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EVALUATION REPORT ON THE GAS QUALITY CONVERSION MECHANISM

Current as at January 2018

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DEFINITIONS

VIRTUAL CONVERSION QUANTITY

The quantity converted and invoiced for each balancing group portfolio under the cross-quality energy balancing mechanism, i.e. if the high CV and low CV gas balances determined for a master balancing group have opposing signs, the lower of the two quantities (as measured in terms of their absolute values) is billed as the conversion quantity. Where low CV gas deficits are balanced out by means of high CV gas inputs, this is referred to as virtual conversion taking place in the direction from high CV to low CV quality (H to L). The reverse direction is defined as virtual conversion from low CV to high CV quality (L to H). The term "virtual conversion" may also refer to the sum of the virtual conversion quantities determined for the individual balancing groups.

SYSTEM-WIDE VIRTUAL CONVERSION QUANTITY

One of the alternative approaches for determining the actual overall conversion quantity: The sum of all inputs and offtakes across all balancing group portfolios with allocations for gas of both gas qualities is determined (separately) for each gas quality. If the resulting high CV and low CV gas balances are in opposite directions (different algebraic signs), then the smaller of the two quantities (as measured in terms of their absolute values) represents the system-wide virtual conversion quantity.

From the quantity thus obtained the technical conversion quantities that have been converted exclusively for virtual conversion purposes must be deducted. In this calculation all balancing group portfolios comprising at least one subordinate balancing group for gas of a quality different from the gas quality of the master balancing group are taken into account. Both the master balancing group and the subordinate balancing group must be actively used, i.e. both must have been declared as receiving data for balancing purposes.

COMMERCIAL CONVERSION

In order to apply a commercial value to the system-wide virtual conversion quantity the relevant figure is compared with the quantities supplied/received as part of the external balancing actions carried out on the day in question. For this purpose it is assumed that quality-specific balancing sell transactions in the gas quality for which there is an oversupply and the quality-specific or locational balancing buy transactions in the quality for which there is an undersupply have been made for the purpose of commercial conversion, with the upper limit being represented by the system-wide virtual conversion quantity.

PHYSICAL CONVERSION QUANTITY

One of the alternative approaches for determining the actual overall conversion quantity: Where balancing actions have been taken in opposite directions, i.e. where quality-specific (balancing criterion "Quality") or locational balancing buy transactions have been made in one gas quality whilst quality-specific or locational balancing sell transactions have been made in the other gas quality, the smaller of the two quantities (as measured in terms of their absolute values) represents the actual overall conversion quantity.

ACTUAL OVERALL CONVERSION QUANTITY

Umbrella term for the quantity determined according to either the "system-wide virtual" approach or the "physical" approach.

TECHNICAL CONVERSION

This refers to the gas quantities technically converted by means of mixing plants owned by the transmission system operators OGE and TG. OGE operates mixing plants converting between both gas qualities (from high CV to low CV quality and vice versa), whereas the Thyssengas mixing plants convert high CV gas to low CV gas only.

1. INTRODUCTION

NCG has been operating a multi-quality market area since 1 April 2011. The rules for the gas quality conversion mechanism were set out in an administrative ruling handed down by the German national regulatory authority Bundesnetzagentur (below referred to as the "Federal Network Agency") on 28 March 2012 (ref: BK7-11-002, the so-called "Konni Gas" decision), which was later amended by the Federal Network Agency's decision of 21 December 2016 (ref: BK7-16-050, below referred to as the "amended Konni Gas ruling").

NCG has an obligation under both the original as well as the amended Konni Gas rulings to submit an annual evaluation report on the development and evaluation of the conversion mechanism by 1 February every year. The present evaluation report describes the conversion developments with a focus on the twelfth (1 October 2016 to 31 March 2017) and thirteenth (1 April 2017 to 30 September 2017) conversion periods and sets out the reasons why we believe that a conversion fee is still necessary for the conversion of gas from high CV to low CV quality (H to L).

The amended Konni Gas ruling came into force on 1 April 2017 and brought some important changes to the rules governing the conversion mechanism. While the amended Konni Gas ruling allows for the H-to-L conversion fee to be retained permanently, no conversion fee may be applied any longer for the conversion of gas from low CV to high CV quality (L to H).

In addition, the way in which we calculate the conversion fee has changed. Under the new rules in effect since April 2017 the conversion fee is set using an incentive-based approach instead of a cost-based approach. On the one hand, market participants are to be given sufficient incentives for using the virtual conversion mechanism available in the multi-quality market areas. On the other hand, it is to be avoided that the resulting commercial conversion measures to be taken by the market area manager (MAM) rise to such a scale as to make the MAM the main buyer of low CV gas in the course of its balancing activities. Another change related to the duration of the conversion fee validity period, which has been extended from six months to a full gas year effective 1 October 2017.

This report is structured as described below:

In chapter 2 we examine the development of the virtual and technical as well as the actual overall conversion quantities in our market area. Chapter 3 describes the commercial aspects of the conversion mechanism and provides information on the development of the relevant costs and revenues including the current position of our conversion neutrality account. In chapter 4 we provide an analysis of the reasons why we believe that it is necessary to retain the conversion fee.

