the physical gas flow at connections with OGE exceeds a certain limit, which will be defined by OGE on the basis of the nominations at NCG
BZK	Annual, quarterly, monthly, daily, within-day	Auction	BZK is restricted only to point-to-point usage, for predefined IPs (Eynatten 2, Bocholtz, Wallbach). The network user that is utilizing the BZK capacity may assign this capacity to a balancing group with access to the VTP; in this case the rights and obligations of interruptible capacity shall apply for both the FZK and BZK part of the balancing group.
Merit Order: (1) FZK, (2) bFZK, (3) BZK			
Fluxys Deutschland GmbH			
DZK	Annual, quarterly, monthly, daily, within-day	Auction	DZK provides point-to-point usage on a firm basis from Greifswald to one or more agreed exit points in the downstream gas transportation system (Achim II, network points of Gascade). The energy quantity of the gas injected and withdrawn must be the same in each hour. Where the user withdraws quantities at exit points other than those defined, the difference shall be usable on an interruptible basis, including access to the VTP.
Merit Order: No merit order of interruption, as only DZK is offered.			
GASCADE Gastransport GmbH / NEL Gastransport GmbH			
DZK	Annual, quarterly, monthly, daily, within-day	Auction	DZK provides point-to-point usage on a firm basis from predefined combinations of entry and exit points (published in Gascade's website). The energy quantity of the gas injected and withdrawn must be the same in each hour. Where the user withdraws quantities at exit points other than those defined, the difference shall be usable on an interruptible basis, including access to the VTP.
Merit Order: No merit order of interruption at IPs, as only DZK is offered.			
Gasunie Deutschland Transport Services GmbH			
BZK	Annual, quarterly, monthly, daily, within-day	Auction	BZK is offered at the Ellund IP (exit) towards Denmark. This requires a corresponding firm entry booking and nomination at Greifswald IP (entry). The entry in Greifswald is FZK.
Merit Order: FZK and BZK products are offered in parallel at Ellund. In case Ellund condition is fulfilled, both products are firm. If interruption is required, then nominations are reduced pro-rata. There is no merit order is applied.			
GRTgaz Deutschland GmbH			
bFZK	Annual, quarterly, monthly, daily, within-day	Auction	The use of bFZK may be restricted in the event that, due to nominations within the market area, the physical gas flow into the system of OGE exceeds a limit value defined by OGE and the forecast for the previous day for the average daily temperature is above 0°C.
DZK	Annual, quarterly, monthly, daily, within-day	IPs and storage: auctions Exits to distribution: annual internal order Exits to transmission consumers: FCFS	When DZK is used, the amount of a balanced transport between the entry and exit points of GRTgaz within a balancing group at a certain hour shall be exactly the minimum of the sum of the hourly entry nominations at GRTgaz at the balancing group and the sum of the hourly exit nominations at GRTgaz at the same balancing group. The same shall be applicable in sum for linked balancing groups. The use of the capacity portion of DZK, which is used in excess of a balanced transport between entry and exit points of GRTgaz – in particular when the VTP is concerned–may be restricted, if, due to current nominations within the whole market area, transport is not possible for network reasons.
Merit Order: There is no specified merit order for interruptions. The nomination will be attributed to the capacity products in a way that the possible gas flow is maximized and that the fulfilment of the different conditions can be controlled by the TSOs.			

<table>
<tr><th>Product</th><th>Duration</th><th>Allocation Mechanism</th><th>Conditions of Application[34]</th></tr>
<tr><td colspan="4">Gastransport Nord GmbH (GTG)</td></tr>
<tr><td>bFZK</td><td>Annual, quarterly, monthly, daily, within-day</td><td>Auction</td><td>The use of bFZK is allowed when certain temperature conditions are met. The amount of firm network use (bFZKf) for delivery day D is calculated by multiplying the booking amount by a temperature factor published by the TSO (this factor is based on the rounded forecast daily average temperature for delivery day D published on day D-1). The parts that can be used as interruptible (bFZKu) are calculated by taking the difference between the booking amount and the maximum usable bFZKf for delivery day D.</td></tr>
<tr><td>DZK</td><td>Annual, quarterly, monthly, daily, within-day</td><td>Auction</td><td>The firm network use (DZKf) of the entry capacity is equal to the nominations of firm capacities (freely allocable exit capacity) to the allocated exit points.
The network user shall use DZK as firm entry capacity with delivery at the designated exit points (DZKf with allocated exit) provided, and to the extent, that the following conditions are met:
i. The user nominates DZK at one or more entry points, and
ii. It nominates fixed exit capacities at the allocated exit points for the same period and the same balancing group or sub-balancing account.</td></tr>
<tr><td colspan="4">Merit Order: (1) bFZK, (2) DZK.</td></tr>
<tr><td colspan="4">Lubimin-Brandov Gastransport GmbH (LBTG)</td></tr>
<tr><td>DZK</td><td>Annual, quarterly, monthly, daily, within-day</td><td>Auction</td><td>The allocability depends on the situation at the adjacent transmission systems. Use of the DZK product is restricted depending on whether the market area-wide transmission system operators GASCADE and ONTRAS have capacities available on their transmission systems.</td></tr>
<tr><td colspan="4">Merit Order: No merit order of interruption, as only DZK is offered</td></tr>
<tr><td colspan="4">Nowega GmbH</td></tr>
<tr><td>bFZK</td><td>Annual, quarterly, monthly, daily, within-day</td><td>For storage auctions
For production FCFS</td><td>The bFZK product is offered for storage and production capacity. The conditions are temperature and flow based. If the conditions are fulfilled the capacity is firm. There is a rule, but it is qualitative focused on the design of the grid (no pre-specified conditions are set by the TSO).</td></tr>
<tr><td colspan="4">Merit Order: No merit order of interruption at IPs, bFZK is offered only at storage and production fields</td></tr>
<tr><td colspan="4">ONTRAS Gastransport GmbH</td></tr>
<tr><td>bFZK</td><td>Annual, quarterly, monthly, daily, within-day</td><td>Auctions</td><td>Firmness of bFZK at storage points UGS Allmenhausen and UGS Peckensen depends on temperature of gas day (TaK product). The available capacity is defined as follows:
<table>
<tr><th>UGS</th><th>Temperature</th><th>Firm Capacity Available</th></tr>
<tr><td rowspan="3">UGS Peckensen (entry)</td><td>T ≤ 0°C</td><td>100%</td></tr>
<tr><td>0°C ≤ T ≤ 8°C</td><td>57%</td></tr>
<tr><td>T > 8°C</td><td>0%</td></tr>
<tr><td rowspan="3">UGS Peckensen (exit)</td><td>T ≥ 16°C</td><td>100%</td></tr>
<tr><td>16°C > T ≥ 10°C</td><td>22%</td></tr>
<tr><td>T < 10°C</td><td>0%</td></tr>
<tr><td rowspan="4">UGS Allmenhausen (exit)</td><td>T ≥ 20°C</td><td>100%</td></tr>
<tr><td>20°C > T ≥ 15°C</td><td>60%</td></tr>
<tr><td>15°C > T ≥ 5°C</td><td>30%</td></tr>
<tr><td>T < 5°C</td><td>0%</td></tr>
</table></td></tr>
<tr><td>DZK</td><td>Annual, quarterly, monthly, daily, within-day</td><td>IPs and storage: auctions
Exits to distribution: annual internal order
Exits to transmission consumers: FCFS</td><td>DZK at entry Lubmin 2 IP (entry of EUGAL pipeline) can be used on firm basis as long as entry nomination equals exit nominations at specified points (e.g. Deutschneudorf or Deutschneudorf-EUGAL) and DZK at exit Deutschneudorf-EUGAL can be used on firm basis as long as exit nomination equals entry nominations at Lubmin 2 IP. The allocability of DZK product for the usage of VGS Storage Hub at the exit point Deutschneudorf, depends on the entry pressure at specific network points. If the pressure falls below 65 bar, ONTRAS restricts allocability for the following day. In other cases access to the VTP is interruptible</td></tr>
</table>

Product	Duration	Allocation Mechanism	Conditions of Application[34]
BZK		FCFS (offered in PRISMA)	Firm capacity product at entry Salzwedel Produktion can only be used in conjunction with exit NKP EMS due to technical restrictions.
Merit Order: No merit order. If more than one firm capacity is offered at one point and one direction, these capacities are offered in parallel and are shortened pro-rata in case of congestions.			
OPAL Gastransport GmbH & Co. KG			
DZK	Annual, quarterly, monthly, daily, within-day	Auctions	DZK provides point-to-point usage on a firm basis from predefined combinations of entry and exit points (Greifswald entry linked to exits at grid points of ONTRAS and at Brandov OPAL). The energy quantity of the gas injected and withdrawn must be the same in each hour. Where the user withdraws quantities at exit points other than those defined, the difference shall be usable on an interruptible basis, including access to the VTP
Merit Order: The DZK capacities are handled in a separate DZK balancing account, if this is done, they are always firm, in case the conditions are fulfilled.			
Open Grid Europe GmbH			
DZK	Annual[35], quarterly, monthly, daily, within-day	IPs and storage: auctions Exits to distribution: annual internal order Exits to transmission consumers: FCFS	DZK is provided on a firm basis in accordance with the following limitations (in other cases capacity is interruptible, including access to the VTP: ▪ on entry and exit points which have to be nominated (market area interconnection points, cross-border interconnection points and storage facilities), the capacity is used exclusively for a balanced transport between predetermined entry and exit points or ▪ on exit points which do not have to be nominated, the predetermined associated entry point or entry points were nominated with at least the same value as the measured allocation on this exit point. To use DZK capacity, the network user has to include the booked DZK in a separate DZK balancing group.
BZK	Annual, quarterly, monthly, daily, within-day	IPs and storage: auctions Exits to distribution: annual internal order Exits to transmission consumers: FCFS	To use BZK capacity, the network user has to include the booked BZK in a separate balancing group for which the virtual trading point cannot be used. The nominations made by the network user on the entry and exit side for restricted allocable capacity must be balanced at all times. If not, OGE reserves the right to reduce them to the lower value.
bFZK	Annual, quarterly, monthly, daily, within-day	FCFS	bFZK is offered at domestic points. It defines a temperature range within which the technical capacities are firm, and outside which they are interruptible. For the entry points, the firmness decreases stepwise as temperature increases. As for the exit points, firmness increases stepwise as temperature increases (temperatures and reduction are predefined and published by OGE).
Merit Order: There is no merit order for interruption.			
Terranets bw GmbH			
DZK	Annual, quarterly, monthly, daily, within-day	Exits to transmission consumers: FCFS	Offered since 01.10.2018. DZK is provided on a firm basis in accordance with the following limitations (in other cases capacity is interruptible, including access to the VTP: ▪ at entry and exit points which have to be nominated (market area interconnection points, cross-border interconnection points and storage facilities), the capacity is used exclusively for a balanced transport between predetermined entry and exit points or ▪ at exit points which do not have to be nominated, the predetermined associated entry point or entry points were nominated with at least the same value as the measured allocation on this exit point. To use DZK capacity, the network user has to include the booked DZK in a separate DZK balancing group.
Merit Order: No merit order of interruption (at the time of the interview only FZK was available)			

[35] Does not apply for the particular DZK combination of exit at Eynatten / Raeren and Exit Oude Statenzijl in combination with Entry Vitzeroda. Due to the difference in flows between summer and winter, the product is not available in the winter season, and therefore annual cycle is not offered.

Product	Duration	Allocation Mechanism	Conditions of Application[34]
Thyssengas GmbH			
bFZK	Annual, quarterly, monthly, daily, within-day	IPs: offered via auctions. Domestic points: offered via FCFS	The use of bFZK may be restricted depending on load. It is only offered at entry points, with conditions on the capacity at exit points. If the exit points capacity is smaller than the entry points nominations, then the capacity is allocated pro-rata to the entries as firm. The rest is offered as interruptible, however the TSO tries using its own resources first (linepack) and if required also OBAs with adjacent TSOs (which creates a strong requirement to co-operate within entry-exit zone between TSOs). If the TSO does not succeed, then an interruption of capacity follows.
DZK	Annual, quarterly, monthly, daily, within-day	IPs: offered via auctions. Domestic points: offered via FCFS	DZK is under discussion to be used for new power plants, as noted in the German TYNDP. Not many interruptions are expected. Currently power plants have interruptible access to the VTP.
Merit Order: No merit order of interruption			

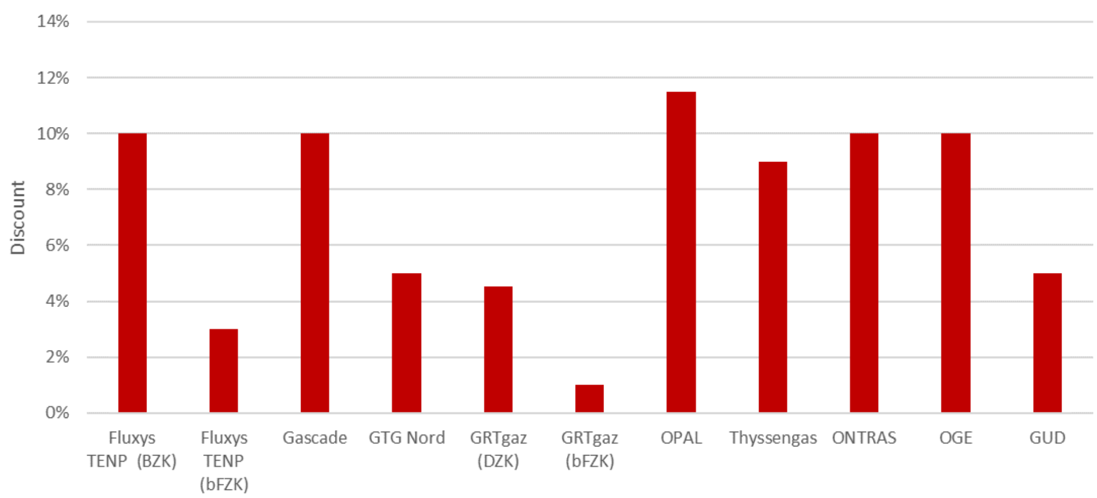
Source: Interviews with TSOs, Special Terms & Conditions of TSOs

Discounts applied for conditional products

58) Conditional products are discounted compared to FZK. These discounts are approved by the regulator and limited to the discount for interruptible capacity. Currently the discount for interruptible capacity is 10%, although this discount may be higher, if the TSO provides to the NRA justification that the proven or estimated probability of disruption exceeds 10%. Implementation of NC TAR will result in revisions of the discounts for interruptible capacity.

59) The discounts applied by the TSOs for conditional firm capacity products ranges from 0% to 11%, as shown in Figure 17. Bayernets is currently an exception, as the shorthaul service is being provided at a much higher discount (98%), despite being offered as a BZK product; this is expected to change with the application of NC TAR[36].

Figure 17: Discounts on FZK capacity tariffs applied for conditional firm capacity products for Gas Year 2017/18[37]



Source: Price lists of TSOs, interviews with TSOs

[36] It is noted that compliance of the tariffs applied on conditional capacity products to the provisions of the TAR NC is a very specific legal issue, and out of the scope of the present study.

[37] TSOs offering both FZK and conditional firm capacity products are shown. The graph does not include Jordgas (only FZK), Fluxys Deutschland, LBTG, NEL (only DZK). For ONTRAS the discount concerns the new point Deutschneudorf EUGAL Brandov; for BZK same tariff as FZK.

Expected future developments

60) The planned merging of the NetConnect Germany and Gaspool market areas into a single entry-exit system by 2021 may result in decreasing the offer of firm freely allocable capacities, as measures for managing operationally the flows within a greater entry-exit system. The impact of market merger on capacities has not been defined yet but is being currently studied by the TSOs in time for 2021 market merger. As part of this merging, BNetzA is preparing an ordinance, to be published in 2019, regarding the offering capacity products in the future to support the market development and the planned market area merger.

III. Ireland

61) The Irish gas transmission system is operated by Gas Networks Ireland (GNI).

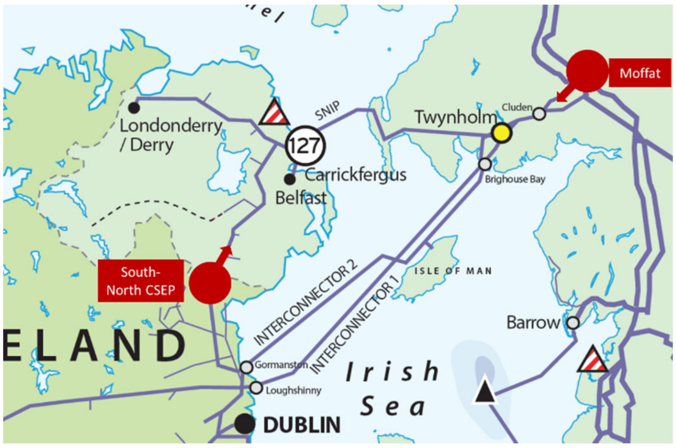
Offering of conditional firm capacity

62) GNI is offering a non-standard firm capacity product, as temporary solution unless material demand for the product materialises. It concerns firm capacity with restricted allocability (BZK product), for the Ireland South-North CSEP IP exit (GNI Exit / GNI(UK) Entry) – the South North Pipeline (SNP) – that allows gas flows through GNI's system in Ireland to its system in Northern Ireland, for security of supply purposes. Based on historical data and current outlook, no one has so far used this option to flow gas, and interruption could never have occurred so far.

Characteristics of conditional firm capacity

63) GNI is offering the conditional product through auctions in the PRISMA booking platform, for daily, monthly, quarterly, and annual durations. Ireland South-North CSEP IP Exit aims to provide security of supply to the Northern Ireland gas market by adding a connection to the Moffat IP. Gas cannot flow from the main GNI grid to the Ireland South-North CSEP IP exit, unless gas is received at Moffat IP (Figure 18). Therefore, nominations at the Ireland South-North CSEP IP Exit can only be facilitated to the extent that there is prevailing entry nomination at Moffat for that gas day[38].

Figure 18: Link between Moffat IP Ireland South-North CSEP IP



Discounts applied for conditional products

64) There is no discount applied for the conditional firm capacity offered by GNI.

[38] In this Study gas day is defined in accordance with the definition in NC CAM.

Expected future developments

65) There are no significant developments foreseen that will change the offering of the conditional product at the Ireland South-North CSEP IP Exit by GNI. GNI stated that they expect supplies to Northern Ireland through the Ireland South-North CSEP IP to start in the coming years. However, the demand assessment report for incremental capacity of 2017 did not indicate demand for flows between the entry-exit system of Gas Networks Ireland (UK) and the entry-exit system of Gas Networks Ireland (no non-binding demand indications for firm capacity were received).

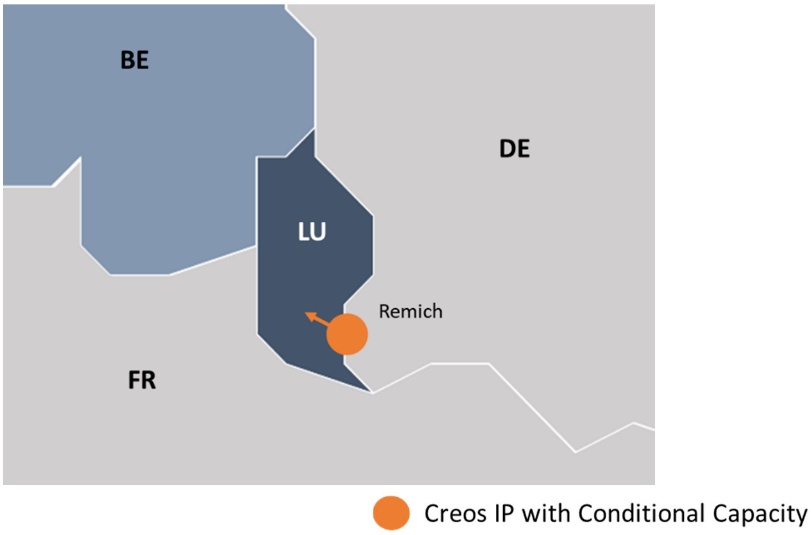
IV. Luxembourg

66) Creos Luxembourg is the operator of the transmission system in Luxembourg.

Offering of conditional firm capacity

67) At the Remich IP (that connects the NCG market area in Germany with the BeLux market), Creos is offering a conditional firm capacity product with free allocability (bFZK), that is linked with the day-ahead temperature and flow conditions in the system. No firm capacity with free allocability (FZK) is offered at the IP. At all other network points standard firm capacity (with free allocability) is being offered.

Figure 19: Cross border IP in Luxembourg at which conditional firm capacity products are available[39]



Source: Creos

68) The bFZK product is offered at the Remich IP to address the capacity limitations of the transmission system, and the fact that on the other side of the IP (operated by OGE) the level of capacity being offered is higher (capacity is offered as FZK). Creos has to readjust capacity on a daily basis, as needed by the market, in order to ensure sufficient gas supplies in the winter period and no excess of gas in the summer period.

69) The conditional firm capacity with free allocability product is being provided by Creos at the PRISMA platform only on a quarterly basis, as a single block of the total capacity, allocated to a single network user. The same level of capacity is being offered for both quarters of the winter period and respectively for those of the summer period. Figure 20 below presents the quarterly offered and

[39] The map depicts only the conditional capacity situation on the Luxembourg side of the IP. The products offered on the other side of the IP are not presented.

booked capacity at Remich IP for each quarter of the period Gas Years 2015/16 – 2017/18. As quarterly capacity is offered and sold as a single block, the offered and booked capacity per quarter is equal (if no network user was awarded the capacity the auction was repeated).

Figure 20: Offered and booked capacity at Remich IP[40]

Source: PRISMA Booking Platform

Characteristics of conditional firm capacity

70) Creos publishes annually a description of the conditional capacity products offered at PRISMA, which defines for each quarter the minimum capacity that the TSO guarantees to the network users with 100% firmness, and the maximum capacity offered at the IP. The restrictions applied on the conditional product depend on the temperature and flow conditions in the system. Creos may request minimum nominations during the winter period or restrict capacity during the summer period.

71) The network user that has booked capacity is notified day ahead by Creos about the lower and upper limits of allowed nominations by the user for the next gas day (the limits remain unchanged throughout the gas day). Additionally, for purpose of better informing the network user, Creos also provides weekly non-binding forecasts of the lower/upper limits of allowed nominations for each day of the next week. As there is only one network user active at the IP every quarter, the interaction is not administratively cumbersome, and is carried out through daily emails. So far, capacity has been restricted only for limited days per year, mainly some days in August and some days in April.

72) The TSO provides sufficient information to network users about the restrictions that will be in place for each season prior to the capacity auctions, as well as a lead time of a day before a potential application of these restrictions. However, due to the day-to-day interactions required between the TSO and the user to manage the conditional product, only a single network user may book capacity each quarter at the IP. The network users that are using the conditional product are suppliers and traders that are active in the BeLux market.

Discounts applied for conditional products

73) As a single product is being offered at the Remich IP there are no discounts to the tariff. Also, there is no reduction in the tariff in case capacity has been interrupted or restricted.

[40] Offered and booked capacity refer to the marketable and marketed capacity for the IP defined in the PRISMA Booking Platform.

Expected future developments

74) Although with the conditional capacity Creos is ensuring the market's security of supply, the TSO considers that offering this product is complicated, requiring close day-to-day interaction with the network users. For this reason, Creos is investigating the possibility and impact of Remich IP being included in the forthcoming BeLux – NCG VIP, in which case the bFZK product would be converted to firm capacity with free allocability (FZK). This would require cooperation between the neighbouring TSOs (Creos and OGE) for efficient steering of gas flows that will ensure sufficient gas volumes for Luxembourg in winter, and maximum level of flows in summer.

1.2.2. Member States having resolved conditionalities

I. Spain

75) In Spain, there used to be a dedicated transit contract in place, from Morocco to Portugal through Spain. According to CNMC, the long-term transit contract, that is applying the terms and conditions of standard transmission contracts, will expire in 2020, after which, as the capacity will be available, it will be offered to the market and allocated following the same criteria as the rest of the capacity. However, in application of the Third Energy Package, Enagás already established for such capacity identical conditions that applies to standard entry-exit transmission services.

76) The Maghreb-Europe Gas pipeline (MEG), operating since 1996-1997, allows to import gas to Spain and Portugal (through IP Badajoz-Campo Maior) from Algeria through Morocco, besides the pipeline crosses Portugal to supply North-West area of Spain (through IP Tuy-Valença do Minho). Commercially, there used to be a dedicated transit contract (89 GWh/d) and, since the start-up of Reganosa LNG terminal conditional capacity products (10 GWh/d) were offered at Tuy IP: a firm product was only offered if gas was injected into the network from the LNG terminal. Moreover, firm capacity (45 GWh/d) was offered at Badajoz. In 2012, during the drafting process of the NC CAM, Enagás and REN committed to an early implementation of the NC CAM by developing a joint allocation procedure (6th March 2012) to allocate bundled products on both sides of the border in a coordinated process[41], creating the VIP Ibérico. This required to convert the conditionalities in an interruptible product. No new infrastructure investments were considered to alleviate the network constraints, instead a commercial solution was offered.

77) Moreover, Spanish and Portuguese TSOs analysed the capacity at VIP Ibérico for a period of three years and simulation tools showed that interruptible capacity could be upgraded to firm, mainly due to changing demand patterns. Since 2015 all capacity at VIP Ibérico is traded as firm: 144 GWh/d from Spain to Portugal and 80 GWh/d from Portugal to Spain.

1.2.3. Member States with future plans for conditional products

78) In this sub-Section we present cases of Member States (Greece and Hungary) that are considering the application of conditional products, as identified during the interviews with TSOs and NRAs.

I. Greece

79) According to the Greek TSO, DESFA, there are considerations of applying conditional firm capacity products, to address the expected increase of transit gas flows after 2020, when new

[41] The principles for this allocation procedure were collected in the document called: "Procedures for the annual auction of yearly and monthly products of gas transmission capacity between Portugal and Spain - Information Memorandum" later approved by the Spanish NRA with the resolution of 28th June 2012.

infrastructure is commissioned (including the Interconnector Greece Bulgaria (IGB), the Trans-Adriatic Pipeline (TAP), the required upgrades at the Kipi IP to accommodate flows to both IGB and TAP, and potentially a new LNG terminal in Alexandroupolis). This large increase of transit gas flows will be located in the north-eastern part of the Greek transmission system. The rest of the transmission system cannot support this increase of flows, due to bottlenecks along the route that require large investments to be lifted. As a result, the TSO would be obliged to perform the required investments, to maintain the firm capacity at a level that can be accommodated across the whole Greek system (i.e. decreasing the firm capacity available for transit and offering the largest part of entry capacity as interruptible) or to introduce conditionalities (e.g. capacity product for the entry at the Kipi IP and exit to IGB, or entry from LNG Alexandroupolis and exit to IGB).

80) With the largest part of consumption located in the southern part of the Greek transmission system, and the plans for new entry capacity in the north, restrictions to the implementation of an entry-exit system do arise with the current constraints of the network. Proceeding with the investments required to lift the related bottlenecks would result in increasing tariffs, since the expected transit flows can be accommodated without these investments, and the overall utilization of the system would not increase. Putting in place conditionalities at the IPs in northern Greece, to facilitate transit flows, could be considered.

81) However, since no exit from the Greek system is possible in the south, the problem is limited to the case of supplying the main Southern Greece consumption areas from the North-East, rather than from the Revythoussa LNG terminal. Any analysis leading to the introduction of conditional products should therefore be based on the capacity of the main North-South Greek transmission lines. It is worth recalling that incremental capacity from Turkey will be limited and largely reserved for long-term contracts to transit towards Albania, Italy and Bulgaria.

II. Hungary

82) According to MEKH, the Hungarian regulatory authority, there are plans to introduce a special conditional product for gas fired power plants that are vital for the balancing of the electricity system. Only the power plants deemed vital for the operation of the power system would be eligible for this product, and it would relieve them from paying balancing penalties if they are called upon by the electricity system operator within-day to commence operation but do not have time to re-nominate on the gas transmission system. The establishment of such a product is still under internal consideration in the Regulator, in cooperation with the TSO.

1.2.4. Member States offering non-firm services

I. Belgium

83) Fluxys Belgium is the operator of the gas transmission system in Belgium.

Provision of non-firm services

84) Fluxys Belgium is only offering firm capacity products with free allocability at all its interconnection points. At selected IPs the TSO is providing to the network users that have contracted firm capacity via Prisma, the possibility to opt for Wheeling and Operational Capacity Usage Commitments (OCUC) services. These services allow the users to transit gas from point to point, without accessing the VTP, at a lower cost than booking capacity separately for the same combination of entry and exit points. The difference between the mentioned services is that wheeling is provided

between IPs that are at very close distance (within the same transfer station[42]), while OCUC is provided between selected cross-border IPs spread in the system.

85) Both these services are offered on request of the network user ex-post, after the user has initially booked firm entry and exit capacity at the respective IPs. It is up to the network user to decide how much of their booked capacity will be used for the wheeling or OCUC service, up to 100% of their booked capacity, provided that the requested flows at the designated entry and exit combination will be balanced. After transforming firm capacity to OCUC, the network user pays the discounted capacity charge of the OCUC service.

86) Fluxys publishes in its Access Code for Transmission the IPs at which wheeling and OCUC services are being provided (Table 6). The combinations of network points at which network users may request OCUC services involve most IPs of the Belgian system (9 out of 15 entry IPs and 8 out of 14 exit IPs). Users may request to use wheeling services only at specific IPs, to transport gas directly between two adjacent market areas, i.e. between the Gaspool and NCG market areas in Germany (through the Eynatten IPs), and between the TTF market area and Zebra pipeline in the Netherlands (through the Zelzate IPs).

Table 6: Combinations of network points at which Fluxys offers OCUC/wheeling

OCUC		**Wheeling**	
Entry	*Exit*	*Entry*	*Exit*
Zelzate 1/ VIP BE-NL or Zelzate 2	IZT or Zeebrugge	Zelzate 1/ VIP BE-NL	Zelzate 2
IZT or Zeebrugge	Zelzate 1 / VIP BE-NL or Zelzate 2	Zelzate 2	Zelzate1 /VIP BE -NL
Dunkirk LNG Terminal or Virtualys	IZT or Zeebrugge	Eynatten 1	Eynatten 2
's Gravenvoeren	Eynatten 1 or Eynatten 2	Eynatten 2	Eynatten 1
Eynatten 1 or Eynatten 2	's Gravenvoeren		

Source: Fluxys Belgium

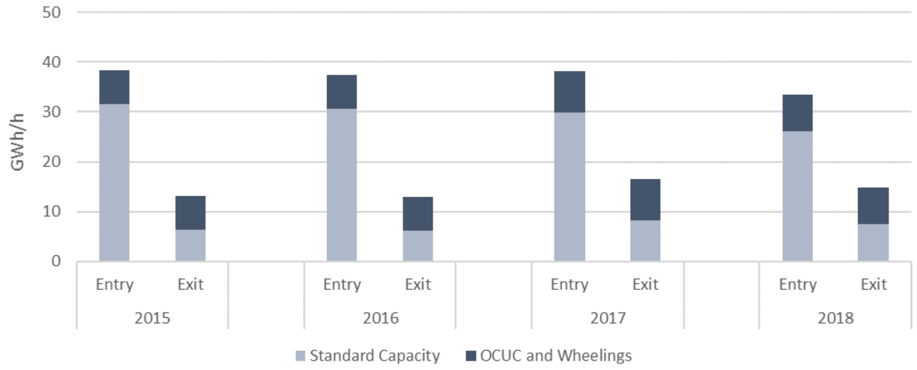
87) Overall, the use of wheeling and OCUC services has been considerable so far, at the IPs where this possibility is provided to the network users (Figure 21). However, this conclusion does not hold for all IPs as the usage depends on the interest of the users (Figure 22). The revenues from the use of wheeling and OCUC services are limited (according to CREG they amount to around 5% of total TSO revenues), as a result of the users' interest, and the discounted tariffs at which they are being offered.

88) The network users can request from the TSO provision of OCUC or wheeling services through the PRISMA platform, for eligible entry and exit combinations (Table 6) at which they have booked firm capacity. OCUC and wheeling may be requested up to 2 hours before the start of the service, and for a minimum duration of 1 gas day.

89) The wheeling and OCUC services are used by the network users through a dedicated nomination code different from the one used for the firm entry and exit transmission services. These nominations for wheeling or OCUC at the designated entry and exit points must be "balanced" (e.g. equal in quantities), otherwise Fluxys uses the "lesser rule" to balance out the difference. The regime probably limits the balancing volumes that could have been exchanged in the absence of the scheme.

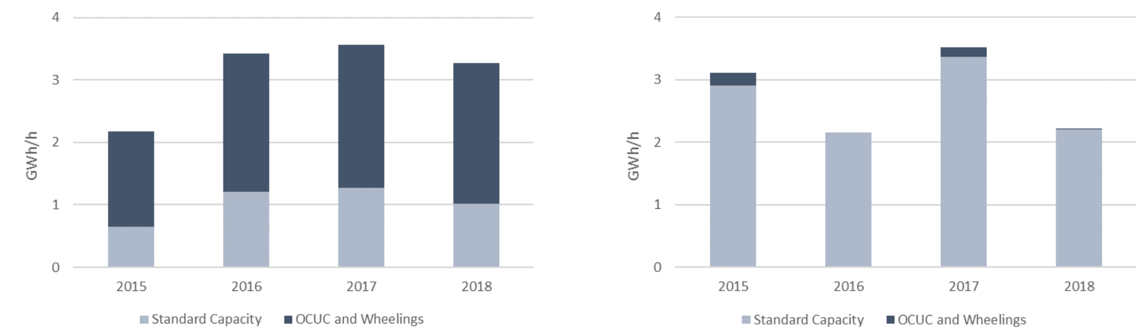
[42] I.e. the infrastructure used for the transfer of gas across the borders, between Belgium-Germany and Belgium-Netherlands - https://www.fluxys.com/en/products-services/ztp-trans-shorthaul-wheeling.

Figure 21: Allocated volumes for wheeling, OCUC services and standard entry/exit transmission[43]



Source: Fluxys Belgium

Figure 22: Allocated volumes for wheeling and OCUC services at network points in which both services are offered



Source: Fluxys Belgium

Discounts applied for non-firm services

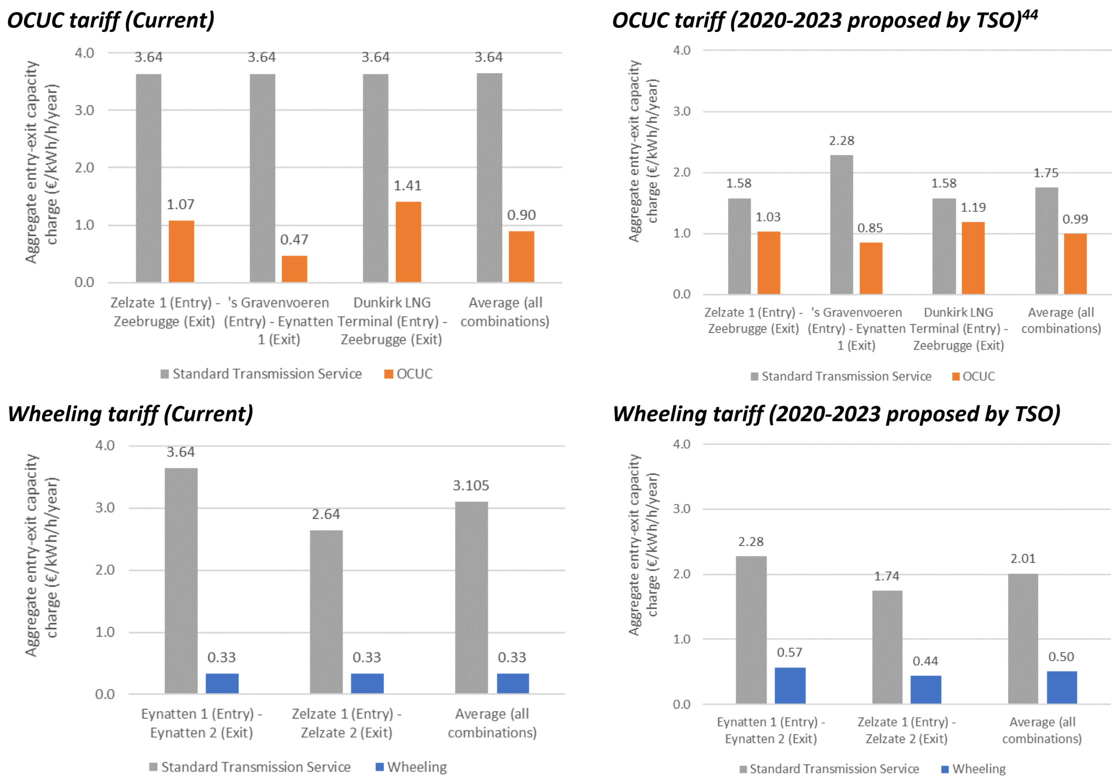
90) When using wheeling or OCUC, there is a discount for the capacity component of the tariff (Figure 23). The reason for the discount is that the network user is not taking advantage of the full flexibility that the firm capacity product provides for using all entries and exits of the transmission system, and does not allow access to the VTP. The current discounts are significant; for OCUC the service is offered with a discount that ranges from 60% to over 80%, whereas wheeling is offered at tariffs 8 – 11 times lower than that of standard capacity.

91) The TSO is in the process to request the approval of the tariffs for the period 2020 – 2023, including those for the OCUC and wheeling services. The tariff methodology proposed by Fluxys for the OCUC service is distance related, but does not follow the approach of capacity weighted distance methodology of NC TAR. For OCUC, a minimum discount of 25% on the entry and exit transmission

[43] The graph presents only entry and exit IPs where wheeling and OCUC services are offered by the TSO. The average hourly allocated volumes of all network users for the whole year, aggregate for all interconnection points are depicted. Allocated volumes for OCUC and wheeling are additional to standard entry/exit transmission services.
Due to the specificities of the Zeebrugge area, allocated volumes in the "balanced regime" for wheeling and OCUC can only be isolated approximately by using the quantities allocated on other IPs not belonging to the Zeebrugge Area.
It is noted that according to Fluxys Belgium, at IPs where both OCUC and Wheeling services are offered, only an aggregate value for the two services can be provided.

tariffs has been proposed, for point combinations having a distance of 100 km or more. The discount is increasing if the distance is shorter than 100 km. For wheeling, Fluxys has proposed a very low tariff that aims to cover only fixed costs related to the transportation of gas between IPs located within the same physical connection facility. Figure 23 provides indicative examples of the current levels of OCUC and wheeling tariffs, compared to the standard entry-exit transmission services, as well as the 2020 – 2023 tariffs proposed by the TSO. The values presented in the Figure are the aggregate entry and exit tariffs for each depicted combination of entry – exit points.

Figure 23: Examples of discounts for using OCUC or wheeling services, current and proposed for 2020-2023



Source: Fluxys Belgium

Expected future developments

92) The TSO will continue providing OCUC and wheeling services. As shown in Figure 23, the tariffs of these services are being reviewed in the view of the NC TAR for the period 2020-2023. It is clear that despite the substantially lower discount of both the wheeling and the OCUC products compared with the standard tariff proposed, such discount remains substantial. Although we have no evidence which links such discounts to underlying costs, we note the reference of the Agency to the tariff of such products: *"In the case of OCUC, distance seems to be the main cost driver. This service is thus correctly classified as transmission service and the tariffs are set in accordance with Article 4(2) of the NC TAR, which allows to consider specific conditions."*[45].

[44] The displayed discounts in the capacity charge for OCUC are different for each entry-exit combination due to the dependence of the discount on the distance. The shorter the distance between entry and exit points, the higher the discount.

[45] See paragraph §79 in ACER's report on the consultation of Fluxys Belgium, in the framework of the NC TAR implementation, published on 5 February 2019 by ACER.

II. Netherlands

93) Gasunie Transport Services (GTS), owns and operates the transmission system in the Netherlands.

Provision of non-firm services

94) The firm capacity products that are offered in Netherlands by Gasunie Transport Services (GTS) have no conditions linked to them. The TSO is offering to network users shorthaul and wheeling services, as long as the provision of these services does not affect the operation of the network and safeguards its physical balancing, and there is no access to the VTP. To this end such services are performed between points in a short distance from each other[46] and are offered, upon request of network users and only after the approval of GTS, at a discount to the firm capacity tariff. Both services impose no conditionalities or restrictions for the use of the firm capacity products of the network.

95) GTS is offering a shorthaul service to feed gas into a specific entry point and withdraw gas from a specific exit point of the GTS network only. The distance between the entry and exit points can be 50 km at the most. The shorthaul service is registered in a separate portfolio and the hourly volume of gas fed in needs to be the same as the volume withdrawn. Shorthaul has a minimum contract period of three years and a maximum contract period of 7 years. The tariff depends on the duration of the contract, the contracted capacity and the distance between the entry and exit point. The shorthaul tariff will be lower when the duration of the contract is longer, the contracted capacity is higher and the distance between the entry and exit point is shorter. It is worth mentioning that this service is rarely used, since shippers do not ask for it[47].

96) Wheeling is a service which can be offered for the transportation of gas from an entry point to an exit point at the same location[48], so it is regarded as being transport across a distance of zero kilometres. Since entry and exit points are all interconnection points, as summarized in Figure 24, it is not possible to transfer gas to the VTP using the wheeling service. Wheeling is an entry-exit combination on the same physical location creating a U-turn on the Dutch side of the border. With this U-turn shippers can switch from Gaspool to NCG or optimize the use capacity contracts in their portfolio.