2. REVIEW AND EVALUATION OF PHYSICAL AND TECHNICAL DEVELOPMENTS

2.1. DEVELOPMENT OF VIRTUAL CONVERSION QUANTITIES

Market participants' use of the virtual conversion mechanism has varied greatly since our market area became a multi-quality market area on 1 April 2011 (for further information, please refer to our previous evaluation reports). While in 2013 market participants temporarily tended to convert relatively large quantities from low CV to high CV quality (L to H), it was not until 2015 that a fundamental trend emerged, with market participants now using the system in the other direction to convert gas from high CV to low CV quality (H to L).

The L-to-H conversion fee was set to zero with effect from the start of the twelfth conversion period on 1 October 2016 as required in accordance with the phase-out schedule set out in the original Konni Gas ruling. With regard to the H-to-L conversion fee, NCG exercised its right to extend the validity of the fee cap applicable in the previous conversion period and thus continued charging an H-to-L conversion fee of 0.453 EUR/MWh. As had been the case in earlier conversion periods, we headed into the twelfth period with virtual conversion activities in the H-to-L direction on a relatively large scale but observed a notable drop from around late January 2017 going forward. At the same time market participants were increasingly converting quantities from low CV to high CV quality (L to H), with the total conversion quantities in both directions nearly balancing each other out over the course of the twelfth period.

Since the start of the thirteenth conversion period, which began on 1 April 2017, the partially changed conversion rules as set out in the amended Konni Gas ruling have been in effect. In line with the newly defined fee cap, we set our conversion fee (H to L) at 0.45 EUR/MWh. Under the amended Konni Gas ruling no conversion fee was to be applied any longer in the opposite direction (L to H). In the thirteenth conversion period market participants' use of the conversion mechanism accelerated further and rose to the highest level since the multi-quality market area was launched. With the L-to-H conversion fee down to zero, the major share of these conversion activities took place in this direction. In the H-to-L direction, market participants made only little use of the virtual conversion mechanism.

Table 1 shows the net virtual conversion quantities along with the conversion fees applicable in each direction for each conversion period.

The aggregate virtual conversion quantities determined for the balancing group managers (BGMs) active in the market area and the actual overall conversion quantities (as determined according to the system-wide virtual approach) determined for the previous conversion periods are shown by gas year in Figure 1. The light colours in the chart represent the first conversion period and the dark colours the second conversion period falling within each gas year, respectively. Due to netting effects the actual overall conversion quantities are lower than the virtual conversion quantities. Netting effects result from the mutual offset-

ting of inputs and offtakes when calculating the sums for the entire market area in each gas quality.

In this context a market shift from low CV to high CV quality (L to H) refers to a situation where exit points using high CV gas are supplied via inputs of low CV gas. The reverse applies where a market shift takes place from high CV to low CV quality (H to L). The term "market shift" describes the proportion (in per cent) in which exit points using gas of one gas quality are supplied with gas of the other gas quality via the virtual conversion mechanism. Please note when comparing the related percentages that total gas demand in the high CV sectors of the market area significantly exceeds total gas demand in the low CV sectors, among other reasons due to transit transports. The market shift figures for both conversion directions are shown for all conversion periods to date in Figure 2.

No.	Conversion period	Conversion fee (H→L)	Conversion fee (L→H)	Net virtual conversion quantity	Direction of conversion (net)
1	01/04/2011 - 30/09/2011	2.000 EUR/MWh	2.000 EUR/MWh	333 GWh	L→H
2	01/10/2011 - 31/03/2012	1.500 EUR/MWh	1.500 EUR/MWh	98 GWh	L→H
3	01/04/2012 - 30/09/2012	0.900 EUR/MWh	0.900 EUR/MWh	356 GWh	L→H
4	01/10/2012 - 31/03/2013	0.700 EUR/MWh	0.700 EUR/MWh	3,086 GWh	L→H
5	01/04/2013 - 30/09/2013	0.600 EUR/MWh	0.600 EUR/MWh	6,294 GWh	L→H
6	01/10/2013 - 31/03/2014	0.600 EUR/MWh	0.600 EUR/MWh	917 GWh	L→H
7	01/04/2014 - 30/09/2014	0.400 EUR/MWh	0.400 EUR/MWh	296 GWh	H→L
8	01/10/2014 - 31/03/2015	0.400 EUR/MWh	0.400 EUR/MWh	2,102 GWh	H→L
9	01/04/2015 - 30/09/2015	0.300 EUR/MWh	0.300 EUR/MWh	7,288 GWh	H→L
10	01/10/2015 - 31/03/2016	0.300 EUR/MWh	0.300 EUR/MWh	19,416 GWh	H→L
11	01/04/2016 - 30/09/2016	0.453 EUR/MWh	0.453 EUR/MWh	7,722 GWh	H→L
12	01/10/2016 - 31/03/2017	0.453 EUR/MWh	0.000 EUR/MWh	97 GWh	H→L
13	01/04/2017 - 30/09/2017	0.450 EUR/MWh	n/a	22,030 GWh	L→H

Table 1: Net virtual conversion quantities

Virtual conversion BGMs (aggregate)

■ Conversion H-to-L ■ Conversion L-to-H
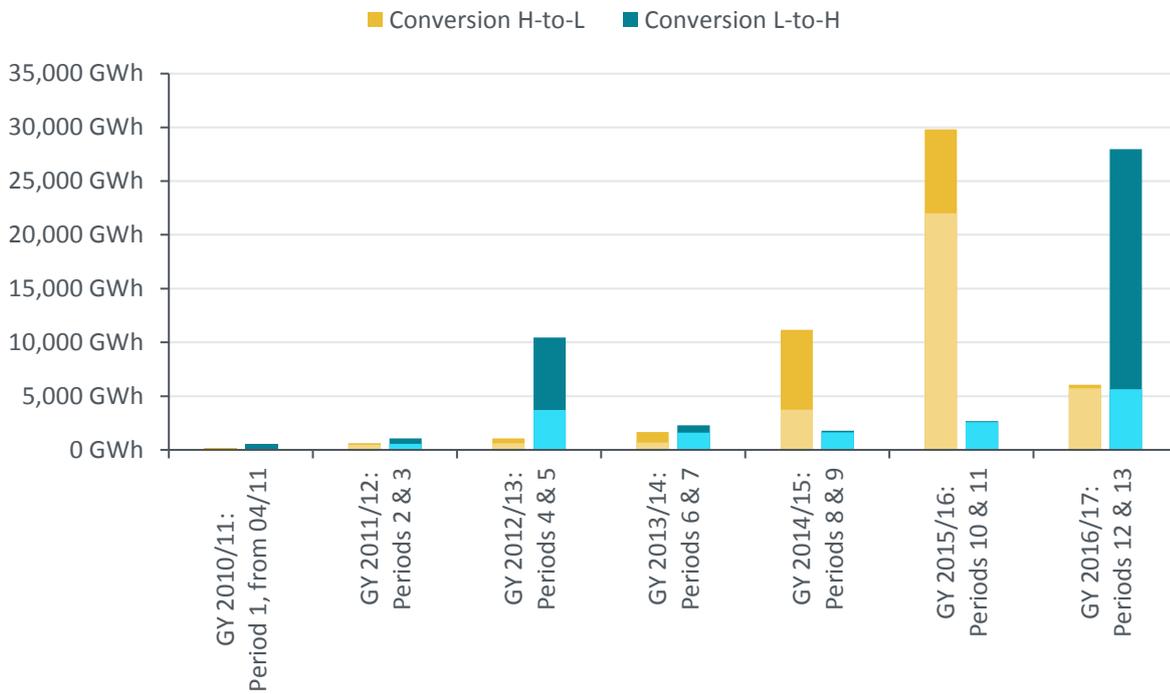
Virtual conversion system-wide (net)