Discounts applied for non-firm services

97) Significant discounts are offered to network users that opt to use the wheeling services, instead of the standard entry-exit transmission service for gas flow from an entry to an exit point (Figure 25). This is possible because no physical demand is placed on the transport network. With the new tariff methodology, the tariff for wheeling will be offered with a 94% discount[49].

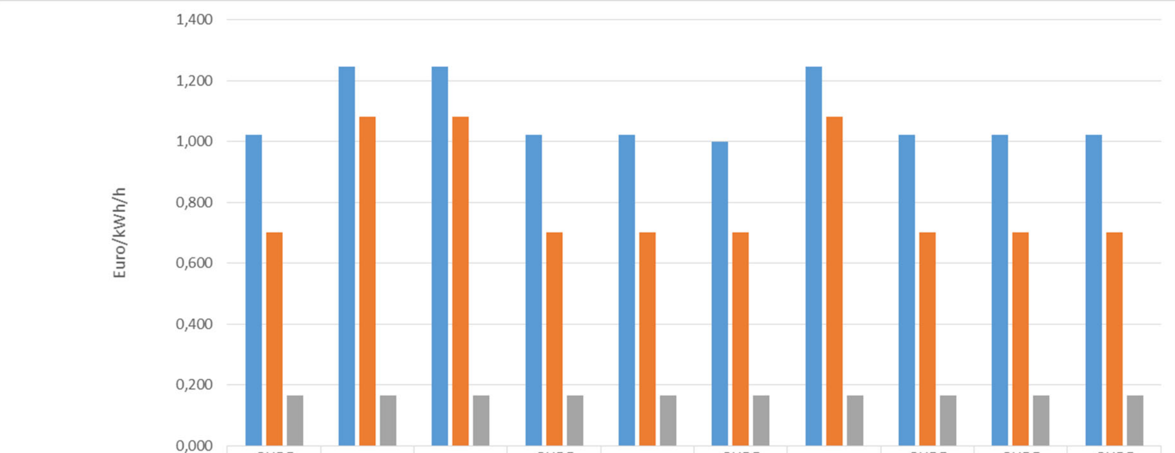
[46] As an example, shorthaul service concerns points with a distance of less than 50 Km from each other, while wheeling is only offered between very specific IPs.
[47] GTS did not provide detailed data concerning the use of shorthaul and wheeling services in the Netherlands, within the frame of this Study.
[48] https://www.gasunietransportservices.nl/en/shippers/products-and-services/wheeling
[49] ACM Decision for implementation of NC TAR (10 December 2018) https://www.acm.nl/sites/default/files/documents/2019-02/code-amendment-decision-for-implementation-of-nc-tar.pdf

Figure 24: Network points at which wheeling services are offered

Exit wheeling	300145 OSZ (OGE)	300146 OSZ (GUD-H)	300147 OSZ (Gascade-H)		301185 OSZ (Renato OGE)	301360 OSZ (Etzel-EKB-H)	301361 OSZ (EWE-H)	301391 OSZ (Astora Jemgum)	301453 OSZ (EWE Jemgum)	301400 OSZ (Etzel-CRYSTAL-H)	301401 OSZ (Etzel-FREYA-H)		300144 OSZ G (GUD-G)	300136 OSZ (GTG Nord-G)		301198 Enschede (Essent-UGS Epe)	301309 Enschede (Nuon-UGS Epe)	301397 Enschede (Eneco-UGS Epe)		300139 Bocholtz TENP (OGE-ENI)	301368 Bocholtz Vetschau (Thyssengas)
Entry wheeling																					
300145 OSZ (OGE)		x	x																		
300146 OSZ (GUD-H)	x		x																		
300147 OSZ (Gascade-H)	x	x																			
301185 OSZ (Renato OGE)						x	x	x	x	x	x										
301360 OSZ (Etzel-EKB-H)					x		x	x	x	x	x										
301361 OSZ (EWE-H)					x	x		x	x	x	x										
301391 OSZ (Astora Jemgum)					x	x	x		x	x	x										
301453 OSZ (EWE Jemgum)					x	x	x	x		x	x										
301400 OSZ (Etzel-CRYSTAL-H)					x	x	x	x	x		x										
301401 OSZ (Etzel-FREYA-H)					x	x	x	x	x	x											
300144 OSZ (GUD-G)														x							
300136 OSZ (GTG Nord-G)													x								
301198 Enschede (Essent-UGS Epe)																	x	x			
301309 Enschede (Nuon-UGS Epe)																x		x			
301397 Enschede (Eneco-UGS Epe)																x	x				
300139 Bocholtz TENP (OGE-ENI)																					x
301368 Bocholtz Vetschau (Thyssengas)																				x	

Source: GTS

Figure 25: Examples of discounts for using wheeling services (capacity component)



	OUDE STATENZIJL RENATO (EWE SSO)	ENSCHEDE (INNOGY-UGS EPE)	ENSCHEDE (NUON-UGS EPE)	OUDE STATENZIJL (ETZEL-EKB-H)	OUDE STATENZIJL (EWE-H)	OUDE STATENZIJL (ASTORA JEMGUM)	ENSCHEDE (ENECO-UGS EPE)	OUDE STATENZIJL (ETZEL-CRYSTAL-H)	OUDE STATENZIJL (ETZEL-FREYA-H)	OUDE STATENZIJL (EWE JEMGUM)
Firm Capacity, Entry Tariffs	1,021	1,246	1,246	1,021	1,021	1,000	1,246	1,021	1,021	1,021
Firm Capacity, ExitTariffs	0,700	1,082	1,082	0,700	0,700	0,700	1,082	0,700	0,700	0,700
Wheeling	0,166	0,166	0,166	0,166	0,166	0,166	0,166	0,166	0,166	0,166

Source: GTS

Expected future developments

98) The shippers' interest to use the shorthaul services are limited. To this end, shorthaul service will no longer be offered, as of 1st January 2020, as a result of the implementation of the NC TAR.

III. United Kingdom

99) National Grid is the major grid system operator of the gas (and power) transmission system in the United Kingdom, with other gas transmission operators being GNI (UK) Limited, Interconnector (UK) Limited, and Premier Transmission Limited.. There are no dedicated transit systems in the country. National Grid offers – at present – shorthaul services, hence below we focus on National Grid.

Provision of non-firm services

100) National Grid is offering to the network users services of shorthaul, at a lower cost than using the standard firm capacity product (entry-exit transmission service). According to the NRA, the shorthaul service is provided at an alternative commodity charge, calculated separately from the standard commodity charge, while the capacity charge for the corresponding entry and exit points is paid in full. Users can request the shorthaul service only at entry and exit points at which they have contracted capacity. For financial years 2017/18 and 2018/2019[50] shorthaul concerned approximately 5% revenues of Transmission Operator and System Operator, and corresponded to 30% of total flows of the national grid in UK[51].

101) Operationally, shorthaul works as follows, in order for the user to be eligible for shorthaul tariff. All gas is deemed to flow through the NBP for the purposes of balancing. No limitations are put on the network user here e.g. if the network user flows gas at the nominated entry point, but instead of flowing out at the nominated exit point they trade (sell) at NBP, then they are allowed to do this but would not be eligible for the shorthaul discount. There are no special nomination or allocation rules, but the shorthaul route must have been approved before the gas day. After the day, then the allocations at the nominated entry point and nominated exit point on the shorthaul route are compared. The minimum common quantity shall be deemed as the shorthaul flow and the discount applied to that quantity. Any additional quantities shall pay the normal commodity rate, hence full tariffs[52].

Discounts applied for non-firm services

102) Currently shorthaul is delivered through standard capacity products, and a different charge according to NRA (which can be considered as a discount) is applied to commodity charges. It is telling that approximately 5% of revenues (shorthaul) account for 30% of flows in the National Grid. The shorthaul charge is based on the cost of building an alternative dedicated pipeline from the entry to the exit point. The length of pipe and exit point size (referred to as the Maximum NTS Exit Point Offtake rate (MNEPOR) are used to calculate the shorthaul charge, which is therefore different for each network point.

[50] The Fiscal Year of National Grid runs from 1 April to 31 March. We as advisors understood that FY is indicative of order of magnitude of issue for GYs as well.

[51] Calculation was provided to the Consultant by National Grid. National Grid did not provide detailed data concerning the use of shorthaul service in the UK, within the frame of this Study.

[52] Shorthaul is potentially undergoing a change. Detailed proposals on potential changes to i.e. shorthaul (NTS optional charges) are listed under: https://www.gasgovernance.co.uk/0621, and for National Grid (as 1 of the proposals) under https://www.gasgovernance.co.uk/sites/default/files/ggf/page/2018-06/Part%20II%20Final%20Modification%20Report%200621%20v1.0%20%28NG%20NTS%29.pdf

Worked example

103) The charge is site specific and is calculated by the function shown in Table 7 below.

Table 7 NTS Optional Commodity Charge

Pence per kWh
$1203 \times [(M)^{\wedge -0.834}] \times D + 363 \times (M)^{\wedge -0.654}$

Source: National Grid

Where:

- **D** is the direct distance from the network point or non-National Grid NTS pipeline to the elected entry point (aggregated system entry point - ASEP) in km (to the nearest 100 meters).
- **M** is the maximum NTS exit point offtake rate in kWh. (MNEPOR)
- ^ means "to the power of …"

104) Please note that although the rate is dependent on the M (i.e. capacity), the shorthaul tariff is a volume-based charge (i.e. p/kWh). A network user must specify an entry point (entry terminal) and an exit point (supply point). Based on these, National Grid will calculate the distance between the two on a straight-line basis, giving the grid coordinates used for reference. The M is network point specific and is used for all network users shipping to a particular point.

Example calculation

105) A network point with an M of 20 GWh (20,000,000 kWh) that is 5 km from the nearest entry point would have a shorthaul charge of 0.0110 p/kWh**.**

Expected future developments

106) According to Ofgem a review of the shorthaul charging arrangements has been raised by National Grid in October 2018. Based on information by Ofgem and National Grid in Q4 2018, a so-called UNC review group has now been set up[53] that will look at the future of how to best accommodate any inefficient bypass of the national grid, currently known under "shorthaul", into the Charging Methodology. The options to address this will be discussed and developed in the review working group. Compliance with EU codes will be a factor in assessing the merits of the options.

1.2.5. Member States with dedicated transit pipelines and long-term transit contracts

I. Bulgaria

107) The Bulgarian transmission system is operated by Bulgartransgaz EAD. The system consists of two networks, a national and a transit one, forming two physical balancing zones, which are interconnected via a transfer point (two physical points) with fixed transfer capacity.

Long-term transit contracts

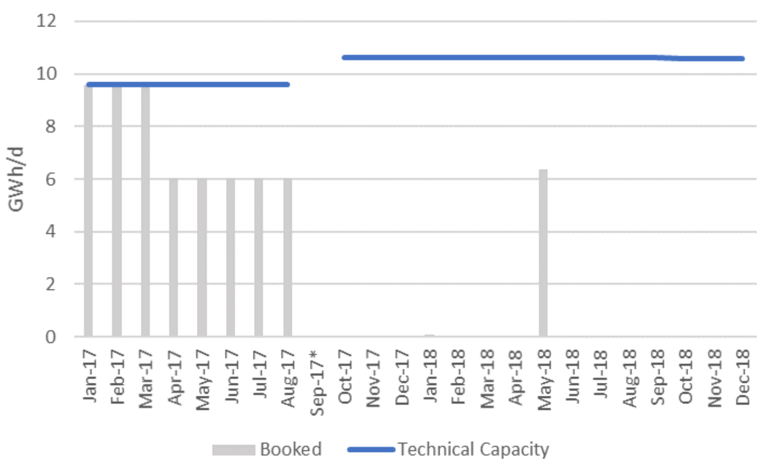
108) The flow transfer between the national and the transit networks is currently restricted to the capacity available at the transfer point. The largest part of the capacity on the transit network has been booked through long-term transit contracts with Gazprom, not following the NC CAM rules and requirements. The long-term transit contracts are applied at the entry IP Negru Voda 2,3 (RO)/Kardam (BG) and the exit IPs Kulata (BG)/Sidirokastron (GR), Strandja/Malkoclar and Kyustendil/Zidilovo. These

[53] Under UNC0670R (https://www.gasgovernance.co.uk/index.php/0670).

contracts, valid until 2030, have terms and conditions that are confidential and not in line with third party access requirements of the Third Energy Package. The capacity at the entry and exit points of the transit network that has not been reserved for the long-term transit contracts is offered by Bulgartransgaz to network users through the RBP booking platform, in line with NC CAM requirements. Indicatively, according to Bulgartransgaz data[54], in Gas Year 2018/19 almost 98% of capacity at the Negru Voda 2,3 (RO)/Kardam (BG) IP (with technical capacity of 626 GWh/d) has been book through the long-term transit contracts, while less than 0.5% of the capacity has been booked by network users through RBP.

109) The Bulgarian NRA has noted that the capacity at the transfer point is limited. Specifically, the technical capacity of the point is much smaller (10.6 GWh/d), compared to the capacity of the entry point at the Negru Voda 2,3 (RO)/Kardam (BG) (626 GWh/d). There are also a few direct exits on the transit network, but their aggregate capacity is also small (6.1 GWh/d). Past utilization of the transfer point capacity (Figure 26) shows that in the first 3 quarters of 2017 there was considerable booking of capacity at the transfer point, for gas transportation from the transit to the national transmission system, however after August 2017 booked capacity has been reported to be mostly zero. Although currently the transfer point does not appear to be utilized, the large capacity differences between entries and exits at the transit system can create a bottleneck in the connection of the national and transit system that does not allow an effective operational and system management of the Bulgarian system. As a result, the majority of gas flows transited through the transit system in Romania (see relevant Section below) are also transited through Bulgaria to downstream markets, without possibilities to enter the market.

Figure 26: Booked capacity at the Bulgartransgaz transfer point from 01/2017 to 12/2018



** Note: data for September 2017 not available*
Source: Bulgartransgaz

II. Hungary

110) The Hungarian gas transmission system is operated by FGSZ and MGT. There are no dedicated transit pipelines in the country, but long-term contracts for transit to Serbia and Bosnia & Herzegovina are currently in place, booking part of the capacity at the Ukrainian-Hungarian and the Hungarian-

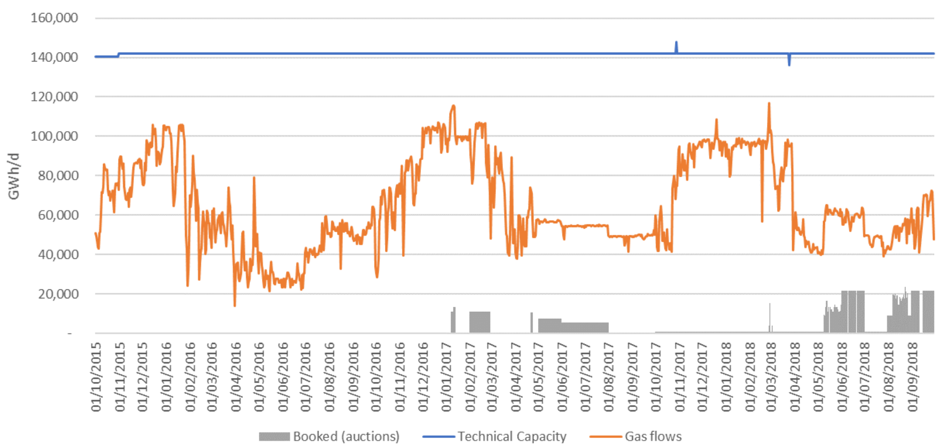
[54] Source: https://bulgartransgaz.bg/en/pages/kapacitet-41.html.

Serbian borders, where the relevant entry-exit points follow the rules of NC CAM only on the Hungarian side[55].

Long-term transit contracts

111) In accordance with the provisions of the long-term transit contracts, capacities have been booked on a long-term basis for gas transit at the entry point from Ukraine (Beregdaróc IP) and at the exit point to Serbia (Kiskundorozsma IP). As the specific IPs connect Hungary with third countries, they are outside of the scope of the capacity allocation procedures of NC CAM, so are the terms and conditions of the transit contracts themselves defined the allocation of capacity binding the specific entry and exit. Usually, 50-60% of capacity at the Kiskundorozsma IP is used for the long-term transit contracts. The remaining capacity is being offered by FGSZ at the RBP platform. The activity at the Kiskundorozsma IP is mainly attributed to the flows for the long-term contract, while the sale of capacity through auctions at the RBP platform (for daily, monthly, quarterly, yearly capacity) has been very limited at this point (Figure 27), and mainly sold as monthly capacity products. The small interest for auctioned capacity shows that the existence of the transit contracts does not materially affect allocability of firm capacity at the relevant IPs.

Figure 27: Gas flows and booked capacity at Hungary-Serbia IP



Source: FGSZ

112) The pipeline between Hungary and Slovakia (linking Balassagyarmat (HU) / Velké Zlievce (SK) IP to the FGSZ system), that is managed by MGT, the other transmission system operator in Hungary, has no restrictions and is compliant with NC CAM.

III. Poland

113) The Polish system has two separate transmission systems, the national gas transmission network owned by GAZ-SYSTEM and the Polish part of the Transit Gas Pipeline System Yamal-Europe (TGPS) owned by Europol Gaz. GAZ-SYSTEM is an ownership unbundled TSO, and is an Independent System Operator (ISO) on TGPS performing commercial management of TGPS not dedicated to the long-term transit contracts (referred to as “historical contracts”).

[55] Lithuania also includes transit of gas with a long-term transit contract from a non-EU IP (Kotlovka IP with Belarus) to another non-EU IP (Sakiai IP with Kaliningrad region). According to Amber Grid, the long-term transit contract does not include specific conditions and the capacity is booked individually at the entry point Kotlovka and at the exit point Sakiai. Therefore, the case of Lithuania is not analysed further in this Study.

Long-term transit contracts

114) EuRoPol Gaz s.a. performs the commercial management of its part of TGPS on the basis of the long-term historical contracts, which are not in line with the rules of NC CAM. As a consequence, capacity has been booked in accordance with the historical contracts, at IPs with EU and third countries, and third-party access is not provided in a transparent and non-discriminatory manner. On the other hand, the part of TGPS capacity which is not booked or is not used by the shippers is sold in auctions by GAZ-SYSTEM via the GSA Platform[56], offered on a yearly, quarterly, monthly, day-ahead and within-day basis.

IV. Romania

115) SNTGN Transgaz is the operator of Romania's gas transmission system. The system includes the dedicated Romanian section of the Trans-Balkan Corridor, which consists of two different parallel dedicated systems operating on a separate point to point basis:

- A pipeline (Transit T1) for Ukraine-Romania-Bulgaria, having Isaccea 1 IP entry point, Negru Vodă 1 IP exit point, and exit points to a distribution system on the Romanian territory directly connected to the T1 pipeline.
- A system comprising two pipelines (Transit T2 & T3) to Ukraine-Romania-Bulgaria-Greece/Turkey, having Isaccea 2,3 IP entry points and Negru Vodă 2,3 IP exit points[57].

Long-term transit contracts

116) At the dedicated Romanian section of the Trans-Balkan Corridor, due to the existence of long-term contracts, the firm capacity is being offered differently compared to the other network points. The capacity allocation mechanisms applied are as follows:

- At the exit IPs Negru Vodă 1 and Negru Vodă 2,3 auctions are applied in accordance with NC CAM, at the RBP booking platform.
- At the entry IPs Isaccea 1 and Isaccea 2,3 implicit allocation is applied on the basis of the allocation at the exit IPs Negru Vodă 1 and IP Negru Vodă 2,3 respectively (firm capacity allocated with auctions at the exit points is considered to be allocated also at the entry points).

117) Due to the historical contracts on the T2 and T3 pipelines, no available capacity is being offered currently by Transgaz at the IPs Negru Vodă 2,3 and Isaccea 2,3. On the other side of the IP Negru Vodă 2,3, Bulgartransgaz is offering entry firm capacity products. Allocability is restricted to a point-to-point transportation of gas. The network users are required to respect the principle of equality between the daily nominations/re-nominations submitted to the TSO for the use of the entry and exit points. In T1 pipeline, the nominations at the entry IP Isaccea 1 must be equal to the nominations at the exit IP Negru Vodă 1, the exits to the domestic points connected to T1. The same applies for T2 and T3 pipelines, where the entry/exit IPs Isaccea 2,3 – Negru Vodă 2,3 require equal nominations.

118) For contracting capacity at the T1 pipeline, Transgaz is applying the terms and conditions of the standard transmission contract. However, as described above, a point-to-point allocation is applied

[56] The capacity at the Mallnow IP on the Polish side is offered on the GSA Platform while for the German side on PRISMA. On 16 October 2018 ACER issued decision No 11/2018 establishing GSA Platform as the capacity booking platform to be used at both sides of the Mallnow IP. Following an appeal case A-002-2018, *PRISMA European Capacity Platform GmbH v ACER* on 14 February 2019 the ACER Board of Appeal annulled the ACER Decision No 11/2018 on the gas booking platform to be used at the Mallnow IP.

[57] Isaccea 2 and 3 are different physical entry points, which however are operating jointly. For this reason, they are considered as a common system by the TSO. The same applied to the Negru Vodă 2 and 3 exit points.

due to technical restrictions, i.e. the lack of connection of this pipeline with the rest of the Romanian transmission system (only an exit point to a single distribution system is currently in place). The situation is expected to change once the connection of the T1 pipeline with the transmission system if finalized.

119) At the T2 and T3 pipelines legacy long-term transit contracts are currently in force. The contractual terms are different to the terms and conditions of the transmission contracts concluded as a result of the auctions for capacity booking at the points related to the IPs Isaccea 2,3 – Negru Vodă 2,3. The situation is expected to change once the legacy long-term transit contracts expire. The transit contract on T2 pipeline is renewed annually, while the T3 pipeline one expires in 2023. According to the TSO, the annual renewal of the contract at T2 pipeline is planned to stop in 2023, once the T3 pipeline contract expires, so that the two pipelines can be integrated in the entry-exit system.

V. Slovakia

120) Eustream a.s. is the Slovak gas transmission system operator, operating a high-pressure gas transmission system that is interconnected with the transmission systems of Ukraine, the Czech Republic and Austria and is mostly used for natural gas transit.

Long-term transit contracts

121) There are still a few old long-term transit contracts in force. Transformation of these contracts to standard entry-exit system contracts was offered by TSO, but not utilized from respective network users. However, due to the large capacity available in the Slovak transmission system, allocability has not been affected by those transit contracts. Equally, booking procedures based on the NC CAM are applied at the IPs of the system with other EU Member States, through the PRISMA booking platform at IPs with Austria and Czech Republic, and the RBP platform at the IP with Hungary.

122) According to Eustream, the current percentage ratio of long-term transit contracts to the booked capacities is 13.5 % at the entry IPs and 13.6 % at the exit IPs.

1.2.6. Pipelines with Third-Party Access exemption

123) In this Section we describe the cases of pipelines in which allocability restrictions apply, as a result of a TPA exemption that has been granted by the pertinent authorities, in accordance with the provisions of Directive 2009/73/EC.

I. BBL Interconnector (Netherlands - UK)

124) The BBL-interconnector, connecting the Netherlands to UK, has an exemption from specific provisions of the regulated TPA regime for part of its capacity[58]. There are two types of long-term capacity contracts (LTC) in place:

- those offered under the initial exemption, in 2006 and will expire until 1st December of 2022,
- and those offered during the 2008 open season (for expansion of the pipeline's technical capacity), which started in 2010 and most of them will expire in 2022, while the longest running contract will be in force until 2036.

125) Between the two types of long-term capacity contracts there are minor price differences, but the main contractual terms and conditions are similar. While the exempted capacity originally

[58] The partial exemption thus covers 80% of the current forward capacity of the pipeline, but not the full capacity nor the reverse flow capacity. The duration of the exemption is limited to the expiration dates of the initial contracts, which expire between 2016 and 2022.

accounted for 40% of the total technical capacity, today the LTCs of exempted capacity account for approximately 15% of the total capacity, while for the rest 85% NC CAM is applicable. There is enough technical firm capacity available to cover the needs of the users without any condition on allocability or firmness.

II. Gazelle Pipeline (Czech Republic)

126) The Gazelle system, that connects to the OPAL system in Germany, allowing gas flows from Nord Stream to the Czech Republic, is exempted from the TPA and tariff regulations until the end of 2034, as approved by the competent authorities. It is operated, until the end of its exemption, on the point-to-point principle, linked with the entry-exit system of NET4GAS. Gazelle is a separate system, and its exemption does not have an impact on firmness or allocability of other network points.

III. OPAL Pipeline (Germany)

127) The OPAL Pipeline, connecting Nord Stream with the German – Czech borders, has received an exemption for TPA. An initial exemption was awarded in 2009, under conditions for the entire capacity of the pipeline, for 22 years. The exemption was revised in 2016, requiring the operator of the pipeline to offer at least 50% of the capacity in auctions. As described in Section 1.2.1, the TSOs operating OPAL, OPAL Gastransport GmbH and Lubmin-Brandov Gastransport GmbH are offering the part of the pipeline open to TPA using mainly DZK products, and only to a small extent FZK (only at the Brandov-OPAL IP with Czech Republic).

1.3. Key findings

128) Annex I provides a graphical representation of the transit routes resulting from the use of conditional firm capacity products (BZK, DZK) and long-term transit contracts (Figure 47, Figure 48 and Figure 49.

1.3.1. Overview of conditional firm capacity products

The country-by-country analysis of the firm capacity products offered by EU TSOs has highlighted that offering of conditional firm capacity products is concentrated in only a few Member States, namely Austria, Germany, Ireland and Luxembourg. Table 8 and

129) Table 9 summarize the extent to which conditional firm capacity products are provided and booked in each of the four Member States.

Table 8: Technical capacity of conditional firm products in Member States (data for Gas Year 2017/18)

Member State	Entry IPs		Exit IPs	
	Technical Conditional Capacity (GWh/d)	Share of total technical capacity	Technical Conditional Capacity (GWh/d)	Share of total technical capacity
Austria	497	17%	156	7%
Germany	3,956	49%	2,618	52%
Ireland	-	-	66	100%
Luxembourg[59]	20	100%	-	-

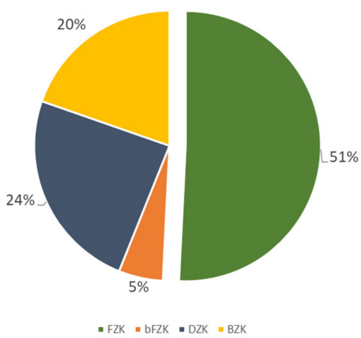
[59] The table presents the technical capacity at the IPs of each country. For Luxembourg, values concern the Remich IP, as the only IP in the country where capacity is sold, and not all area BeLux IPs. Should the whole BeLux area be considered, then the share of conditional products (the percentage value in the table) would be lower.

Table 9: Booked capacity of conditional firm products in Member States (data for Gas Year 2017/18)

Member State	Entry IPs		Exit IPs	
	Booked Conditional Capacity (GWh/d)	Share of total booked capacity	Booked Conditional Capacity (GWh/d)	Share of total booked capacity
Austria	95	4%	156	8%
Germany	3,541	69%	1,977	57%
Ireland	-	-	-	-
Luxembourg[60]	20	100%	-	-

130) Germany is making by far the largest use of all types of conditional products. In fact, out of the approximately 12,600 GWh/d of maximum technical capacity in the German market areas in Gas Year 2017/18, 49% concerned capacity offered under conditionalities. Most of conditional capacity concerned products that are used for designated point-to-point gas transportation, with or without possibility to access the VTP (DZK and BZK products' maximum technical capacity amounted to 89% of total conditional products). Capacity restrictions linked with temperature and/or flow conditions (bFZK) are used to a much lesser extent (11% of total conditional products), to address specific limitations, restrictions and bottlenecks of the system.

Figure 28: Maximum technical capacity in Germany per firm product for Gas Year 2017/18



Source: TSOs websites

131) In Austria, the other market area of considerable size where DZK products are being used, these products are gradually being phased-out. Already offering of new DZK capacity at the Oberkappel and Überackern IPs has ceased as of 2014, and only a few existing contracts remain, the last of which will expire in 2027. In the third IP where DZK product is available, Arnoldstein, TAG is proceeding with the necessary investments to partly convert this product to firm with free allocability.

132) In Luxembourg, only conditional capacity is being offered at the country's IP, for security of supply reasons, to ensure sufficient gas in the winter period, and gas flows that the system can withstand in summer. According to the TSO, the potential future development of a VIP will result in offering only firm capacity with free allocability, at lower levels that the current bFZK product. Inclusion of Remich IP in the BeLux-NCG VIP, and its impact on firm capacity, is still under investigation.

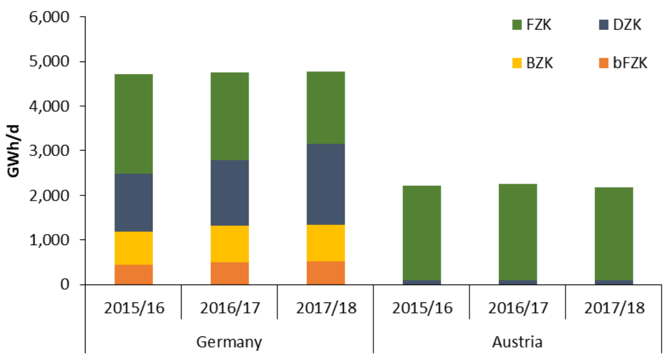
[60] The table presents the booked capacity at the IPs of each country. For Luxembourg, values concern the Remich IP, as the only IP in the country where capacity is sold, and not all BeLux area IPs. Should the whole BeLux area be considered, then the share of conditional products (the percentage value in the table) would be lower.

133) In Ireland, despite the market's smaller complexity in comparison to large meshed continental zones like Germany, the TSO opted to apply a BZK product at the exit IP to Northern Ireland, avoiding large investments in the system. The NRA and TSO confirmed that factually so far, the market has not used that product, nor indicated a willingness to pay for firm product, because the particular IP was mainly developed for security of supply and not commercial reasons. So, for GNI and its network users at present the issue is of minor materiality, and does not affect the young IBP VTP development[61].

134) Taking into consideration the very small size of the market in Luxembourg, and the fact that the conditional product in Ireland is not used in practice, analysis of the use of conditional firm capacity products, in the remainder of this Section, focuses on the use of these products in Germany and Austria.

135) Figure 29 and Figure 30 present the evolution of booking FZK and conditional capacity in Germany and Austria, which indicates the actual interest of network users to make use of the different capacity products. The trends are different for the two Member States. In Austria booking of DZK capacity has been very limited, mainly through the expiring contracts at the Überackern IP. On the other hand, in Germany the use of conditional products by network users is increasing, at the expense of FZK capacity booking. This increase is mainly driven by the extended contracting of DZK capacity, which is reasonable, given that this product offers to network users the possibility of accessing the VTP (even on an interruptible basis), expanding the users' alternative options to either use the capacity for transit or to sell gas in the German market. The attractiveness of the DZK products is higher, given that, as reported by the NRA and TSOs, no interruption on DZK capacity actually occurred in the last seven years. It should be noted that no quantitative information on interruptions of conditional products is publicly available by the TSOs, while it appears that the data on interruptions collected by the NRA does not have such a disaggregation.

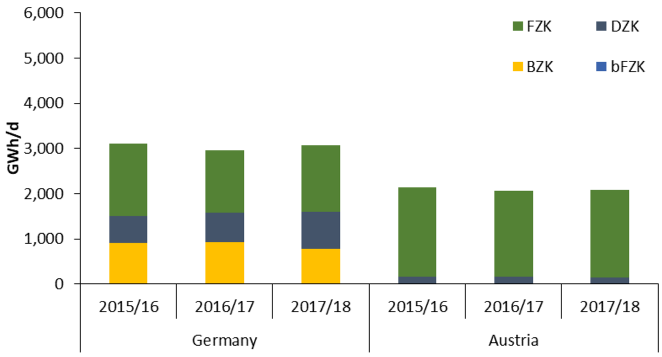
Figure 29: Recent evolution of booked capacity in Germany and Austria - Entry Side



Source: TSOs websites

61 https://www.ebi.ie/uncategorized/20-sept-2017-electronic-gas-trading-in-ireland-commences/

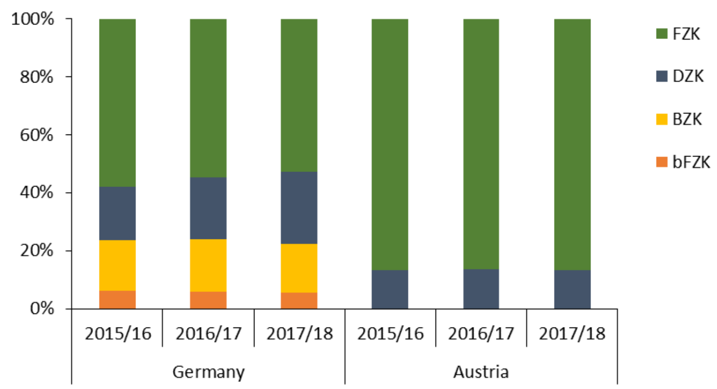
Figure 30: Recent evolution of booked capacity in Germany and Austria - Exit Side



Source: TSOs websites

136) Figure 31 below presents the evolution of conditional products' share in technical capacity at entry and exit IPs. In Germany, overall, both the offer and use of conditional firm capacity products appears on the rise, notably as regards DZK. This is consistent with reported information pointing to a gradual evolution from BZK towards more flexible DZK. This evolution is fostered by regulator's (BNetzA) policy, aimed at converting BZK into DZK[62]. On the other hand, FZK is stable but its use has declined, despite a significant consumption growth in both Germany and neighbouring Member States. In Austria the mix of conditional and firm capacity has remained constant, as no new DZK products are being introduced in the market.

Figure 31: Recent evolution of main Capacity Products Mix (Technical Capacity aggregate for entry and exit IPs)



Source: TSOs websites

137) Figure 32 presents the ratio of booked capacity at exit IPs to the booked capacity at the entry IPs of the Member State[63]. This value provides an indication of the extent to which a capacity product is used for transit purposes; values close to 1 indicate use of the product at the entry IPs with purpose of transporting it to exit IPs[64]. Values higher than 1 are justified in cases where conditional capacity at exit points is linked to FZK capacity at the corresponding entries (e.g. e.g. the DZK product at

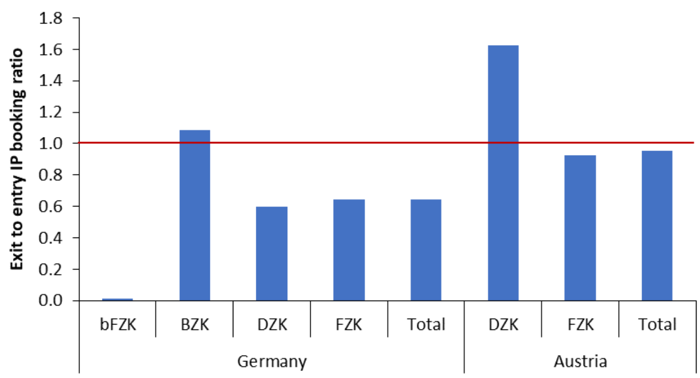
[62] https://www.bundesnetzagentur.de/DE/Service-Funktionen/Beschlusskammern/1_GZ/BK7-GZ/2018/2018-0001bis0999/2018_0001bis0099/BK7-18-0052/BK7-18-0052_Einleitungsdokument_english_download_bf.pdf?__blob=publicationFile&v=2

[63] Only cross-border IPs are taken into consideration; IPs between TSOs within the same Member State are not included.

[64] It is noted that this ratio provides only a broad indication for the use of conditional capacity products between entry and exit IPs. Cases in which capacity assignments of conditional products are not linked with products of the same quality, but with FZK, are not captured with this ratio.

Arnoldstein entry IP of TAG requires a capacity assignment of FZK capacity at Murfeld exit IP of GCA). The transit orientation of BZK capacity is confirmed by the balanced bookings at entry and exit IPs. The low ratio of exit to entry bookings for DZK capacity in Germany indicates that network users make extensive use of the flexibility that the product provides, to access internal network points and the VTP, instead of using it for transit. Weather-related and flow-related bFZK is used mostly for internal purposes and is therefore hardly offered at IP exits. In Austria, the higher booking of DZK capacity at exit IPs compared to entry IPs is mainly justified by the fact that with the expiry of DZK contracts at Oberkappel IP, booking of both entry and exit DZK capacity is primarily concentrated in the same IP (Überackern), as well as by the network topology and its historical growth that was developed to accommodate flows from east to west.

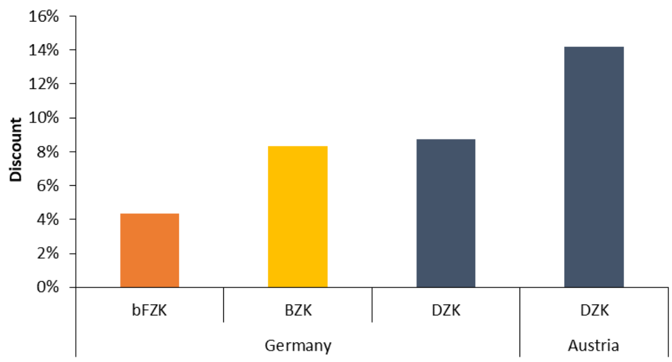
Figure 32: Ratio of booked capacity at exit IPs to booked capacity at entry IPs per product for Gas Year 2017/18



Source: TSOs websites

138) Each TSO has its own policy on the discounts offered to conditional firm capacity products. As shown in Figure 33, on average[65], bFZK capacity is offered with a small discount compared with FZK, while BZK and DZK products in Germany have larger discounts, close to that for interruptible capacity. Zooming in at the discounts offered by each German TSO for DZK and BZK products (Figure 34) it can be seen that in most cases similar discounts are offered, despite the different flexibility that the two products provide.

Figure 33: Average discounts of conditional firm capacity products for Gas Year 2017/18[66]

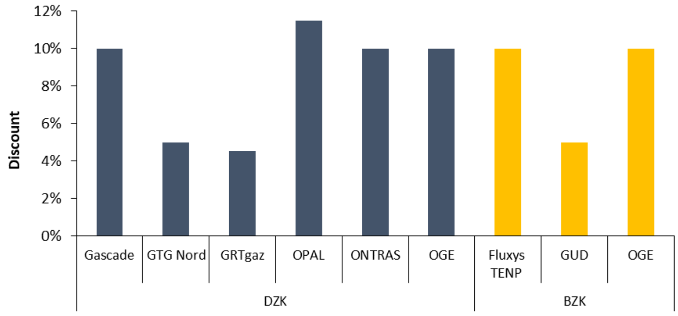


Source: TSOs websites

[65] Numerical average of the discount per product offered by each TSO, comparing the capacity charge for the conditional product with that of FZK. Only cases in which the TSO offers both FZK and conditional products, are included in the calculation.

[66] For Austria, discount at Oberkappel IP not included, as DZK product is no longer used at that IP.

Figure 34: Discounts for DZK and BZK capacity by German TSOs for Gas Year 2017/18



Source: TSOs websites

139) In Austria, the use of the DZK product also has a tariff discount that depends on the selected path. On average this discount is higher than the corresponding discount for DZK products in Germany.

1.3.2. Overview of non-firm services

140) Fluxys Belgium, Gasunie Netherlands and National Grid have developed and are offering tailor-made services to network users that are not interested in accessing the VTP, but only to use the system for deliveries at specific network points, cross-border or domestic. The difference with the conditional firm capacity products is that these services are only provided if requested by network users, after they have booked firm capacity with free allocability.

141) The shorthaul service in the Netherlands, OCUC in Belgium and the optional commodity charge (shorthaul) in the UK, are all designed means for management potential system congestions, by facilitating transportation of loads along specified paths, while the TSOs take special provisions, with the view not to affect the normal operation of the rest of the network or the operation of the VTP. However, although these services serve the same purpose, their design elements are materially different. The shorthaul service of Gasunie is only provided at entry and exit combinations close to each other (less than 50 km). The OCUC service of Fluxys is offered only at IPs, spread through the transmission system, provided that the entry and exit nominations are balanced. The National Grid service allows the network users to access the VTP, but losing the discount on the commodity charge.

142) Implicitly, the request by a network user of the non-firm services is equivalent to the choice between participating to the balancing regime and using the transmission system only to deliver gas to a predefined exit point. The network users are not obliged to take such a choice on a long-term basis; for example, in the UK access to the VTP is permitted, while in Belgium the OCUC service can be requested on a daily basis, allowing the user to then revert to the standard transmission service.

143) The non-firm services are provided at a discount, compared to the standard transmission service that the TSO provides for firm capacity. This discount usually differs, depending on the combination of entry and exit points that the network user opts to request the service for. The way each TSO defines the tariffs for the non-firm services is different, not allowing direct comparison of the discounts. In the Netherlands the shorthaul tariff depends on the duration of the contract, the contracted capacity and the distance between the entry and exit point. In Belgium the capacity charge for use of OCUC per combination of points is published by Fluxys. In the UK the optional commodity charge is defined as a function of entry-exit distance and capacity of the network points.

144) Wheeling offered by Fluxys and GTS is a different type of point-to-point service. It is only offered in the special cases of IPs located within the same physical connection facility that due to their

location provide access to adjacent markets. When applying the wheeling service, network users do not access the transmission system, therefore the tariff of the service comprises only of fixed costs for the use of the relevant IPs.