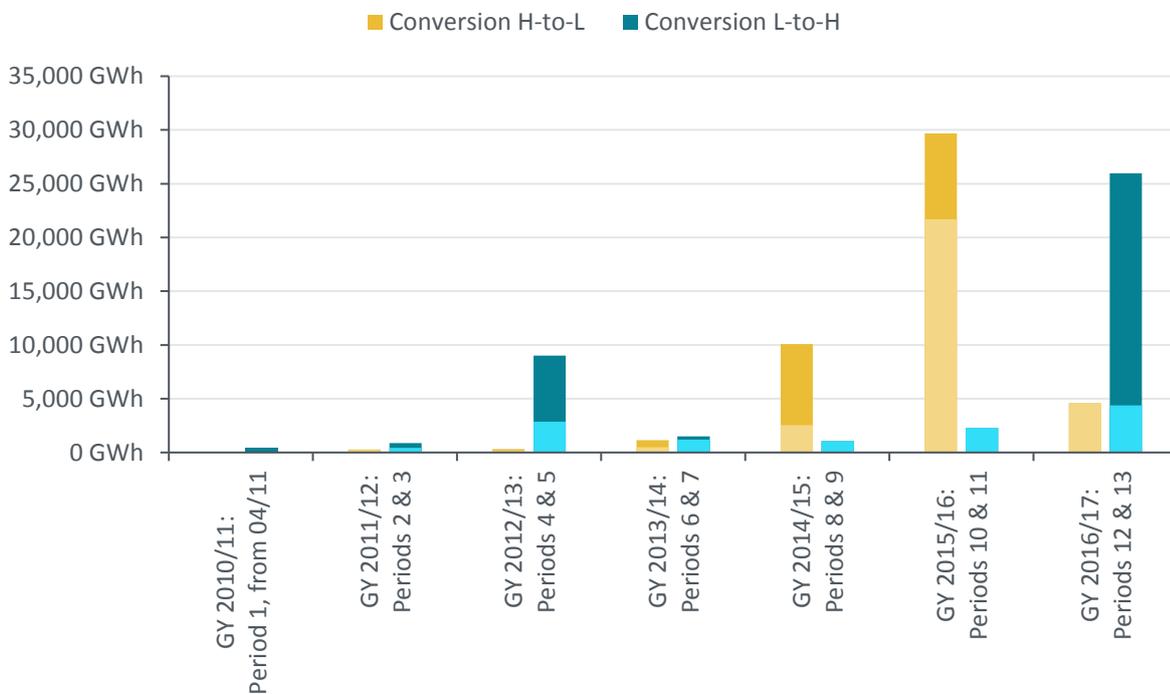■ Conversion H-to-L ■ Conversion L-to-H

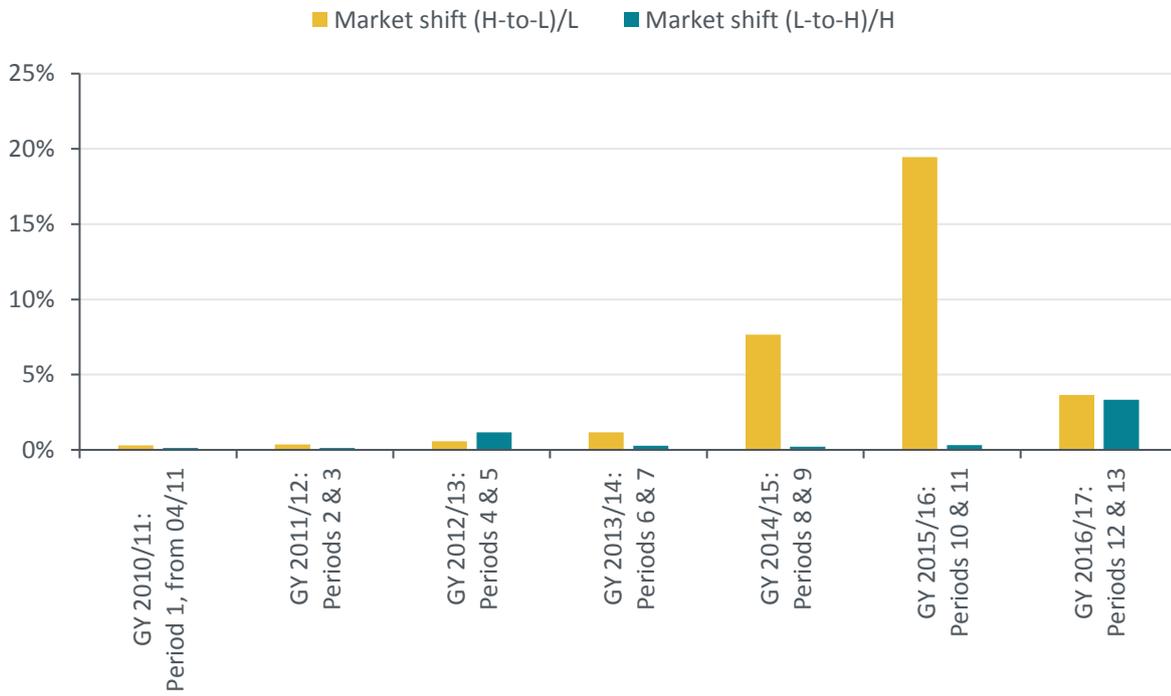Figure 1: Virtual conversion quantities

Market shift

Figure 2: Market shift

2.2. TECHNICAL CONVERSION QUANTITIES

At present, OGE and TG own technical conversion facilities in the NCG market area. OGE's Werne gas mixing plant is capable of adding both low CV gas to the high CV system and high CV gas to the low CV system. OGE's Scheidt mixing plant adds low CV gas to the high CV system. TG, in contrast, has a gas-air mixing plant located in Broichweiden. The facility adds air to high CV gas in order to obtain low CV gas. No third-party conversion facilities are currently used. So far, the use of the OGE and TG mixing plants has not generated any additional costs that would need to be recovered through the conversion fee.

We follow a computational approach to determine what proportion of the quantities converted in the available technical conversion facilities can be attributed to the Konni Gas mechanism. To do so, we calculate the difference between the system-wide virtual conversion quantity and the commercial conversion quantity for each day, compare it with the quantity technically converted on the same day and then apply the minimum of these two quantities. The resulting utilisation of the technical mixing plants in our market area is shown by gas year in Figure 3. The light colours in the chart represent the first conversion period and the dark colours the second conversion period falling within each gas year, respectively.

Since March 2015, there has been a considerable decline in the technical conversion capability for the conversion of gas from high CV to low CV quality, most notably at the Werne gas mixing plant. It is assumed that this development can be attributed to the increased technical conversion activities in the Dutch gas transmission system, where high CV gas is
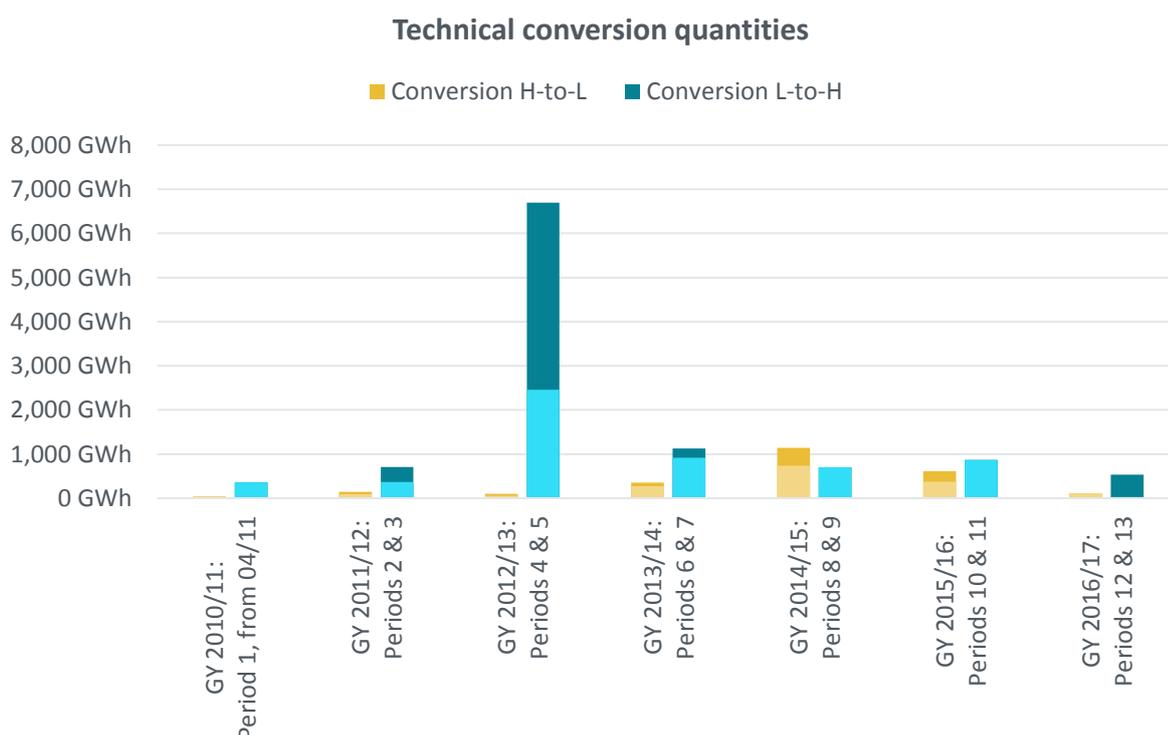
Technical conversion quantities