145) The use of non-firm services is considerable in Belgium and the UK[67], as for Fluxys OCUC and wheeling constitute around 30% of gas volumes at the IPs where they are available, and for National Grid shorthaul corresponded to 30% of total flows in the system. On the other hand, as a result of the discounted tariffs for these services, the users' interest is not reflected in the revenues that the TSOs receive from the use of non-firm services; for both Fluxys and National Grid they constitute only 5% of the TSOs' total revenues. Given the significant impact of discounts on the TSOs revenues from the non-firm services, the TSOs should be accurate in their estimations for the expected use of these services, to ensure recovery of costs through the discounted tariffs.

146) An additional observation on the non-firm services is the lack of transparency on how these services are actually being applied by the network users. The TSOs are publishing information about the firm capacity, nominations and gas flows at the IPs where the services are available, but no data on the part of nominated volumes attributed to the non-firm services. According to their view, the reasoning of this is that publication of such information is out of scope of the Third Energy Package transparency requirements.

1.3.3. Overview of dedicated transit pipelines and long-term transit contracts

147) The analysis has identified that long-term transit contracts and/or dedicated transit pipelines are still in place in Bulgaria, Hungary, Poland, Romania, and Slovakia, however the impact in limiting the use of firm capacity is different in each case.

148) The most significant impact can be identified in Romania, where the Trans-Balkan Pipeline can only be used for a point-to-point transit of gas, as long as the long-term transit contracts are in force, and the transit network is not integrated with the national transmission system. In Bulgaria the vast majority of transit capacity has been booked through long-term transit contracts, while the small capacity of the transfer point, connecting the transit and national transmission systems, does not allow effective implementation of the entry-exit system.

149) In Poland, only part of the capacity of the Polish section of the Transit Gas Pipeline system Yamal-Europe is offered to the network users, with the rest been booked due to the historical transit contracts.

150) In Hungary, capacity transit route from Ukraine to Serbia has been booked through a long-term transit contract, which is possible, given that the transit concerns IPs with third countries, out of scope of the NC CAM procedures. Furthermore, interest of system users for contracting capacity at the affected IPs is limited, therefore the actual impact on the use of firm capacity is very limited.

151) In Slovakia, long-term transit contracts were not converted to entry-exit system contracts by the TSO. However, due to the large transit capacity available in the Slovak transmission system, the allocability is not affected by those transit contracts.

152) Table 10 below summarises the situation with transit pipelines and contracts in these Member States, and the extent to which this affects utilization of firm capacity.

[67] In the Netherlands the situation is different, as the network users show very limited interest in the shorthaul service and GTS is planning to eliminate it in 2020.

Table 10: Member States with dedicated transit and/or long-term transit contracts in place

Country	Transit situation	Foreseen developments	Impact
Romania	Two transit systems are in place (T1 Pipeline, and T2&3 Pipelines). In T1 Pipeline there is no historic contract in place, but the pipeline is not connected with the Romanian transmission system. At T2&3 Pipeline historic contracts are in place reserving the capacity.	Connection of T1 Pipeline with the national system is undergoing. The contracts for the T2&3 Pipelines are expiring in 2023, after which an entry-exit regime is expected to be applied.	At the transit system of T2&3 Pipelines 100% of booked capacity corresponds to the historic contracts.
Bulgaria	Bulgartransgaz has a national and a transit network, interconnected through a transfer point, the small capacity of which limits gas flows from one system to the other.	LTCs are set to expire in 2030	At the Negru Voda 2,3 (RO)/Kardam (BG) entry IP to the transit network, over 99% of booked capacity corresponds to the long-term contracts.
Poland	A historical contract is in place in the TGPS pipeline, reserving part of the capacity. The rest is being marketed by GAZ-SYSTEM as an ISO.	Expiry date of the LTC was not disclosed	Capacity of TGPS used through the historical contract is confidential
Hungary	Capacity for transit to Serbia has been allocated through a long-term contract, with the remaining capacity available through auctions. Limited interest of network users to contract capacity at the affected IPs.	Expiry date of the LTC was not disclosed	50-60% of capacity at the Kiskundorozsma IP is used for the long-term transit contracts.
Slovakia	Long-term transit contracts are still in place, as network users were not interested to convert them to entry-exit ones.	Expiry date of the LTC was not disclosed	The booked capacity of long-term transit contracts corresponds to just 13.5% of overall booked capacity at entry and exit points.

2. Effect of conditional capacity products on the efficient use and the integration of the European gas markets

153) As shown in the previous Chapter, and despite their concentration in few Member States, conditionalities stipulated in contracts for standard capacity products, where offered, are widely used by network users, especially since, in some cases, the bulk of the capacity offered is conditional. The as-if exercise reported in this Chapter aims at verifying if and under which conditions the presence of conditionalities interacts with the EU internal natural gas market results with particular reference to market integration indicators. The exercise is integrated with an introductory discussion on a possible framework for cost-benefit analysis of conditionalities based on a pilot study.

154) According to the TSOs surveyed in Chapter 1, the rationale of offering conditionalities is aiming to maximize the transport capacities, while avoiding further costly investments. Alternative solutions for the TSOs, other than the offering of conditionalities would be: i) to remove the firm conditional products from the market, offering the relative capacity as interruptible, ii) not offering the capacity of conditional products to the market at all, and iii) transforming them to FZK products, pursuing the corresponding investments needed. Our approach in analysing the aforementioned impact is based on creating alternative market scenarios, using various capacities for the interconnection infrastructure, as proposed above. In particular, we tested a *base case*, which reproduces, for each entry-exit area, a share of conditional products over the total firm products offered by TSOs. Then, we tested two *alternative cases* in which the capacities offered under conditionalities in the *base case* were removed by the market or were upgraded to firm capacities with free allocability.

155) In order to implement this approach, we used an economically optimal model of the European gas market, developed by REF-E, called *EU-GaMe* (the Model). The Model simulates the natural gas market flows between entry-exit areas and spot (daily) prices for gas exchanged within those areas (VTP prices). Flows and prices are computed while minimizing overall costs in a fully competitive[68] environment, given a set of constraints on daily demand, supply availability, interconnection capacities, storage and LNG capacities. Costs originate from gas imports contracts and from infrastructure charges. A more detailed description of the Model can be found in Annex IV.

2.1. The *base case*

156) The *base case* is built in order to simulate the actual EU natural gas market, reproducing the prevailing conditions of GY16 and imposing conditionalities in line with those surveyed in Chapter 1 and affecting interconnection capacities.

157) The model is structured to include 23 countries aggregated in 11 entry-exit areas (Table 11) comprising all EU Member States except the four Baltic states (Estonia, Finland, Latvia, and Lithuania), Cyprus and Malta, which are not currently interconnected to the main EU network. Since the four Baltic States account for only 1.2% of EU's consumption and are not reported to use conditionalities, while Malta and Cyprus have no gas market yet, their exclusion does not affect the results of our analysis. On the other hand, Switzerland (0.7% of European consumption) is included for geographical continuity. A greater detail is required for countries where conditionalities are more widespread.

[68] In a fully competitive environment suppliers are price takers. Simulated flows and prices minimise the overall supply and transport cost, maximising the overall surplus of the EU wide gas market. Market power is not exerted by suppliers (nor by consumers), irrespective of their market share.

Therefore, the current separation of Germany's market areas (NCG and Gaspool) is retained. On the contrary, Austria is included into the CEE market area, which does not affect results, because there are no conditionalities attached to IPs between Austria and other CEE countries. We have performed the analysis based on a *Reference scenario* and a *high demand scenario*, in order to simulate respectively a normal and a tight demand situation of the EU market.

Table 11: Entry-exit area specification in the model

Market Area	Memeber States	Interconnection Points
ESPT	Spain Portugal	VIP PIRINEOS Sagunto Mugardos Bilbao Sines Barcelona Huelva Cartagena Tarifa Almeria
FR	France	Oltingue Jura VIP PIRINEOS Alveringem Montoir de Bretagne Fos (Tonkin/Cavaou) Dunkerque LNG Dunkerque Blaregnies (BE) / Taisnières (H) (FR) (Segeo/Troll) Blaregnies L (BE) / Taisnières B (FR) Obergailbach (FR) / Medelsheim (DE)

BELU	Belgum Luxembourg	Zeebrugge IZT
		Zelzate
		Zelzate (Zebra Pijpleiding)
		Eynatten 1 (BE) // Lichtenbusch / Raeren (DE)
		Eynatten 2 (BE) // Lichtenbusch / Raeren (DE)
		Remich
		Blaregnies (BE) / Taisnières (H) (FR) (Segeo/Troll)
		Blaregnies L (BE) / Taisnières B (FR)
		Zeebrugge LNG
		Zandvliet H-gas
		Poppel (BE) // Hilvarenbeek/Zandvliet-L (NL)
		's Gravenvoeren Dilsen (BE) // 's Gravenvoeren/Obbicht (NL)
		Alveringem
		Zeebrugge ZPT

UKIE	Great Britain Ireland	Zeebrugge IZT Teesside Isle of Grain Milford Haven Bacton (BBL) St. Fergus Easington Internal Production

NL	Netherlands	Zelzate
		Zandvliet H-gas
		Poppel (BE) // Hilvarenbeek/Zandvliet-L (NL)
		's Gravenvoeren Dilsen (BE) // 's Gravenvoeren/Obbicht (NL)
		Bocholtz
		Bocholtz-Vetschau
		Zevenaar
		Winterswijk
		Bunde (DE) / Oude Statenzijl (H) (NL) (GASCADE)
		Bunde (DE) / Oude Statenzijl (L) (NL) (GTG Nord)
		Bunde (DE) / Oude Statenzijl (L) (NL) (GUD)
		Vlieghuis
		Bacton (BBL)
		Haanrade
		Gate Terminal (I)
		Zelzate (Zebra Pijpleiding)
		Emden (EPT1)
		Internal Production

NCG	Germany	Eynatten 2 (BE) // Lichtenbusch / Raeren (DE) Remich Oberkappel Obergailbach (FR) / Medelsheim (DE) Überackern SUDAL (AT) / Überackern 2 (DE) Wallbach Ellund (OGE) RC Basel RC Lindau RC Thayngen-Fallentor Steinitz Steinbrink (DE) Zone GASCADE / OGE Bocholtz Bocholtz-Vetschau Zevenaar Winterswijk Überackern ABG (AT) / Überackern (DE) Waidhaus Kienbaum

Market Area	Memeber States	Interconnection Points
NCG	Germany	Broichweiden Süd Lampertheim IV Bunder-Tief Emsbüren-Berge Wardenburg RG Gernsheim Zone L-Gas GUD/OGE Dornum Emden (EPT1) Internal Production
GSP	Germany	Eynatten 1 (BE) // Lichtenbusch / Raeren (DE) Ellund (GUD) Mallnow Olbernhau (DE) / Hora Svaté Kateřiny (CZ) Hora Svaté Kateřiny (CZ) / Deutschneudorf (Sayda) (DE) Brandov-OPAL (DE) Kienbaum Broichweiden Süd Lampertheim IV Bunder-Tief Emsbüren-Berge Steinitz Wardenburg RG Gernsheim Zone L-Gas GUD/OGE Steinbrink (DE) Zone GASCADE / OGE Bunde (DE) / Oude Statenzijl (H) (NL) (GASCADE) Bunde (DE) / Oude Statenzijl (L) (NL) (GTG Nord) Bunde (DE) / Oude Statenzijl (L) (NL) (GUD) Vlieghuis Dornum Emden (EPT1) Greifswald Internal Production
DKSE	Denmark, Sweden	Internal Production Ellund
ITCH	Italy, *Switzerland*	Panigaglia Cavarzere OLT Gorizia Tarvisio Wallbach Oltingue (FR) / Rodersdorf (CH) Jura RC Basel RC Thayngen-Fallentor Mazara Gela Internal Production
CEE	Austria Czech Republic Slovak Republic Poland Hungary Croatia Slovenia	Oberkappel Überackern ABG (AT) / Überackern (DE) Überackern SUDAL (AT) / Überackern 2 (DE) Tarvisio (IT) / Arnoldstein (AT) Mallnow Brandov-OPAL (DE) Hora Svaté Kateřiny (CZ) / Deutschneudorf (Sayda) (DE) Waidhaus Kiskundorozsma Csanadpalota Budince Swinoujscie Olbernhau (DE) / Hora Svaté Kateřiny (CZ) Haidach (AT) / Haidach USP (DE) Tieterowka Kondratki Wysokoje Drozdovichi (UA) -Drozdowicze (PL) Uzhgorod (UA) - Velké Kapušany (SK) Beregdaróc 1400 (HU) - Beregovo (UA) (UA>HU) Gorizia (IT) /Šempeter (SI) Internal Production
SEE	Romania Bulgaria Greece	Kyustendil (BG) / Zidilovo (MK) Strandzha (BG) / Malkoclar (TR) Csanadpalota Ungheni Isaccea (RO) - Orlovka (UA) I Isaccea (RO) - Orlovka (UA) II Isaccea (RO) - Orlovka (UA) III Kipi Agia Triada

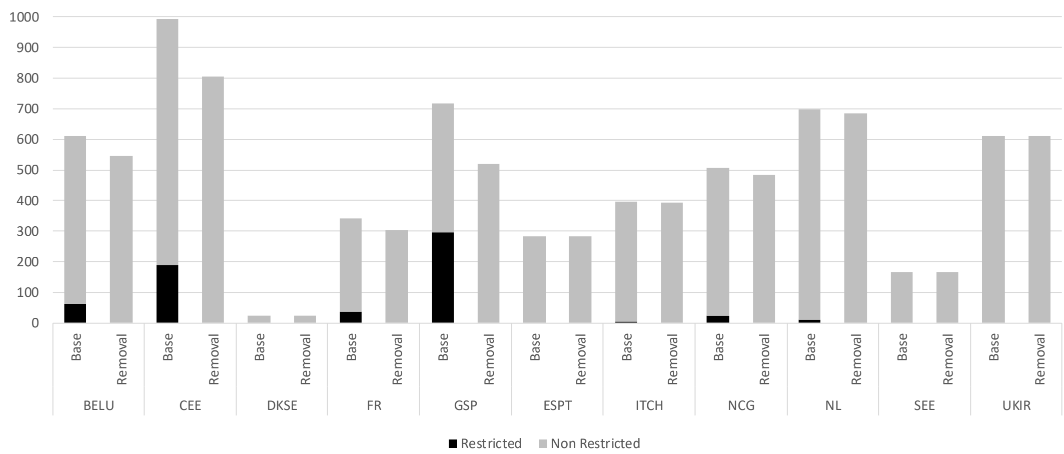
Source: EU-GaMe model.

2.2. The removal of conditionalities

158) According to the TSOs surveyed, the rationale to offer conditionalities in contracts for standard capacity products aims at maximizing the transport capacities given the internal physical constraints. The exercise presented in this paragraph simulates the natural gas market outcomes in a situation where, with respect to the *base case* presented in the above paragraph, the conditional capacities are removed from the market[69]. All other assumptions remain unchanged. Consequently, in this new case all available capacities are offered without restrictions and full allocability is guaranteed, but the overall available capacities are lower, namely for those entry-exit areas where conditionalities in the *base case* are higher (Figure 35).

159) The comparison between the two simulations (*base case* against *removal case*) tests the hypothesis that offering conditional capacities is better for the market than not having it offered at all[70]. The comparison is repeated under two demand scenarios.

Figure 35. Simulated technical available capacitates in each entry-exit area – Base versus Removal scenario (MWh/d)



Source EU-GaMe model

160) We need to stress that what matters in this as-if exercise is not the result in each case, but the comparison of market indicators among the scenarios. For example, the decrease in simulated price of a market area means that conditional capacity removal leads the reduction of the total supply costs of this area, and hence the more efficient utilization of the transmission and storage system. To this end, the results of the various scenarios, presented in the following paragraphs, should be considered in comparison to those of the *base case*.

161) Variations in the level of simulated average prices (Figure 36) are influenced by the demand level: in the *Reference scenario*, the price tends to increase when removing the capacities while

[69] The capacity corresponding to the import from Russia to Gaspool is reduced at 80% of the actual restricted capacity. We made this assumption because the majority of firm conditional capacities offered at this border are downgraded to interruptible when the conditions are not respected (DZK products). Thus, a complete removal of such capacities would overestimate the impact of capacity removal over this area. This assumption can be interpreted also with DZK capacities transformed in interruptible capacities with 80% average availability. This could be valid also for conditional products offered at other IPs. For the sake of simplicity, we designed the removal scenario assuming complete removal of capacities from the market where conditionalities represent a lower share of overall technical firm capacity in respect to the share observed at Greiswald.

[70] We do not consider here possible alternatives, such as the transformation of firm conditional products in interruptible products. We consider such alternatives later in the analysis (see paragraph2.4).

reducing in the *High scenario*. The intuition behind this effect is that lower availability of transmission capacity (as conditional capacity is cancelled) forces most market areas to resort to other, more expensive sources, where capacity is available. Moreover, the market is affected by a slight increase in unit transport costs, as the 10% tariff discount is removed, together with the corresponding products. Thus, variations are very low on average (in the range of +-1% on EU average) but are relevant not only to the areas where conditionalities where higher (Gaspool in particular), but also to other areas (ITCH and CEE).

162) The variability index in Figure 37 is computed as the normalized standard deviation of each entry-exit area simulated average price in respect to EU average. The analysis of the variability index shows that prices within each area tend to be more distant (higher variability index) in the *removal case* compared to the *base case*, both in *reference* and *high demand scenario*. The level of price convergence is a simple indicator of market integration. Divergent prices indicate isolated markets, where constrains prevent the minimization of supply costs. The simulated variability index suggests that the presence of conditional capacities increases market integration in respect to the situation where such capacities are not available. In other words, the statement that offering conditional capacities is better than not offering such capacities at all seems to be confirmed by this indicator. Suppliers use conditional capacities exploiting trading opportunities. As a consequence, prices are more aligned in respect to a situation where such capacities are not available. This result is not inconsistent with the previous one: reduced variability implies that price increases for some entry-exit areas, while decreasing for others. One could argue that price divergence is a market signal of congestions. If such congestion actually exists, the price divergence is a good indicator of the need of new investments and of the costs and benefits of having or not such additional capacities. Thus the presence of conditionalities could hide to the market the right price signal. A balance of the two outcomes and a final conclusion on benefit and drawback of having conditional products offered in the market cannot be drawn at this stage of the work.

Figure 36. Simulated price changes in the removal scenario *compared to the* base scenario

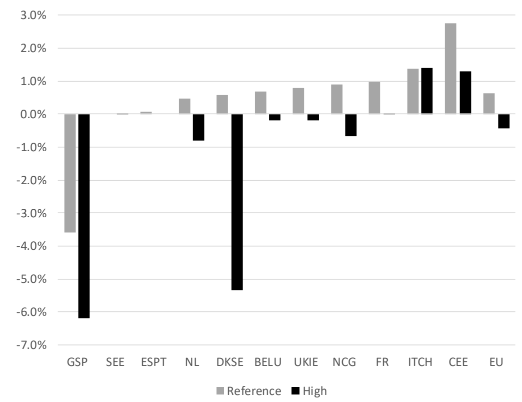
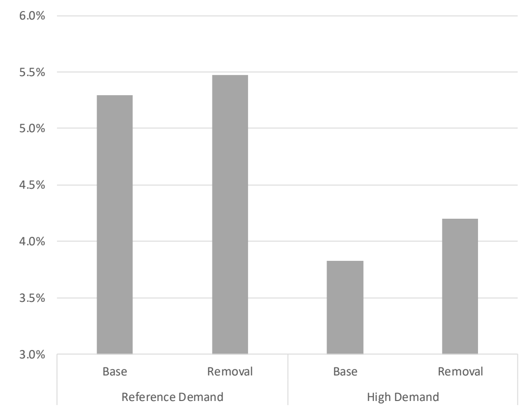


Figure 37. Simulated variability index of average prices in alternative scenarios



Source EU-GaMe model.

163) We analysed two additional simulated indicators: churn ratio and market concentration. Simulated churn ratio is computed as yearly flows at VTP over yearly demand in the entry-exit area; such indicator is used as a proxy of market liquidity at VTP. Market concentration is measured through simulated Herfindahl-Hirshmann Index (HHI). The HHI is defined as the sum of squared market shares, calculated by setting total market size equal to 100. The simulated HHI is calculated at upstream level and focuses on suppliers (exporters to Europe and domestic producers: Algeria, LNG, Libya, National

Production, Norway, Russia)[71]. A higher (lower) simulated HHI index indicates a lower (higher) level of supply diversification between exporters to Europe and does not necessarily indicates a lower (higher) level of market competitiveness. In fact, since a higher (lower) simulated HHI could indicate a lower (higher) level of dependence from suppliers, a complete competition analysis should be based on wider market analysis (for example taking into account the level of competitiveness of non-domestic gas markets) and is out of the scope of this exercise.

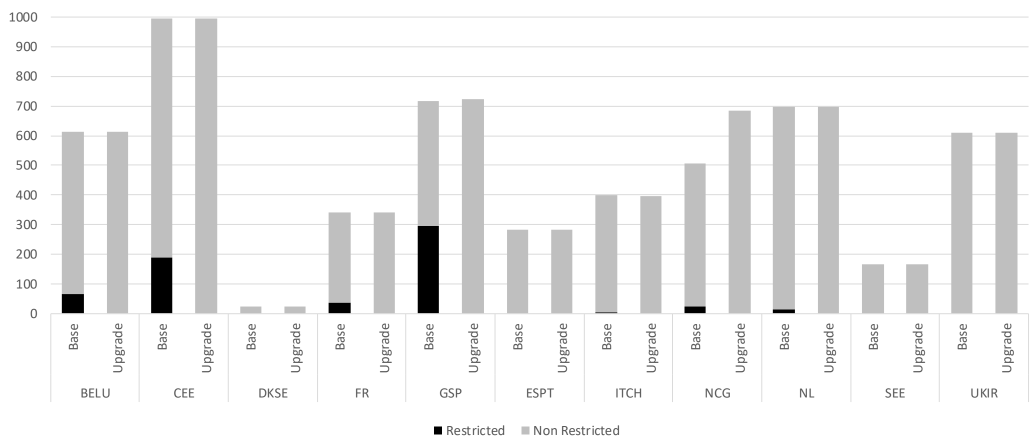
164) Simulated churn ratios and HHI indexes show only marginal, non-significant changes, when moving from *base case* to *removal case* (thus we do not show figures for such indicators). Conditional products prevent access to VTP, so flows at VTP, and consequently the simulated churn ratios, are only marginally affected by the removal of the relative capacitates from the market. The removal on capacities does not change the simulated HHI as well, showing that the supply is not affected.

2.3. The upgrade of conditional capacities into firm capacities with free allocability

165) The simulation presented in this case assumes that conditional capacities are transformed into firm capacities with free allocability (Figure 38). Consequently, in this case, all the available capacities are offered without restrictions and full allocability is guaranteed, while assuring the overall level of available capacities of the *base case*. In this scenario, revenues for TSOs are slightly incremented in respect to other cases, since the discounts on conditional capacities (assumed 10% in the *base case*) are cancelled. Nevertheless, our analysis is limited to impacts and did not consider (nor assessed) the costs needed upgrade products form conditional to freely allocable. In other words, a cost benefit analysis is outside the scope of the as-if simulations (see paragraph 2.5 for a discussion on cost-benefit analysis of conditional products upgrade).

166) The comparison between this *upgrade case* and the *base case* tests the hypothesis that increasing the allocability of capacities could lead to substantial benefits for the EU internal gas market's integration.

Figure 38. Simulated technical available capacitates in each entry-exit area – Base versus Upgrade scenario (MWh/d)



Source EU-GaMe model

[71] HHI values are thus higher than those estimated at upstream company level by the AGTM Compendium 2016.

167) Simulated prices for each entry-exit area are similar to those in the *base case* under the *reference demand scenario*, while they tend to be reduced under the *high demand scenario*. Gaspool is an exception, always benefitting from capacity transformation. In the *reference demand scenario*, decreases in import costs deriving from the increased allocability are compensated by the reduction in tariff discounts, while limited impact on the variability index is reported, therefore it is not shown in figures. As for the simulated churn ratio, it increases remarkably in the Gaspool area, where it actually doubles, and the NCG area, while presents lower variations, in the areas directly connected to Germany, and no variations in other regions (Figure 39 and Figure 40). In other words, liquidity is greatly impacted in the German area.

168) Price decreases for the Gaspool area are linked to higher import level from cheapest import areas allowed by conditional capacity removal, which are reflected in a higher import/export activity and thus higher churn ratio (Figure 40). The HHI index registered for the two German areas increases with increasing imports from low priced non domestic suppliers, while slightly decreasing at EU level since the concentration level is decreased correspondingly in the CEE area.

169) It is interesting to notice that Central Europe (CEE), even though only marginally affected by capacity conditionalities, suffers the highest simulated price increases when conditionalities are upgraded to freely allocable capacities, followed by Italy and Switzerland. This is an indirect effect of the increase of import capacity from cheapest suppliers to Gaspool. When it comes to increasing the free allocability of capacity available, cheapest gas has a better access in the Northern part of the Continent, with higher cost benefits for Germany (mainly in Gaspool area). The gas imported in CEE and Central Southern Europe (ITCH) is still imported from the North, but from a longer route, transiting from Gaspool and NCG areas, and becoming more expensive due to additional transport costs.

Figure 39. Simulated price changes in the upgrade case *compared to the* base case

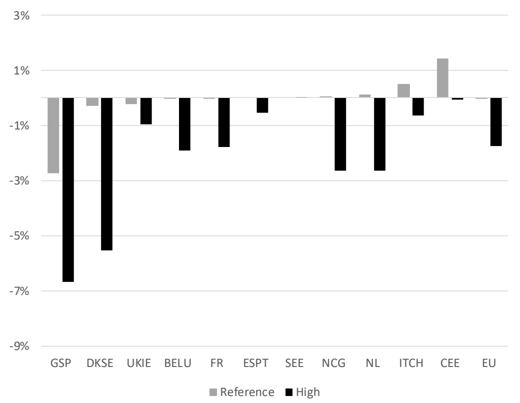
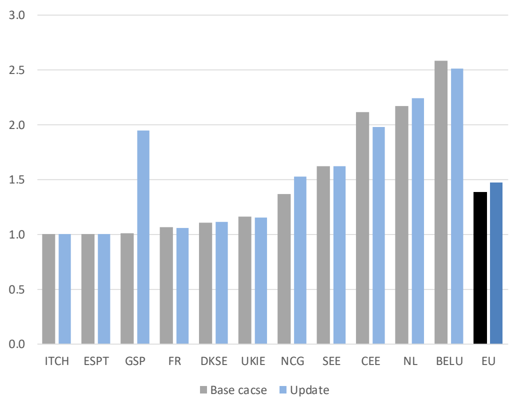
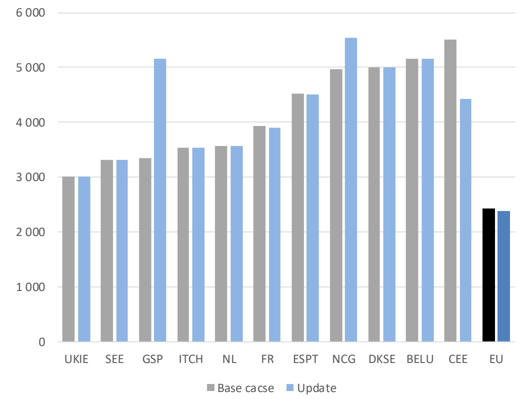


Figure 40. Simulated churn ratios in the base case *and in the* update case



Source EU-GaMe model.

Figure 41. Simulated HHI indexes in the base case *and in the* update case



Source EU-GaMe model.

2.4. The role of interruptible capacities

170) In terms of the conditionalities surveyed in Chapter 1, BZK products reduce allocability by requiring coordinated nominations of specific entry and exit points, preventing any use of VTP. For DZK, access to the VTP is only allowed on an interruptible basis. Thus, the conditions for the use of capacities depend on the probability of interruptions: if the probability of interruption (reflecting the expectation of actual interruption by the network user) is high, the DZK, in terms of freedom of allocability, is close to BZK, preventing any access to the VTP. However, in case the probability of interruption is low, the DZK is closer to an FZK, allowing almost free allocability and access to VTP.

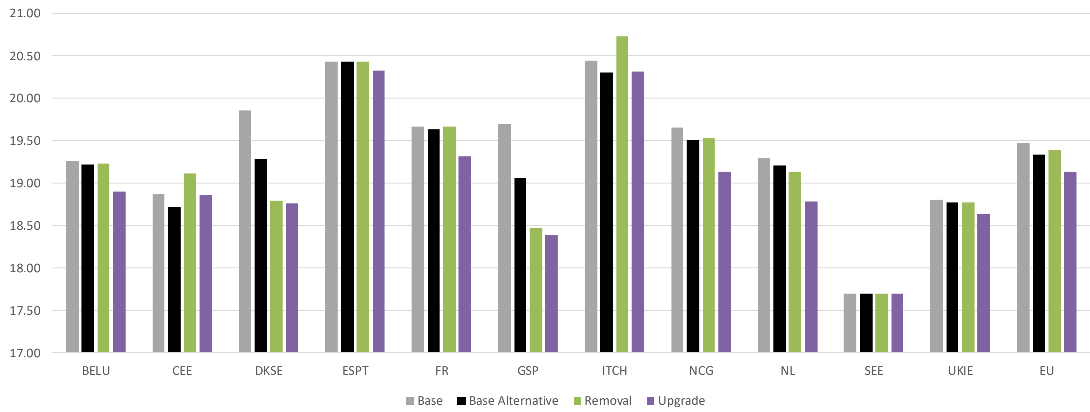
171) In our *base case* conditionalities in contracts for standard capacity products are modelled forcing point-to-point routes for gas flows when using conditional capacity products. We have thus modelled all the restrictions as if a very high probability of interruption was assigned to DZK products, or, in other words if they were similar to BZK products. When the actual probability of interruption is low, our assumption overestimates the restrictions of DZK products in the *base case* in respect of the actual situation: in fact shipper utilising the DZK have actually access to VTP, even if subject to interruption probability, while in the Model the access to VTP is totally restricted. In order to check the impact of our assumption, we have simulated an *alternative base case*, where we have assigned a low probability of interruption for DZK products, allowing access to VTP for such products. In other words, in this *alternative base case* DZK are treated as similar to FZK. However, such products are still priced at a discount of 10% in respect of normal tariffs.

172) The probability of interruption of DZK products actually offered is hard to be estimated. Data on historical frequency of interruptions, that could represent a proxy of the probability of actual interruptions, are only partially available, but they have been reported by stakeholders as extremely low. Thus the case where the DZK are similar to FZK should be closer to reality than the one where DZK are similar to BZK. In fact it could represent either a scenario where the subjective value of the network users of a DZK product is lower than that reflected by simple interruption probability or a scenario where the flexibility conditions of capacity products are reduced in respect of the actual one.

173) It is worth noting that this *alternative base case*, which is in fact an intermediate case with partial transformation of conditionalities into freely allocable products, shows intermediate results

between the *base case* and the complete *upgrade case*, as shown in Figure 42 for the *high demand scenario*, where price changes are more evident. Since the analysis of other market indicators evolution does not change substantially the finding of the as-if simulation, we do not show further data for this case.

Figure 42: Yearly prices for each case in the high demand scenario (EUR/MWh)



Source: EU-GaMe model.

2.5. A cost-benefit analysis pilot study

174) The as-if exercises presented in this Chapter shows a positive impact of a generalised upgrading of existing conditioanlities in standard capacity contracts on market integration and market efficiency. Moreover, impacts do not apply only to EU entry-exit areas that are directly concerned by the upgrading, but there are also effects on market areas that do not currently host such conditionalities. Thus the analysis does not explicitly consider the costs needed to allow such upgrades, only assuming an increase in tariffs linked to the removal of 10% discount allowed to conditional products in the *base case*. Capacity upgrading usually involves some costs, mostly investment costs, which are case-specific. Upgrading conditionalities into freely allocable products may require interventions spanning from metering and flow regulation devices, to compression enhancements, to looping or even substitution of existing pipelines. These costs should be compared with the benefits of the upgrading, which may extend well beyond directly concerned areas.

175) This Chapter proposes a framework for cost-benefit analysis of conditionalities upgrading and implementation, as a pilot study, for a specific case. The chosen case is based on the upgrade from DZK to FZK at the entry Arnoldstein on the Trans Austrian Gasleitung (TAG), located in Austria. TAG, together with GCA, forms the backbone of the Austrian transmission gas grid (Figure 43). Currently, DZK (conditional firm) products are offered at Entry Oberkappel, Überackern (managed by GCA) and Arnoldstein (managed by TAG). TAG is implementing the project TAG 2016/01 (Reverse Flow Weitendorf/Eggendorf project), which comprises operation of the Weitendorf CS and all necessary modifications to the station control system, and aims to allow full reverse flow across the TAG system. This project, in conjunction with the projects GCA 2015/10 and TAG 2016/02, will create new and non-competing freely allocable capacity at the Arnoldstein and Murfeld entry points, allowing for the existing DZK capacities to be upgraded to FZK capacities at the Arnoldstein entry point. Following the projects' completion, physical transport of 1,600,000 Nm^3/h, i.e. 1,000,000 Nm^3/h at the Arnoldstein entry point and 600,000 Nm^3/h at the Murfeld entry point, will be possible, allowing additional flows towards North Austria from Italy. Conditional capacity at German exit will remain in place. Currently, such flows can only be directed towards internal East Austrian exits and towards Slovenia. Project TAG 2016/01 was proposed in the "2017 Coordinated Network Development Plan for Natural Gas Transmission System Infrastructure in Austria for the period from 2018 to 2027" as approved by the Decision V KNEP G 01/17 on 19.1.2018 of E-Control[72]. The project has also been submitted in the TYNDP 2017 (TRA-N-954) and is expected to be completed by the end of 2019.

176) Currently, the DZK sold at Arnoldstein enables transportation to local distributors along the TAG, but does not allow guaranteed delivery in other Austrian locations or at IPs with Germany, which are located along the WAG and Penta West pipelines. Such delivery is only granted on an interruptible basis[73]. Thus, access to the Austrian VTP is only qualified on an interruptible basis. Full access would

[72] https://www.e-control.at/documents/20903/388512/V+KNEP+G+01_17+Bescheid+GCA_TAG_final.pdf/ad478e5d-e250-1ed1-d3f5-00c4c223dc3b

[73] In particular, DZK conditions, broadly defined as applicable for GCA as well, allow the injection on a firm basis from the entry point with the corresponding withdrawal at the allocated exit points ("allocation constraint") and the withdrawal at the exit point with the corresponding injection at the allocated entry points ("allocation constraint"). Injection at an entry point without the corresponding withdrawal at the allocated exit points or a withdrawal at the exit point without the corresponding injection at the allocated entry points is available on an interruptible basis. The TSO(s) have the right to interrupt the transportation service wholly or partially, if the quantity of the nomination at the allocated points does not correspond, or corresponds only partially, to the

be granted following Project TAG's 2016/01 implementation. This will enable the completion of the upgrade of DZK to FZK, made possible through Project TAG 2016/01[74], flows from Italy to other European markets entering at Arnoldstein would pass on towards Baumgarten for further transportation, as freely allocable.

177) This Project involves:

- adding a connection from the SOL GCA system (SLO-AT interconnection) in Compressor Station Weitendorf to the suction side of the compressor station (ca. 20 m with DN 24") with related valve and bypass
- adding a connection from the high-pressure side to TAG 2 (ca. 20 m with DN 24") with related valve and bypass in Compressor Station Eggendorf, in order to create the possibility to reverse the flow with two lines
- update of the existing station control system in the Weitendorf and Eggendorf Compressor Stations.

178) The source for the CBA input parameters is publicly available data. Given that the cost of Project TAG 2016/01 is confidential, an assumption of the cost had to be made. As the exact CAPEX value is a fundamental input of the proposed CBA methodology, the economic results of the CBA of TAG Project 2016/01 is for illustration purpose only. The CBA exercise proposed in this Study assumes an investment cost of EUR 25 million with no additional operational cost, even if the upgraded product leads to higher commercial flows from Arnoldstein, and thus it may lead to some decrease of compression costs[75].

179) The Project is regarded as a milestone towards ensuring full reverse flow on the TAG pipeline. In fact, after Project 2016/01 is implemented, TAG physical reverse flow capacity will amount to about one quarter of that in the dominant (SW) direction. Project TAG 2016/01 is also related to an additional 6,714,000 kWh/h FZK from entry Murfeld (IP with Slovenia), for which Project GCA 2015/08 is also necessary. This development seems related to the construction of a new LNG terminal or the Ionian Adriatic Pipeline in Croatia, which could provide further sources that could enter Austria ay Murfeld. This further enhancement is not included into this pilot case study. TAG undertook the conversion through investment under a Security of Supply rationale, but underlined that upgrading DZK into FZK also contributes to market integration and the enhancement of competition and diversification. In fact, Austria is substantially dependent on Russian supplies through Ukraine – Slovakia, accounting for 95% of its supply as of 2017. On the other hand, Italy has highly diversified supplies and a reasonably liquid market, so that improving Austria's connection to Italy's supplies may be appealing. In particular, Italy has three currently underused LNG terminals and is expected to be connected to Caspian supplies through the new Trans Adriatic Pipeline after 2020.

DZK share of the nomination at the entry/exit point. Thus, access to the virtual trading point is also interruptible. The firm DZK share (DZKg) is defined as either the DZK share or the nomination of the allocation constraint, whichever is smaller. The interruptible DZK share (DZKu) is defined as the difference between the DZK share and DZKg. In Austria, DZK exists at Entry Oberkappel, Überackern and Arnoldstein. For this case study, only Entry Arnoldstein is relevant.

[74] https://www.taggmbh.at/fileadmin/content/TAG-Website-Content-PA/20161006_Projects_Coordinated_Network_development_plan_2017_2026_EN.pdf

[75] The dominant TAG flow towards South-West is not likely to lead to physical reversal but in very special cases, but more commercial supplies from Italy may occur. We neglect this impact as a minor one.

Figure 43: Main Austrian international pipelines

Source: www.pipelineinternational.com

180) The methodology and assessment of DZK upgrading by Project 2016/01 is in line with the approach of ENTSOG's CBA Methodology[76]. For the assessment, we consider:

- capital expenditure, estimated at EUR 25 million, equally divided between 2018 and 2019
- impacts on marginal and total supply costs by market area
- impacts on (non-monetised) indicators of market health (HHI, NSS, RSI).

181) Implemented CBA is limited to the market impact of conditionalities, with a view to provide and test a framework for the assessment of projects aimed mainly to the removal/upgrading of conditional projects. Such projects may have other benefits, the analysis of which should follow approved methodologies and be integrated with the proposed one. In other words, whereas we set the analysis firmly in the framework of gas infrastructure project development as it is carried out in the European Union (notably after Regulation 347/2013), it is beyond the scope of the project to implement the CBA of a project (like Project TAG 2016/01) by including all relevant components. Our analysis is limited to key benefits of capacity upgrading, but does not consider other potentially important benefits, regarding e.g. security of supply and Value of Lost Load, environmental and social impacts, among others. As each project may have its own specific benefits, as well as costs, such benefits should be added to those evaluated by the methodology proposed in this Chapter, but with particular care, in order to avoid any duplication.

182) Project 2016/01 is an excellent example to show how multiple benefits may arise from a project aimed at upgrading conditionalities stipulated in contracts for standard capacity products. By significantly increasing reverse flow capacity on the TAG, Project 2016/01 could be very useful to

[76] See in particular the *2nd ENTSOG methodology for cost-benefit analysis of gas infrastructure projects Draft for ACER and Commission opinions,* 24 July 2017, www.entsog.eu. Whereas we are aware of the following discussion, notably ACER's opinion, we think that proposed improvements are of limited relevance for the scope of the present CBA.

increase Austria's (and other Member States') security of supply. For example, in case of a disruption of the Baumgarten hub, or of supplies from Russia through Ukraine (just to mention some cases that have already occurred), reverse flow on TAG would greatly help. Yet a proper valuation of this benefit requires the monetisation of the Value of Lost Load, the assessment of the disruption probability, and other parameters. Performing the assessment based on the same model used for the quantitative exercise of the previous paragraph, DZK upgrading at Arnoldstein has a very small impact on the market, with small marginal cost decreases and increases of supply costs. However, impacts are so small that they may well fall within margins of uncertainty of the calculation algorithm. The impact on liquidity and market concentration is almost negligible as well. Thus no positive benefits are identified with this approach. (See Annex IV for further details)

183) A further approach is based on the market valuation of interruptible capacity. Since there is a price difference between firm and interruptible capacity, if such difference is supposed to be the outcome of an efficient (undistorted) market, it may be interpreted as an estimation of their value difference. We assume that the value of upgrading DZK to FZK amounts to 20% or 10% of FZK[77]. The value of FZK is estimated by the regulated tariff (as no auction premium was detected in the relevant point). For the calculation we use an FZK tariff of 1.3 EUR/kWh/h/y, which if applied to maximum available capacity would yield a maximum value of FZK of EUR 14,547,000 for the upgraded Arnoldstein entry.

184) Results of the calculations are shown in Table 12, for the EU as a whole (including Switzerland) and for the Central and Eastern Europe market area, which includes Austria. The calculation uses a 4% social discount rate, a 20 years' time horizon (with sensitivity analysis showing results for a 10 years' horizon), the Benefit/Cost ratio and NPV. The Internal Rate of Return (IRR) is not shown but is hardly relevant and very high. With such high values of B/C, the IRR does not provide any different judgement. We perform two sensitivity analysis dimensions: time horizon (20 or 10 years); value of interruptible capacity (as discount to FZK): 20% or 10%. Only in case the evaluation is applied over 20 years and for value of the upgrading estimated at 20% the usual CBA indicators are positive. However, these evaluations assume that this capacity is fully booked.

Table 12: Results of CBA based on market valuation of interruptible capacity (EUR Million)

DZK VALUE DISCOUNT	UPGRADING BENEFITS	YEARS	B/C	NPV
20%	2.91	20	1.49	12.06
20%	2.91	10	0.89	-2.68
10%	1.45	20	0.75	-6.22

[77] Since the enforcement of the CAM network code, the sale of interruptible capacity has been limited and its pricing subject to regulatory control. In general, interruptible capacity can only be sold after firm capacity is sold out, and discounts are related to proven chance of interruption in Germany (leading to typical values of 10-12%), or applied only ex-post in case interruptions actually occur (as in Austria). The current ratio of the value of interruptible vs. firm capacity hardly offers guidance on market players' preferences. However, some suitable information could be found by looking at tariffs that prevailed before NC CAM was implemented, i.e. around 2015. Unfortunately we could not find any information about tariffs for interruptible capacity in Austria before NC CAM, but we considered the average of discounts for interruptible capacity that was offered at congested IPs (as reported by ACER' Congestion Management Reports). The average discount was found to be 80%. As an alternative, we use the regulated discount for Germany, assumed at 10%, as an estimation of the reduced value of interruptible capacity. Although this is not a market value (DZK area offered in Austria at a discount of 52% while interruptible capacities are priced as FZK and ex-post refunded), we use it as fair value that was provided by a regulatory process.

10%	1.45	10	0.45	-13.59

2.6. Key findings

185) The as-if exercise reported in this Chapter aims at verifying if and under which conditions the presence of conditionalities interacts with EU internal natural gas market results with particular regard to market integration indicators. Our approach in analysing the aforementioned interactions is to simulate alternative market scenarios, using each time different capacities for the interconnection infrastructure. In particular we test a *base case*, which reproduces, for each entry-exit area, a share of conditional products over the total firm products offered by TSOs in line with the actual ones. Then, we have tested two alternative cases in which the capacities offered under conditionalities in the *base case* are removed by the market or upgraded to freely allocable capacities.

186) The survey has concluded that conditionalities stipulated in contracts for standard capacity products are not an EU widespread phenomenon, rather they are concentrated in central European areas (Germany and Austria mainly). Despite this, where available they tend to be widely used by network users especially since, in some cases, the bulk of the capacity offered is conditional. In order to measure the size of the impact of alternative product availability scenarios, we have designed qualitative indicators. Such indicators do not assess whether the alternative scenarios imply costs or benefits for each entry-exit area but measure the impacts in relative terms[78], and try to link the magnitude of the impact to the presence of conditionalities.

187) The most affected areas are Gaspool in Germany, and CEE to a lesser extent: these are also the entry-exit areas where conditionalities are higher, both in absolute terms and in comparison to overall technical capacity. These observations lead to the conclusion that the higher the level of conditionalities, the higher the impact on market results.

Figure 44: Qualitative indicators of impact of alternative scenarios on EU internal market indicators

	CCP Relevance	Price				Churn Ratio		HHI Index	
		Removal		Upgrade		Removal	Upgrade	Removal	Upgrade
		Base Demand	High Demand	Base Demand	High Demand	Base Demand	Base Demand	Base Demand	Base Demand
GSP	High	High	High	High	High	High	High	Medium	High
CEE	Medium	High	High	Medium	Low	Medium	Medium	Medium	Medium
FR	Medium	Medium	Low	Low	Medium	Medium	Low	Low	Low
BELU	Medium	Medium	Low	Low	Medium	Medium	Medium	Low	Low
NCG	Medium	Medium	Low	Low	Medium	High	High	Medium	Medium
NL	Low	Low	Low	Low	Medium	Medium	Medium	Low	Low
ITCH	Low	High	Medium	Low	Low	Low	Low	Low	Low
DKSE	Low	Low	HIgh	Medium	High	Low	Low	Low	Low
ESPT	Low	Low	Low	Low	Low	Low	Low	Low	Low
SEE	Low	Low	Low	Low	Low	Low	Low	Low	Low
UKIE	Low	Medium	Low	Low	Medium	Low	Low	Low	Low

Source: EU-GaMe model.

188) Despite this conclusion, it is important to note that occasionally the impact is high also for market areas where the presence of conditionalities in marginal or null. It is the case of Italy, Denmark

[78] In other words, *High* means that the impact in the highest in absolute terms between those registered for all the areas, *Low* are the lowest, *Medium* are average values. Since the we consider changes in absolute terms, where the table reports *High,* this does not mean that there is a positive or negative effect, but only that the simulated results register the highest for such area in respect to the others. The table it is not intended to express an evaluation of the impact, but only to link the magnitude of impacts in respects to the presence of conditionalities.

and Sweden, where removal of conditionalities may result in high impact on prices. This additional observation drives to the conclusion that conditionalities deserve attention, especially if there would be a tendency among TSOs to expand their application, as reported in our analysis in Chapter 1.

189) The shorter the market, the higher is the impact of conditionalities. This is confirmed by the amplification and reinforcement of all impacts detected under the *high demand scenario*, reflecting tighter market conditions, in comparison to the *reference demand scenario*, under the same overall supply conditions; this is evident in particular for the impact on prices (the sole reported in the table): under the higher demand there are 5 high impact against 3 under the reference demand.

190) When referring to the analysis of potential benefits, there is evidence that the removal of conditionalities would increase market integration. Simulated prices variation in the EU entry-exit areas is moderate (less than 1% in our analysis), while the absolute removal of the conditionalities products from the market lead to an average increase of 0.6% in prices and their transformation into FZK products would lead to an on average overall decrease in price levels (- 0.1%). However, such averages hide some regional differences, with Gaspool benefiting more from the conditionalities removal than Central Europe and, to a lower extent, Italy and Benelux countries, since less expensive gas supplies are better directed toward Gaspool, being replaced by more expensive sources in the Central and South Europe. Thus, the simulated price variability index increases when conditional capacities are removed from the market, resulting in a reduction of market integration, but does not increase sensibly when conditional capacities are updated to freely allocable capacities. At the same time, the churn ratio, that proxies the level of liquidity inside each entry-exit area, increases when removing conditionalities. Again, stronger evidences of increased liquidity and price reduction are found for the Gaspool area. Such benefits should be analysed also in the light of changes in the market concentration index: the removal of conditionalities leads to higher market concentration of non-domestic suppliers. A higher simulated HHI index indicates a lower level of supply diversification between exporters to Europe but does not necessarily indicates a lower level of market competitiveness. In fact, since a higher simulated HHI could indicate a higher dependence from suppliers, a complete competition analysis should be based on wider market analysis (for example taking into account the level of competitiveness of non-domestic gas markets) and is out of the scope of this exercise. The exercise also shows that the benefits from upgrading conditionalities to freely allocable products have potential positive effects for market liquidity, since the churn ratio increases. At the same time, optimization of import sources is compensated by the increase in tariff due to the removal of discounts allowed to conditional products.

191) The conclusion is thus that the Agency should monitor the level of conditionalities and restriction on the use of capacities in order to understand if there is a tendency to increment their use from the TSOs. The benefit and drawback of having conditionalities in contracts for standard capacity products should be evaluated on a case-by-case approach. The case-by-case analysis should not be limited to the entry-exit area involved, but should also evaluate the effects on all EU entry-exit areas and on market integration. The importance of a case-by-case approach is also confirmed by our pilot cost-benefit analysis. This pilot also suggests the need of a more complex approach for cost and benefit evaluation in respect to that adopted in the scope of this project. In fact our pilot case proved that benefits on EU market are hard to estimate when the conditional products are not fully used, but analysis is limited to key benefits of capacity upgrading, and does not consider the overall benefits, regarding e.g. security of supply, environmental and social impacts, and others. This is in fact a general point: each project may have its own specific benefits, as well as costs, therefore such benefits should be added to those evaluated by the CBA methodology used in this Study, but with particular care to

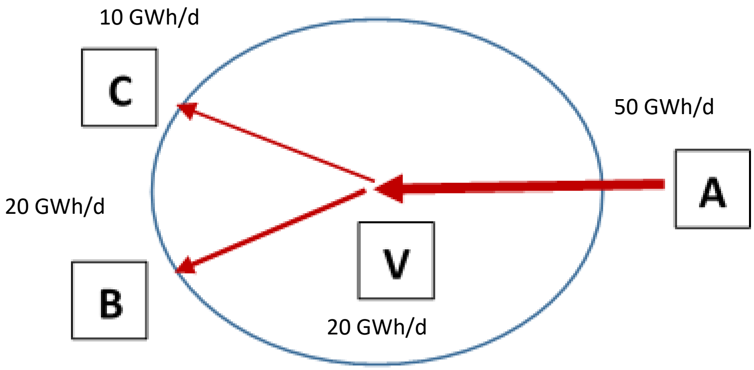
avoid any duplication. Another question should be how to allocate the costs of the upgrade among those entry-exit areas benefitting from the upgrade.

3. Conclusions and recommendations

3.1. Overview of the benefits and drawbacks of conditional capacity products

192) In order to understand the role of conditionalities stipulated in contracts for standard capacity products in entry-exit regimes for gas transmission, we consider a simple, stylised network model. In the following Figure 45 gas enters a Market Area (MA) from entry point A (assumed to be an import source), with exits B and C (export to neighbouring MAs), as well as V (the MA's Virtual Trading Point). Let us assume that the capacity offered, before an entry-exit system is implemented, amounts to 50 GWh/day at entry point A, with exit capacity of 20 GWh/day at V (representing the maximum demand in the MA that is in transit, including demand at VTP), 20 GWh/day at B and 10 GWh/day at C.

Figure 45: Stylised entry-exit transmission system



193) If a simple entry-exit model with firm and freely allocable capacity products is implemented in this case, shippers should in principle be free to choose any exit point for gas entering at A. Should the TSO conclude that all shippers choose exit C, then only 10 GWh/d can be transported firmly through the system, and would therefore offer only a firm capacity of 10 GWh/d at entry point A, with any other capacity made available on an interruptible basis.

194) However, if capacity can be offered at entry point A conditional upon delivery at (e.g. 20 GWh/d) at exit point B, as a BZK or DZK conditional product, then total capacity offered at A could be increased to 30 (=10 for C and 20 for B) GWh/d, as the risk of all gas diverted to C would be void. If conditional products could be offered for exports to B as well, or if some capacity can be offered under an objective condition (e.g. when temperatures are not too low so that capacity for supply to the domestic market V is not likely to be fully utilised) then the full capacity of 50 GWh/d could be restored. The alternative would be for the TSO responsible for market area V to increase the available entry capacity at A, with the view to accommodate all possible combinations of shipper requirements. In most of the cases, this is neither the common practice, nor the most efficient way of expanding the available capacity. This is the main reason why EU regulation has introduced tools like the Incremental Capacity approach of the NC CAM, where, following shippers' request, TSOs can build additional interconnection capacity, should this fulfil the appropriate economic conditions.

195) This simple model illustrates the basic reasons why conditionalities in capacity contracts have been introduced in some market areas. In fact, capacity calculations are not based on such extreme

assumptions, but consider the probability of demand arising from each exit point. Thus, conditionality may be applied to the route (choice of an entry and exit point combination such as BZK conditionalities) but may also depend on the flow conditions. For example, capacity may be conditional on flows remaining below certain levels, and be related to objective factors (like temperature) that are related with such flows (bFZK conditionalities).

196) Conditional capacity products have, in principle, several impacts on gas markets. On one hand, their existence allows TSOs to offer more firm capacity than they would without the use of conditionalities, thus ensuring a better usage of existing networks and reducing potential congestions. According also to what most of the TSOs who are using such products have told us, if these conditions were not offered, such capacity could only be offered on an interruptible basis, subject to general conditions that apply to interruptible capacity products. Therefore, conditional firm capacity products can be regarded as an intermediate option, between the firm capacities with free allocability and the fully interruptible products, as already described in the previous Chapters.

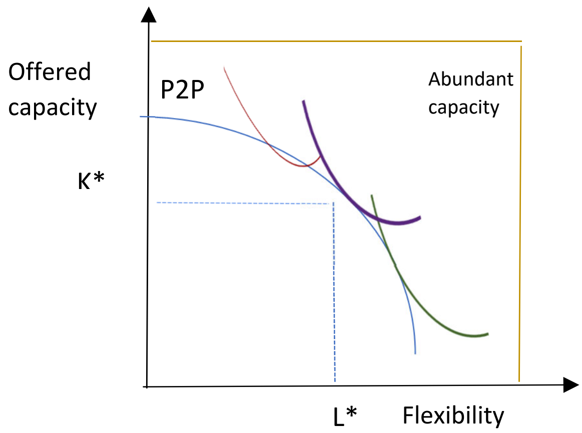
197) On the other hand, conditionalities reduce flexibility for network users, as some transported gas cannot be sold locally, notably at the virtual trading point, at least under certain conditions. In turn, this may reduce shippers' ability to quickly react to market signals, like a significant difference between prices of interconnected market areas, as gas delivered under a conditional capacity product may not be released at the desired VTP, even if it physically crosses its market area. This may be particularly true in case of point-to point conditionalities that restrict delivery at the VTP. Theory implies, and our analysis of the simulated churn ratio has shown that, in this respect, turning conditional into normal firm capacity products increases the liquidity offered at the VTP, even if one could claim that, liquidity that is not provided to a market area, where conditional capacity products exist, may be actually transferred to an adjacent market area.

198) Overall, it is clear that the discussion on conditionalities can focus on the trade-off between availability of capacity and market liquidity. For a given network infrastructure, offered capacity can be increased, by offering more conditional capacity products, which would reduce market flexibility, or by investing in more capacity, which would lead to higher costs. On the contrary, the request of maximum flexibility may enhance liquidity, but force the TSO to reduce capacity offer, or invest in additional capacity. This trade-off can be represented by a typical microeconomic chart (Figure 46). In the chart, for a given network, capacity offer can be maximised by means of a pure Point-To Point (P2P) service, almost destroying any available flexibility within the network, whereas provision of a fully flexible service would minimise offered capacity.

199) In the chart, the trade-off is represented by the convex line. In the same chart, preferences of different network users are also shown. For example, a shipper focusing on baseload supplies to a limited number of customers, or a shipper interested only in using the network for transit to a neighbouring market, would show preferences like the red concave line, and hence be inclined to forego flexibility in return for a higher capacity. On the other hand, a short-term trader would prefer a more flexible market, where its market opportunities increase, and would thus show preferences like the green concave line.

200) Some networks could have such abundant spare capacity that the trade-off actually vanishes, so that they do not need to offer any conditionalities in contracts for standard capacity products. In the chart, this is represented by the gold line, where any flexibility increase does not require any capacity restriction. This seems to be the case in the majority of current transmission systems in Europe. Yet, a few important ones are in a situation where the need for trade-off appears and have therefore decided to offer conditional capacity products.

Figure 46: Trade-off between market liquidity and offered capacity



201) The existence of such different preferences also explains why traders are divided on the issue, as shown by our small survey (Annex V), and why the main association of European traders has not been able to reach a common position on conditionalities stipulated in contracts for standard capacity products. The qualitative analysis above suggests that, at least from a theoretical perspective, by combining preferences, it is possible to define an optimal mix of flexibility and capacity (L*, K*), in relation to average user preferences (purple line of the chart), gas demand patterns and network capabilities. It is likely that such optimal combination is not the same in all networks. To make things more complicated, EU gas market integration implies that the optimal combination of user needs and capacity availability may be across adjacent market areas, implying the need for better coordination and approach to network availability across the strict borders of any single TSO of a specific market area. Identifying ways of exploiting again across the borders of a single TSO, the existence of ample spare capacity, (gold line), is also another challenge. Moreover, any optimal combination in a certain market area should consider the possible impacts on other (directly or indirectly) interconnected market areas. The decrease or increase of available conditional firm capacity products in a market area may not affect only its own network capacity and market liquidity, but also that of other ones. For example, with reference to the stylised model of Figure 45 above, the introduction of a conditional product for transit from A to B, offered at a discount, may reduce the transmission costs from A towards the market area that is interconnected at B, but increase its liquidity, while at the same time it may increase capacity but reduce liquidity within the market area (V).

202) Investment could, in principle, be undertaken in order to remove conditionalities without loss of total offered firm capacity. It would be most interesting to assess the scope of a reduction in conditional capacity products' offer, with investment that is necessary to offset the entailed capacity decrease. However, such calculation strongly depends on the complexity of the network to be addressed, and, in most cases, requires expanding the analysis not only to analysis of the market, but, mostly, analysis of the capacities of the networks, since, as shown by our analysis for the case of Germany, most of the conditionalities at interconnection points are accompanied also by conditionalities at exit points in the interior of the market areas concerned. Such an analysis requires combined market and flow simulations, and, most importantly, appropriate data on costs and flow conditions, expanding, in most cases, to more than one single TSO or even market area. This is a challenging task of a magnitude that resembles the stress test analyses of the overall EU network and, to our opinion, requires the direct involvement of the TSOs and the NRAs concerned.

203) As part of our Study, we tried to analyse the case of Austria and the removal of the TAG pipeline conditional capacity products, in our effort to outline as far as possible how this assessment could be pursued. However, we consider that a more detailed analysis would be required, with the view to assess the corresponding situation in the networks around and including Germany, since those networks are pivotal for the gas flows in Europe, as related to its biggest gas market and concentrate the larger amount of conditional capacity products. We realize, of course, that such an assessment can only be performed by the German TSOs, under the auspices and the guidance of the regulator.

3.2. Conclusions and Recommendations

204) European legislation and resulting regulations clearly and consistently follow the path of enlarging the national gas market areas, by gradual removal of obstacles, enhanced implementation of harmonized rules across the borders and development of streamlined approaches regarding development of gas infrastructure across the borders both of the EU, and among the EU Member States as, for example, new LNG Terminals and Interconnectors to new sources of gas. The result is the increasing formation of large entry-exit gas market areas, where gas flows from entry to exit points among countries, in the same way it would if it were flowing within the same country. The introduction of harmonized bundled capacity products, the introduction of balancing platforms and the introduction of virtual trading points, as an interim to the establishment of an integrated gas and energy market in Europe, are the results of this new vision for Europe.

205) In such an environment, the existence of restrictions to gas flows, as those are imposed by the implementation of conditionalities in contracts for standard capacity products, looks incompatible with an entry-exit regime, where all technically available capacity should be made available to the users and it is normal to raise concerns regarding the rationale behind those products, the need for their existence, their compatibility with the EU legislation and the endurance of such products in the future.

206) On the other hand, conditional capacity products are a reality. Although it seems that such products were mainly conceived as an interim measure to accommodate the transition from some legacy, long term transportation contracts into capacity products offered at entry-exit zones which developed alongside the traditional paths of gas transportation in Europe, this is not their only reason of existence. Unlike the gradual, yet not concluded, expiration of those long-term contracts, conditional capacity products not only seem to exist, but in the cases of the German market mergers is expected to increase. German NRA and TSOs are currently considering the expansion of conditional capacity products, and while such products tend to eliminate from any other place in Europe, there are other TSOs, like in Greece and Hungary, who are also considering the introduction of such products, as a means to avoid additional investments.

207) In Greece, the thoughts for imposition of conditional capacity products are linked to the need to connect new import capacity to the existing network, designed for the relatively small market of Greece, one or two new, bulk transportation infrastructures, meant primarily for transit purposes. According to the Greek TSO, only the imposition of conditional capacity products will permit the non-interruptible provision of new entry capacity to the Greek market, otherwise substantial investments would be required, which might be disproportionate for the size of the Greek gas market. The Greek NRA is currently carefully considering the situation, also in the light of the national network code in place, which, fortunately enough, provides remedies and guidance on the way forward.

208) It is also interesting to note that the written consultation that we undertook as part of this Study raised only a limited interest among stakeholders[79]. As expected, the large majority of answers came from players that are based or heavily active in Germany. A small number of respondents agree that conditionalities allow for a better utilization of a limited transmission capacity. On the other hand, they believe that such products reduce liquidity at VTPs with respect to firm capacities with free allocability. Some respondents also raised concerns that capacity expansion, as a way of transposing conditionalities into firm capacity, would be probably too costly and inefficient, despite the fact that such an expansion could be gradual. Moreover, most respondents fear that the scheduled merger of the German market areas (NCG and Gaspool) will trigger a further expansion of conditional products offer, to avoid capacity cuts. However, opinions diverge on the way to overcome the limitations included in conditional capacity products. Some traders point at their complexity, lack of transparency, especially regarding their cost, implying that they would welcome replacement of such conditional products with firm allocable capacity. Others support conditionalities as they are preferable to fully interruptible capacity.

209) Implications of using conditional firm capacity products cannot be answered as a standalone question. The bigger question is how to form bigger entry exit zones, with high trading liquidity, whilst managing any capacity constraints cost efficiently for local and other consumers. The capacity constraints can be triggered through introduction of VIPs, bundling of capacity at IPs, mergers of the entry-exit zones and operational removal of IPs.

210) Let us look specifically at merger of zones. There are a number of examples of TSOs in Europe with an (ongoing) experience of forming bigger entry-exit zones across Europe. For example, such cases are:

- Denmark and Sweden merging entry-exit zones;
- Finland, Estonia and Latvia merging entry-exit zones;
- BBL and Gasunie network merging (IP Julianadorp was removed);
- Belgium and Luxembourg concluded the entry-exit zones' merger.

211) The evidence suggests, that these TSOs seem to have been able to avoid the use of conditional firm capacity products, or confine such use to a minimum, as in the case of Belgium and Luxemburg. In other cases, as in Spain and currently in Austria, some conditional products have been removed thanks to more careful network modelling or limited investments, while the more coordinated management of the transmission networks, either through the cooperation of national TSOs, as was the case in the Iberian Peninsula, or through the operation of the Austrian TSOs, has certainly an important role to play in the process.

212) This implies that conditional products are part of a wider tool box that European TSOs have at their disposal to manage bigger entry-exit zones. The tool box seems to include – in addition to conditional capacity products:

I. Strong pricing incentives, normally expressed in big tariff discounts for conditional products
II. Enhanced network modelling and better inter-TSO coordination, including use of IT systems;
III. Larger use of overbooking and buy back mechanisms, as envisaged by the Congestion Management Procedures

[79] We received 8 answers over 19 shippers and associations interviewed.

IV. Infrastructure reinforcement by investments.

213) On the other hand, each of these tools may have drawbacks, or significant side effects:

I. Flow commitments may be regarded suspiciously by regulators, as they are akin to clauses of long-term contracts with significant take or pay levels that have long hampered the development of liquid markets. In fact, they could have similar liquidity impacts as transit oriented conditionalities.

II. The overbooking and buy-back mechanism may be cost-effective in systems with surplus of capacity, but risky in tight ones, as the resulting cost may be substantial and ultimately fall on end users. Whereas TSOs and shippers alike may see it as an effective mechanism of keeping the transmission prices low, by avoiding capacity expansion and transferring related costs to consumers, regulators could be wary of them and may be willing to carefully assess risks and expand capacity, with the view to enhance the integration of entry-exit zones which lead to market integration.

III. Whereas the introduction of a more coordinated approach to the management, operation, planning and expansion of transmission system networks may raise claims of intervening on the rights of the owners of the corresponding entities, it is worth recalling that several Member States with multiple TSOs have promoted enhanced coordination, e.g. by defining a specific role for a market area manager (as in Austria) or by attributing similar roles to the largest TSO of the market (as in Italy). In both cases this seems to have led to a more effective provision of capacity scheme and smoother system management.

IV. Offer of discounted conditional capacity products may, in some cases, lead to lower revenues for TSOs involved and offset the benefits of market mergers.

V. Investments is certainly the natural way of enhancing capacity to firm, free allocability status. In some cases - as we have seen in the case study of Austria - investment is needed and justified. In addition, investment is typically a multi-purpose process that is already well regulated in the EU. Enhancing capacity with the view to reduce the use of conditionalities could be included in the scope of the framework of investment decisions that has been devised (mostly by Regulations 347/2013/EU and 459/2017/EC), including the TYNDP, Cost-Benefit Analysis, CBCA, and the Incremental Capacity process. In this process, security of supply, environmental and social goals also play a significant role.

214) The conclusions that can be derived from our analysis of the removal of the conditional capacity products, as compared to the current situation (*base case*), can be summarized as follows:

I. The higher the level of conditionalities, the higher the impact on market results; despite such conclusion, it is important to note that occasionally the impact is higher also for market areas where the presence of conditionalities in marginal or null. This additional observation drives to the conclusion that conditionalities deserve attention, especially if there would be a tendency among TSOs to expand their application, as has been reported in our analysis in Chapter 1.

II. The shorter is the market, the higher the impact of conditionalities. This is confirmed by the amplification and reinforcement of all impacts detected under the *high demand scenario*, reflecting tighter market conditions, in comparison to the *reference demand scenario*, under the same overall supply conditions; this is evident in particular for the impact on prices (the sole reported in the table): under the Higher demand there are 5 high impact against 3 under the base demand.

215) There are indications that the removal of conditionalities would increase market integration. Simulated prices variation in the EU entry-exit areas is moderate on average but with relevant regional differences, with Gaspool enjoying lower prices from the removal of conditionalities than Central Europe and, to a lower extent, Italy and Benelux countries. This is an indirect effect of the increase of imports from cheaper non-domestic suppliers to Gaspool, being replaced by more expensive sources in the Central and South Europe. Thus, the simulated price variability index increases when conditional capacities are removed from the market, signalling a reduction of market integration, but does not increases sensibly when conditional capacities are updated to firm capacities with free allocability. In addition, the level of trading inside each entry-exit area increases when removing restrictions, as revealed by the corresponding proxy of liquidity indicator (churn ratio). Again, the increase of liquidity is stronger for the Gaspool area. On the other hand, removal of conditionalities leads to lower prices in the same market area, since lower priced imports are increasing as a result of increased available capacity and market mechanisms.

Recommendation 1. Follow a case-by-case approach

216) The variety of conditional products offered, even in a limited number of countries, shows that such products have been regarded as one of the tools TSOs use in their transition to EU market integration. Input provided by a number of network users, as well as the results of our quantitative exercise, show that at least upgrading of conditional capacity to firm capacities with free allocability, i.e. standard firm capacity, products is worth considering. On the contrary, transforming conditional products to interruptible ones raises significant uncertainty, since availability of interruptible capacity is hardly predictable by shippers. In this case, when all current conditional firm capacity products are eliminated and turned to interruptible, as our quantitative analysis has shown, an increase of supply costs and VTP prices may occur.

217) Since both costs and benefits of conditional firm capacity products' upgrading or removal are highly case specific, we support the careful consideration of them on a case by case basis. Our results, notably in the pilot case of TAG reverse flow, suggest that upgrading may lead to reduction of supply costs, so that a CBA would yield a positive outcome. However, there are other cases, especially those related to the various TSOs in Germany, where the additional costs implied for transformation of conditional products to firm capacities with free allocability are not balancing the corresponding benefits.

218) What is certain, is that existing conditional capacity products cannot be removed overnight. Their removal requires a careful examination of the corresponding costs and benefits and the impact they entail in the operation of the gas market in the vicinity of the networks they apply. This needs to be done on a case-by-case basis.

219) The same holds for the imposition of any new conditional capacity product. We recommend that corresponding national rules assign to the TSOs and NRAs involved to follow an appropriate justification of the reasons that lead to the necessity of imposition of a conditional capacity product, accompanied by the impact it will have to the corresponding network it will apply, but also to the vicinity of such network. Such procedure may lead to the need of cooperation with adjacent TSOs and NRAs, with the potential involvement of the Agency, following the request of the NRAs, or under its monitoring competencies.

Recommendation 2. Improve the procedure for the evaluation of conditional capacity products and related projects

220) The current EU legislative approach to investment implies a twofold approach. On one hand, the initiative for investments in the network belongs to the TSOs, both on a national and regional basis. On the other hand, tools are provided to market participants to request the development of new capacity, such as the exemption approach of Article 36 of the Gas Directive[80], or the Incremental Capacity approach, as recently introduced by the revised NC CAM.

221) Usually, national procedures oblige the TSO, when developing the network planning, to consider the need for removal of bottlenecks from the network, alongside relevant requests of network users for additional capacity. The process for network planning and development are under the monitoring and approval of the national regulatory authority.

222) Upgrading conditional capacity products may have significant benefits in some cases, while their existence may allow new market entrants in some others. Investments for conditional firm capacity products' upgrading typically entail other potential benefits, notably on security of supply, but also potential costs, like those of the local environmental impact of the required facilities. Therefore, we believe that the right framework for such evaluation should similar to that of Incremental Capacity, as outlined in NC CAM, Chapter V. Pursuant to the 11th recital of this Regulation, "*Any investment decision […] should be subject to an economic test to determine the economic viability. This economic test should in turn ensure that network users demanding capacity assume the corresponding risks associated with their demand to avoid captive customers from being exposed to the risk of such investments*".

223) The incremental capacity process is particularly appropriate for investments aimed at conditional capacity products' upgrading, as demand for fully flexible capacity (as opposed to that for conditional capacity) depends on network users' preferences, which are subjective and related to their availability of alternative supplies, their evaluation of interruption probability, and their willingness to pay higher costs in return for firm capacities with free allocability. Network users' preferences can only be revealed by taking part in an official procedure where they can assume binding commitments on bearing a fair share of the capacity upgrading costs.

224) NRAs and the Agency may consider the introduction of a special track for the evaluation of projects aimed at upgrading conditional capacities to firm capacities with free allocability, or avoiding the introduction of new conditional capacity products where this would be required to satisfy requests of users for new connections to the network.

225) The main, indicative, features of such procedure could be as follows:

I. In developing or updating their national development plans the TSOs should consider the existence of conditional capacity products in their respective network and assess the possibility to upgrade such products into firm capacities with free allocability. To this end, they should consult with the corresponding NRA, the network users and the neighbouring TSOs. Assessment should include proper, in-depth network and market analysis, impact assessment on network and market operation in the vicinity of the potential upgrade, including across the border, and CBA. Results should be communicated and approved by the corresponding NRAs

[80] Directive 2009/73/EC of the European Parliament and of the Council of 13 July 2009 concerning common rules for the internal market in natural gas and repealing Directive 2003/55/EC.

involved and, where and if appropriate, the Agency, according to the provisions of the EU legislation in force

II. Users or new entrants, either as part of the process above, or individually, should be in position to ask the TSO and NRAs involved to include in the corresponding assessment the upgrading of one or more conditional capacity products.

III. The NRA(s) involved may require TSOs to present an investment proposal aimed at upgrading (or non-imposing) of the conditional capacity products, outlining related costs and other potential benefits, and a case specific CBA.

IV. The CBA should also consider the impact on other European market areas, by means of suitable analytical tools. Results should be notified to NRAs of Member States that may be affected, with a view to activate a CBCA procedure if impacts are expected to be significant (as defined by ACER Recommendations No. 7/2013 and 5/2015 on CBCA).

V. The proposal would be submitted to a procedure similar to the economic test required by Article 22 of NC CAM. TSOs of other affected market areas may also take part in the procedure if allowed by their NRAs, in relation to net benefits accruing to its market area or Members State.

VI. If the concerned NRAs find that the CBA is positive, they may allow TSOs of their jurisdiction to take part in the proposed upgrading investments, and include related costs in their asset and cost base.

VII. The NRA would approve the upgrading proposal if the economic test foreseen by Article 22 of NC CAM is positive.

226) As mentioned, the above procedure is indicative and should also be considered vis-à-vis any legal implementation details it implies, especially under the light of the recent new pieces of EU legislation. The complexity of the issue requires more sophisticated analysis than the one that seems to have been used so far. This is even more complex, when considering the need for convergence between electricity and gas markets across EU, the enhanced climate obligations stemming from the Clean Energy Package.

227) We recommend that the impact of conditional capacity products is conducted in a dynamic way, by considering both the market and the network conditions. To this end, the TSOs and NRAs concerned should be following a dynamic approach, involving dynamic simultaneous network & market simulation, to evaluating the CBA impact of the removal of upgrading of conditionalities. Static, non-coordinated approaches across TSO areas (and not only market areas), as it happens today, probably fails to capture all elements of combined network and market operation and thus provide the proper signals for network upgrade.

Recommendation 3. Verify pricing rules of conditional capacity products

228) All the products and services that apply conditionalities on the use of firm capacity are offered to network users at discounts, compared to firm and freely allocable capacity. These discounts differ from case-to-case, depending on the characteristics and the probability of the conditionality.

229) The issue of discounts for conditional capacity and interruptible capacity is still largely debated in Europe. The extent of such discussion is shown by recent consultation processes and decisions by a few European regulators. For example, the Belgian regulator allows a minimum discount of 25% on products with reduced flexibility. Germany only allows discounts around 10%, depending on actual interruption frequency. Whereas most network users have supported this approach, some have highlighted that service offered by some conditional capacity products is less flexible than that of simple interruptible capacity, and should therefore be discounted more. Austria has allowed even

higher discount: for example DZK on the TAG reverse flow entry (analysed in our pilot study) is discounted by 52% with respect to the fully flexible entry. For special products involving very little transportation, like shorthaul services and wheeling, some regulators allow far higher discounts: this is the case of wheeling in Belgium, but also in Netherlands, where the NRA has recently confirmed that wheeling can be discounted even by 95%.

230) On the other hand, some NRAs have promoted investment aimed at phasing out of conditionalities and the related discounts, as was the case of Spain. The Italian system has no conditional capacity products and its regulator sees conditionalities as an unacceptable right to withdraw a key service, which should be tightly restricted and overcome.

231) In principle, all discounts should follow the principles below:

- Be cost-reflective: The discount for each product or service should take into consideration the underlying differences from firm free allocable capacity. For example, discounts for the BZK product and OCUC and shorthaul services should take into consideration the avoided costs from the users not accessing the VTP and fully using the flexibilities of the transmission system, while DZK product should also factor in the possibility of interrupting access to the VTP;
- Minimize possible over/under-recovery: Projections on the expected use of the conditional products and services should be performed, to ensure appropriate recovery of all associated costs;
- Avoid cross-subsidies: The revenues generated from each conditional product or service should be calculated separately from those concerning firm free allocable capacity. Otherwise, the network users that are using a standard entry-exit transmission service with firm free allocable capacity would be subsidizing the use of conditional products or services;
- Do not distort competition: Discounts offered for conditional capacity products may not only affect the cost of using the relevant products in a specific market area, but may result in distortions in the wholesale price of gas in adjacent markets. To this end, distortion of the appropriate market signals may occur, an issue that needs to be tackled also on a cross border basis, since it may raise considerations related to potential violation of state-aid rules of the Union.

232) Article 4(2) EU of the NC TAR provides that "*Transmission tariffs may be set in a manner as to take into account the conditions for firm capacity products.*" Although this was not explicitly stated by any of the NRAs or TSOs interviewed, we assume that this is the legal basis for setting large discounts if conditions on flexible firm capacity are particularly restrictive. However, NC TAR provides explicitly for discounts only on interruptible capacity products. To this end, the applicability of discounts on conditional capacity products remains an open issue, unless conditional capacity products are legally considered interruptible and thus linked to the corresponding provisions of the NC TAR, or considered firm products and priced differently, following the interpretation of Article 4(2) of NC TAR.

233) Yet this may create a paradox, as, according to Article 16 of the same Code, interruptible products are set in line with probability of interruption, with the adjustment factor also considering "[…] the estimated economic value of the type of the standard capacity product for interruptible capacity"[81]. This may produce tariffs for firm, but conditional, products, which are lower than the one of interruptible products. Since a legal interpretation of these provisions do not fall in the scope of the present Study, we would recommend that the Agency addresses this potential paradox and analyses

[81] Adjustment factor, according to paragraph 3 of Article 16 of the NC TAR.

this legal issue in more detail, probably in proper consultation with the Commission. Once legal terms are defined, it remains up to regulators to strike the appropriate balance between the willingness to enhance liquidity at efficient costs, the interest and the scope of competitiveness of gas against other fuels, especially taking into account sustainability considerations, the cross-border compatibility of conditional capacity products' pricing with state-aid principles and the need to avoid inefficient investments.

234) In any case, we consider that the issue of tariff setting for conditional capacity products should be carefully addressed, especially along the principles presented above.

Technical annexes

Annex I: Mapping of transit routes resulting from conditional products and long-term transit contracts

235) In this Annex we provide a representation of the transit routes resulting from the use of conditional firm capacity products (BZK, DZK) and long-term transit contracts.

236) The maps of Figure 47 and Figure 48 depict the transit routes, as a result of the use of BZK and/or DZK products, in Austria and Germany. The drawn entry to exit routes (arrows) are based on the required combinations of BZK and DZK capacity, foreseen in the respective TSOs' Terms & Conditions and Price Lists. The points that are depicted are market area interconnection points, (where two adjacent TSOs are interconnected) and cross border points. Network points, apart from the aforementioned, (i.e. storage points etc.) are not depicted in the map, although BZK or DZK products might be offered at them.

237) For each route, to provide an indication of the transited volumes, we have used as a proxy the booked capacity of conditional capacities at the entry/exit points[82]. The booked capacity data originate from the data collected and included in the database developed during the implementation of the Study. Gas Year 2017/18 has been used as the basis of the analysis.

238) The following approach has been used to estimate the booked capacity along each route, depending on the entry-exit combinations of each conditional product:

- For an entry point with a conditional product linked to a single exit point ("one-to-one" link), the booked capacity at the entry is used.
- For an exit point with a conditional product linked to a single entry point ("one-to-one" link), the booked capacity at the exit is used.
- For a single entry point with a conditional product linked to multiple exit points with conditional products ("one-to-many" link), the booked capacity at each of the exits is used.
- For multiple entry points with conditional products linked to a single exit point with conditional products ("many-to-one" link), the booked capacity at each of the entries is used.
- For multiple entry points with conditional products linked to multiple exit points with conditional products ("many-to-many" link), a value is assigned only in cases where a single entry-exit combination is clearly used. Otherwise, no value is attributed to any of the respective routes.

239) The width of the arrows in the maps of Figure 47 and Figure 48 represent comparatively the amount of booked capacities between the routes. Gas Year 2017/18 has been used as the basis of the analysis. Table 13 presents the links between drawn entry and exit IPs, and the estimated booked capacity.

240) The map of Figure 49 depicts the transit routes in Central-Eastern and South-Eastern, as a result of the existing long-term transit contracts. These are based on the relevant information provided by TSOs.

[82] It is noted that gas flows at each IP are not available split for each firm capacity product. Therefore, booked capacity provides an approximation. Actual volumes of each route may differ from these estimates.

Figure 47: Map of transit routes resulting from the use of BZK and/or DZK products in Germany

Combination of Cross Border Entry Exit points where BZK or DZK products are offered

Combination of Cross Border and Market Area Entry Exit points where BZK or DZK products are offered

Area where locally BZK or DZK products are offered

Note: The DZK product is being offered at the new entry Lubmin 2 (entry of EUGAL pipeline), and at exit Deutschneudorf-EUGAL.
The offer of the BZK product from Open Grid Europe GmbH at the points Entry Kienbaum/ Entry Steinitz – Exit Oude Statenzijl expired on 1st October of 2018

Figure 48: Map of transit routes resulting from the use of BZK and/or DZK products in Austria

Combination of Cross Border Entry Exit points where BZK or DZK products are offered

Note: At Oberkappel, the DZK product that used to be linked with capacity assignment at Überackern is no longer offered (no bookings as of April 2018).