Figure 3: Technical conversion quantities

converted to low CV gas through the addition of nitrogen. As nitrogen is added, the Wobbe Index of the low CV gas received from the Netherlands rises, which results in a higher calorific value. This in turn limits the high CV to low CV conversion capability of the Werne mixing plant. In view of the expected decline in Dutch low CV gas production volumes from the Groningen gas field, we assume that the conversion capability of the Werne mixing plant will continue to be subject to limitations.

2.3. USE OF COMMERCIAL CONVERSION MEASURES

APPROACH FOR CALCULATING COMMERCIAL CONVERSION QUANTITIES

Commercial conversion measures need to be taken in situations where using the technical conversion facilities is not sufficient to counterbalance market shifts.

The first step in determining the quantity converted through commercial conversion measures is to calculate the sums of the balancing quantities sold in the gas quality for which there is an oversupply and the balancing quantities purchased in the gas quality for which there is an undersupply, respectively. In view of the fact that for "Global" balancing actions the gas quality is no relevant criterion, only rest-of-the-day (RoD) and day-ahead (DA) buy and sell transactions effected to meet "Quality" or "Local" balancing requirements are taken into account when calculating the overall commercial conversion quantity. Where the above calculations show that balancing actions have been taken in opposite directions in the two different gas qualities (e.g. sales of high CV gas and purchases of low CV gas), the relevant figure is compared with the direction of the system-wide virtual conversion quantity previously determined. If the direction of the relevant opposite balancing actions corresponds to the direction in which the system-wide virtual conversion quantity has been converted, then the smaller of the two values (as measured in terms of their absolute values) represents the quantity that was converted by way of commercial conversion measures in each direction.

Where even within one gas quality balancing actions have been taken in opposite directions, the actual overall sell/buy figure is used, i.e. where there is an oversupply in the market area and gas has been both sold and purchased on that day, only the gas quantities sold in the relevant gas quality are taken into account, and not offset by the quantities bought in that quality. Any netting between quantities of the same quality would result in reduced sell or buy quantities, which would not reflect the actual balancing actions taken. The corresponding quantity for the other gas quality is determined following the same principles. The balancing quantity deployed in opposite directions is determined as the smaller of the two quantities (as measured in terms of their absolute values).

DEVELOPMENTS IN THE CONVERSION PERIODS COVERED BY THIS REPORT

The extreme levels to which our commercial conversion activities rose in the spring of 2016 were not seen again neither in the twelfth nor in the thirteenth conversion periods. As virtual conversion activities in the H-to-L direction decreased in January 2017, the scale of our commercial conversion measures in this direction also went down. Increased virtual conversion activities in the L-to-H direction, most notably from February 2017 forward, meant that

our commercial conversion measures in this direction (L to H) also accelerated, albeit to a lesser extent. This was due to the fact that on the Dutch side market participants are looking to bring down low CV gas sales in view of the recent production cutbacks implemented in the Netherlands. In many cases, therefore, the transmission system operators operating the relevant cross-border interconnection points (IPs) now agree to swap the additional volumes of low CV gas made available by shippers for high CV gas, which is then delivered at other IPs. These swaps in turn mean that we have to carry out fewer technical and/or commercial conversion measures.

Figure 4 summarises the commercial conversion quantities determined for each of the conversion periods by gas year and provides a graphical illustration of their development. The light colours in the chart represent the first conversion period and the dark colours the second conversion period falling within each gas year, respectively.

2.4. DEVELOPMENT OF TOTAL PHYSICAL INPUTS ACROSS ALL BALANCING GROUPS

According to the Konni Gas ruling the MAM may levy a conversion neutrality charge on BGMs if the revenues generated from conversion fee payments are insufficient to recover the costs incurred under the conversion mechanism. The conversion neutrality charge is applied on all physical inputs as allocated to the balancing groups for each day, with only balancing groups of the type "FZK" (i.e. freely combinable capacity that is not subject to any transportation route restrictions) being taken into account. Purely virtual inputs, such as trades on the virtual trading point, are not taken into account.
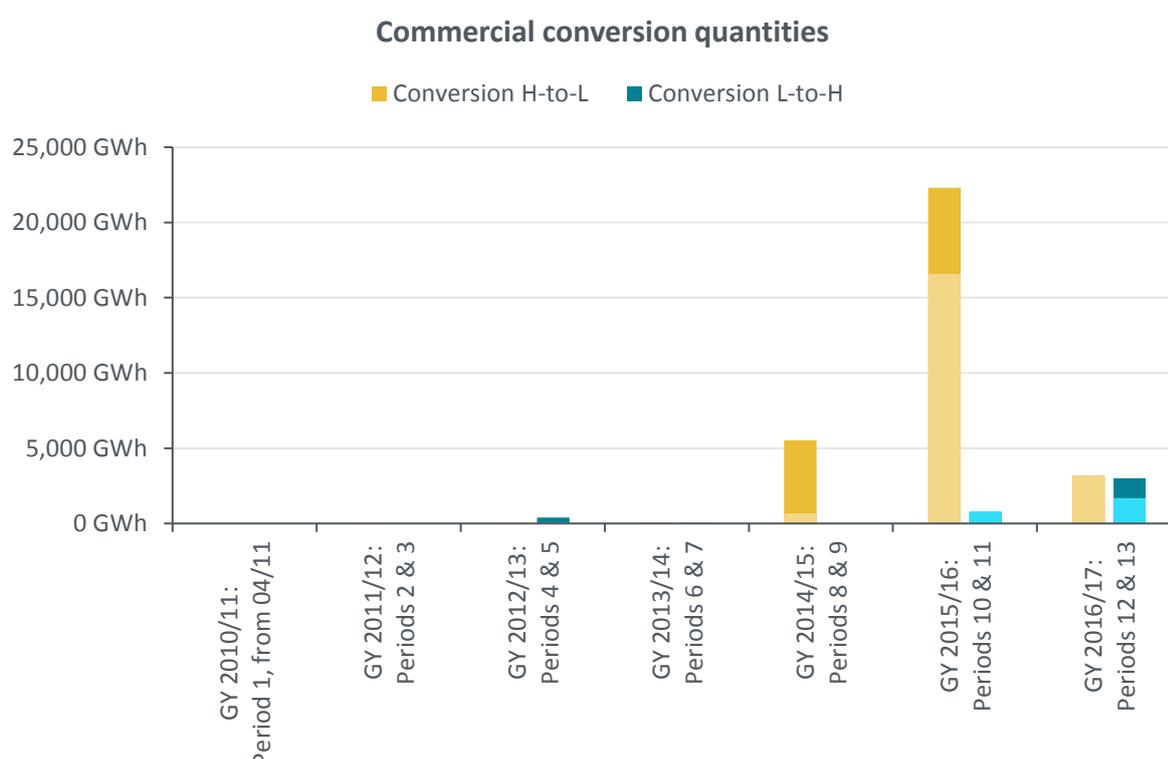

Figure 4: Commercial conversion quantities

Conversion neutrality charges are currently applied to the following input data series types:

- inputs of the type "Entryso"
- inputs of the type "Entry Biogas"
- inputs of the type "Entry Wasserstoff"

The physical gas deliveries across all balancing groups of the type "FZK" in each gas year are shown in Figure 5, with the light colours in the chart representing the first conversion period and the dark colours representing the second conversion period falling within each gas year, respectively.
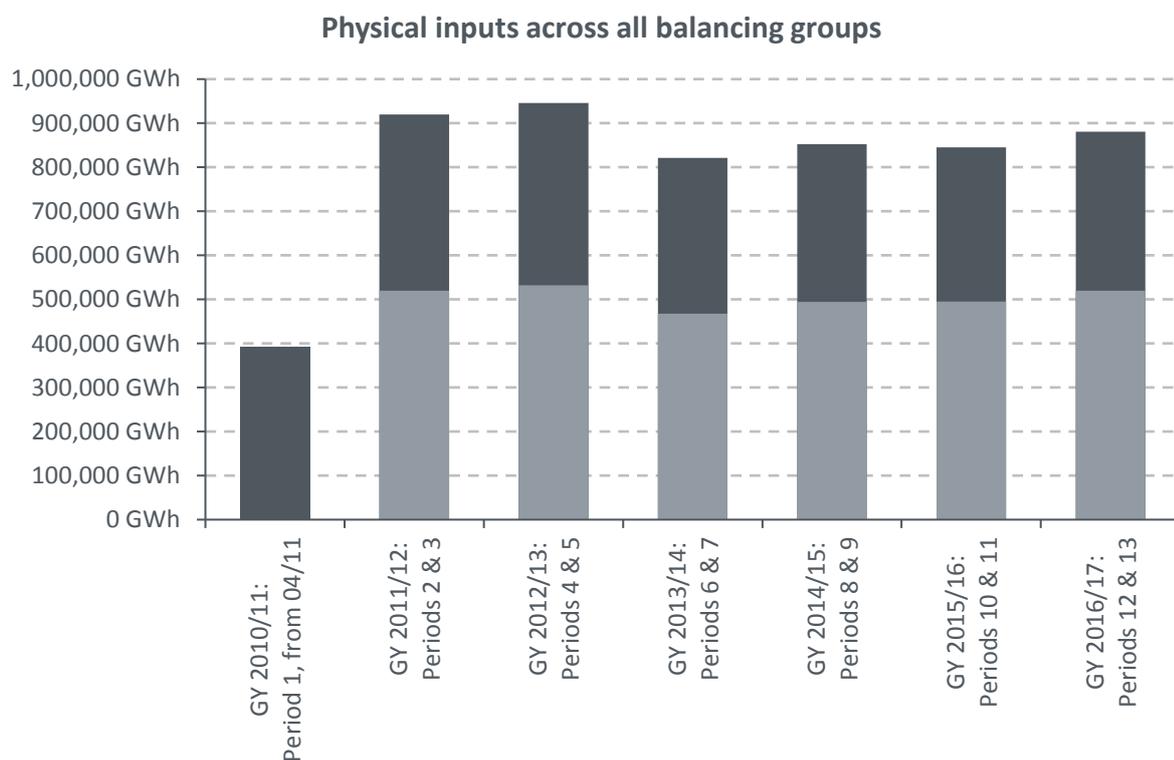
Physical inputs across all balancing groups