Figure 49: Map of transit routes resulting from long-term transit contracts

Transit Flows

Table 13: Conditional capacity products' entry-exit transit for Gas Year 2017/18

Entry				Exit				Estimated booked capacity for transit GY 2017/18 (GWh/d)
Point	TSO - Entry	Capacity product offered	Adjacent TSO	Point	TSO - Exit	Capacity product offered	Adjacent TSO	
Mallnow	Gascade	DZK	Gaz System	Kienbaum	Gascade	DZK	Open Grid Europe	66.6
Mallnow	Gascade	DZK	Gaz System	Olbernhau (DE) / Hora Svaté Kateřiny (CZ)	Gascade	DZK	Net4Gas	232.9
Mallnow	Gascade	DZK	Gaz System	Ronneburg OGE	Gascade	DZK	Open Grid Europe	5.7
Gernsheim	GRTgaz Deutschland	DZK	Gascade	Obergailbach (FR) / Medelsheim (DE)	GRTgaz Deutschland	DZK	GRTGaz	98.3
Oberkappel	GRTgaz Deutschland	DZK	Gas Connect Austria	Obergailbach (FR) / Medelsheim (DE)	GRTgaz Deutschland	DZK	GRTGaz	50.5
Überackern SUDAL (AT) / Überackern 2 (DE)	Bayernets	BZK (Shorthaul)	Gas Connect Austria	Haidach (AT) / Haidach USP (DE)	Bayernets	BZK (Shorthaul)	GSA LLC	162.2
Haidach (AT) / Haidach USP (DE)	Bayernets	BZK (Shorthaul)	GSA LLC	Überackern SUDAL (AT) / Überackern 2 (DE)	Bayernets	BZK (Shorthaul)	Gas Connect Austria	131.7
Greifswald	Fluxys Deutschland	DZK	Nord Stream	Achim II	Fluxys Deutschland	DZK	Open Grid Europe	8.6
Lubmin (NonReg)	Lubmin-Brandov Gastransport	BZK		Brandov-OPAL (DE)	Lubmin-Brandov Gastransport	BZK	Net4Gas	190.4
Greifswald-Brandov	OPAL Gastransport	BZK	Nord Stream	Greifswald-Brandov	OPAL Gastransport	BZK	Nord Stream	380.7
Greifswald	OPAL Gastransport	DZK	Nord Stream	Brandov-OPAL (DE) (PartReg)	OPAL Gastransport	DZK	Net4Gas	303.9
Greifswald	Gasunie Deutschland	FZK	Nord Stream	Ellund	Gasunie Deutschland	BZK	Energinet.dk	28.1
Bocholtz	Fluxys TENP	BZK	Gasunie Transport Services	Eynatten 2 (BE) // Lichtenbusch / Raeren (DE)	Fluxys TENP	BZK	Fluxys Belgium	Not estimated*
Bocholtz	Fluxys TENP	BZK	Gasunie Transport Services	Wallbach	Fluxys TENP	BZK	Swissgas	Not estimated*
Wallbach	Fluxys TENP	BZK	Swissgas	Bocholtz	Fluxys TENP	BZK	Gasunie Transport Services	Not estimated*
Wallbach	Fluxys TENP	BZK	Swissgas	Eynatten 2 (BE) // Lichtenbusch / Raeren (DE)	Fluxys TENP	BZK	Fluxys Belgium	Not estimated*
Eynatten 2 (BE) // Lichtenbusch / Raeren (DE)	Fluxys TENP	BZK	Fluxys Belgium	Bocholtz	Fluxys TENP	BZK	Gasunie Transport Services	Not estimated*
Eynatten 2 (BE) // Lichtenbusch / Raeren (DE)	Fluxys TENP	BZK	Fluxys Belgium	Wallbach	Fluxys TENP	BZK	Swissgas	Not estimated*
Kienbaum	Open Grid Europe	BZK	Gascade	Bunde (DE) / Oude Statenzijl (H) (NL) I (OGE)	Open Grid Europe	BZK	Gasunie Transport Services	66.6
Steinitz	Open Grid Europe	BZK	ONTRAS	Bunde (DE) / Oude Statenzijl (H) (NL) I (OGE)	Open Grid Europe	BZK	Gasunie Transport Services	66.6
Waidhaus	Open Grid Europe	BZK	Net4Gas	Obergailbach (FR) / Medelsheim (DE)	Open Grid Europe	BZK	GRTgaz	30.6
Überackern	Gas Connect Austria	DZK	Open Grid Europe/bayernets	Oberkappel	Gas Connect Austria	DZK	GRTgaz/Open Grid Europe	1.4
Oberkappel	Gas Connect Austria	DZK	GRTgaz/Open Grid Europe	Überackern	Gas Connect Austria	DZK	Open Grid Europe/bayernets	1.4
TARVISIO (IT) / ARNOLDSTEIN (AT)	Trans Austria Gasleitung	DZK	Snam Rete Gas	Murfeld (AT) / Ceršak (SI)	Gas Connect Austria	FZK	Plinovodi	14.4

* Booked capacity for transit could not be estimated due to a "many-to-many" relation of entry and exit points at which DZK products are offered.

Annex II: Stakeholders Interviewed

National Regulatory Authorities interviewed:

Country	National Regulatory Authority	Questionnaire response
Austria	E-Control	Interview
Belgium	CREG	Interview
Bulgaria	EWRC	Email
Croatia	HERA	Interview
Czech Republic	ERU	Interview
Denmark	DERA	Interview
Estonia	ECA	Derogation no interview required
Finland	EV	Derogation no interview required
France	CRE	Interview
Germany	BNetzA	Interview
Greece	RAE	Interview
Hungary	MEKH	Interview
Ireland	CRU	Interview
Italy	ARERA	Interview
Latvia	PUC	Interview
Lithuania	NCC	Interview
Luxembourg	ILR	Interview
Netherlands	ACM	Interview
Poland	URE	Interview
Portugal	ERSE	Interview
Romania	ANRE	Email
Slovakia	RONI	Interview
Slovenia	AGEN	Interview
Spain	CNMC	Interview
Sweden	EI	Interview
UK	OFGEM	Interview

Transmissions System Operators interviewed:

Country	Transmission System Operator	Questionnaire response
Austria	GAS CONNECT AUSTRIA GmbH	Interview
	Trans Austria Gasleitung GmbH	Interview
Belgium	Fluxys Belgium	Interview
Bulgaria	BULGARTRANSGAZ EAD	Email
Croatia	Plinacro Ltd	Interview
Czech Republic	NET4GAS, s.r.o.	Interview
Denmark	Energinet	Interview
Estonia	Elering AS	Interview
Finland	Gasum	Derogation no interview required
France	GRTgaz	Interview
	TIGF	Interview

Germany	GASCADE Gastransport GmbH	Interview
	NEL Gastransport GmbH	Interview
	OPAL Gastransport GmbH	Interview
	Gastransport Nord GmbH	Interview
	Gasunie Deutschland Transport Services GmbH	Interview
	jordgasTransport GmbH	Interview
	ONTRAS Gastransport GmbH	Interview
	Open Grid Europe GmbH	Interview
	Thyssengas GmbH	Interview
	bayernets GmbH	Email
	Fluxys TENP GmbH	Interview
	Fluxys Deutschland GmbH	Interview
	GRTgaz Deutschland GmbH	Interview
	Lubmin-Brandov Gastransport GmbH	Interview
	Nowega GmbH	Interview
	terranets bw GmbH	Interview
Greece	DESFA S.A. (GR)	Interview
Hungary	FGSZ Ltd.	Interview
	Magyar Gáz Tranzit ZRt.	Interview
Ireland	Gas Networks Ireland	Interview
Italy	Snam Rete Gas S.p.A	Interview
Latvia	JSC Conexus Baltic Grid	Interview
Lithuania	AB Amber Grid	Interview
Luxembourg	Creos	Interview
Netherlands	Gasunie Transport Services	Interview
	BBL Company V.O.F.	Interview
Poland	Gas Transmission Operator GAZ - SYSTEM S.A.	Interview
Portugal	REN-Gasodutos, S.A.	Interview
Romania	Transgaz	Interview
Slovakia	eustream, a.s.	Interview
Slovenia	PLINOVODI d.o.o.	Interview
Spain	ENAGAS	Interview
Sweden	Swedegas AB	Interview
UK	GNI(UK) Limited	Interview
	Interconnector (UK) Limited	Email
	National Grid Gas	Interview
	Premier Transmission Limited	Interview

Annex III: Factsheet of firm conditional products offered by the TSOs offering firm capacity conditional products at IPs[83]

bayernets GmbH (Germany)

Firm products offered: FZK, BZK (Shorthaul)

Products at entry IPs

Entry IP:	Adjacent Operator	IP Type	Products
Überackern ABG (AT) / Überackern (DE)	Gas Connect Austria	Cross Border Point	FZK, BZK (Shorthaul)
Überackern SUDAL (AT) / Überackern 2 (DE)	Gas Connect Austria	Cross Border Point	FZK, BZK (Shorthaul)
Haidach (AT) / Haidach USP (DE)	GSA LLC	Cross Border Point	FZK, BZK (Shorthaul)

Products at Exit IPs

Exit IP:	Adjacent Operator	IP Type	Products
Überackern SUDAL (AT) / Überackern 2 (DE)	Gas Connect Austria	Cross Border Point	FZK, BZK (Shorthaul)
Haidach (AT) / Haidach USP (DE)	GSA LLC	Cross Border Point	FZK, BZK (Shorthaul)
VIP Kiefersfelden-Pfronten	NCG	Market-Area Point	FZK, BZK (Shorthaul)

Other network points with conditionalities

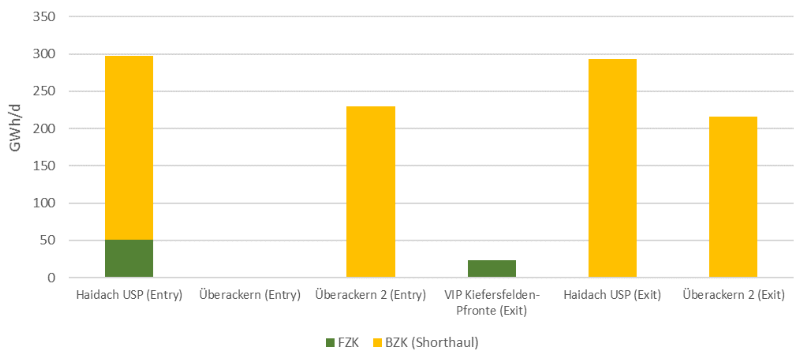
Bayernets, also provides a BZK (shorthaul) conditional product at exits to transmission consumers

Conditions of application

The following restrictions are applied for the capacity assignment of the BZK (shorthaul) product at each interconnection point:

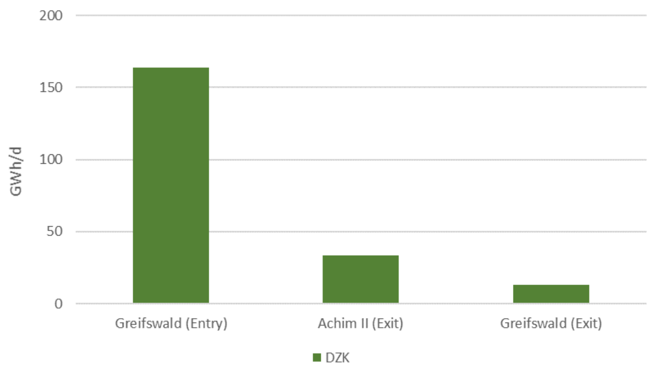
- Überackern ABG (AT) / Überackern (DE): Link to specific domestic exit to consumers
- Überackern SUDAL (AT) / Überackern 2 (DE): Link to specific domestic exit to consumers, exit of same IP (shorthaul), Haidach Storage
- Haidach (AT) / Haidach USP (DE): Link to Überackern exit, specific domestic exit to consumers, storage entry

Average daily maximum technical capacity per IP (Gas Year 2017/18)



Discounts applied: The shorthaul BZK product is being offered at a discount of 98%

[83] Terranets, that started offering conditional firm capacity in 1/10/2018, and Nowega, that is offering conditional capacity only at connections with storage and local production, are not included in these factsheets that focus on IPs.

<table>
<tr><th colspan="2">Fluxys Deutschland GmbH (Germany)</th></tr>
<tr><td>Firm products offered</td><td>DZK</td></tr>
<tr><td>Products at entry IPs</td><td><table><tr><th>Entry IP:</th><th>Adjacent Operator</th><th>IP Type</th><th>Products</th></tr><tr><td>Greifswald</td><td>Nord Stream</td><td>Cross Border Point</td><td>DZK</td></tr></table></td></tr>
<tr><td>Products at Exit IPs</td><td><table><tr><th>Exit IP:</th><th>Adjacent Operator</th><th>IP Type</th><th>Products</th></tr><tr><td>Achim II</td><td>OGE</td><td>Market-Area Point</td><td>DZK</td></tr></table></td></tr>
<tr><td colspan="2">Conditions of application</td></tr>
<tr><td colspan="2">The DZK product at Greifswald is linked with the capacity assignment at market-area interconnection points with Gascade points & Achim II. The DZK product at Achim II is linked with capacity assignment at Greifswald</td></tr>
<tr><td colspan="2">Average daily maximum technical capacity per IP (Gas Year 2017/18)</td></tr>
<tr><td colspan="2">
</td></tr>
<tr><td>Discounts applied</td><td>Not applicable (only DZK offered)</td></tr>
</table>

Fluxys TENP GmbH (Germany)

Firm products offered: FZK, bFZK, BZK

Products at entry IPs

Entry IP:	Adjacent Operator	IP Type	Products
Eynatten 2 (BE) // Lichtenbusch / Raeren (DE)	Fluxys Belgium	Cross Border Point	BZK
Bocholtz	Gasunie NL	Cross Border Point	FZK, bFZK, BZK
Wallbach	Swissgas	Cross Border Point	FZK, BZK

Products at Exit IPs

Exit IP:	Adjacent Operator	IP Type	Products
Eynatten 2 (BE) // Lichtenbusch / Raeren (DE)	Fluxys Belgium	Cross Border Point	BZK
Bocholtz	Gasunie NL	Cross Border Point	FZK, bFZK, BZK
Wallbach	Swissgas	Cross Border Point	FZK, BZK

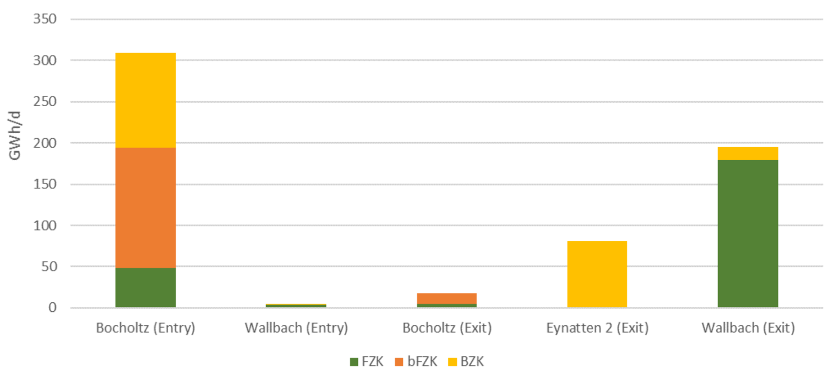
Conditions of application

The BZK product at the entry of each IP (Eynatten 2, Bocholtz, Wallbach) is linked with the exit at one of the remaining two IPs.

The bFZK product is subject to usage restrictions under specific temperature and flow conditions in the network. In case the forecast of the previous day for the average daily temperature is:

- Below 0°C: Firm freely allocable in the entire NCG
- Between 0 °C and 8 °C: 46.67% of the bFZK is considered as FZK. The remaining 53.33% is subject to reduction or interruption in case the physical gas flows at predefined connections with OGE's system exceed a certain limit, which will be defined by OGE based on the nominations at NCG
- Above 8 °C: the bFZK is subject to reduction or interruption in case the physical gas flow at connections with OGE exceeds a certain limit, which will be defined by OGE on the basis of the nominations at NCG

Average daily maximum technical capacity per IP (Gas Year 2017/18)



Discounts applied: The bFZK product is being offered at a discount of 3%, and the BZK at 10%

Gascade GmbH (Germany)

Firm products offered: FZK, DZK

Products at entry IPs

Entry IP:	Adjacent Operator	IP Type	Products
Eynatten 1 (BE) // Lichtenbusch / Raeren (DE)	Fluxys Belgium	Cross Border Point	FZK
Mallnow	GAZ-SYSTEM	Cross Border Point	FZK, DZK
Gernsheim	GRTgaz Deutschland	Market-Area Point	FZK

Products at Exit IPs

Exit IP:	Adjacent Operator	IP Type	Products
Eynatten 1 (BE) // Lichtenbusch / Raeren (DE)	Fluxys Belgium	Cross Border Point	FZK
Bunde (DE) / Oude Statenzijl (H) (NL) (GASCADE)	Gasunie NL	Cross Border Point	FZK
Drohne-Nowal	OGE	Market-Area Point	FZK
Mallnow	GAZ-SYSTEM	Cross Border Point	FZK
Olbernhau (DE) / Hora Svaté Kateřiny (CZ)	Net4Gaz	Cross Border Point	FZK, DZK
Kienbaum	OGE	Market-Area Point	DZK
Broichweiden Süd	Thyssengas	Market-Area Point	FZK
Lampertheim IV	Terranets	Market-Area Point	FZK
Gernsheim	GRTGaz	Market-Area Point	FZK
Zone GASCADE / OGE	OGE	Market-Area Point	FZK
Ronneburg OGE	OGE	Market-Area Point	DZK

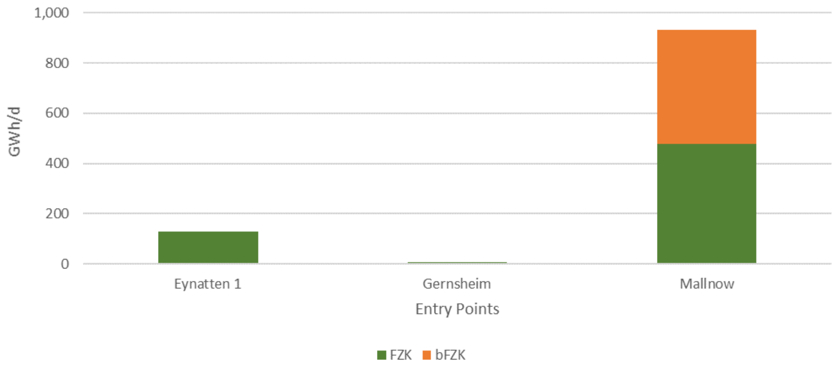
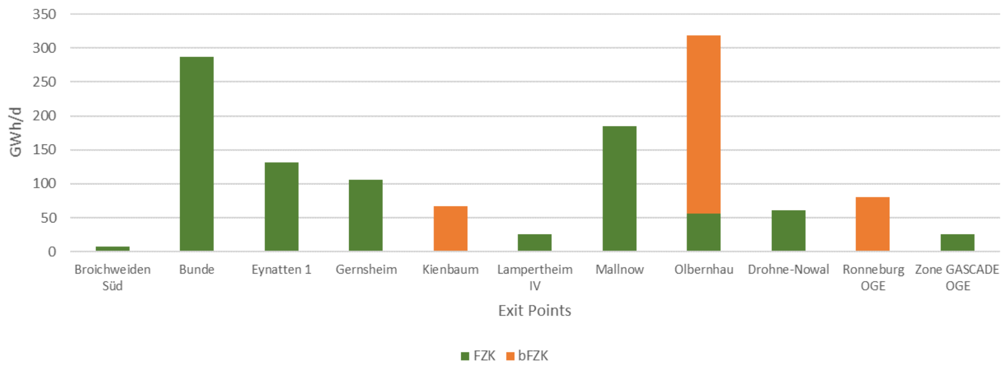
Other network points with conditionalities

Gascade also provides DZK conditional products at connection points with storages (Bobbau entry/exit, Sp. Rehden entry)

Conditions of application

The following restrictions are applied for the capacity assignment of the DZK product at each interconnection point:

- Olbernhau (exit) with Mallnow (entry)
- Mallnow (entry) with Olbernhau II, Ronneburg, Kienbaum, VIP Brandov-GASPOOL (exits)
- Kienbaum (exit) with Mallnow (entry)
- Mallnow (exit) with Bobbau UGS (entry)

Average daily maximum technical capacity per IP (Gas Year 2017/18)	
 	
Discounts applied	The DZK product is being offered at a discount of 10%

Gastransport Nord GmbH (GTG) (Germany)

Firm products offered	FZK[84], bFZK, DZK

Products at entry IPs

Entry IP:	Adjacent Operator	IP Type	Products
Bunde (DE) / Oude Statenzijl (L) (NL) (GTG Nord)	Gasunie NL	Cross Border Point	bFZK, DZK

Other network points with conditionalities

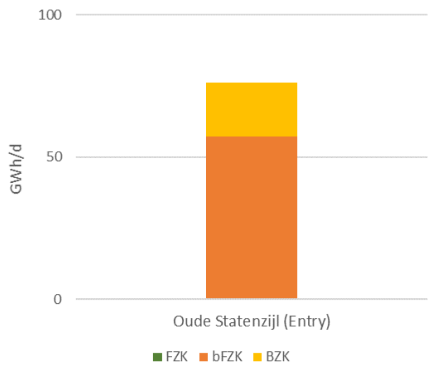
GTG also provides bFZK and DZK products at the entry to Zone UGS EWE L-Gas

Conditions of application

The DZK product at Bunde is linked with the capacity assignment at DZK linked to Zone UGS EWE L-Gas Exit, or Virtual Exit to Oude Statenzijl.

For the bFZK product, the use of network is allowed when certain temperature conditions are met. The amount of fixed network use (bFZKf) for delivery day D is calculated by multiplying the booking amount by the published temperature factor based on the rounded forecast daily average temperature for delivery day D published on day D-1. The parts that can be used as bFZKu are calculated by taking the difference between the booking amount and the maximum usable bFZKf for delivery day D.

Average daily maximum technical capacity per IP (Gas Year 2017/18)



Discounts applied	The DZK product is being offered at a discount of 5% (no discount for bFZK). The FZK product also has a market area conversion levy not applied to bFZK and DZK

[84] For exit points

GRTgaz Deutschland GmbH (Germany)

Firm products offered: FZK, bFZK, DZK

Products at entry IPs

Entry IP:	Adjacent Operator	IP Type	Products
Gernsheim	Gascade	Market-Area Point	FZK, DZK
Oberkappel	Gas Connect Austria	Cross Border Point	FZK, bFZK, DZK
Waidhaus	Net4Gas	Cross Border Point	FZK, bFZK, DZK

Products at Exit IPs

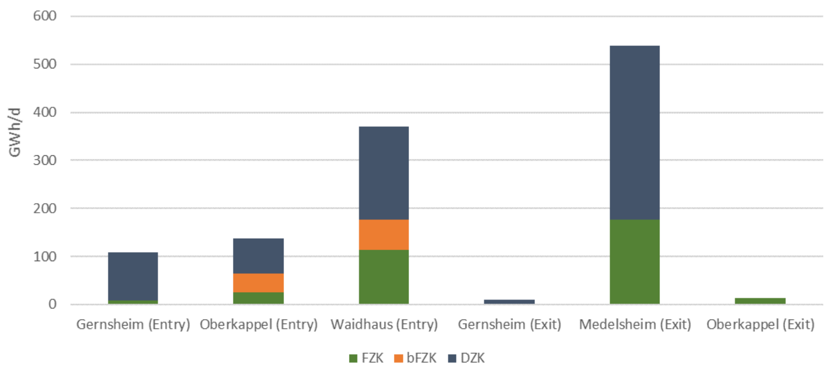
Exit IP:	Adjacent Operator	IP Type	Products
Gernsheim	Gascade	Market-Area Point	DZK
Oberkappel	Gas Connect Austria	Cross Border Point	FZK
Obergailbach (FR) / Medelsheim (DE)	GRTGaz	Cross Border Point	FZK, DZK

Conditions of application

The use of bFZK may be restricted in the event that, due to nominations within the market area, the physical gas flow into the system of OGE exceeds a limit value defined by OGE and the forecast for the previous day for the average daily temperature is above 0ºC.

Flows between the entry and exit points of GRTgaz within a balancing group at a certain hour shall be exactly the minimum of the sum of the hourly entry nominations at GRTgaz at the balancing group and the sum of the hourly exit nominations at GRTgaz at the same balancing group. The same shall be applicable in sum for linked balancing groups. The use of the capacity portion of DZK, which is used in excess of a balanced transport between entry and exit points of GRTgaz – in particular when the VTP is concerned–may be restricted, if, due to current nominations within the whole market area, transport is not possible for network reasons.

Average daily maximum technical capacity per IP (Gas Year 2017/18)



Discounts applied: The bFZK product is being offered at a discount of 1%, and the DZK at 5%

Lubimin-Brandov Gastransport GmbH (LBTG) (Germany)				
Firm products offered	DZK, Transit (non-regulated			
Products at entry IPs	**Entry IP:**	**Adjacent Operator**	**IP Type**	**Products**
	Greifswald / Lubmin	Nord Stream	Cross Border Point	DZK, Transit (non-regulated)
Products at Exit IPs	**Exit IP:**	**Adjacent Operator**	**IP Type**	**Products**
	Brandov-OPAL	Net4Gas	Cross Border Point	BZK (transit)
Conditions of application				
The BZK product refers to the non-regulated transit of gas from Lubmin to Brandov. For the DZK product, the allocability depends on the situation at the adjacent transmission systems.				
Average daily maximum technical capacity per IP (Gas Year 2017/18)				
Maximum technical DZK capacity at Lubmin in Gas Year 2017/18 amounted to 27.5 GWh/d. Non-regulated transit from Lubmin to Brandow was 190 GWh/D.				
Discounts applied	Not applicable (only DZK offered)			

NEL GmbH (Germany)				
Firm products offered	DZK			
Products at entry IPs	**Entry IP:**	**Adjacent Operator**	**IP Type**	**Products**
	Greifswald	Nord Stream	Cross Border Point	DZK
Average daily maximum technical capacity per IP (Gas Year 2017/18)				
Maximum technical DZK capacity at Greifswald in Gas Year 2017/18 amounted to 373 GWh/d.				
Discounts applied	Not applicable (only DZK offered)			

OPAL Gastransport GmbH & Co. KG (Germany)

Firm products offered	FZK, DZK, Transit (non-regulated)

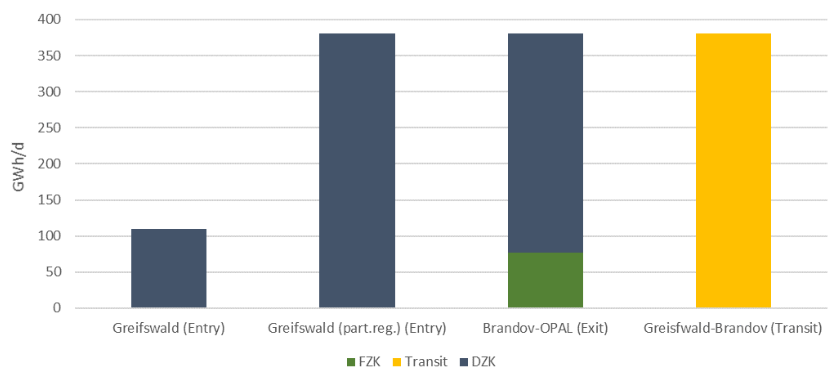
	Entry IP:	Adjacent Operator	IP Type	Products
Products at entry IPs	Greifswald	Nord Stream	Cross Border Point	DZK, Transit (non-regulated)

	Exit IP:	Adjacent Operator	IP Type	Products
Products at Exit IPs	Brandov-OPAL	Net4Gas	Cross Border Point	FZK, DZK, Transit (non-regulated)

Conditions of application

The BZK product refers to the non-regulated transit of gas from Greifswald to Brandov. At the Greifswald entry, DZK linked to the grid points of ONTRAS and exit at grid point Brandov OPAL. At Brandov DZK is linked with capacity assignment at Greifswald entry.

Average daily maximum technical capacity per IP (Gas Year 2017/18)



Discounts applied	The DZK product is being offered at a discount of 11%

Thyssengas GmbH (Germany)

Firm products offered	bFZK, BZK (at entry points), FZK (at exit points), DZK (under consideration to supply power plants from 2021/22 onwards)

Products at entry IPs

Entry IP:	Adjacent Operator	IP Type	Products
Haanrade	Gasunie NL	Cross Border Point	BZK
Broichweiden Süd	Gascade	Market-Area Point	bFZK
Emsbüren-Berge	Gasunie DE	Market-Area Point	bFZK
Emden (EPT1)	Gassco	Cross Border Point	bFZK
Eynatten 2 (BE) // Lichtenbusch / Raeren (DE)	Fluxys Belgium	Cross Border Point	bFZK
Bocholtz-Vetschau	Gasunie NL	Cross Border Point	bFZK
Zevenaar	Gasunie NL	Cross Border Point	bFZK

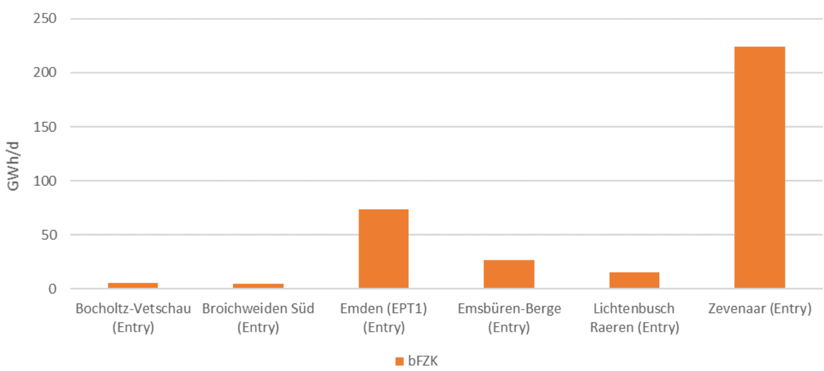
Other network points with conditionalities

Thyssengas, also provides a bFZK conditional product at entry points from storages (Emlichheim-Kalle [under decommissioning], Epe III, Epe-Xanten I, Gronau-Epe 11, Gronau-Epe 13, Leer-Mooracker 1,3).

Conditions of application

Basic restriction is on the firmness, depending on load. Only offered at entry points, with conditions on the aggregated use of capacity at exit points. If the use of exit points capacity reduced by flow commitments to other TSOs/the relevant system load is smaller than the entry points nominations, then the relevant system load is allocated pro-rata to the booked entry capacity as firm. The rest is regarded as interruptible; however the TSO tries using its own resources first (linepack) and if required also OBAs and interruptible connection capacities with adjacent TSOs of the same market area (noting strong obligation to co-operate within market area between TSOs). If the TSO does not succeed, then interruption of capacity follows.

Average daily maximum technical capacity per IP (Gas Year 2017/18)



Discounts applied	The bFZK product is being offered at a discount of 9%

Gasunie Deutschland Transport Services GmbH (Germany)

Firm products offered: FZK, BZK

Products at entry IPs

Entry IP:	Adjacent Operator	IP Type	Products
Bunde (DE) / Oude Statenzijl (H) (NL) (GUD)	Gasunie NL	Cross Border Point	FZK
Bunde (DE) / Oude Statenzijl (L) (NL) (GUD)	Gasunie NL	Cross Border Point	FZK
Ellund	Energinet.dk	Cross Border Point	FZK
Bunder-Tief	OGE	Market-Area Point	FZK
Wardenburg RG	OGE	Market-Area Point	FZK
Dornum	Gassco	Cross Border Point	FZK
Emden (EPT1)	Gassco	Cross Border Point	FZK
Greifswald	Nord Stream	Cross Border Point	FZK

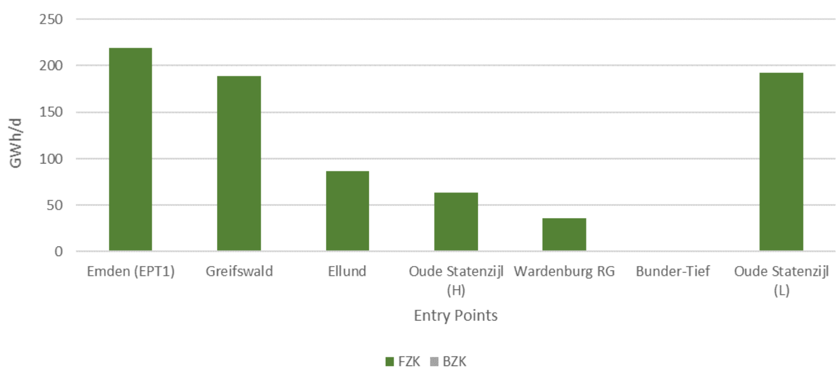
Products at Exit IPs

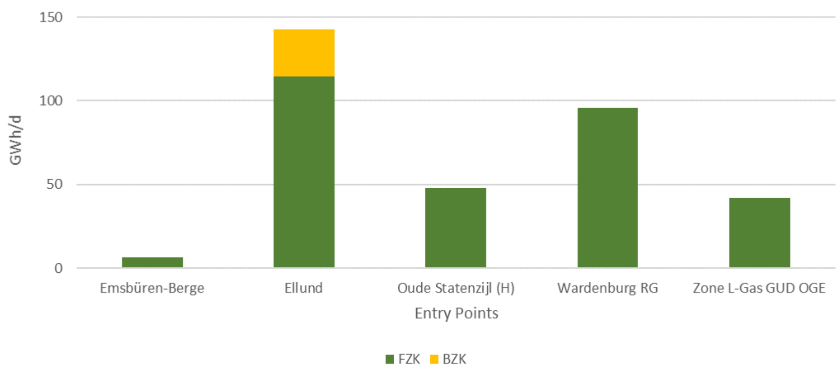
Exit IP:	Adjacent Operator	IP Type	Products
Bunde (DE) / Oude Statenzijl (H) (NL) (GUD)	Gasunie NL	Cross Border Point	FZK
Ellund	Energinet.dk	Cross Border Point	FZK, BZK
Bunder-Tief	OGE	Market-Area Point	FZK
Emsbüren-Berge	Thyssengas	Market-Area Point	FZK
Wardenburg RG	OGE	Market-Area Point	FZK
Zone L-Gas GUD/OGE	OGE	Market-Area Point	FZK

Conditions of application

BZK at Ellund exit point requires a corresponding firm entry booking and nomination at Entry Greifswald

Average daily maximum technical capacity per IP (Gas Year 2017/18)





Discounts applied	The BZK product is being offered at a discount of 5%

ONTRAS Gastransport GmbH (Germany)

Firm products offered: FZK, bFZK, DZK, BZK

Products at entry IPs

Entry IP:	Adjacent Operator	IP Type	Products
Hora Svaté Kateřiny (CZ) / Deutschneudorf (Sayda) (DE)	NET4Gas	Cross Border Point	FZK
GCP GAZ-SYSTEM/ONTRAS	GAZ-SYSTEM	Cross Border Point	FZK
Steinitz	OGE	Market-Area Point	FZK

Products at Exit IPs

Exit IP:	Adjacent Operator	IP Type	Products
Hora Svaté Kateřiny (CZ) / Deutschneudorf (Sayda) (DE)	NET4Gas	Cross Border Point	FZK, DZK
GCP GAZ-SYSTEM/ONTRAS	GAZ-SYSTEM	Cross Border Point	FZK
Steinitz	OGE	Market-Area Point	FZK

Other network points with conditionalities

ONTRAS also provides storage points UGS Allmenhausen and UGS Peckensen, and BZK at entry Salzwedel Produktion.

The DZK product is being offered at the new entry Lubmin 2 (entry of EUGAL pipeline), and at exit Deutschneudorf-EUGAL.

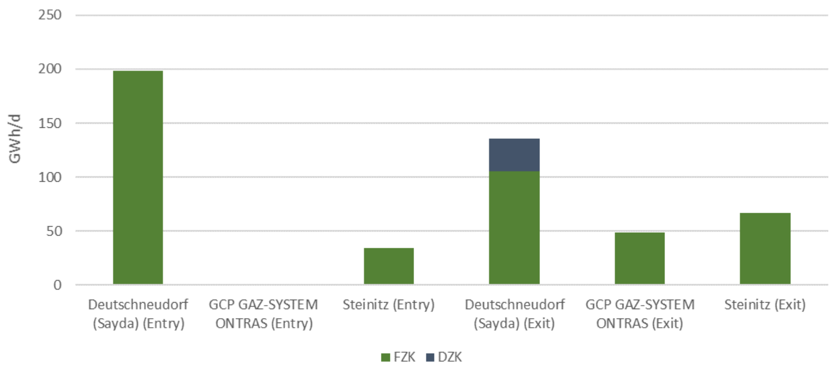
Conditions of application

Firmness of bFZK at storage points UGS Allmenhausen and UGS Peckensen depends on temperature of gas day (TaK product). The available capacity is defined as follows:

UGS	Temperature	Firm Capacity Available
UGS Peckensen (entry)	T ≤ 0ºC	100%
	0ºC ≤ T ≤ 8ºC	57%
	T > 8ºC	0%
UGS Peckensen (exit)	T ≥ 16ºC	100%
	16ºC > T ≥ 10ºC	22%
	T < 10ºC	0%
UGS Allmenhausen (exit)	T ≥ 20ºC	100%
	20ºC > T ≥ 15ºC	60%
	15ºC > T ≥ 5ºC	30%
	T < 5ºC	0%

DZK at entry Lubmin 2 IP (entry of EUGAL pipeline) can be used on firm basis as long as entry nomination equals exit nominations at specified points (e.g. Deutschneudorf or Deutschneudorf-EUGAL) and DZK at exit Deutschneudorf-EUGAL can be used on firm basis as long as exit nomination equals entry nominations at Lubmin 2 IP. The allocability of DZK product for the usage of VGS Storage Hub at the exit point Deutschneudorf, depends on the entry pressure at specific network points. If the pressure falls below 65 bar, ONTRAS restricts allocability for the following day.

Firm capacity product at entry Salzwedel Produktion can only be used in conjunction with exit NKP EMS due to technical restrictions.

Average daily maximum technical capacity per IP (Gas Year 2017/18)	
 	
Discounts applied	DZK is being offered at a discount of 10%. bFZK is offered at the same price as FZK

Open Grid Europe GmbH (Germany)

Firm products offered: FZK, bFZK, DZK, BZK

Products at entry IPs

Entry IP:	Adjacent Operator	IP Type	Products
Eynatten 2 (BE) // Lichtenbusch / Raeren (DE)	Fluxys Belgium	Cross Border Point	FZK
Bocholtz	Gasunie NL	Cross Border Point	FZK
Zevenaar	Gasunie NL	Cross Border Point	FZK
Winterswijk	Gasunie NL	Cross Border Point	FZK
Bunde (DE) / Oude Statenzijl (H) (NL) I (OGE)	Gasunie NL	Cross Border Point	FZK, BZK
Oberkappel	Gas Connect Austria	Cross Border Point	FZK
Waidhaus	NET4Gas	Cross Border Point	FZK, BZK
Kienbaum	Gascade	Market-Area Point	FZK, BZK
Bunder-Tief	Gasunie Deutschland	Market-Area Point	FZK
Steinitz	ONTRAS	Market-Area Point	FZK, BZK
Zone L-Gas GUD/OGE	Gasunie Deutschland	Market-Area Point	FZK
Steinbrink (DE)	Nowega	Market-Area Point	FZK
Zone GASCADE / OGE	Gascade	Market-Area Point	FZK
Dornum	Gassco	Cross Border Point	FZK
Emden (EPT1)	Gassco	Cross Border Point	FZK
Achim II	Fluxys Deutschland	Market-Area Point	FZK
Ronneburg OGE	Gascade	Market-Area Point	FZK

Products at Exit IPs

Exit IP:	Adjacent Operator	IP Type	Products
Eynatten 2 (BE) // Lichtenbusch / Raeren (DE)	Fluxys Belgium	Cross Border Point	FZK, BZK
Remich	Creos	Cross Border Point	FZK
Bocholtz	Gasunie NL	Cross Border Point	FZK
Bunde (DE) / Oude Statenzijl (H) (NL) I (OGE)	Gasunie NL	Cross Border Point	FZK, BZK

		Oberkappel	Gas Connect Austria	Cross Border Point	FZK	
		Obergailbach (FR) / Medelsheim (DE)	GRTGaz	Cross Border Point	FZK, BZK	
		Wallbach	Swissgas	Cross Border Point	FZK	
		Ellund	Energinet.dk	Cross Border Point	FZK	
		Bunder-Tief	Gasunie Deutschland	Market-Area Point	FZK	
		Steinitz	ONTRAS	Market-Area Point	FZK	
		Wardenburg RG	Gasunie Deutschland	Market-Area Point	FZK	
		Zone GASCADE / OGE	Gascade	Market-Area Point	FZK	
		Zevenaar	Gasunie NL	Cross Border Point	FZK	
		Winterswijk	Gasunie NL	Cross Border Point	FZK	

Other network points with conditionalities

OGE, also provides bFZK products to storage entry/exit connections (Etzel Weg10 exit, Friedeburg-Etzel EGL_entry, Friedeburg-Etzel EGL_exit, Speicher Gronau-Epe H1_exit, Speicher Gronau-Epe L1_exit, Speicher Gronau-Epe L2_entry, Speicher Krummhorn_exit, Speicher Bierwang_entry, Speicher Bierwang_exit, Speicher Breitbrunn_entry, Speicher Breitbrunn_exit, Speicher Epe H_entry, Speicher Epe H_exit, Speicher Epe L_entry, Speicher Epe L_exit, Speicher Eschenfelden_entry, Speicher Eschenfelden_exit, Zone MND GSG_entry, Zone MND GSG_exit), and DZK conditional products at exits to transmission consumers

Conditions of application

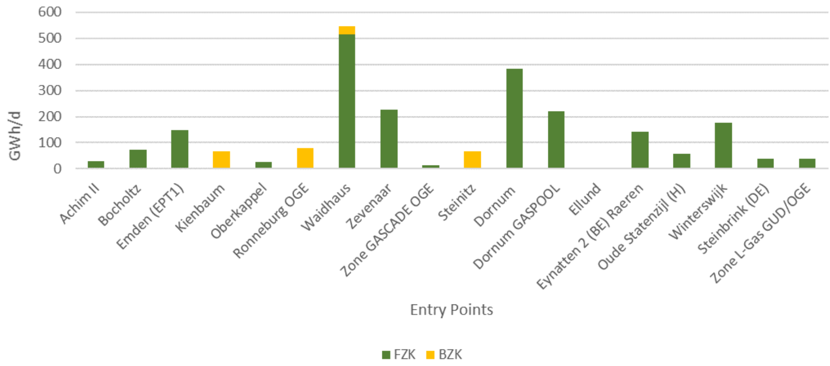
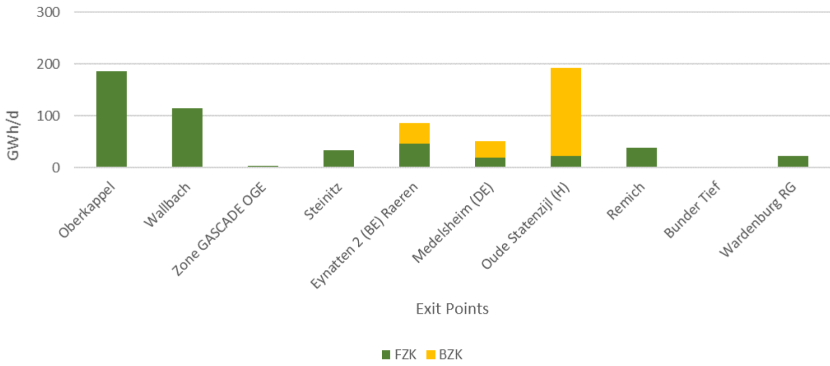
The following capacity assignment requirements are for the DZK product at each interconnection point:

- Entry Kienbaum/Entry Steinitz – Exit Oude Statenzijl
- Entry Vitzeroda – *(Exit Eynatten/Raeren respectively Exit Oude Statenzijl)*
    - Exit "Eynatten/Raeren" (for the winter term)
    - Exit "Oude Statenzijl" (for the summer term)

For the BZK product:

- Entry Kienbaum/ Entry Steinitz – Exit Oude Statenzijl (expiration date: 1st October 2018)
- Entry Waidhaus - Exit Medelsheim (expiration date 1st October 2023)

bFZK is offered at domestic points. It defines a temperature range within which the technical capacities are firm, and outside which they are interruptible. For the entry points, the firmness decreases stepwise as temperature increases. As for the exit points, firmness increases stepwise as temperature increases (temperatures and reduction are predefined by OGE).

Average daily maximum technical capacity per IP (Gas Year 2017/18)	
 	
Discounts applied	OGE is applying a discount of 10% at the conditional products offered at IPs

Gas Connect Austria (GCA) (Austria)

Firm products offered	FZK (DZK offering ceased in 2014)

Products at entry IPs

Entry IP:	Adjacent Operator	IP Type	Products
Baumgarten	Eustream	Cross Border Point	FZK
Oberkappel	OGE, GRTGaz	Cross Border Point	FZK
Überackern	Bayernets	Cross Border Point	FZK (DZK offering ceased in 2014)

Products at Exit IPs

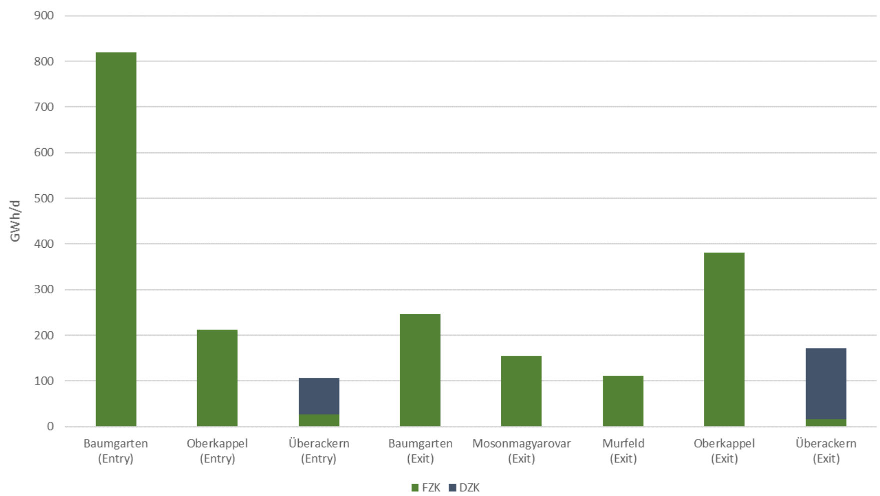
Exit IP:	Adjacent Operator	IP Type	Products
Baumgarten	Eustream	Cross Border Point	FZK
Mosonmagyarovar	FGSZ	Cross Border Point	FZK
Murfeld (AT) / Ceršak (SI)	Plinovodi	Cross Border Point	FZK
Oberkappel	OGE, GRTGaz	Cross Border Point	FZK
Überackern	OGE, Bayernets	Cross Border Point	FZK (DZK offering ceased in 2014)

Conditions of application

The DZK product at Überackern required a capacity assignment at Oberkappel and was offered just until the merger of BOG GmbH (marketing party at Oberkappel) into GCA. From this point in time every firm capacity available at Überackern/Oberkappel is offered on FZK basis in competition to each other.

At Oberkappel, the DZK product that used to be linked with capacity assignment at Überackern is no longer contracted (last DZK contract ceased in April 2018)

Average daily maximum technical capacity per IP (Gas Year 2017/18)[85]



[85] For Oberkappel DZK capacity is 0, because the product was contracted just until April 2018.

<table>
<tr><td colspan="2">Note: DZK capacity at Überackern concerns capacity that was booked until 2014, after which offering of the product ceased. Currently only FZK capacity is available.</td></tr>
<tr><td>Discounts applied</td><td>The discount is different for each point and direction. For entry at Überackern and exit via Oberkappel the total discount is 71% (10% for entry and 94% for exit)

For entry at Oberkappel and exit via Überackern (no longer offered) the total discount was 32% (84% for entry and 13% for exit)

<table>
<tr><td></td><td colspan="3">Entry</td><td colspan="3">Exit</td></tr>
<tr><td>Tariff EUR/kWh/h/y</td><td>FZK</td><td>DZK</td><td>Discount</td><td>FZK</td><td>DZK</td><td>Discount</td></tr>
<tr><td>Überackern (DZK must exit via: Oberkappel)</td><td>1.3</td><td>1.17</td><td>10%</td><td>3.44</td><td>2.99</td><td>13%</td></tr>
<tr><td>Oberkappel (DZK must exit via: Uberackern)</td><td>1.3</td><td>0.21</td><td>84%</td><td>3.44</td><td>0.21</td><td>94%</td></tr>
</table>
</td></tr>
</table>

Trans Austria Gasleitung (TAG) (Austria)

Firm products offered

FZK, DZK

Products at entry IPs

Entry IP:	Adjacent Operator	IP Type	Products
Baumgarten	Eustream	Cross Border Point	FZK
Tarvisio (IT) / Arnoldstein (AT)	Snam Rete Gas	Cross Border Point	DZK

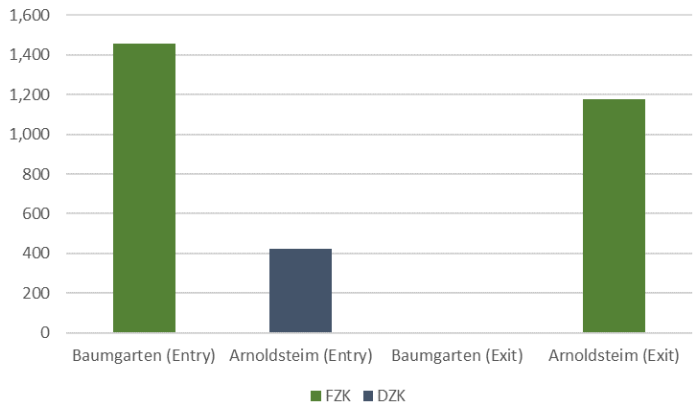
Products at Exit IPs

Exit IP:	Adjacent Operator	IP Type	Products
Tarvisio (IT) / Arnoldstein (AT)	Snam Rete Gas	Cross Border Point	FZK

Conditions of application

The DZK product at Arnoldstein is firm if coupled with a firm capacity product of opposite sign at Murfeld (FZK) or to the final customers of DSO networks along the TAG pipeline.

Average daily maximum technical capacity per IP (Gas Year 2017/18)



Discounts applied

The discount for entry at Arnoldstein and exit via Murfeld is 52%.

	Entry			*Exit*		
Tariff EUR/kWh/h/y	*FZK*	*DZK*	*Discount*	*FZK*	*DZK*	*Discount*
Arnoldstein (DZK must exit via: Murfeld)	*1.3*	*0.62*	*52%*	*4.63*	*n/a*	*n/a*

Creos (Luxembourg)	
Firm products offered	FZK (at domestic points), bFZK
Products at entry IPs	<table><tr><th>Entry IP:</th><th>Adjacent Operator</th><th>IP Type</th><th>Products</th></tr><tr><td>Remich</td><td>OGE</td><td>Cross Border Point</td><td>bFZK</td></tr></table>
Conditions of application	
The restrictions applied on the conditional product depend on the temperature and flow conditions in the system. Creos may request minimum nominations during the winter period or restrict capacity during the summer period. The capacity restrictions are published by Creos prior to each gas year.	
Average daily maximum technical capacity per IP (Gas Year 2017/18)	
Creos provides only quarterly capacity of bFZK, which is the same for the winter quarters and for the summer quarters. In Gas Year 2017/18, for Q1 and Q1 26.7 GWh/d of bFZK was offered, and for Q3 and Q4 13.3 GWh/d.	
Discounts applied	Not applicable (only bFZK offered)

Gas Networks Ireland (GNI) (Ireland)

Firm products offered	FZK, BZK

Products at entry IPs

Entry IP:	Adjacent Operator	IP Type	Products
Moffat	National Grid	Cross Border Point	FZK

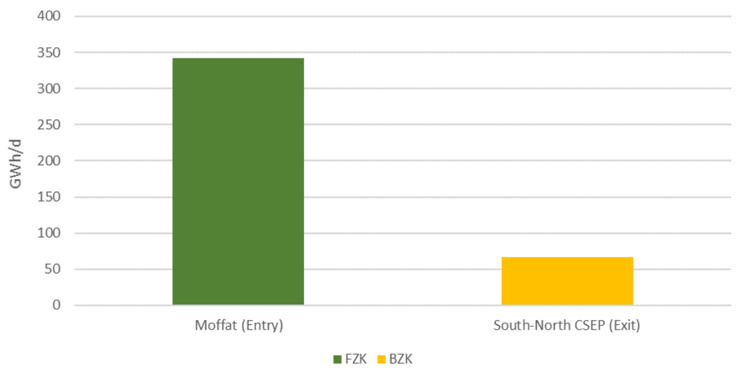
Products at Exit IPs

Exit IP:	Adjacent Operator	IP Type	Products
South-North CSEP	GNI (UK)	Cross Border Point	BZK

Conditions of application

Capacity booked and used at the South-North CSEP exit IP must have a corresponding capacity booking at the Moffat entry IP.

Average daily maximum technical capacity per IP (Gas Year 2017/18)



Discounts applied	No discount for the BZK product.

Annex IV: EuGaMe: methodology and scenario assumptions details

Methodology

241) The as-if simulation is performed by means of EU-GaMe, a quantitative model of the European gas market, developed by REF-E. The model simulates the optimal result as the mix of supply, interconnection, and storage utilization that minimizes the total gas supply cost allowing to satisfy demand in all market areas. In other words, supply cost minimization is performed, subject to a given set of constraints on supply availability, interconnection capacity of entry and exit point into/from the EU, storage volumes, injection and withdrawal capacity.

242) The model considers market scenarios referred to a typical gas year (October to September), with daily granularity, including for each market area:

- gas demand (consumption);
- gas supply cost from directly connected sources (domestic production, imports by pipeline and LNG);
- interconnection capacities from production, imports from outside the EU, and with other market areas (in both directions, where applicable;
- storage capacities (volume, injection and withdrawal rates);
- maximum supply from external (non-EU) sources;
- tariffs of entry from outside the EU and production, entry and exit from/to other market areas, and storage.

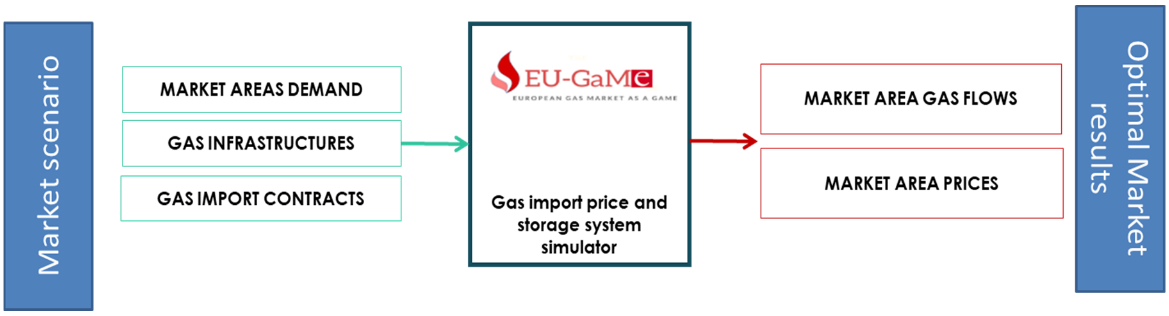
243) Constraints on minimum supply use of sources (notably take or pay clauses) are also included, while all capacities are optimized by price signals on daily basis. The optimization is run on a daily basis. However, constraints on maximum supply flows from each source and storage capacity are applied on an annual time scale. This allows the simulation of shippers' behavior who buy gas in summer (or any other lower gas price time), store it and deliver it to satisfy demand in winter (or at any other higher price times). The total cost minimization algorithm allows the model to find the most efficient use of the network, which is achieved in two ways:

- By finding the least costly routes for given transmission costs (tariffs), gas supply availability, transmission and storage capacities;
- By choosing the least costly supply mix, for given unit supply costs and for given supply (annual and daily) capacities of each source, storage, and interconnections.

244) Minimization of costs also amounts to maximization of market surplus, given almost price-inelastic demand and supply (these assumptions are discussed in the next sub-Section). If no reaction from demand and supply occurs, any price increase (decrease) in a given marker area leads to a cost increase (decrease) for consumers of that market area, and hence to gas supply cost variation for the related consumption. By minimizing total supply cost subject to the above listed constraints, the model simulates the outcome of a perfectly competitive market. *For each market area*, it yields:

- The marginal supply costs, including production and import costs, transmission and storage tariffs, which in perfectly competitive markets would correspond to market prices;
- The contribution of each domestic and external supply source to meet market demand;
- Flows between interconnected market areas of the EU, and hence the contribution of gas transported along each route and interconnection points to satisfy demand.

Figure 3. Model inputs and outputs



245) EU-GaMe has been built upon request from the natural gas market industry. The model is constantly updated and used by REF-E for its forecasting activities, and for drawing European gas and electricity forecasting scenario that are delivered to several market operators. The model has been used for several studies and market analysis[86]:

246) In the following paragraph we report a series of details about assumption and data adopted for the analysis performed in this Study.

Demand

247) Two **demand scenarios** are envisaged: a) "Reference" b) "High". They are selected in order to represent both a typical year, or the most probable demand level under normal temperature conditions, and a *high demand scenario*, representing a less probable situation of thigh market conditions (Figure 50 and Figure 51).

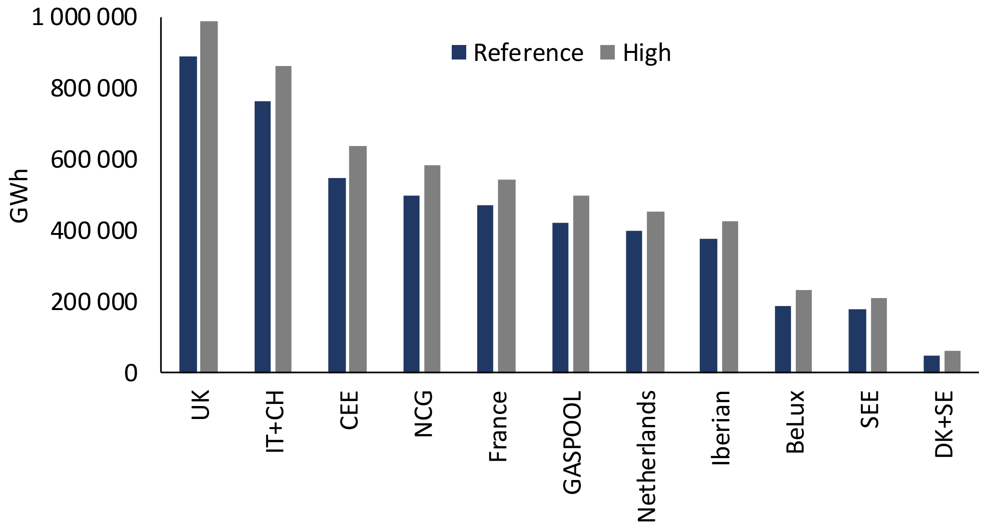
I. The "Reference" scenario is thus based on the five-year average monthly historical demand and accounts for overall 4.8 billion TWh demand;

II. The "High" scenario is based on the maximum five-year monthly historical demand, and accounts for 5.5 billion TWh, with 15% average increase in respect to the Reference scenario.

248) Demand scenarios are based on monthly historical demand (from Gas Year 2012/13 to GY 2016/17). In agreement with the Agency, we decided to undertake simulations based on historical market facts, rather than forecasts. This has the advantage of being more able to calibrate the model so that it provides a more accurate representation of the actual market. However, we used a five-year average to avoid specific events that may have affected each year. Therefore, the model is representative of a typical (average year) of the past. A daily specification is added, based on the historical average of the NCG daily profile.

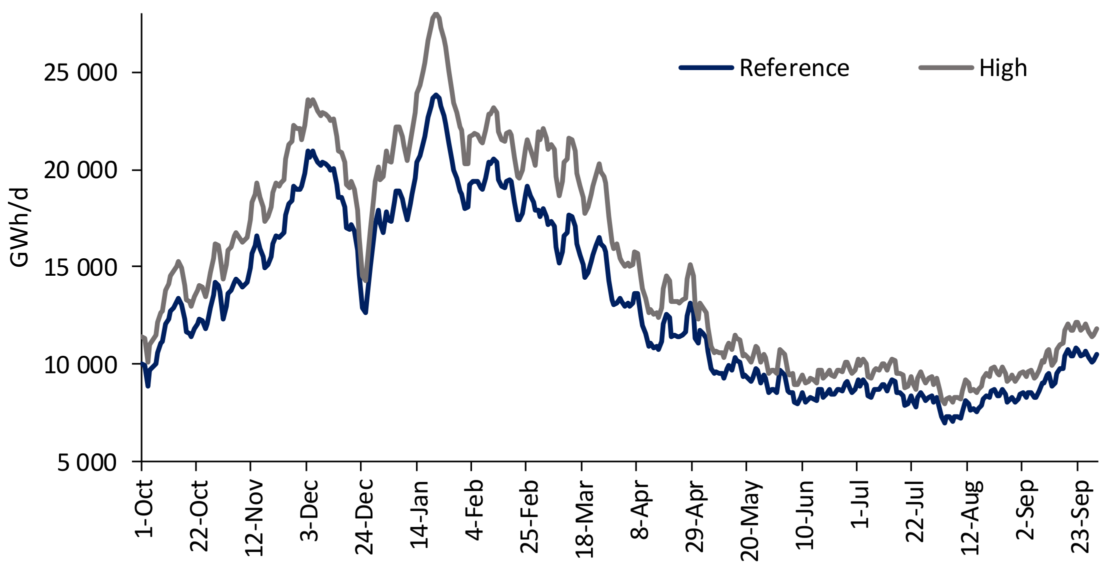
[86] For example, it has been used to estimate the impact of TAP interconnection on Italian natural gas prices for a natural gas transport operator and to draw scenarios of expected utilization rates for selected LNG European terminal for an infrastructure fund.

Figure 50. Demand scenarios by market area (GWh/y)



Source: EU-GaMe model.

Figure 51. Daily demand level (GWh/d)



Source: EU-GaMe model.

Network Representation

249) The network representation is pictured in Figure 52, where modelled import flows are also shown. EU exports towards Serbia, Macedonia and Turkey are also allowed, whereas LNG re-exports are not modelled. Capacity at each entry / exit point is taken from ENTSOG data (ENTSOG capacity map dataset)[87]. Capacity at interconnection points (IPs) between two market areas is aggregated as the sum of the capacity of the relevant IPs (Table 14).

[87] https://www.entsog.eu/maps/transmission-capacity-map

Figure 52. Modelled network structure

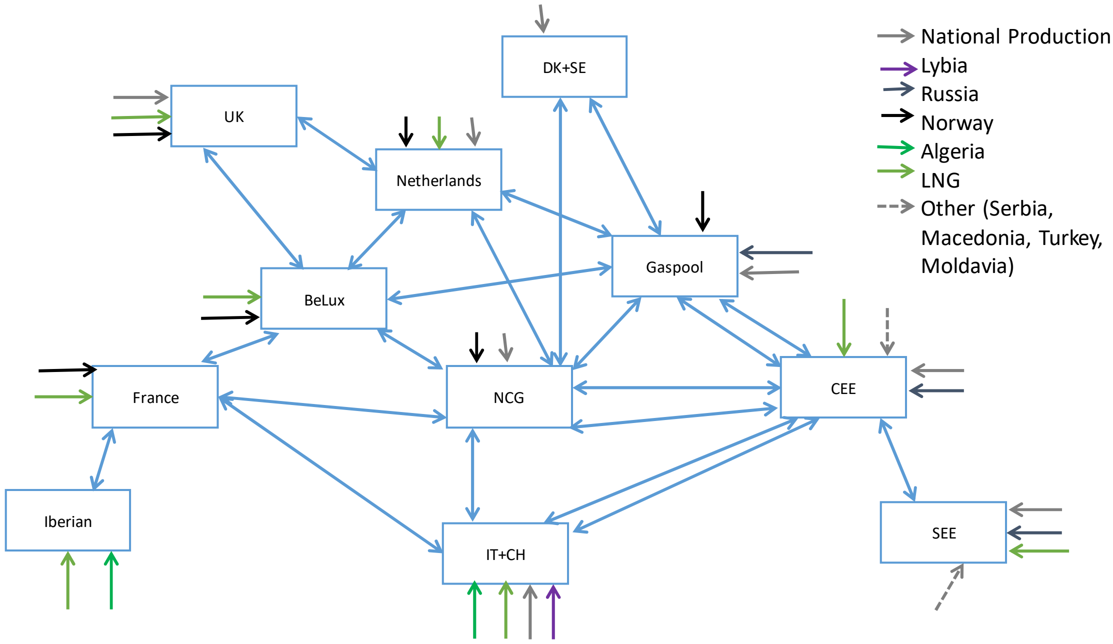


Table 14. Interconnection Capacities (GWh/d)

From\To	AT	BELU	CEE	DKSE	FR	GPL	GSP	IBER	ITCH	NCG	NL	SEE	UKIE	EXPORT	TOTAL EXIT
AT	-	-	518.90	-	-	-	-	-	1,150.50	348.10	-	-	-	-	2,017.50
BELU	-	-	-	-	870.00	-	129.50	-	-	183.60	393.20	-	803.40	-	2,379.70
CEE	1,612.00	-	-	-	-	1,129.00	-	-	21.50	906.90	-	51.50	-	422.90	4,143.80
DKSE	-	-	-	-	-	32.70	-	-	-	-	-	-	-	-	32.70
FR	-	870.00	-	-	-	-	-	165.00	260.40	-	-	-	-	-	1,295.40
GPL	-	129.50	1,129.00	32.70	-	-	-	-	-	397.60	-	-	-	-	1,688.80
IBER	-	-	-	-	165.00	-	-	-	-	-	-	-	-	-	165.00
ITCH	-	-	1,172.00	-	260.40	-	-	-	-	-	-	-	-	-	1,432.40
NCG	348.10	183.60	906.90	32.70	-	397.60	-	-	-	-	-	-	-	-	1,868.90
NL	-	393.20	-	-	-	-	-	-	-	-	-	-	494.00	-	887.20
SEE	-	-	-	-	-	-	-	-	-	-	-	-	-	27.40	27.40
TR	-	-	-	-	-	-	-	-	-	-	-	48.60	-	-	48.60
UKIE	-	803.40	-	-	-	-	-	-	-	-	494.00	-	-	-	1,297.40
PROD	-	-	166.03	179.18	-	238.32	-	-	179.18	238.32	1,963.81	314.53	547.82	-	3,827.20
ALG	-	-	-	-	-	-	-	710.00	2,231.90	-	-	-	-	-	2,941.90
NO	-	488.00	-	-	570.00	1,710.20	-	-	-	1,710.20	988.90	-	1,499.10	-	6,966.40
RU	-	-	4,055.00	-	-	1,570.30	-	-	-	-	-	766.20	-	-	6,391.50
LNG	-	-	158.00	-	880.00	-	-	2,092.80	543.40	-	398.50	149.90	2,088.70	-	6,311.30
TOTAL ENTRY	1,960.10	2,867.70	8,105.83	244.58	2,745.40	5,078.12	129.50	2,967.80	4,386.88	3,784.72	4,238.41	1,330.73	5,433.02	450.30	43,723.10

Conditional Products

250) For conditionalities that require coordinated nomination of specific entry and exit points, like BZK and DZK, the model considers them as a point-to point interconnection with no firm access to any other point of the transited network, including VTPs. For example, in Figure 53 a case is represented where a conditional product is offered for transit across the NCG area, connecting in fact Austria with France, with capacity reported in the chart. The main conditional product paths that have been identified and quantified, based on information collected by the Study, are pictured in Figure 54**.**

Figure 53. Example of a BZK / DZK Conditional Product (entry capacity/exit capacity) (GWh/d)

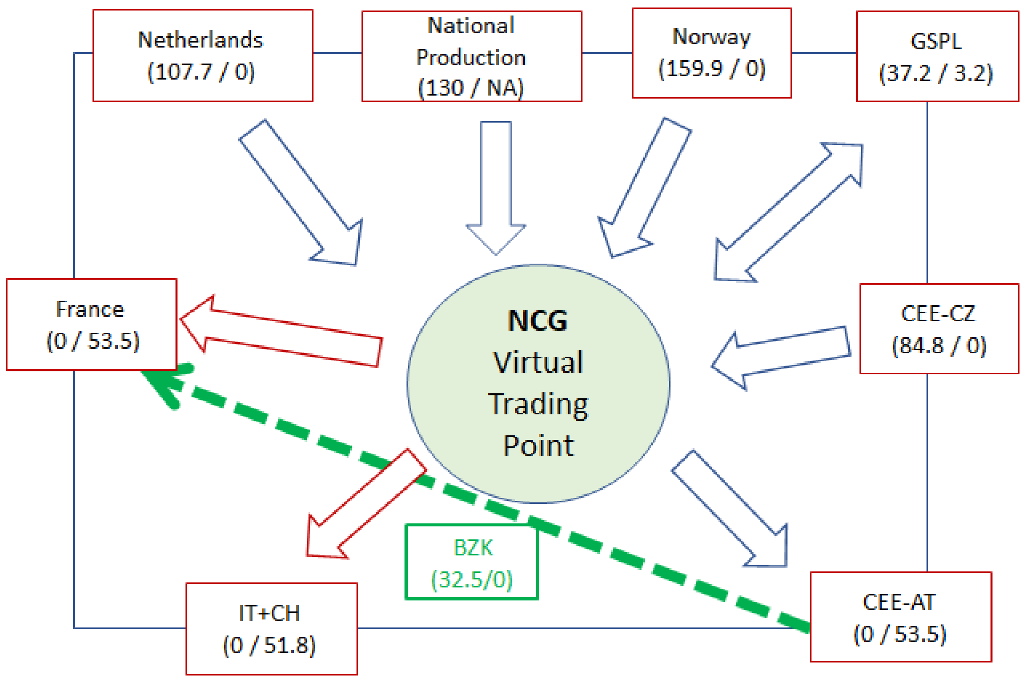
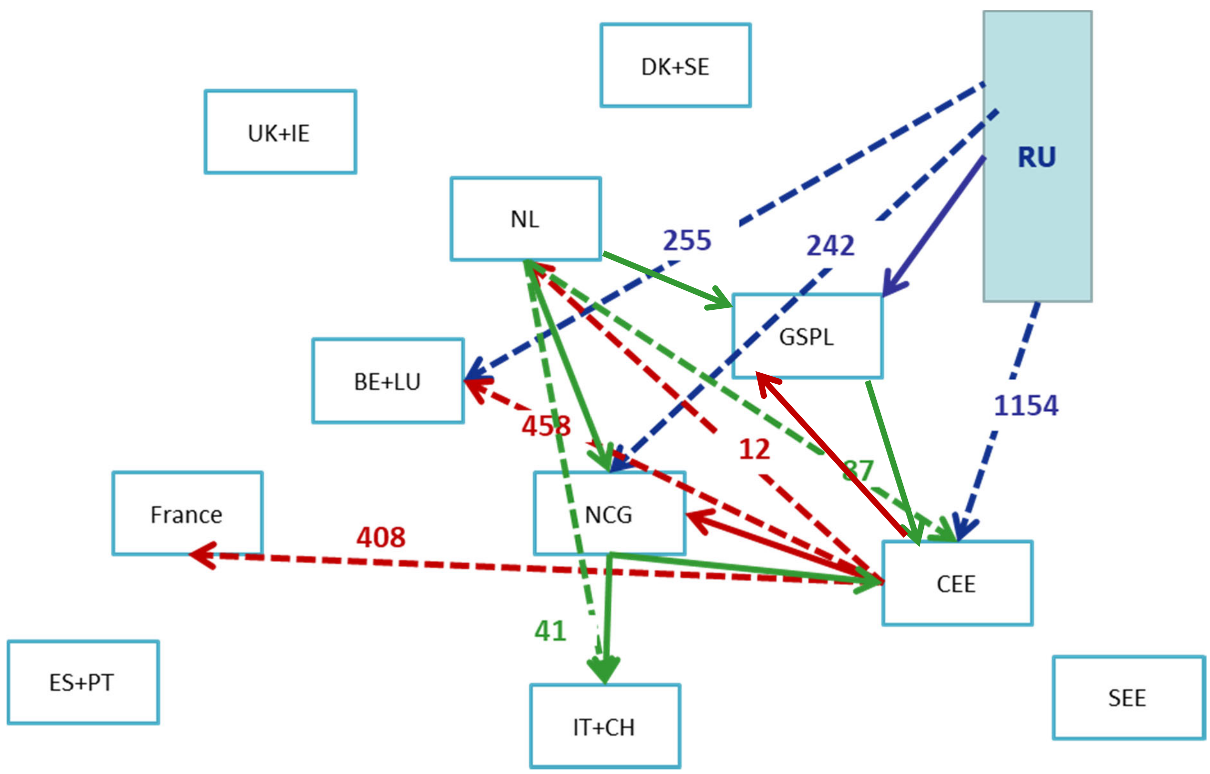


Figure 54. Main Conditional Product Pathways and their Capacity (GWh/d)



Dotted lines: conditionalities stipulated in contracts for standard capacity products
Continuous lines: FZK impacted by conditionalities stipulated in contracts for standard capacity products
Numbers = available firm capacities in GWh/day

Tariffs

251) Transmission tariffs have been taken from data published by the Agency[88]. Tariffs (prevailing) capacity related components have been turned into commodity-related tariffs, following the same approach that has been used by REKK in a study for the CESEC region[89]. The average load factor of 56% has been used for the conversion. Tariffs are reported in Figure 55 and Figure 56

Figure 55: Entry-Exit tariffs for no- EU areas - ordered from cheaper to more expensive (EUR/MWh)

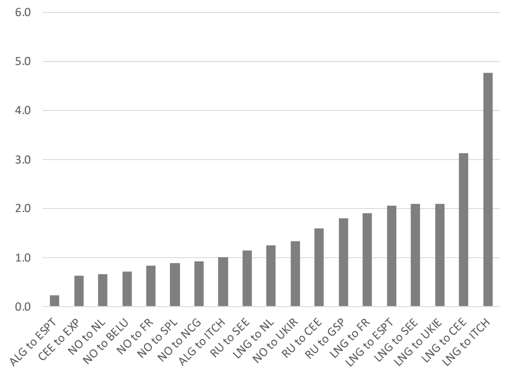
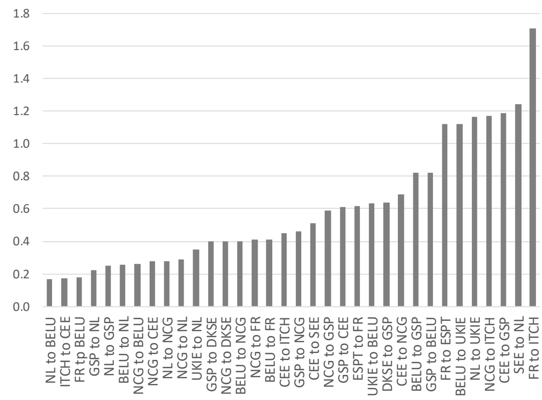


Figure 56. Entry-exit tariffs within EU - ordered from cheaper to more expensive (EUR/MWh)



Source EU-GaMe model.

Supply prices

252) Upstream supply prices play the key role in supply choice as they represent by far the largest component of wholesale prices. We have in general used publicly available import prices, as provided by Eurostat's COMEXT database[90]. However, since in a few cases data are missing, we have corrected them, by considering estimates provided by World Gas Intelligence (WGI)[91]. In particular, data are missing at the border between Russian Federation and Germany (i.e. Nord Stream/Greifswald). Therefore, we have used BAFA data for the period. Since COMEXT estimates of LNG import prices are very volatile we have used WGI estimates instead. The high variability of COMEXT data may depend on discrepancies between the timing of physical flows and related financial transactions. Average import prices for the GY 2016/17 are reported in Table 15 and monthly detail is shown in Figure 57.

[88] ACER, *Market Monitoring Report 2017 – Gas Wholesale Market Volume*, 03/10/2018

[89] REKK, *The preconditions for market integration compatible gas transmission tariffs in the CESEC region*, https://rekk.hu/analysis/natural_gas_markets/2. This corresponded to the EU IPs average utilization factor in 2016, assessed in ACER's *Market Monitoring Report 2017*.

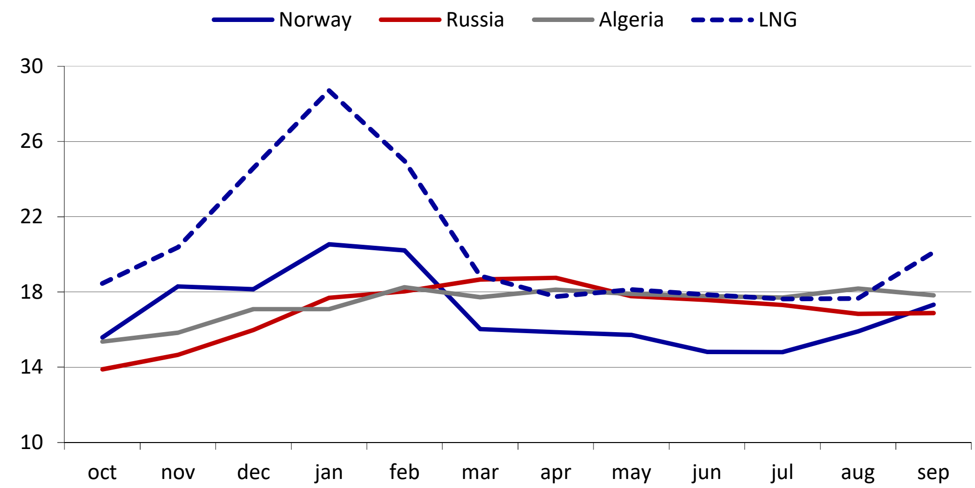
[90] http://epp.eurostat.ec.europa.eu/newxtweb/

[91] WGI is a highly respected and widely used information source of the gas industry. Price data are collected by private sources and updated based on formulas, which also result from private sources. Unfortunately, the official COMEXT database reports implicit prices (resulting from dividing trade values by quantities) that a range from 10% to over 2 times the average resulting from the sample or from WGI and similar intelligence sources.

Table 15. Average import prices for Europe, GY 2016/17 (EUR/MWh)

Market Area	Norway	Algeria	Russia	LNG	National Production	Libya
ES+PT		17.32		20.11		
IT+CH		17.48		22.83	10.00	17.48
France	17.08			19.97		
UK+IE	16.19			20.15	10.00	
BeLux	17.08			19.67		
Netherlands	17.08			19.32	10.00	
Gaspool	17.08		16.34		10.00	
NCG	17.08				10.00	
CEE			18.52	21.18	10.00	
SEE			16.48	20.15	10.00	
DK+SE					10.00	

Figure 57. Average import prices for Europe - Monthly details, GY 2016/17 (EUR/MWh)



Source: elaboration on Eurostat COMEXT data (WGI estimates for LNG)

253) For domestic production, a value of 10 EUR/MWh is considered. In continental Europe, domestic production is normally used at its maximum allowed capacity, so that this value does not affect the choice of supply sources.

254) Supply capacity is constrained only in few cases, notably domestic production, Algeria, Libya, and Norway, where it is deemed to be lower than that of interconnecting pipelines. For other external suppliers (Russia, Azerbaijan, and LNG), capacity is only limited by that of the IPs.

255) Storage capacity is based on the GSE map[92]. Storage sites are attached to market areas and their total working gas volume, daily injection and withdrawal capacity as reported by GSE for GY 2016/17 is included as a further set of optimization constraints. Moreover, storage accumulation and depletion are bound to follow certain path, comprised between a minimum and maximum values that are based on historical paths.

[92] https://www.gie.eu/index.php/gie-publications/maps-data/gse-storage-map

CBA pilot study

256) The assessment of DZK upgrading by Project 2016/01 presented in this Study is in line with the approach of ENTSOG's CBA Methodology[93]. For the assessment, we consider:

- capital expenditure, estimated at EUR 25,000,000, equally divided between 2018 and 2019
- impacts on marginal and total supply costs by market area
- impacts on (non-monetised) indicators of market health (HHI, NSS, RSI).

257) The assessment is performed by the same model used for the quantitative exercise of Chapter 2. We follow two alternative approaches to the valuation of the benefits of DZK upgrading, based respectively on:

- additional costs raised by use of DZK instead of FZK
- market based valuation of interruptible vs. firm capacity products.

258) Implemented CBA is limited to the market impact of conditionalities, with a view to provide and test a framework for the assessment of projects aimed mainly at the removal / upgrading of conditional projects. Such projects may have other benefits, the analysis of which should follow approved methodologies and be integrated with the proposed one. The CBA adopts the following methodological assumptions:

- time horizon of 20 years.; considering the relatively small scale of the Project and uncertainty about future market scenario, we also provide results obtained by limiting the horizon to 10 years
- residual value of the investment is set to zero;
- social discount rate is set to 4% (real)
- all values are real (at constant prices)
- assessment is performed by Benefit/Cost Ratio (B/C) and Net Present Value (NPV), and the Internal Rate of Return (IRR).

259) The analysis considers the *reference demand scenario* (described in Chapter 2), based on actual consumption of Gas Year 2016-17 and focuses on two LNG market price scenarios, i.e.:

- a *Base scenario*, which has the same assumptions of the Reference scenario of Chapter 2
- a Low LNG price scenario, where the price is lower by 19%: this scenario is chosen as a symmetrical one to the Base scenario, in terms of relative prices of Russian and LNG supplies, which is a key driver of the European gas market and particularly of supplies through the TAG
- all other assumptions are as described in Chapter 2

For each price scenario, we use the EU-GaME model to simulate the outcome of:

- a *No Upgrade case*, where Project 2016/01 is not implemented
- an *Upgrade case* where Project 2016/01 is implemented: this case allows an increased capacity of nearly 11.2 GWh/h at Arnoldstein (from Italy to Austria).

[93] See in particular the *2nd ENTSOG methodology for cost-benefit analysis of gas infrastructure projects Draft for ACER and Commission opinions,* 24 July 2017, www.entsog.eu. Whereas we are aware of the following discussion, notably ACER's opinion, we think that proposed improvements are of limited relevance for the scope of the present CBA.

260) Simulated supply prices are provided in Table 16and Table 17. These results represent prices achieved in a perfectly competitive environment under full information and are no forecast of actual market prices. Unsurprisingly, changes are very small in both scenarios, but almost always decreasing. There is a small increase in the area that is directly affected by the increase (CEE, including Austria), as more capacity towards NCG becomes available.

Table 16: Simulated prices by market area with and without TAG DZK upgrading (EUR/MWh)

MARKET AREA	NO UPGRADE-BASE	UPGRADE-BASE	NO UPGRADE-LOW	UPGRADE_LOW
ES+PT	21.040	21.040	19.270	19.270
BE+LU	18.446	18.440	18.296	18.287
IT+CH	20.089	20.090	19.943	19.943
CEE	18.822	18.823	18.752	18.754
DK+SE	18.167	18.161	18.058	18.053
FR	18.915	18.915	18.745	18.739
NL	18.398	18.391	18.327	18.320
SEE	17.421	17.421	17.405	17.406
UK+IE	17.434	17.434	17.370	17.370
NCG	18.790	18.782	18.710	18.702
GSPL	18.409	18.399	18.320	18.311
EU Average	**18.802**	**18.800**	**18.572**	**18.569**

261) The impact on gas flows of each market area is not reported, as it is very small (0.02% in the Base scenario, -0.01% in the Low scenario). The highest impact is on CEE (+0.1% in the Base scenario, -0.09 in the Low scenario). Such impacts are too low to have a real effect on market liquidity. Impacts on total supply costs are also very small and fall below the levels that are justified by algorithm approximation. The impact on market concentration, measured by the HHI[94], the RSI and the number of supply sources, is also negligible.

262) We conclude that DZK upgrading at Arnoldstein has a very small impact on the market, with small marginal cost decreases and increases of supply costs. However, impacts are so small that they may well fall within margins of uncertainty of the calculation algorithm. The impact on liquidity and market concentration is almost negligible as well. Thus no positive benefits are identified with this approach.