Figure 5: Physical inputs

3. COMMERCIAL ASSESSMENT

3.1. REVENUES AND COSTS UNDER THE CONVERSION MECHANISM

APPROACH FOR CALCULATING REVENUE AND COST ITEMS

The level of the revenues earned under the conversion mechanism is determined by the conversion fees charged to BGMs for their individual virtual conversion quantities as well as by the conversion neutrality charges levied on BGMs' inputs. To date no revenues have been generated from commercial conversion measures. Generally, such revenues could result from positive price differences between simultaneous balancing sales and purchases (SystemSell commodity price less SystemBuy commodity price).

Conversion costs generally comprise the commodity costs incurred as a result of the relevant balancing buy and sell transactions effected in the two directions where balancing actions have been taken in opposite directions, plus a proportion of the costs incurred for transportation capacity contracts and availability contracts for long-term balancing products.

In order to calculate the commodity costs, the commercial conversion quantities are first determined for each day. Subsequently, the weighted average prices paid/received in connection with the associated balancing buy and sell transactions are calculated for the relevant direction of conversion. In order to do so the price difference between quality-specific balancing sell transactions (SystemSell) and balancing buy transactions (SystemBuy) is multiplied by the net commercial conversion quantity determined to have been converted on the day in question (amount of the commercial conversion quantity calculated for one direction pursuant to chapter 2.3).

The next step is to calculate the allocation key which is used to apportion the costs incurred for availability contracts for long-term balancing products as well as the costs incurred for transportation capacity contracted to procure low CV gas on the Dutch TTF. In order to allocate the relevant cost items first the proportion of the balancing quantities supplied/received for conversion purposes (commercial conversion quantity) is determined in relation to the total balancing requirements on the day in question. This gives the allocation key. Then the availability contract costs for keeping balancing services available (per quarter) are distributed proportionally over all days within the quarter. Costs for capacity bookings are also calculated on a daily basis. Following this, the allocation key is applied to the daily costs thus determined for the purpose of allocating the relevant proportional costs to the conversion mechanism.

Due to the decrease in commercial conversion measures in the twelfth and thirteenth conversion periods, the balancing costs attributable to the conversion mechanism have gone down significantly. We charged a conversion neutrality charge of 0.15 EUR/MWh in the twelfth and of 0.04 EUR/MWh in the thirteenth period, generating revenues that were primarily used to build the required liquidity buffer provided via the conversion neutrality account.
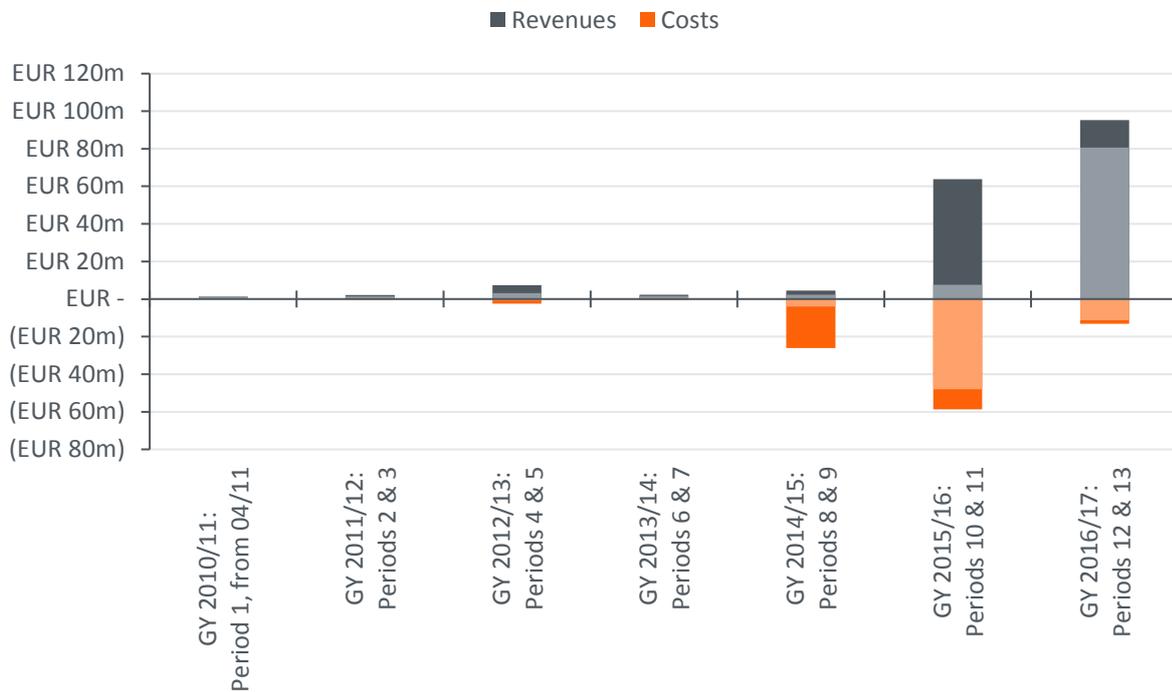
Conversion costs and revenues

Figure 6: Conversion costs and revenues

Our conversion costs and conversion revenues are shown by gas year in Figure 6, with the light colours in the chart representing the first conversion period and the dark colours representing the second conversion period falling within each gas year, respectively.