263) An alternative approach, based on a microeconomic analysis of traders' needs and suggested by Wagner, Elbling and Co.[95] tries to estimate the value of the upgrade by estimating the cost that shippers bear due to interruption probability of DZK. Following this view, the cost of DZK is the cost alternative supplies to be activated in case of interruption. In other words, the difference between the value of a DZK (which is interruptible at least for some destinations) and a firm capacity with free allocability (FZK) could be represented as:

Value (FZK) – Value (DZK) = [Cost of alternative (gas and capacity) supplies] X [Interruption probability]

[94] HHI is calculated in relation to model assumptions, including a pooling of European and LNG suppliers. Therefore, it is not comparable with the HHI that is calculated by ACER in its Market Monitoring Reports.

[95] *Kapazitätsprodukte im Deutschen Erdgasmarkt — Bestandsaufnahme Und Weiterentwicklung,* Gutachten im Auftrag der Bundesnetzagentur (2014). See in particular sub-section 5.2.1.2.2.

In practice, the simulation by this approach is not easy. The cost of alternative supplies could be estimated by considering prices at the relevant VTP, where alternative supplies could be purchased. Since interruption is likely to occur at times of peak demand and prices[96], a reasonable and prudent estimate could be based on peak values of gas in the relevant VTP, or (more accurately) on some correlation analysis between interruption and VTP prices.

*Table 17: I*mpacts of TAG DZK upgrading on supply costs, by market area

MARKET AREA	IMPACT OF UPGRADE - BASE		IMPACT OF UPGRADE - LOW	
	Million EUR	% variation	Million EUR	% variation
ES+PT	0.04	0.00%	-0.06	0.00%
BE+LU	0.28	0.01%	0.04	0.00%
IT+CH	-0.42	0.00%	-0.20	0.00%
CEE	0.09	0.00%	0.01	0.00%
DK+SE	-0.03	-0.01%	-0.06	-0.01%
FR	0.09	0.00%	0.22	0.00%
NL	0.00	0.00%	0.06	0.01%
SEE	0.00	0.00%	0.00	0.00%
UK+IE	-0.01	0.00%	0.00	0.00%
NCG	0.13	0.00%	0.03	0.00%
GSPL	-0.12	0.00%	0.04	0.00%
EU + CH	0.04	0.00%	0.09	0.00%

264) However, the problem lies with the estimation of probabilities. In the five ACER's annual monitoring Reports on congestion at IPs that have been issue so far[97] we found no evidence of interruption at IPs between Austria and Germany in the exit direction, whereas these points are among the most congested ones in the entry direction (i.e. from Germany to Austria). This is confirmed by data from ENTSOG's Transparency platform, where no actual unplanned interruptions of either firm or interruptible capacity are reported from March 2015 to date. Therefore, we have no objective basis for the estimation of such values, and hence of the value of capacity upgrading by this approach. It is also worth noticing that, even if actual interruptions had been found, this would hardly represent a suitable guide to understanding network users' valuations of turning DZK into FZK. In fact, as the literature on decision theory under uncertainty has long acknowledged, the valuation of uncertainty that consists of by multiplying values estimated under certainty by historical frequency is only a very rough approach. Actual valuation depends on the sign and size of the expected event (damage), and the assessment of probabilities is highly subjective and only partly affected by historical frequency. For these reasons, we do not further pursue or recommend this approach as a practical way of estimating the benefits of capacity upgrading.

265) A further approach is based on the market valuation of interruptible capacities. Since there is a price difference between firm and interruptible capacity, if such difference is supposed to be the outcome of an efficient (undistorted) market, it may be interpreted as an estimation of their value difference. In fact, since the enforcement of the CAM network code, the sale of interruptible capacity has been limited and its pricing subject to regulatory control. In general, interruptible capacity can only

[96] See the interesting analysis of the *2016 ACER Annual Report on Congestion at Interconnection Points in 2015*, Chapter 6.
[97] https://www.acer.europa.eu/Official_documents/Publications/Pages/Publication.aspx.

be sold after firm capacity is sold out, and discounts are related to proven chance of interruption in Germany (leading to typical values of 10-12%), or applied only ex-post in case interruptions actually occur (as in Austria). Therefore, the current ratio of the value of interruptible vs. firm capacity hardly offers guidance on market players' preferences. However, some suitable information could be found by looking at tariffs that prevailed before CAM was implemented, i.e. around 2015. Unfortunately we could not find any information about tariffs for interruptible capacity in Austria before CAM, but we considered the average of discounts for interruptible capacity that was offered at congested IPs (as reported by ACER' Congestion Management Reports). The average discount was found to be 80%. As an alternative, we use the regulated discount for Germany, assumed at 10%, as an estimation of the reduced value of interruptible capacity. Although this is no market value, we use it as it as a fair value that was provided by a regulatory process.

266) Using this info assume that the value of upgrading DZK to FZK amounts to 20% or 10% of FZK. The value of FZK is estimated by the regulated tariff (as no auction premium was detected in the relevant point). For the calculation we use an FZK tariff of 1.3 EUR/kWh/h/y, which if applied to maximum available capacity would yield a maximum value of FZK of EUR 14,547,000 for the upgraded Arnoldstein entry. With these data, CBA can be performed. Results of the calculations are shown in Table 2, for the EU as a whole (including Switzerland) and for the Central and Eastern Europe market area, which includes Austria. The calculation uses the above mentioned assumption, i.e. a 4% social discount rate, a 20 years' time horizon (with sensitivity analysis showing results for a 10 years' horizon), the Benefit/Cost ratio and NPV. The IRR is not shown but it is hardly relevant and very high. With such high values of B/C, the IRR does not provide any different judgement. We perform two sensitivity analysis dimensions:

- Time horizon (20 or 10 years);
- Value of interruptible capacity (as discount to FZK): 20% or 10%.

Results are provided in Table 18.

Table 18. Results of CBA based on market valuation of interruptible capacity (EUR Million)

DZK VALUE DISCOUNT	UPGRADING BENEFITS	YEARS	B/C	NPV
20%	2.91	20	1.49	12.06
20%	2.91	10	0.89	-2.68
10%	1.45	20	0.75	-6.22
10%	1.45	10	0.45	-13.59

267) Only in case the evaluation is applied over 20 and for value of the upgrading estimated at 20% the usual CBA indicators are positive. However, these evaluations assume that this capacity is fully booked. In fact, this is not likely. Even in case LNG prices were particularly appealing and be priced in Austria and other Central European countries below competing Russian supplies, it is unlikely that the TAG flow would be actually reversed. If it is unlikely that reverse flow capacity would be interrupted, except in case of problems along the Russian supply chain, shippers would probably prefer the cheaper DZK (currently priced at 50% of FZK), and bet on the very low interruption probability. This outcome is also confirmed by the model simulation (reported in the previous Section): even with low LNG prices flows between Central Europe and Italy are almost unchanged.

Annex V: Stakeholders' consultation

268) The present Annex presents results of questionnaires from and interviews of stakeholders other than from NRAs and TSOs, regarding the utilisation of conditionalities stipulated in contracts for standard capacity products in the EU Member States, its outlook, rationale, advantages and drawbacks.

269) The questionnaire was similar to that already submitted to NRAs and TSOs. No quantitative information was requested but only a qualitative assessment of the extent of use of the main conditionalities stipulated in contracts for standard capacity products by the respondents (Question 5). The Questionnaire was sent by email on 25 September to address 19 associations and groupings of stakeholders[98]. The deadline for answers was set at 31 October. By 10 November, 9 stakeholders answered, but only 8 sent a filled Questionnaire:

- One association (IOGP)
- 4 gas traders / suppliers (EnBW; Gazprom M&T, RWE S&T, Uniper GCSE)
- 3 storage operators (Innogy, Storengy Deutschland, Storengy UK)

270) It is worth highlighting that 6 of the 7 individual respondents are based in Germany, the Member State where by far most conditionalities are used. It is also worth noticing the relative interest in the issue by storage operators, alleging the indirect impact of conditionalities stipulated in contracts for standard capacity products on their activity, for reasons outline below. Overall, stakeholders' interest in the topic seem limited, and mostly localized in Germany. The following answers are based on 8 provided questionnaires. Use of conditionalities by respondents (or in case of storage operators, by their users) is reported as follows

Capacity Product	No. of respondents
FZK	7
bFZK	7
DZK	3
BZK	3
Other	3

271) Regarding expected developments, the most often mentioned issue is the Net Connect/Gaspool merger (due in 2022), which is expected to reduce firm capacity (FZK) availability according to 5 of the 8 respondents. Gas flows changing due to lower NL production are also a source of concern for 2 respondents. Since lower Dutch production and the disappearance of Dutch gas exports would presumably lead to an increase of supplies from the East, further pressure could affect the existing German network, requiring a further expansion of conditionalities use. Another respondent reports that BZK may be abolished and substituted by DZK (this expectation also came from TSO consultation).

272) The main conditionalities impact on Virtual Trading Points is for most respondents the restriction of liquidity (5). However, the assessment varies, with some seeing it as a problem and others pointing at the availability of sufficient liquidity despite conditionalities. In fact, a minority claims that

[98] BUSINESS EUROPE, CEDEC, CEFIC, CEN, EASEE-Gas, EFET, EHI, EURELECTRIC, EUROGAS, EUROGAS, EUROPEX, GEODE, GIE, GSE, GLE, IFIEC EUROPE, IOGP, MARCOGAZ, EUGINE

conditionalities actually boost liquidity, as the alternative would be a less predictable interruptible service.

273) Two respondents (both large German traders) complain that conditionalities increase complexity and reduce transparency of the transmission service and call for their elimination, with service reduced to the choice between freely allocable firm and interruptible capacity.

274) One SSO claims that conditionalities damage storage, because “Conditional firm capacity (bFZK) offered at storage connection points, whose actual degree of firmness is dependent on the prevailing temperature, restricts full access of flexibility service from storage to the VTP. Consequently, market liquidity at VTP is limited and the value of storage is reduced. Moreover, storage is discriminated against competing sources of flexibility (e.g. from abroad), to the extent those other sources of flexibility are linked to the VTP based on unconditional firm capacity (FZK)”. The only non-German individual respondent (Storengy UK) points at heavily discounted off peak capacity that is currently available in UK, and widely used by storage users to refill storages in the summer. However, they expect that implementation of the TAR Network Code may shortly lead to reduction of such discounts, which together with reform of tariff “multipliers” may further jeopardise the storage sector of the country.

275) Less interest is raised by the Question about conditionalities impact on VIPs. Two respondents remark that lack of standard products makes their development harder. In fact, VIP creation is difficult if capacity products differ on both sides of the IP. However, two respondents dismiss the problem.

276) The Questionnaire investigated the Extent of Product Use only by a point system (from 5 = high to 1 = None). Points were allocated by respondents as reported in the following Figure 3.1, which confirms that bFZK are the most popular conditionalities among respondents. The list of conditionalities advantages and drawbacks partly overlaps with the previously mentioned issues. Among drawbacks, respondents notice that conditionalities stipulated in contracts for standard capacity products:

- Reduce volume on VTPs (3 answers)
- Increase complexity (2)
- Increase costs for network users (2)

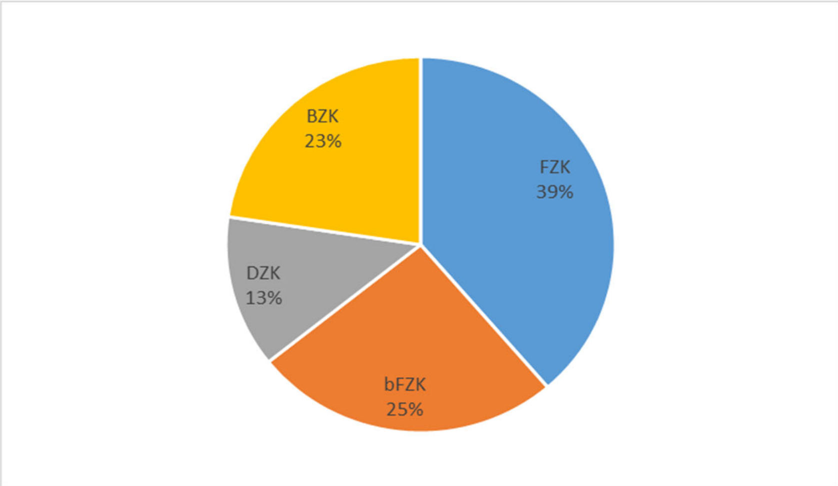
On the positive sides, respondents notice that conditionalities stipulated in contracts for standard capacity products:

- Allow higher capacity use for a given network (6 answers)
- Are preferable to "hidden" (i.e. unconditional) interruptible capacities (3)
- Enhance cost effective cross-border trade (1)

277) An interesting comment, provided in similar ways by 2 respondents, notices that inadequate discounting of capacity products may lead to distortions, e.g. artificially boosting the demand for firm capacity. Finally, when asked what could happen if conditionalities stipulated in contracts for standard capacity products were eliminated, most respondents (5) suggested that the impact may be offset by establishing buy-back mechanisms or by load-flow commitments. Overall, respondents expect that a ban on conditionalities stipulated in contracts for standard capacity products would lead to loss of predictable capacity (3), liquidity reduction (2), demand suppression of sensitive users (1). Three respondents explicitly address the issue of capacity reinforcement that would be necessary to turn conditionalities into freely allocable firm capacity but deem them as not cost effective. One respondent expressed concerns as conditionalities are challenged in Germany and the UK. On the

other hand, the power stations market may be adversely affected by a shift from FZK to DZK, a risk triggered by the NCG/Gaspool merger.

Figure 58. Reported use of main capacity products according to Stakeholders' Questionnaire answers.



Annex VI: Annual data on conditional products and services per TSO[99]

bayernets GmbH (Germany)

Technical and booked capacity of firm capacity products (average per Gas Year)

2015/16	FZK		BZK (Shorthaul)	
	Average Maximum Capacity [GWh/d]	Average Booked Capacity [GWh/d]	Average Maximum Capacity [GWh/d]	Average Booked Capacity [GWh/d]
Entry				
Haidach (AT) / Haidach USP (DE)	9.79	9.79	266.40	131.16
Überackern ABG (AT) / Überackern (DE)	54.31	6.60	6.95	0.02
Überackern SUDAL (AT) / Überackern 2 (DE)			230.14	171.75
Exit				
Haidach (AT) / Haidach USP (DE)			293.04	152.12
Überackern SUDAL (AT) / Überackern 2 (DE)			113.60	116.11
VIP Kiefersfelden-Pfronten	23.16	17.98		

2016/17	FZK		BZK (Shorthaul)	
	Average Maximum Capacity [GWh/d]	Average Booked Capacity [GWh/d]	Average Maximum Capacity [GWh/d]	Average Booked Capacity [GWh/d]
Entry				
Haidach (AT) / Haidach USP (DE)	62.23	49.36	237.72	139.33
Überackern ABG (AT) / Überackern (DE)	0.08	0.00	6.95	0.00
Überackern SUDAL (AT) / Überackern 2 (DE)			230.14	201.62
Exit				
Haidach (AT) / Haidach USP (DE)			293.04	161.98
Überackern SUDAL (AT) / Überackern 2 (DE)			158.00	121.24
VIP Kiefersfelden-Pfronten	23.16	17.95		

2017/18	FZK		BZK (Shorthaul)	
	Average Maximum Capacity [GWh/d]	Average Booked Capacity [GWh/d]	Average Maximum Capacity [GWh/d]	Average Booked Capacity [GWh/d]
Entry				
Haidach (AT) / Haidach USP (DE)	50.91	50.15	246.62	142.92
Überackern ABG (AT) / Überackern (DE)			1.74	0.00
Überackern SUDAL (AT) / Überackern 2 (DE)			230.14	186.47

[99] Detailed data per TSO are provided in the Database developed by the Consultant within the frame of this Study.

Exit				
Haidach (AT) / Haidach USP (DE)			293.04	162.17
Überackern SUDAL (AT) / Überackern 2 (DE)			216.39	131.68
VIP Kiefersfelden-Pfronten	23.16	18.07		

Tariffs of firm capacity products (average per Gas Year)

2015/16	Average Tariff [EUR/kWh/h/y] FZK	BZK (Shorthaul)
Entry		
Haidach (AT) / Haidach USP (DE)	1.53	0.05
Überackern ABG (AT) / Überackern (DE)	2.44	0.00
Überackern SUDAL (AT) / Überackern 2 (DE)		0.07
Exit		
Haidach (AT) / Haidach USP (DE)		0.06
Überackern SUDAL (AT) / Überackern 2 (DE)		0.07
VIP Kiefersfelden-Pfronten	2.78	

2016/17	Average [Tariff EUR/kWh/h/y] FZK	BZK (Shorthaul)
Entry		
Haidach (AT) / Haidach USP (DE)	1.34	0.03
Überackern ABG (AT) / Überackern (DE)	2.46	0.00
Überackern SUDAL (AT) / Überackern 2 (DE)		0.20
Exit		
Haidach (AT) / Haidach USP (DE)		0.17
Überackern SUDAL (AT) / Überackern 2 (DE)		0.20
VIP Kiefersfelden-Pfronten	3.26	

2017/18	Average [Tariff EUR/kWh/h/y] FZK	BZK (Shorthaul)
Entry		
Haidach (AT) / Haidach USP (DE)	1.43	0.03
Überackern ABG (AT) / Überackern (DE)		0.00
Überackern SUDAL (AT) / Überackern 2 (DE)		0.32
Exit		
Haidach (AT) / Haidach USP (DE)		0.05
Überackern SUDAL (AT) / Überackern 2 (DE)		0.32
VIP Kiefersfelden-Pfronten	3.57	

Fluxys Deutschland GmbH (Germany)

Technical and booked capacity of firm capacity products (average per Gas Year)

2015/16	DZK	
	Average Maximum Capacity [GWh/d]	Average Booked Capacity [GWh/d]
Exit		
Greifswald	13.05	0.00

2016/17	DZK	
	Average Maximum Capacity [GWh/d]	Average Booked Capacity [GWh/d]
Entry		
Greifswald	110.39	87.00
Exit		
Achim II	30.66	0.00
Greifswald	33.71	0.00

2017/18	DZK	
	Average Maximum Capacity [GWh/d]	Average Booked Capacity [GWh/d]
Entry		
Greifswald	163.95	130.50
Exit		
Achim II	33.45	8.60
Greifswald	13.05	0.00

Tariffs of firm capacity products (average per Gas Year)[100]

2016/17	Average [Tariff EUR/kWh/h/y]
	DZK
Entry	
Greifswald	5.88

2017/18	Average [Tariff EUR/kWh/h/y]
	DZK
Entry	
Greifswald	4.92
Exit	
Achim II	1.95

[100] No data for Gas Year 2015/16

Fluxys TENP GmbH (Germany)

Technical and booked capacity of firm capacity products (average per Gas Year)

2015/16	FZK		bFZK		BZK	
	Average Maximum Capacity [GWh/d]	Average Booked Capacity [GWh/d]	Average Maximum Capacity [GWh/d]	Average Booked Capacity [GWh/d]	Average Maximum Capacity [GWh/d]	Average Booked Capacity [GWh/d]
Entry						
Bocholtz	60.00	62.92	180.00	182.23	127.20	127.68
Eynatten 2 (BE) // Lichtenbusch / Raeren (DE)	0.36	0.17			4.16	0.20
Wallbach	13.59	0.00			7.41	0.00
Exit						
Bocholtz	5.65	4.26	16.03	12.54	11.39	3.66
Eynatten 2 (BE) // Lichtenbusch / Raeren (DE)					81.50	81.50
Wallbach	240.00	255.49			127.20	134.96

2016/17	FZK		bFZK		BZK	
	Average Maximum Capacity [GWh/d]	Average Booked Capacity [GWh/d]	Average Maximum Capacity [GWh/d]	Average Booked Capacity [GWh/d]	Average Maximum Capacity [GWh/d]	Average Booked Capacity [GWh/d]
Entry						
Bocholtz	36.92	61.82	179.54	189.68	127.20	128.21
Eynatten 2 (BE) // Lichtenbusch / Raeren (DE)	0.06	0.00			5.26	2.52
Wallbach	9.90	0.00			5.39	0.00
Exit						
Bocholtz	4.83	3.88	14.40	6.38	11.57	1.60
Eynatten 2 (BE) // Lichtenbusch / Raeren (DE)					85.80	83.52
Wallbach	195.14	282.93			110.70	148.10

2017/18	FZK		bFZK		BZK	
	Average Maximum Capacity [GWh/d]	Average Booked Capacity [GWh/d]	Average Maximum Capacity [GWh/d]	Average Booked Capacity [GWh/d]	Average Maximum Capacity [GWh/d]	Average Booked Capacity [GWh/d]
Entry						
Bocholtz	48.23	62.75	146.37	180.51	114.85	127.48
Wallbach	3.83	1.11			0.39	0.10

Exit						
Bocholtz	4.91	3.04	12.49	6.23		
Eynatten 2 (BE) // Lichtenbusch / Raeren (DE)					81.50	61.03
Wallbach	179.68	200.42			15.92	27.28

Tariffs of firm capacity products (average per Gas Year)

2015/16	Average Tariff [EUR/kWh/h/y]		
	FZK	bFZK	BZK
Entry			
Bocholtz	1.78	1.55	1.44
Eynatten 2 (BE) // Lichtenbusch / Raeren (DE)	1.78		1.44
Exit			
Eynatten 2 (BE) // Lichtenbusch / Raeren (DE)			1.46
Wallbach	1.68		1.24

2016/17	Average [Tariff EUR/kWh/h/y]		
	FZK	bFZK	BZK
Entry			
Bocholtz	1.62	1.57	1.45
Eynatten 2 (BE) // Lichtenbusch / Raeren (DE)	1.62		1.45
Wallbach	1.39		1.25
Exit			
Bocholtz	1.62	1.57	1.45
Eynatten 2 (BE) // Lichtenbusch / Raeren (DE)			1.47
Wallbach	1.39		1.25

2017/18	Average [Tariff EUR/kWh/h/y]		
	FZK	bFZK	BZK
Entry			
Bocholtz	1.62	1.57	1.46
Wallbach	1.39		1.25
Exit			
Bocholtz	1.62	1.57	
Eynatten 2 (BE) // Lichtenbusch / Raeren (DE)			1.48
Wallbach	1.39		1.25

Gascade GmbH (Germany)

Technical and booked capacity of firm capacity products (average per Gas Year)

2015/16	FZK		DZK	
	Average Maximum Capacity [GWh/d]	Average Booked Capacity [GWh/d]	Average Maximum Capacity [GWh/d]	Average Booked Capacity [GWh/d]
Entry				
Brandov STEGAL (CZ) / Stegal (DE)	0.92	0.00		
Eynatten 1 (BE) // Lichtenbusch / Raeren (DE)	129.16	75.70		
Gernsheim	10.08	0.18		
Mallnow	477.43	477.48	453.70	453.70
Exit				
Broichweiden Süd	13.37	0.00		
Bunde (DE) / Oude Statenzijl (H) (NL) (GASCADE)	298.07	251.93		
Eynatten 1 (BE) // Lichtenbusch / Raeren (DE)	171.70	106.06		
Gernsheim	106.59	105.82		
Kienbaum			66.60	66.60
Lampertheim I	0.00	12.00		
Lampertheim IV	32.80	5.34		
Mallnow	162.99	29.57		
Olbernhau (DE) / Hora Svaté Kateřiny (CZ)	56.97	57.01	262.71	262.17
Reckrod I	0.00	0.00		
Zone GASCADE / OGE	38.67	12.00		

2016/17	FZK		DZK	
	Average Maximum Capacity [GWh/d]	Average Booked Capacity [GWh/d]	Average Maximum Capacity [GWh/d]	Average Booked Capacity [GWh/d]
Entry				
Eynatten 1 (BE) // Lichtenbusch / Raeren (DE)	125.58	18.92		
Gernsheim	10.53	0.11		
Mallnow	477.70	477.48	453.70	453.70
Exit				
Broichweiden Süd	12.90	0.00		
Bunde (DE) / Oude Statenzijl (H) (NL) (GASCADE)	275.77	215.49		
Eynatten 1 (BE) // Lichtenbusch / Raeren (DE)	166.25	107.73		
Gernsheim	106.63	105.81		
Kienbaum			66.60	66.60
Lampertheim IV	38.70	3.14		
Mallnow	179.15	46.42		
Olbernhau (DE) / Hora Svaté Kateřiny (CZ)	56.97	37.87	262.71	228.45
Ronneburg OGE			79.92	9.12
Zone GASCADE / OGE	35.60	0.00		

2017/18	FZK		DZK	
	Average Maximum Capacity [GWh/d]	Average Booked Capacity [GWh/d]	Average Maximum Capacity [GWh/d]	Average Booked Capacity [GWh/d]
Entry				
Eynatten 1 (BE) // Lichtenbusch / Raeren (DE)	129.29	3.99		
Gernsheim	5.96	0.13		
Kienbaum			0.00	0.01
Mallnow	477.80	477.70	453.70	453.70
Exit				
Broichweiden Süd	7.05	2.55		
Bunde (DE) / Oude Statenzijl (H) (NL) (GASCADE)	286.66	272.47		
Drohne-Nowal	60.49	0.00		
Eynatten 1 (BE) // Lichtenbusch / Raeren (DE)	131.67	118.54		
Gernsheim	106.45	106.22		
Kienbaum			66.60	66.60
Lampertheim IV	25.19	1.68		
Mallnow	184.62	38.00		
Olbernhau (DE) / Hora Svaté Kateřiny (CZ)	56.37	43.81	262.71	232.93
Ronneburg OGE			79.92	5.71
Zone GASCADE / OGE	25.51	2.00		

Tariffs of firm capacity products (average per Gas Year)

2015/16	Average Tariff [EUR/kWh/h/y]		
	FZK		DZK
Entry			
Brandov STEGAL (CZ) / Stegal (DE)	2.83		
Eynatten 1 (BE) // Lichtenbusch / Raeren (DE)	2.83		
Gernsheim	2.83		
Mallnow	2.83		1.70
Exit			
Broichweiden Süd	2.55		
Bunde (DE) / Oude Statenzijl (H) (NL) (GASCADE)	2.55		
Eynatten 1 (BE) // Lichtenbusch / Raeren (DE)	2.55		
Gernsheim	2.55		
Kienbaum			1.53
Lampertheim I	2.55		
Lampertheim IV	2.55		
Mallnow	2.55		
Olbernhau (DE) / Hora Svaté Kateřiny (CZ)		2.55	1.53
Reckrod I		2.55	
Zone GASCADE / OGE		2.37	

2016/17	Average Tariff [EUR/kWh/h/y] FZK	DZK
Entry		
Eynatten 1 (BE) // Lichtenbusch / Raeren (DE)	2.67	
Gernsheim	2.67	
Mallnow	2.67	2.41
Exit		
Broichweiden Süd	2.67	
Bunde (DE) / Oude Statenzijl (H) (NL) (GASCADE)	2.67	
Eynatten 1 (BE) // Lichtenbusch / Raeren (DE)	2.67	
Gernsheim	2.67	
Kienbaum		2.40
Lampertheim IV	2.67	
Mallnow	2.67	
Olbernhau (DE) / Hora Svaté Kateřiny (CZ)	2.67	2.40
Ronneburg OGE		2.40
Zone GASCADE / OGE	2.67	

2017/18	Average Tariff [EUR/kWh/h/y] FZK	DZK
Entry		
Eynatten 1 (BE) // Lichtenbusch / Raeren (DE)	2.65	
Gernsheim	2.65	
Kienbaum		2.38
Lampertheim IV	2.65	
Mallnow	2.65	2.38
Exit		
Broichweiden Süd	2.69	
Bunde (DE) / Oude Statenzijl (H) (NL) (GASCADE)	2.69	
Drohne-Nowal	2.66	
Eynatten 1 (BE) // Lichtenbusch / Raeren (DE)	2.69	
Gernsheim	2.69	
Kienbaum		2.42
Lampertheim IV	2.69	
Mallnow	2.69	
Olbernhau (DE) / Hora Svaté Kateřiny (CZ)	2.69	2.42
Ronneburg OGE		2.42
Zone GASCADE / OGE	2.69	

Gastransport Nord GmbH (GTG) (Germany)

Technical and booked capacity of firm capacity products (average per Gas Year)

2015/16	FZK		bFZK		DZK	
	Average Maximum Capacity [GWh/d]	Average Booked Capacity [GWh/d]	Average Maximum Capacity [GWh/d]	Average Booked Capacity [GWh/d]	Average Maximum Capacity [GWh/d]	Average Booked Capacity [GWh/d]
Entry						
Bunde (DE) / Oude Statenzijl (L) (NL) (GTG Nord)	0.00	0.00	57.16	58.32	19.04	18.46
Exit						
Bunde (DE) / Oude Statenzijl (L) (NL) (GTG Nord)	0.00	1.44				

2016/17	FZK		bFZK		DZK	
	Average Maximum Capacity [GWh/d]	Average Booked Capacity [GWh/d]	Average Maximum Capacity [GWh/d]	Average Booked Capacity [GWh/d]	Average Maximum Capacity [GWh/d]	Average Booked Capacity [GWh/d]
Entry						
Bunde (DE) / Oude Statenzijl (L) (NL) (GTG Nord)	0.00	0.00	57.16	58.40	19.04	19.14
Exit						
Bunde (DE) / Oude Statenzijl (L) (NL) (GTG Nord)	0.00	1.69				

2017/18	FZK		bFZK		DZK	
	Average Maximum Capacity [GWh/d]	Average Booked Capacity [GWh/d]	Average Maximum Capacity [GWh/d]	Average Booked Capacity [GWh/d]	Average Maximum Capacity [GWh/d]	Average Booked Capacity [GWh/d]
Entry						
Bunde (DE) / Oude Statenzijl (L) (NL) (GTG Nord)	0.00	0.00	57.16	60.03	19.04	19.34
Exit						
Bunde (DE) / Oude Statenzijl (L) (NL) (GTG Nord)	0.00	2.24				

Tariffs of firm capacity products (average per Gas Year)

2015/16	Average Tariff [EUR/kWh/h/y] FZK	DZK	bFZK
Entry			
Bunde (DE) / Oude Statenzijl (L) (NL) (GTG Nord)		1.93	2.00
Exit			
Bunde (DE) / Oude Statenzijl (L) (NL) (GTG Nord)	1.06		

2016/17	Average Tariff [EUR/kWh/h/y] FZK	DZK	bFZK
Entry			
Bunde (DE) / Oude Statenzijl (L) (NL) (GTG Nord)		1.51	1.58
Exit			
Bunde (DE) / Oude Statenzijl (L) (NL) (GTG Nord)	0.82		

2017/18	Average Tariff [EUR/kWh/h/y] FZK	DZK	bFZK
Entry			
Bunde (DE) / Oude Statenzijl (L) (NL) (GTG Nord)		1.13	1.19
Exit			
Bunde (DE) / Oude Statenzijl (L) (NL) (GTG Nord)	1.21		

GRTgaz Deutschland GmbH (Germany)

Technical and booked capacity of firm capacity products (average per Gas Year)

2015/16	FZK		bFZK		DZK	
	Average Maximum Capacity [GWh/d]	Average Booked Capacity [GWh/d]	Average Maximum Capacity [GWh/d]	Average Booked Capacity [GWh/d]	Average Maximum Capacity [GWh/d]	Average Booked Capacity [GWh/d]
Entry						
Gernsheim	12.44	11.47			95.57	94.35
Oberkappel	62.45	26.03	20.41	19.37	57.46	55.16
Waidhaus	72.06	7.82	79.48	44.79	215.93	184.94
Exit						
Gernsheim					10.37	0.18
Obergailbach (FR) / Medelsheim (DE)	176.87	90.37			377.93	273.89
Oberkappel	12.96	12.95				

2016/17	FZK		bFZK		DZK	
	Average Maximum Capacity [GWh/d]	Average Booked Capacity [GWh/d]	Average Maximum Capacity [GWh/d]	Average Booked Capacity [GWh/d]	Average Maximum Capacity [GWh/d]	Average Booked Capacity [GWh/d]
Entry						
Gernsheim	12.87	11.97			94.44	93.84
Oberkappel	60.74	9.01	24.46	19.11	52.62	50.76
Waidhaus	57.60	3.20	68.95	45.14	215.43	200.66
Exit						
Gernsheim					10.52	0.11
Obergailbach (FR) / Medelsheim (DE)	175.43	94.90			376.90	280.13
Oberkappel	12.96	12.94				

2017/18	FZK		bFZK		DZK	
	Average Maximum Capacity [GWh/d]	Average Booked Capacity [GWh/d]	Average Maximum Capacity [GWh/d]	Average Booked Capacity [GWh/d]	Average Maximum Capacity [GWh/d]	Average Booked Capacity [GWh/d]
Entry						
Gernsheim	8.24	0.42			99.63	98.33
Oberkappel	25.21	6.83	38.65	34.82	73.91	50.48
Waidhaus	114.44	28.32	62.65	60.69	192.64	185.49
Exit						
Gernsheim					9.29	0.13
Obergailbach (FR) / Medelsheim (DE)	177.16	141.83			360.72	201.16
Oberkappel	13.14	12.95				

Tariffs of firm capacity products (average per Gas Year)

2015/16	Average Tariff [EUR/kWh/h/y] FZK	DZK	bFZK
Entry			
Gernsheim	2.29	2.12	
Oberkappel	2.29	2.12	2.24
Waidhaus	2.29	2.12	2.24
Exit			
Gernsheim		2.25	
Obergailbach (FR) / Medelsheim (DE)	2.83	2.61	
Oberkappel	2.84		

2016/17	Average Tariff [EUR/kWh/h/y] FZK	DZK	bFZK
Entry			
Gernsheim	2.27	2.16	
Oberkappel	2.27	2.16	2.25
Waidhaus	2.27	2.16	2.25
Exit			
Gernsheim		2.72	
Obergailbach (FR) / Medelsheim (DE)	2.85	2.72	
Oberkappel	2.85		

2017/18	Average Tariff E[UR/kWh/h/y] FZK	DZK	bFZK
Entry			
Gernsheim	2.74	2.60	
Oberkappel	2.74	2.60	2.71
Waidhaus	2.74	2.60	2.71
Exit			
Gernsheim		2.96	
Obergailbach (FR) / Medelsheim (DE)	3.10	2.96	
Oberkappel	3.10		

Lubimin-Brandov Gastransport GmbH (LBTG) (Germany)

Technical and booked capacity of firm capacity products (average per Gas Year)

2015/16	DZK		BZK	
	Average Maximum Capacity [GWh/d]	Average Booked Capacity [GWh/d]	Average Maximum Capacity [GWh/d]	Average Booked Capacity [GWh/d]
Entry				
Greifswald	27.52	27.52		
Lubmin (NonReg)			190.37	190.37
Exit				
Brandov-OPAL (DE)			190.37	190.37

2016/17	DZK		BZK	
	Average Maximum Capacity [GWh/d]	Average Booked Capacity [GWh/d]	Average Maximum Capacity [GWh/d]	Average Booked Capacity [GWh/d]
Entry				
Greifswald	27.52	27.52		
Lubmin (NonReg)			190.37	190.37
Exit				
Brandov-OPAL (DE)			190.37	190.37

2017/18	DZK		BZK	
	Average Maximum Capacity [GWh/d]	Average Booked Capacity [GWh/d]	Average Maximum Capacity [GWh/d]	Average Booked Capacity [GWh/d]
Entry				
Greifswald	27.52	27.52		
Lubmin (NonReg)			190.37	190.37
Exit				
Brandov-OPAL (DE)			190.37	190.37

Tariffs of firm capacity products (average per Gas Year)[101]

2017/18	Average Tariff [EUR/kWh/h/y]	
	DZK	BZK
Entry		
Greifswald	1.87	
Lubmin (NonReg)		1.87
Exit		
Brandov-OPAL (DE)		1.87

[101] No data for Gas Years 2015/16 and 2017/18.

NEL GmbH (Germany)

Technical and booked capacity of firm capacity products (average per Gas Year)

2015/16	DZK	
	Average Maximum Capacity [GWh/d]	Average Booked Capacity [GWh/d]
Entry		
Greifswald	350.29	343.00

2016/17	DZK	
	Average Maximum Capacity [GWh/d]	Average Booked Capacity [GWh/d]
Entry		
Greifswald	350.29	348.46

2017/18	DZK	
	Average Maximum Capacity [GWh/d]	Average Booked Capacity [GWh/d]
Entry		
Greifswald	373.01	367.85

Tariffs of firm capacity products (average per Gas Year)

2015/16	Average [Tariff EUR/kWh/h/y] DZK
Entry	
Greifswald	4.55

2016/17	Average [Tariff EUR/kWh/h/y] DZK
Entry	
Greifswald	3.93

2017/18	Average [Tariff EUR/kWh/h/y] DZK
Entry	
Greifswald	2.38

OPAL Gastransport GmbH & Co. KG (Germany)

Technical and booked capacity of firm capacity products (average per Gas Year)

2015/16	DZK		BZK	
	Average Maximum Capacity [GWh/d]	Average Booked Capacity [GWh/d]	Average Maximum Capacity [GWh/d]	Average Booked Capacity [GWh/d]
Entry				
Greifswald	110.08	110.08		
Transit				
Greifswald-Brandov			761.50	381.47

2016/17	FZK		DZK		BZK	
	Average Maximum Capacity [GWh/d]	Average Booked Capacity [GWh/d]	Average Maximum Capacity [GWh/d]	Average Booked Capacity [GWh/d]	Average Maximum Capacity [GWh/d]	Average Booked Capacity [GWh/d]
Entry						
Greifswald			110.08	110.08		
Greifswald (PartReg)			82.56	68.76		
Exit						
Brandov-OPAL (DE) (PartReg)	19.00	7.06	75.19	57.97		
Transit						
Greifswald-Brandov					726.83	380.75

2017/18	FZK		DZK		BZK	
	Average Maximum Capacity [GWh/d]	Average Booked Capacity [GWh/d]	Average Maximum Capacity [GWh/d]	Average Booked Capacity [GWh/d]	Average Maximum Capacity [GWh/d]	Average Booked Capacity [GWh/d]
Entry						
Greifswald			110.08	110.08		
Greifswald (PartReg)			380.75	380.75		
Exit						
Brandov-OPAL (DE) (PartReg)	76.80	70.76	303.95	303.91		
Transit						
Greifswald-Brandov					380.75	380.75

Tariffs of firm capacity products (average per Gas Year)

2015/16	Average Tariff [EUR/kWh/h/y] FZK	Average Tariff [EUR/kWh/h/y] DZK
Entry		
Greifswald		0.29

2016/17	Average Tariff [EUR/kWh/h/y] FZK	Average Tariff [EUR/kWh/h/y] DZK
Entry		
Greifswald		0.16
Greifswald (PartReg)		2.55
Exit		
Brandov-OPAL (DE) (PartReg)	2.55	2.55

2017/18	Average Tariff [EUR/kWh/h/y] FZK	Average Tariff [EUR/kWh/h/y] DZK
Entry		
Greifswald		0.36
Greifswald (PartReg)		2.69
Exit		
Brandov-OPAL (DE) (PartReg)	2.69	2.69

Thyssengas GmbH (Germany)

Technical and booked capacity of firm capacity products (average per Gas Year)

2015/16	FZK		bFZK		BZK	
	Average Maximum Capacity [GWh/d]	Average Booked Capacity [GWh/d]	Average Maximum Capacity [GWh/d]	Average Booked Capacity [GWh/d]	Average Maximum Capacity [GWh/d]	Average Booked Capacity [GWh/d]
Entry						
Bocholtz-Vetschau			24.00	0.09		
Broichweiden Süd			0.50	0.00		
Emden (EPT1)			73.72	13.83		
Emsbüren-Berge			26.81	5.40		
Eynatten 2 (BE) // Lichtenbusch / Raeren (DE)			0.94	0.00		
Haanrade					4.92	0.00
Zevenaar			224.14	117.33		

2016/17	FZK		bFZK	
	Average Maximum Capacity [GWh/d]	Average Booked Capacity [GWh/d]	Average Maximum Capacity [GWh/d]	Average Booked Capacity [GWh/d]
Entry				
Bocholtz-Vetschau			18.81	0.00
Broichweiden Süd			1.68	0.00
Emden (EPT1)			72.78	58.96
Emsbüren-Berge			26.81	5.40
Eynatten 2 (BE) // Lichtenbusch / Raeren (DE)			4.95	0.11
Zevenaar			224.14	124.04

2017/18	FZK		bFZK	
	Average Maximum Capacity [GWh/d]	Average Booked Capacity [GWh/d]	Average Maximum Capacity [GWh/d]	Average Booked Capacity [GWh/d]
Entry				
Bocholtz-Vetschau			5.12	0.01
Broichweiden Süd			4.80	2.60
Emden (EPT1)			73.33	17.03
Emsbüren-Berge			26.81	1.41
Eynatten 2 (BE) // Lichtenbusch / Raeren (DE)			15.52	0.23
Zevenaar			224.14	161.87

Tariffs of firm capacity products (average per Gas Year)

2015/16	Average Tariff [EUR/kWh/h/y]		
	FZK	bFZK	BZK
Entry			
Bocholtz-Vetschau		2.60	
Broichweiden Süd		2.60	
Emden (EPT1)		2.60	
Emsbüren-Berge		2.60	
Eynatten 2 (BE) // Lichtenbusch / Raeren (DE)		2.60	
Haanrade			2.05
Zevenaar		2.05	
Exit			
Zevenaar	2.60		

2016/17	Average Tariff [EUR/kWh/h/y]	
	FZK	bFZK
Entry		
Bocholtz-Vetschau		2.59
Broichweiden Süd		2.59
Emden (EPT1)		2.59
Emsbüren-Berge		2.59
Eynatten 2 (BE) // Lichtenbusch / Raeren (DE)		2.59
Zevenaar		2.59
Exit		
Zevenaar	2.59	

2017/18	Average Tariff [EUR/kWh/h/y]	
	FZK	bFZK
Entry		
Bocholtz-Vetschau		2.60
Broichweiden Süd		2.60
Emden (EPT1)		2.60
Emsbüren-Berge		2.60
Eynatten 2 (BE) // Lichtenbusch / Raeren (DE)		2.60
Zevenaar		2.60
Exit		
Zevenaar	2.60	

Gasunie Deutschland Transport Services GmbH (Germany)

Technical and booked capacity of firm capacity products (average per Gas Year)

2015/16	FZK		BZK	
	Average Maximum Capacity [GWh/d]	Average Booked Capacity [GWh/d]	Average Maximum Capacity [GWh/d]	Average Booked Capacity [GWh/d]
Entry				
Bunde (DE) / Oude Statenzijl (H) (NL) (GUD)	63.48	1.24		
Bunde (DE) / Oude Statenzijl (L) (NL) (GUD)	192.40	39.88		
Bunder-Tief	0.80	0.00		
Dornum	1.00	0.01		
Ellund	86.93	7.00		
Emden (EPT1)	219.27	41.03		
Greifswald	172.37	158.66		
Wardenburg RG	32.00	24.02		
Exit				
Bunde (DE) / Oude Statenzijl (H) (NL) (GUD)	35.77	3.64		
Bunder-Tief	10.26	1.00		
Ellund	78.02	71.50	21.06	21.06
Emsbüren-Berge	6.20	5.40		
Wardenburg RG	88.00	0.00		
Zone L-Gas GUD/OGE	36.17	12.23		

2016/17	FZK		BZK	
	Average Maximum Capacity [GWh/d]	Average Booked Capacity [GWh/d]	Average Maximum Capacity [GWh/d]	Average Booked Capacity [GWh/d]
Entry				
Bunde (DE) / Oude Statenzijl (H) (NL) (GUD)	63.08	2.63		
Bunde (DE) / Oude Statenzijl (L) (NL) (GUD)	192.40	30.88		
Bunder-Tief	1.20	0.00		
Dornum	0.00	0.00		
Ellund	86.93	2.82		
Emden (EPT1)	219.27	27.40		
Greifswald	172.37	167.42		
Wardenburg RG	36.00	24.02		
Exit				
Bunde (DE) / Oude Statenzijl (H) (NL) (GUD)	46.92	23.91		
Bunder-Tief	2.01	0.03		
Ellund	115.80	73.12	28.08	28.08
Emsbüren-Berge	6.60	5.40		
Wardenburg RG	96.00	0.00		
Zone L-Gas GUD/OGE	38.60	0.02		

2017/18	FZK		BZK	
	Average Maximum Capacity [GWh/d]	Average Booked Capacity [GWh/d]	Average Maximum Capacity [GWh/d]	Average Booked Capacity [GWh/d]
Entry				
Bunde (DE) / Oude Statenzijl (H) (NL) (GUD)	63.08	4.82		
Bunde (DE) / Oude Statenzijl (L) (NL) (GUD)	192.40	26.07		
Bunder-Tief	1.20	0.00		
Dornum	0.00	0.00		
Ellund	86.92	1.98		
Emden (EPT1)	219.27	11.15		
Greifswald	188.97	164.29		
Wardenburg RG	36.00	6.11		
Exit				
Bunde (DE) / Oude Statenzijl (H) (NL) (GUD)	48.10	26.23		
Bunder-Tief	0.00	0.00		
Ellund	114.42	46.00	28.08	28.08
Emsbüren-Berge	6.60	1.41		
Wardenburg RG	96.00	0.00		
Zone L-Gas GUD/OGE	42.00	2.28		

Tariffs of firm capacity products (average per Gas Year)

2015/16	Average Tariff [EUR/kWh/h/y] FZK	BZK
Entry		
Bunde (DE) / Oude Statenzijl (H) (NL) (GUD)	3.03	
Bunde (DE) / Oude Statenzijl (L) (NL) (GUD)	3.74	
Bunder-Tief	3.74	
Dornum	3.03	
Ellund	3.74	
Emden (EPT1)	3.03	
Greifswald	4.12	
Wardenburg RG	3.74	
Exit		
Bunde (DE) / Oude Statenzijl (H) (NL) (GUD)	4.10	
Bunder-Tief	4.10	
Ellund	4.10	3.66
Emsbüren-Berge	4.10	
Wardenburg RG	4.10	
Zone L-Gas GUD/OGE	4.10	

2016/17	Average Tariff [EUR/kWh/h/y] FZK	BZK
Entry		
Bunde (DE) / Oude Statenzijl (H) (NL) (GUD)	3.02	
Bunde (DE) / Oude Statenzijl (L) (NL) (GUD)	3.63	
Bunder-Tief	3.63	
Dornum	3.02	
Ellund	3.63	
Emden (EPT1)	3.02	
Greifswald	3.76	
Wardenburg RG	3.63	
Exit		
Bunde (DE) / Oude Statenzijl (H) (NL) (GUD)	3.93	
Bunder-Tief	3.93	
Ellund	3.93	3.73
Emsbüren-Berge	3.93	
Wardenburg RG	3.93	
Zone L-Gas GUD/OGE	3.93	

2017/18	Average Tariff [EUR/kWh/h/y] FZK	BZK
Entry		
Bunde (DE) / Oude Statenzijl (H) (NL) (GUD)	3.82	
Bunde (DE) / Oude Statenzijl (L) (NL) (GUD)	3.97	
Bunder-Tief	3.97	
Dornum	3.82	
Ellund	3.97	
Emden (EPT1)	3.82	
Greifswald	4.01	
Wardenburg RG	1.21	
Exit		
Bunde (DE) / Oude Statenzijl (H) (NL) (GUD)	4.05	
Bunder-Tief	4.05	
Ellund	4.05	3.85
Emsbüren-Berge	4.05	
Wardenburg RG	4.05	
Zone L-Gas GUD/OGE	4.05	

ONTRAS Gastransport GmbH (Germany)

Technical and booked capacity of firm capacity products (average per Gas Year)

2015/16	FZK		DZK	
	Average Maximum Capacity [GWh/d]	Average Booked Capacity [GWh/d]	Average Maximum Capacity [GWh/d]	Average Booked Capacity [GWh/d]
Entry				
GCP GAZ-SYSTEM/ONTRAS	0.09	0.00		
Hora Svaté Kateřiny (CZ) / Deutschneudorf (Sayda) (DE)	198.33	14.92		
Steinitz	34.41	0.06		
Exit				
GCP GAZ-SYSTEM/ONTRAS	48.71	14.36		
Hora Svaté Kateřiny (CZ) / Deutschneudorf (Sayda) (DE)	104.99	25.51	29.69	0.00
Steinitz	66.60	67.53		

2016/17	FZK		DZK	
	Average Maximum Capacity [GWh/d]	Average Booked Capacity [GWh/d]	Average Maximum Capacity [GWh/d]	Average Booked Capacity [GWh/d]
Entry				
GCP GAZ-SYSTEM/ONTRAS	0.09	0.00		
Hora Svaté Kateřiny (CZ) / Deutschneudorf (Sayda) (DE)	198.33	15.01		
Steinitz	34.41	0.00		
Exit				
GCP GAZ-SYSTEM/ONTRAS	48.70	15.55		
Hora Svaté Kateřiny (CZ) / Deutschneudorf (Sayda) (DE)	105.60	1.88	29.69	0.02
Steinitz	66.60	59.95		

2017/18	FZK		DZK	
	Average Maximum Capacity [GWh/d]	Average Booked Capacity [GWh/d]	Average Maximum Capacity [GWh/d]	Average Booked Capacity [GWh/d]
Entry				
GCP GAZ-SYSTEM/ONTRAS	0.09	0.00		
Hora Svaté Kateřiny (CZ) / Deutschneudorf (Sayda) (DE)	198.33	15.18		
Steinitz	31.54	0.00		
Exit				
GCP GAZ-SYSTEM/ONTRAS	48.70	19.88		
Hora Svaté Kateřiny (CZ) / Deutschneudorf (Sayda) (DE)	105.60	4.90	29.69	0.63
Steinitz	66.60	60.22		

Tariffs of firm capacity products (average per Gas Year)

2015/16	Average Tariff [EUR/kWh/h/y] FZK	DZK
Entry		
GCP GAZ-SYSTEM/ONTRAS	4.49	
Hora Svaté Kateřiny (CZ) / Deutschneudorf (Sayda) (DE)	4.49	
Steinitz	4.49	
Exit		
GCP GAZ-SYSTEM/ONTRAS	4.54	
Hora Svaté Kateřiny (CZ) / Deutschneudorf (Sayda) (DE)	3.70	3.50
Steinitz	3.70	

2016/17	Average Tariff [EUR/kWh/h/y] FZK	DZK
Entry		
GCP GAZ-SYSTEM/ONTRAS	4.49	
Hora Svaté Kateřiny (CZ) / Deutschneudorf (Sayda) (DE)	4.49	
Steinitz	4.49	
Exit		
GCP GAZ-SYSTEM/ONTRAS	4.71	
Hora Svaté Kateřiny (CZ) / Deutschneudorf (Sayda) (DE)	3.80	3.53
Steinitz	3.80	

2017/18	Average Tariff [EUR/kWh/h/y] FZK	DZK
Entry		
GCP GAZ-SYSTEM/ONTRAS	4.35	
Hora Svaté Kateřiny (CZ) / Deutschneudorf (Sayda) (DE)	4.35	
Steinitz	4.35	
Exit		
GCP GAZ-SYSTEM/ONTRAS	4.60	
Hora Svaté Kateřiny (CZ) / Deutschneudorf (Sayda) (DE)	3.71	3.45
Steinitz	3.71	

Open Grid Europe GmbH (Germany)

Technical and booked capacity of firm capacity products (average per Gas Year)

2015/16	FZK		BZK	
	Average Maximum Capacity [GWh/d]	Average Booked Capacity [GWh/d]	Average Maximum Capacity [GWh/d]	Average Booked Capacity [GWh/d]
Entry				
Bocholtz	109.97	39.05		
Bunde (DE) / Oude Statenzijl (H) (NL) I (OGE)	60.01	3.78	0.00	0.08
Bunder-Tief	5.96	0.29		
Dornum	400.36	261.99		
Ellund	4.04	0.33		
Emden (EPT1)	190.49	76.25		
Eynatten 2 (BE) // Lichtenbusch / Raeren (DE)	134.77	25.71		
Kienbaum	12.54	12.54	54.07	54.07
Obergailbach (FR) / Medelsheim (DE)	0.00	0.00	0.00	0.00
Oberkappel	24.25	0.32		
Steinbrink (DE)	27.92	0.11		
Steinitz	12.54	12.54	54.07	54.08
Waidhaus	517.23	292.99	24.87	24.88
Wallbach	0.00	0.00		
Winterswijk	176.02	152.79		
Zevenaar	228.18	168.48		
Zone GASCADE / OGE	6.61	5.29		
Zone L-Gas GUD/OGE	40.60	21.02		
Exit				
Bocholtz	0.00	0.01		
Bunde (DE) / Oude Statenzijl (H) (NL) I (OGE)	53.99	25.33	148.10	148.10
Bunder-Tief	2.12	0.00		
Eynatten 2 (BE) // Lichtenbusch / Raeren (DE)	32.89	15.05	24.92	24.92
Kienbaum			0.00	0.00
Obergailbach (FR) / Medelsheim (DE)	27.50	8.50	24.87	24.88
Oberkappel	184.78	179.67		
Remich	38.69	32.23		
Steinitz	33.92	0.05		
Waidhaus	0.00	0.29		
Wallbach	180.29	165.34		
Wardenburg RG	23.39	0.05		
Winterswijk	0.00	0.28		
Zevenaar	0.00	0.31		
Zone GASCADE / OGE	1.21	0.00		
Zone L-Gas GUD/OGE	0.00	0.00		

2016/17	FZK		BZK	
	Average Maximum Capacity [GWh/d]	Average Booked Capacity [GWh/d]	Average Maximum Capacity [GWh/d]	Average Booked Capacity [GWh/d]
Entry				
Achim II	16.47	0.00		
Bocholtz	93.41	37.75		
Bunde (DE) / Oude Statenzijl (H) (NL) I (OGE)	69.68	4.58	0.00	0.03
Bunder-Tief	6.25	0.03		
Dornum	383.38	182.10		
Ellund	3.96	1.24		
Emden (EPT1)	162.16	35.69		
Eynatten 2 (BE) // Lichtenbusch / Raeren (DE)	142.44	16.99		
Kienbaum	0.00	0.00	66.61	66.61
Obergailbach (FR) / Medelsheim (DE)	0.00	0.00	0.00	0.00
Oberkappel	23.55	0.08		
Ronneburg OGE			16.39	0.00
Steinbrink (DE)	41.24	0.51		
Steinitz	0.00	0.00	66.61	66.61
Waidhaus	486.79	286.72	30.64	30.64
Wallbach	0.00	0.00		
Winterswijk	178.17	161.21		
Zevenaar	229.03	159.43		
Zone GASCADE / OGE	14.67	3.16		
Zone L-Gas GUD/OGE	39.90	0.02		
Exit				
Bocholtz	0.00	0.01		
Bunde (DE) / Oude Statenzijl (H) (NL) I (OGE)	11.61	0.06	172.75	133.21
Bunder-Tief	2.13	0.00		
Eynatten 2 (BE) // Lichtenbusch / Raeren (DE)	9.67	0.18	39.97	26.65
Kienbaum			0.00	0.00
Obergailbach (FR) / Medelsheim (DE)	18.07	0.25	30.64	30.64
Oberkappel	175.98	122.86		
Remich	37.34	26.71		
Steinitz	34.23	0.00		
Waidhaus	0.00	0.01		
Wallbach	141.69	126.69		
Wardenburg RG	23.87	0.02		
Winterswijk	0.00	0.23		
Zevenaar	0.00	0.13		
Zone GASCADE / OGE	2.72	0.00		
Zone L-Gas GUD/OGE	0.00	0.00		

2017/18	FZK		BZK	
	Average Maximum Capacity [GWh/d]	Average Booked Capacity [GWh/d]	Average Maximum Capacity [GWh/d]	Average Booked Capacity [GWh/d]
Entry				
Achim II	29.32	0.85		
Bocholtz	73.53	37.76		
Bunde (DE) / Oude Statenzijl (H) (NL) I (OGE)	57.20	1.17	0.00	0.00
Bunder-Tief	0.00	0.00		
Dornum	384.95	37.99		
Dornum GASPOOL	219.11	92.72		
Ellund	4.11	3.77		
Emden (EPT1)	147.70	2.49		
Eynatten 2 (BE) // Lichtenbusch / Raeren (DE)	142.59	21.60		
Kienbaum	0.00	0.00	66.61	66.61
Obergailbach (FR) / Medelsheim (DE)	0.00	0.00	0.00	0.00
Oberkappel	24.96	1.11		
Ronneburg OGE			78.92	5.80
Steinbrink (DE)	40.18	0.53		
Steinitz	0.00	0.00	66.61	66.61
Waidhaus	515.24	184.26	30.64	30.64
Wallbach	0.00	0.04		
Winterswijk	176.84	153.98		
Zevenaar	227.38	152.78		
Zone GASCADE / OGE	14.67	2.23		
Zone L-Gas GUD/OGE	39.17	2.28		
Exit				
Bocholtz	0.00	0.05		
Bunde (DE) / Oude Statenzijl (H) (NL) I (OGE)	22.90	1.47	169.69	133.21
Bunder-Tief	2.10	0.00		
Ellund	0.00	0.00		
Eynatten 2 (BE) // Lichtenbusch / Raeren (DE)	46.45	6.26	39.86	5.80
Kienbaum			0.00	0.00
Obergailbach (FR) / Medelsheim (DE)	19.68	1.39	30.64	30.64
Oberkappel	185.22	125.68		
Remich	38.12	26.71		
Steinitz	32.70	0.00		
Waidhaus	0.00	0.04		
Wallbach	114.81	115.11		
Wardenburg RG	22.80	0.11		
Winterswijk	0.00	0.10		
Zevenaar	0.00	0.09		
Zone GASCADE / OGE	2.68	0.01		
Zone L-Gas GUD/OGE	0.00	0.03		

Tariffs of firm capacity products (average per Gas Year)

2015/16	Average [Tariff EUR/kWh/h/y] FZK	BZK
Entry		
Bocholtz	3.17	
Bunde (DE) / Oude Statenzijl (H) (NL) I (OGE)	3.17	2.73
Bunder-Tief	3.17	
Dornum	3.17	
Ellund	3.17	
Emden (EPT1)	3.17	
Eynatten 2 (BE) // Lichtenbusch / Raeren (DE)	3.17	
Kienbaum	3.17	2.73
Obergailbach (FR) / Medelsheim (DE)	3.17	2.73
Oberkappel	3.17	
Steinbrink (DE)	3.17	
Steinitz	3.17	2.73
Waidhaus	3.17	2.73
Wallbach	3.17	
Winterswijk	3.17	
Zevenaar	3.17	
Zone GASCADE / OGE	3.17	
Zone L-Gas GUD/OGE	3.17	
Exit		
Bocholtz	3.08	
Bunde (DE) / Oude Statenzijl (H) (NL) I (OGE)	3.08	2.67
Bunder-Tief	3.08	
Eynatten 2 (BE) // Lichtenbusch / Raeren (DE)	3.08	2.67
Obergailbach (FR) / Medelsheim (DE)	3.08	2.67
Oberkappel	3.08	
Remich	3.08	
Steinitz	3.08	
Waidhaus	3.08	
Wallbach	3.08	
Wardenburg RG	3.08	
Winterswijk	3.08	
Zevenaar	3.08	
Zone GASCADE / OGE	3.08	
Zone L-Gas GUD/OGE	3.08	

2016/17	Average [Tariff EUR/kWh/h/y]	
	FZK	BZK
Entry		
Achim II	3.35	
Bocholtz	3.35	
Bunde (DE) / Oude Statenzijl (H) (NL) I (OGE)	3.35	3.01
Bunder-Tief	3.35	
Dornum	3.35	
Ellund	3.35	
Emden (EPT1)	3.35	
Eynatten 2 (BE) // Lichtenbusch / Raeren (DE)	3.35	
Kienbaum	3.35	3.01
Obergailbach (FR) / Medelsheim (DE)	3.35	3.01
Oberkappel	3.35	
Ronneburg OGE		3.01
Steinbrink (DE)	3.35	
Steinitz	3.35	3.01
Waidhaus	3.35	3.01
Wallbach	3.35	
Winterswijk	3.35	
Zevenaar	3.35	
Zone GASCADE / OGE	3.35	
Zone L-Gas GUD/OGE	3.35	
Exit		
Bocholtz	3.35	
Bunde (DE) / Oude Statenzijl (H) (NL) I (OGE)	3.35	3.02
Bunder-Tief	3.35	
Eynatten 2 (BE) // Lichtenbusch / Raeren (DE)	3.35	3.02
Obergailbach (FR) / Medelsheim (DE)	3.35	3.02
Oberkappel	3.35	
Remich	3.35	
Steinitz	3.35	
Waidhaus	3.35	
Wallbach	3.35	
Wardenburg RG	3.35	
Winterswijk	3.35	
Zevenaar	3.35	
Zone GASCADE / OGE	3.35	
Zone L-Gas GUD/OGE	3.35	

2017/18	Average [Tariff EUR/kWh/h/y]	
	FZK	BZK
Entry		
Achim II	3.65	
Bocholtz	3.65	
Bunde (DE) / Oude Statenzijl (H) (NL) I (OGE)	3.65	3.28
Bunder-Tief	3.65	
Dornum	3.65	
Dornum GASPOOL	3.73	
Ellund	3.65	
Emden (EPT1)	3.65	
Eynatten 2 (BE) // Lichtenbusch / Raeren (DE)	3.65	
Kienbaum	3.65	3.28
Obergailbach (FR) / Medelsheim (DE)	3.65	3.28
Oberkappel	3.65	
Ronneburg OGE		3.28
Steinbrink (DE)	3.65	
Steinitz	3.65	3.28
Waidhaus	3.65	3.28
Wallbach	3.65	
Winterswijk	3.65	
Zevenaar	3.65	
Zone GASCADE / OGE	3.65	
Zone L-Gas GUD/OGE	3.65	
Exit		
Bocholtz	3.65	
Bunde (DE) / Oude Statenzijl (H) (NL) I (OGE)	3.65	3.28
Bunder-Tief	3.65	
Ellund	3.65	
Eynatten 2 (BE) // Lichtenbusch / Raeren (DE)	3.65	3.28
Kienbaum		3.35
Obergailbach (FR) / Medelsheim (DE)	3.65	3.28
Oberkappel	3.65	
Remich	3.65	
Steinitz	3.65	
Waidhaus	3.65	
Wallbach	3.65	
Wardenburg RG	3.65	
Winterswijk	3.65	
Zevenaar	3.65	
Zone GASCADE / OGE	3.65	
Zone L-Gas GUD/OGE	3.65	

JordgasTransport GmbH

Technical and booked capacity of firm capacity products (average per Gas Year)

2015/16	FZK	
	Average Maximum Capacity [GWh/d]	Average Booked Capacity [GWh/d]
Entry		
Dornum	298.60	176.40

2016/17	FZK	
	Average Maximum Capacity [GWh/d]	Average Booked Capacity [GWh/d]
Entry		
Dornum	298.60	173.81

2017/18	FZK	
	Average Maximum Capacity [GWh/d]	Average Booked Capacity [GWh/d]
Entry		
Dornum	74.65	45.62

Tariffs of firm capacity products (average per Gas Year)

2015/16	Average [Tariff EUR/kWh/h/y] FZK
Entry	
Dornum	2.81

2016/17	Average [Tariff EUR/kWh/h/y] FZK
Entry	
Dornum	2.11

2017/18	Average [Tariff EUR/kWh/h/y] FZK
Entry	
Dornum	1.85

Nowega GmbH

Technical and booked capacity of firm capacity products (average per Gas Year)

2015/16	FZK	
	Average Maximum Capacity [GWh/d]	Average Booked Capacity [GWh/d]
Exit		
Steinbrink (DE)	26.73	16.05

2016/17	FZK	
	Average Maximum Capacity [GWh/d]	Average Booked Capacity [GWh/d]
Exit		
Steinbrink (DE)	28.44	0.61

2017/18	FZK	
	Average Maximum Capacity [GWh/d]	Average Booked Capacity [GWh/d]
Exit		
Steinbrink (DE)	28.37	0.55

Tariffs of firm capacity products (average per Gas Year)[102]

2016/17	Average [Tariff EUR/kWh/h/y] FZK
Entry	
Steinbrink (DE)	3.25

2017/18	Average [Tariff EUR/kWh/h/y] FZK
Entry	
Steinbrink (DE)	3.66

[102] No data for Gas Year 2015/16

Terranets bw

Technical and booked capacity of firm capacity products (average per Gas Year)

2015/16	FZK	
	Average Maximum Capacity [GWh/d]	Average Booked Capacity [GWh/d]
Entry		
Lampertheim IV	39.71	8.79

2016/17	FZK	
	Average Maximum Capacity [GWh/d]	Average Booked Capacity [GWh/d]
Entry		
Lampertheim IV	39.71	6.33

2017/18	FZK	
	Average Maximum Capacity [GWh/d]	Average Booked Capacity [GWh/d]
Entry		
Lampertheim IV	39.71	3.73

Tariffs of firm capacity products (average per Gas Year)

2015/16	Average Tariff [EUR/kWh/h/y] FZK
Entry	
Lampertheim IV	2.01

2016/17	Average Tariff [EUR/kWh/h/y] FZK
Entry	
Lampertheim IV	2.00

2017/18	Average Tariff [EUR/kWh/h/y] FZK
Entry	
Lampertheim IV	3.80

Gas Connect Austria (GCA) (Austria)

Technical and booked capacity of firm capacity products (average per Gas Year)

2015/16	FZK		DZK	
	Average Maximum Capacity [GWh/d]	Average Booked Capacity [GWh/d]	Average Maximum Capacity [GWh/d]	Average Booked Capacity [GWh/d]
Entry				
Baumgarten GCA	395.21	66.38		
Baumgarten WAG	471.36	381.31		
Oberkappel	228.46	227.10	5.62	1.39
Überackern	25.93	33.88	86.48	86.48
Exit				
Baumgarten WAG	243.07	169.80		
Mosonmagyarovar	155.34	159.43		
Murfeld (AT) / Ceršak (SI)	105.45	80.12		
Oberkappel	382.10	380.10	0.00	1.39
Überackern	17.91	3.49	157.21	157.21

2016/17	FZK		DZK	
	Average Maximum Capacity [GWh/d]	Average Booked Capacity [GWh/d]	Average Maximum Capacity [GWh/d]	Average Booked Capacity [GWh/d]
Entry				
Baumgarten GCA	396.18	138.17		
Baumgarten WAG	484.17	379.60		
Oberkappel	199.03	183.33	31.42	2.76
Überackern	18.33	38.02	80.57	80.57
Exit				
Baumgarten WAG	249.95	150.24		
Mosonmagyarovar	153.04	115.35		
Murfeld (AT) / Ceršak (SI)	108.94	79.21		
Oberkappel	380.84	379.08	0.24	2.76
Überackern	19.21	6.23	157.21	157.21

2017/18	FZK		DZK	
	Average Maximum Capacity [GWh/d]	Average Booked Capacity [GWh/d]	Average Maximum Capacity [GWh/d]	Average Booked Capacity [GWh/d]
Entry				
Baumgarten GCA	341.93	80.35		
Baumgarten WAG	478.12	379.05		
Oberkappel	212.54	194.21	12.08	1.38
Überackern	26.22	33.44	80.57	80.57
Exit				
Baumgarten WAG	247.00	146.58		
Mosonmagyarovar	154.99	140.03		
Murfeld (AT) / Ceršak (SI)	110.87	51.07		
Oberkappel	380.81	379.04	0.03	1.38
Überackern	16.17	3.75	155.78	155.78

Tariffs of firm capacity products (average per Gas Year)

2015/16	Average Tariff [EUR/kWh/h/y]	
	FZK	DZK
Entry		
Baumgarten GCA	0.70	
Baumgarten WAG	0.70	
Oberkappel	1.39	0.21
Überackern	1.54	1.39
Exit		
Baumgarten WAG	1.15	
Mosonmagyarovar	1.92	
Murfeld (AT) / Ceršak (SI)	4.16	
Oberkappel	4.21	0.21
Überackern	4.21	2.99

2016/17	Average Tariff [EUR/kWh/h/y]	
	FZK	DZK
Entry		
Baumgarten GCA	0.75	
Baumgarten WAG	0.75	
Oberkappel	1.32	0.21
Überackern	1.36	1.23
Exit		
Baumgarten WAG	1.13	
Mosonmagyarovar	1.32	
Murfeld (AT) / Ceršak (SI)	3.54	
Oberkappel	3.63	0.21
Überackern	3.63	2.99

2017/18	Average Tariff [EUR/kWh/h/y] FZK	DZK
Entry		
Baumgarten GCA	0.77	
Baumgarten WAG	0.77	
Oberkappel	1.30	0.21
Überackern	1.30	1.17
Exit		
Baumgarten WAG	1.12	
Mosonmagyarovar	1.12	
Murfeld (AT) / Ceršak (SI)	3.33	
Oberkappel	3.44	0.21
Überackern	3.44	2.99

Trans Austria Gasleitung (TAG) (Austria)

Technical and booked capacity of firm capacity products (average per Gas Year)

2015/16	FZK		DZK	
	Average Maximum Capacity [GWh/d]	Average Booked Capacity [GWh/d]	Average Maximum Capacity [GWh/d]	Average Booked Capacity [GWh/d]
Entry				
Baumgarten	1435.42	1393.66		
TARVISIO (IT) / ARNOLDSTEIN (AT)			414.26	12.72
Exit				
TARVISIO (IT) / ARNOLDSTEIN (AT)	1052.53	1165.60		

2016/17	FZK		DZK	
	Average Maximum Capacity [GWh/d]	Average Booked Capacity [GWh/d]	Average Maximum Capacity [GWh/d]	Average Booked Capacity [GWh/d]
Entry				
Baumgarten	1436.06	1390.69		
TARVISIO (IT) / ARNOLDSTEIN (AT)			416.88	13.56
Exit				
TARVISIO (IT) / ARNOLDSTEIN (AT)	1108.41	1166.13		

2017/18	FZK		DZK	
	Average Maximum Capacity [GWh/d]	Average Booked Capacity [GWh/d]	Average Maximum Capacity [GWh/d]	Average Booked Capacity [GWh/d]
Entry				
Baumgarten	1434.13	1380.73		
TARVISIO (IT) / ARNOLDSTEIN (AT)			416.22	14.43
Exit				
TARVISIO (IT) / ARNOLDSTEIN (AT)	1158.73	1194.87		

Tariffs of firm capacity products (average per Gas Year)

2015/16	Average Tariff [EUR/kWh/h/y]	
	FZK	DZK
Entry		
Baumgarten	0.70	
TARVISIO (IT) / ARNOLDSTEIN (AT)		0.56
Exit		
TARVISIO (IT) / ARNOLDSTEIN (AT)	5.26	

2016/17	Average Tariff [EUR/kWh/h/y]	
	FZK	DZK
Entry		
Baumgarten	0.75	
TARVISIO (IT) / ARNOLDSTEIN (AT)		0.61
Exit		
TARVISIO (IT) / ARNOLDSTEIN (AT)	4.79	

2017/18	Average Tariff [EUR/kWh/h/y]	
	FZK	DZK
Entry		
Baumgarten	0.77	
TARVISIO (IT) / ARNOLDSTEIN (AT)	1.3	0.62
Exit		
TARVISIO (IT) / ARNOLDSTEIN (AT)	4.63	

Creos (Luxembourg)

Technical and booked capacity of firm capacity products (average per Gas Year)

2015/16	bFZK	
	Average Maximum Capacity [GWh/d]	Average Booked Capacity [GWh/d]
Entry		
Remich	22.77	22.77

2016/17	bFZK	
	Average Maximum Capacity [GWh/d]	Average Booked Capacity [GWh/d]
Entry		
Remich	20.01	20.01

2017/18	bFZK	
	Average Maximum Capacity [GWh/d]	Average Booked Capacity [GWh/d]
Entry		
Remich	20.01	20.01

Tariffs of firm capacity products (average per Gas Year)

2015/16	Average Tariff [EUR/kWh/h/y] FZK
Entry	
Remich	0.14

2016/17	Average Tariff [EUR/kWh/h/y] FZK
Entry	
Remich	0.14

2017/18	Average Tariff [EUR/kWh/h/y] FZK
Entry	
Remich	0.14

Fluxys (Belgium)

Allocated gas volumes for standard entry-exit capacity service, OCUC and wheeling service (average per Calendar Year)[103]

2015	Average Allocation [GWh/d]	
	Standard Capacity	OCUC/Wheeling
Entry		
Alveringem	0.29	-
Blaregnies Troll	2.82	0.23
Eynatten 1	52.93	0.01
Eynatten 2	30.68	0.57
's Gravenvoeren	168.15	4.89
Zeebrugge	486.68	121.81
Zelzate 1	15.61	36.51
Exit		
Eynatten 1	46.29	0.57
Eynatten 2	69.71	4.90
's Gravenvoeren	4.83	-
Zeebrugge	23.38	36.74
Zelzate 1	8.74	82.76
Zelzate 2	0.07	39.04

2016	Average Allocation [GWh/d]	
	Standard Capacity	OCUC/Wheeling
Entry		
Alveringem	15.03	-
Blaregnies Troll	1.67	2.00
Eynatten 1	70.61	-
Eynatten 2	45.49	1.38
's Gravenvoeren	169.05	-
Zeebrugge	405.38	105.89
Zelzate 1	29.01	53.24
Exit		
Eynatten 1	39.55	1.38
Eynatten 2	51.91	-
IZT	0.22	-
's Gravenvoeren	0.84	-
Zeebrugge	44.42	55.24
Zelzate 1	12.45	65.84
Zelzate 2	0.32	40.05

[103] Values for Dunkerque LNG IP are confidential.

2017	Average Allocation [GWh/d]	
	Standard Capacity	OCUC/Wheeling
Entry		
Alveringem	13.69	-
Blaregnies Troll	0.12	1.04
Eynatten 1	107.60	-
Eynatten 2	23.55	-
IZT	1.88	-
's Gravenvoeren	125.29	3.63
Virtualys	0.01	-
Zeebrugge	412.83	139.79
Zelzate 1	30.39	55.12
Exit		
Eynatten 1	7.09	-
Eynatten 2	80.86	3.63
IZT	0.53	-
's Gravenvoeren	6.77	-
Zeebrugge	69.63	56.74
Zelzate 1	31.68	86.82
Zelzate 2	0.14	52.97

2018	Average Allocation [GWh/d]	
	Standard Capacity	OCUC/Wheeling
Entry		
Eynatten 1	111.47	0.03
Eynatten 2	20.47	-
IZT	3.20	-
's Gravenvoeren	106.65	-
Virtualys	3.78	5.05
Zeebrugge	350.94	113.31
Zelzate 1	24.41	53.99
Exit		
Eynatten 1	3.91	-
Eynatten 2	52.99	0.03
IZT	0.24	-
's Gravenvoeren	5.11	-
Zeebrugge	87.78	62.94
Zelzate 1	26.82	73.18
Zelzate 2	1.31	40.13

Tariffs of firm capacity products (annual tariff)

2017/18		Tariff [EUR/kWh/h/y]		
		OCUC	Corresponding entry-exit combination	
Entry	Exit		Entry	Exit
Zelzate 1 / VIP BE-NL or Zelzate 2	IZT or Zeebrugge	1.07	0.73	2.91
IZT or Zeebrugge	Zelzate 1 / VIP BE-NL or Zelzate 2	1.07	0.73	2.91
Dunkirk LNG Terminal or Virtualys	IZT or Zeebrugge	1.41	0.73	2.91
's Gravenvoeren	Eynatten 1 or Eynatten 2	0.47	0.73	2.91
Eynatten 1 or Eynatten 2	's Gravenvoeren	0.47	0.73	

2017/18		Tariff [EUR/kWh/h/y]		
		Wheeling	Corresponding entry-exit combination	
Entry	Exit		Entry	Exit
Zelzate 1/VIP BE-NL	Zelzate 2	0.33	0.73	1.90
Zelzate 2	Zelzate1 /VIP BE-NL	0.33	0.73	1.78
Eynatten 1	Eynatten 2	0.33	0.73	2.91
Eynatten 2	Eynatten 1	0.33	0.73	2.91

Gasunie Transport Services (Netherlands)

Tariffs of firm capacity products (annual tariff)

2017/18	Average Tariff [EUR/kWh/h/y]	
	FZK	Wheeling
Entry		
Bocholtz	1.10	0.15
Bocholtz-Vetschau	1.10	0.15
Bunde (DE) / Oude Statenzijl (H) (NL) (GASCADE)	0.94	0.15
Bunde (DE) / Oude Statenzijl (H) (NL) (GUD)	1.17	0.15
Bunde (DE) / Oude Statenzijl (H) (NL) I (OGE)	0.94	0.15
Bunde (DE) / Oude Statenzijl (L) (NL) (GTG Nord)	1.17	0.15
Bunde (DE) / Oude Statenzijl (L) (NL) (GUD)	0.94	0.15
Exit		
Bocholtz	1.73	0.15
Bocholtz-Vetschau	1.73	0.15
Bunde (DE) / Oude Statenzijl (H) (NL) (GASCADE)	0.86	0.15
Bunde (DE) / Oude Statenzijl (H) (NL) (GUD)	0.84	0.15
Bunde (DE) / Oude Statenzijl (H) (NL) I (OGE)	0.86	0.15
Bunde (DE) / Oude Statenzijl (L) (NL) (GTG Nord)	0.84	0.15
Bunde (DE) / Oude Statenzijl (L) (NL) (GUD)	0.86	0.15

Annex VII: Sources of quantitative data

Austria

TAG-GCV: https://platform.aggm.at/vis/visualisation/entry_exit (capacity data)

Germany

Bayernets GmbH:
http://kapazitaet.bayernets.de/BNGridInfo/default.aspx (capacity data)
http://www.bayernets.de/start_gastransport_en.aspx?int_name=_70612 (tariffs data)

Fluxys TENP GmbH / Deutschland GmbH:
https://gasdata.tnp.gsmartsuite.com/sdp/Pages/Reports/CapacitiesFlows.aspx (capacity data)
https://www.fluxys.com/tenp/en/Services/Tarrifs/Archive (tariffs data)

Gascade Gastransport GmbH:
https://ivo.gascade.biz/ivo/capacities;jsessionid=F195A76E6303D1B89A61FF6FD4F4E5C7?0#showData (capacity data)
https://www.gascade.de//en/download/download-archiv/ (tariffs data)

Gastransport Nord GmbH:
https://gtg-nord.de/en/transparency/transparency_tool.php (capacity data)
https://gtg-nord.de/en/downloads.php (tariffs data)

Gasunie Deutschland Transport Services GmbH:
https://transparenz.gasunie.de/mts.web/netzkarte/Index?lang=en&inst=gud (capacity data)
https://www.gasunie.de/en/news/information-about-the-new-preliminary-tariff-structure-of-gasunie-deutschland-transport-services-gmbh-as-of-01012018 (tariffs data)

GRTgaz Deutschland GmbH:
https://www.grtgaz-deutschland.de/en/node/349?sent=1&i=Oberkappel&r=A&von_monat=10&von_jahr=2015&bis_monat=09&bis_jahr=2018&Submit=Search (capacity data)
https://www.grtgaz-deutschland.de/en/networkaccess/tariffs (tariffs data)

Jordastransport GmbH:
https://transparenz.jordgastransport.de/mts.web/netzkarte/Index?lang=en&inst=statoil (capacity data)
http://jordgastransport.de/en/kapazitaeten-46/capacity-trading/tariffs-and-charges.html (tariffs data)

Lubmin-Brandov Gastransport GmbH:
https://gasdata.transparency-lbtg.de/sdp/Pages/Reports/CapacitiesFlows.aspx (capacity data)
http://lbtg.de/en/system/files/2018-01/20180101_Pricesheet_LBTG.pdf (tariffs data)

NEL Gastransport GmbH:

https://ivo.nel-gastransport.biz/ivo/capacities;jsessionid=B3E1DD5BC2FA44C3B8236FE4304EDB14?0 (capacity data)

https://www.nel-gastransport.de/en/download/archive/ (tariffs data)

Open Grid Europe:

https://www.open-grid-europe.com/cps/rde/SID-2A673956-8C6AA903/oge-internet/hs.xsl/Abfrage-von-Netzdaten-1804.htm?rdeLocaleAttr=en (capacity data)

https://www.open-grid-europe.com/cps/rde/SID-2A673956-8C6AA903/oge-internet/hs.xsl/Gaswirtschaftsjahre-2014-2015-bis-2016-2017-1748.htm (tariffs data)

ONTRAS Gastransport GmbH:

https://www.ontras.com/en/transparency/transparency-tool/ (capacity data)

https://www.ontras.com/en/downloads/terms-and-conditions-of-ontras/preisblatt-archiv/ (tariffs data)

OPAL Gastransport GmbH & Co:

https://ivo.opal-gastransport.biz/ivo/capacities;jsessionid=B4DB45427501861CA74D26AFE93ABA9B?0#showData (capacity data)

https://www.opal-gastransport.de//en/download/archive/ (tariffs data)

Thyssengas GmbH:

https://netzzugang.thyssengas.com/publication/?language=en# (capacity data)

https://www.thyssengas.com/en/network-access/download-area-network-access/archive/ (tariffs data)

Luxembourg

Creos:

https://platform.prisma-capacity.eu/#/reporting/auction?startOfAuctionFrom=2018-12-06T05:00:00.000Z&pageSize=10 (capacity data)

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List of Abbreviations

Abbreviation	Definition
bFZK	Capacity restricted in case a predefined external condition applies (such as temperature condition). Any additional capacity is offered on an interruptible basis
BAFA	Federal Office of Economics and Export Control
BZK	Capacity conditional upon appropriate levels of nominations made in other predetermined physical entry or exit points of the system.
CMP	Congestion Management Procedures
DZK	Capacity conditional upon appropriate levels of nominations made in other predetermined physical entry or exit points of the system. Any additional use, including access to the Virtual Trading Point, is offered on an interruptible basis.
EU	European Union
FZK	Freely allocable capacity
GD	Gas-Day: period from 6:00 to 6:00 CET or CEST
GY	Gas-Year: period from October to September
IP	Interconnection Point
LNG	Liquefied Natural Gas
NC CAM	Network Code Capacity Allocation Mechanism, see: Commission Regulation (EU) 2017/459
NC TAR	Tariffs Network Code, see: Commission Regulation (EU) 2017/460
NRA	National Regulatory Authority
TPA	Third Party Access
TSO	Transmission System Operator
TYNDP	Ten-Year Network Development Plan
UGS	Underground Gas Storage
VIP	Virtual Interconnection Point
VTP	Virtual Trading Point