3.2. CURRENT POSITION OF THE CONVERSION NEUTRALITY ACCOUNT

Under the rules introduced by the amended Konni Gas ruling, which came into force on 1 April 2017, the MAMs are allowed to factor in certain liquidity reserves when setting their conversion fees and conversion neutrality charges. The intended function of this so-called "liquidity buffer" is to take account of the uncertainty inherent to a system in part based on estimates and projections and to mitigate the MAMs' liquidity risks. For information on our approach to setting the level of the liquidity buffer and on the amounts taken into account in each conversion period, please refer to the published "Statement of the Basis of the Conversion Fee and Conversion Neutrality Charge" relating to the relevant period.

As required under the Konni Gas ruling, the MAMs publish the current position of their conversion neutrality accounts on a monthly basis (see Figure 7), with the preliminary account balances for each month being published by the 5th business day of the following month. The account data provided for a month is updated once all final data required for the purpose of publication is available for that month, which is usually the case 10 business days after the end of the second month following the relevant month.

The final account balance determined for the conversion neutrality account for GY 2016/17 as at the end of September 2017 was EUR 76 million.

Development of conversion neutrality account balances

Figure 7: Development of conversion neutrality account balances

4. NECESSITY TO RETAIN THE CONVERSION FEE

Section 3(c) of the operative provisions of the Konni Gas ruling imposes an obligation on NCG to consider in its annual evaluation report whether it will be necessary to retain the conversion fee. These considerations are provided in this chapter.

SUPPLY SECURITY RISKS DUE TO SHARP DROP IN LOW CV GAS PRODUCTION

Low CV gas production from the natural gas field in the Groningen area in the Netherlands has been impacted by unforeseeable cutdowns in production, which saw production output being scaled down enormously since 2013. While in 2013 production output was still at approximately 58.8 bcm/a (billion cubic metres per year), a decision by the Dutch government of 23 September 2016[1] limited production to 24 bcm/a for the next five years, with a contingency to increase output in especially cold winter periods to up to 30 bcm/a. In April 2017, the production limit for GY 2017/18 was lowered by another 10%, down to 21.6 bcm/a. And in October 2017 it emerged that the Dutch Ministry of Economic Affairs was planning to further scale back production to 20.1 bcm/a by 2021.

The above cutbacks in production were ordered amid a rise in the frequency of earthquakes registered in the region around Groningen, the cause of which is assumed to be the extraction of natural gas from the field. On 8 January 2018 an earthquake with a magnitude of 3.4 on the Richter scale struck the Netherlands, the strongest since 2012. In the wake of the earthquake the Dutch Minister of Economic Affairs announced that the ministry was reviewing further options to limit gas extraction from the Groningen gas field to the lowest level possible. In view of this background additional cutbacks in Dutch low CV gas production are likely in the future. If low CV gas production were to be further reduced, this could only be offset by creating additional technical conversion capacity or by reducing low CV gas demand. Legal claims to have sufficient supplies of low CV gas provided so that the demand of German end users can be met are only available under the existing long-term supply contracts signed by German gas suppliers and Dutch producers. For the security of the supply of German end users of low CV gas it is therefore essential that German gas suppliers do not terminate their existing long-term supply contracts for low CV gas prematurely.

NCG is of the view that the conversion fee is one of the factors that will motivate German suppliers to uphold their existing long-term supply contracts for low CV gas. This effect results from the fact that the conversion fee provides an incentive for suppliers to physically provide low CV gas for the supply of low CV end users. The conversion fee can therefore contribute to preventing supply security risks in the German low CV network areas, also in the long term.

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[1] Final Consent Decision on gas extraction in the Groningen gas field
(https://www.government.nl/ministries/ministry-of-economic-affairs/documents/parliamentary-documents/2016/09/23/letter-to-the-parliament-final-consent-decision-on-gas-extraction-in-the-groningen-gas-field)

COSTS INCURRED UNDER THE CONVERSION MECHANISM

The costs incurred under the conversion mechanism have gone down significantly over the last two conversion periods. At the same time, the revenues generated from conversion neutrality charges were used to build a liquidity buffer that helps mitigate our financial risk exposure under the conversion mechanism.

Even so, our experiences in the spring of 2016 have shown that there is a real risk of a full H-to-L market shift taking place – at least from a balancing perspective – if the H-to-L conversion fee is set too low. If this were to occur, it is likely that due to the large balancing requirements arising as a consequence the costs incurred under the conversion mechanism would surge again, resulting in a correspondingly high balancing neutrality charge which would then have to be borne by all market participants. Besides producing high costs, NCG is of the view that such a development does not reflect the separate market roles as defined by law. The purpose of balancing actions should be to address gas imbalances on the gas networks but in no event should this mean that the MAM becomes the main buyer of gas in either gas quality.

In the other direction (L to H) we do not face such risks and problems on a comparable level. Despite the large-scale virtual conversion activities in this direction observed in the twelfth and thirteenth conversion periods our conversion costs and technical and commercial conversion measures remained at a relatively low level.

As the above circumstances have not changed, it is our view that an appropriately priced H-to-L conversion fee – as defined in the amended Konni Gas ruling – remains a necessity.

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