Gas Monitor:
Developments in the Wholesale Gas Market in the Netherlands in 2006

The Netherlands Competition Authority (NMa) - Office of Energy Regulation (DTe)

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Executive summary

The present situation in the wholesale gas market calls for measures aimed at enhancing competition. Our annual monitoring report into the functioning of the gas market identifies a number of serious problems that impede competition in the wholesale market. Market parties have indicated a lack of available import capacity, storage capacity and quality conversion capacity, though facilities are not always optimally utilised. The report's findings confirm the necessity of the action plan which was presented by the NMa/ DTe to the Minister of Economic Affairs in early October this year. Improvement is required for the rules of play and the level of transparency in the gas market. It is also necessary to pursue further integration into North-West Europe.

State of affairs in 2006
For 2006 the wholesale market for gas shows hardly any development as compared to last year. Obstacles occur in all the main aspects of the wholesale market. Nevertheless, trade volumes increased.

- NMa/DTe finds that obstacles exist for practically all **market conditions**, and hardly any improvement appears to have taken place compared to 2005. The availability of import capacity is a major point of concern for the efficient operation of the market. This also applies to the availability of conversion capacity, allowing the conversion of high-calorific gas (from Russia, for instance) to low-calorific gas. In addition, access to and availability of seasonal flexibility – needed to supply the winter peak in demand - is one of the factors that is currently impeding the development of the low-calorific market. Finally, the availability and timeliness of relevant information about the market and the infrastructure is a major area of attention.
- The **market structure** shows high concentration along almost the entire value chain. In particular, the trade in low-calorific gas is highly concentrated, as hardly any low-calorific gas is traded in public marketplaces. Gas of this type is usually directly transported from the source to end users, with no intermediary stop at the central marketplace (TTF). In addition, the degree of concentration both in import capacity for high-calorific gas and in quality conversion capacity has increased compared to 2005.
- Finally, with regard to **market outcomes**, the growth of high calorific gas trading on TTF stands out. Though growth figures are significant, they are limited in absolute terms. It must be realised that the TTF still handles only a very limited part of the total trading volume. Still, prices have also converged with those of neighbouring countries and market participants expect the integration to increase further in the years ahead. A positive result for 2006 lies in the construction of a new pipeline between the Netherlands and the United Kingdom, referred to as the BBL, which links up with the British market. However, the (temporary) reduction of firm import capacity at Zelzate will limit arbitrage possibilities among the Netherlands, Belgium and the United Kingdom.

Measures
In order to effectively address the above obstacles to the operation of market forces and realise Dutch ambitions in the international gas market, measures must be taken in the short term. The conclusions to that effect in this Gas Monitor are in line with the recommendations recently issued by NMa/DTe in the report entitled "Acceleration of the Development of the TTF and the Gas Wholesale Market" (hereinafter: TTF Report) and can be divided into three categories:

1. Increase of gas supply volume entering the TTF
2. Better utilisation of gas infrastructure

3. Facilitation of new investments

1. Increase of gas supply volume entering the TTF

In order to increase the quantity of gas which finds its way to the wholesale market, more gas from the Groningen field, including flexibility, must reach the TTF. This requires a package of structural measures to boost the operation of market forces in the low-calorific market. This package must include the possibility of transferring (mainly low-calorific) gas at the TTF rather than "behind the city gate". It is also necessary to extend the range of products supplied. Shippers should have better opportunities for building up a portfolio in a more modular way. This requires a range of standardised (framework) contracts instead of the "all-in-one" contracts that are currently in use. As a result, the tradability of low-calorific gas as well as purchase opportunities for retail companies will increase.

Better utilisation of infrastructure

To allow a better utilisation of the existing gas infrastructure, a number of "rules of play" for the use of infrastructure must be amended:

- The harmonisation of transport procedures in the various countries of North-West Europe must be improved. This will simplify cross-border trade and transport and thus improve connections with the surrounding marketplaces. Also, the utilisation of currently available import capacity must reach a higher level. At the moment import capacity is fully allocated, but not used exhaustively. Improved allocation will increase cross-border trade in the short term.

  Note: agreements on precisely these issues were reached within the Gas Regional Initiative[1], in which regulators join hands with market parties and transmission system operators in an effort to further regional market integration;
- GTS and GasTerra shall enter into a contractual agreement to resolve the shortage of quality conversion. As a result, the reservation system can be scrapped and availability will no longer be a point of concern in the market. As was seen to be the case for import capacity, the shortage of available quality conversion capacity is also mainly a contractual shortage in the current situation. Shippers now have to reserve conversion capacity beforehand, allowing GTS, the Dutch TSO, to be in full control of the conversion balance, thus ruling out any shortage of availability. GTS needs this system to deal with the large impact on the supply of and demand for quality conversion exerted by GasTerra's large and diverse portfolio. When GTS enters into a contractual agreement with GasTerra, GTS can control the conversion balance at all times. The reservation system is then made redundant;
- The balancing regime, used by GTS to maintain the network balance, must be tackled in the short term. The present system is no longer adequate. This must enable shippers to control the costs of imbalance and actively contribute to controlling the balance across the whole network.
  Note: the national transmission system operator GTS is already researching possibilities for a new balancing regime in the Netherlands. The NMa/DTe will assess this regime in due course.

3. Facilitation of new investments

In the medium term, additional capacity is required for (seasonal) storage, quality conversion and import, as well as LNG landing. This is warranted due to a fall in domestic production and with a view to creating a proper (North-West) European market. Bearing in mind the lead time to completion, investments should be

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[1] Arrangements for the North-North-West region have been laid down in a Memorandum of Understanding between Belgium, Germany, France, the United Kingdom, Ireland, Sweden, Denmark and the Netherlands.

set in train now. It is also advisable to improve the existing connections with the UK and Belgian marketplaces, by ensuring that the connections can be used in both directions (import and export). This of course requires a favourable investment climate, while maintaining a balance between facilitating the market and guarding against undesirable social costs of infrastructure.

New recommendations in the Monitor

Two important points have been added to supplement those in the TTF Report: the development of interconnection capacity at Zelzate and increased concentration in transmission capacity and quality conversion capacity.

GTS intends to facilitate the export of gas to Belgium. At present, the Zeldzate connection only allows for the import of gas from Belgium. According to information from GTS, the Zelzate import point will have been converted to a bidirectional point by 2012. This is a positive step in the coupling of the Dutch gas hub TTF and its British equivalent NBP via Zeebrugge. In the meantime, however, the coupling will worsen, according to GTS, since the firm capacity of the Zelzate import point will for the larger part be withdrawn from 2009 onwards as part of adjustments to the Belgian gas transmission system. The deterioration of the coupling with the NBP in such crucial years poses a threat to the development of the TTF. NMa/DTe will assess the quality and capacity documents to evaluate the development of the connections.

The level of concentration of transport capacity and quality conversion capacity has increased. Though recommendations to bring down these concentration levels are not in any way new, they have now gained in urgency. In the short term the level of concentration may be lowered by improving the allocation of transport capacity, for instance by providing better opportunities for capacity resales and by making available unused capacity to the market. The use of quality conversion will improve as soon as the reservation system is scrapped. In the medium term it will prove necessary to invest in transport capacity and quality conversion.

Contents

1 Introduction

This document is the monitoring report on the wholesale gas market in 2006. It endeavours to provide the most factual reflection possible of the current state of affairs in the wholesale gas market in the Netherlands in 2006. In this document, NMa/DTe gives its assessment of the operation of market forces and the issues which need to be addressed in this market. Recommendations on necessary improvements in the operation of market forces will be formulated at a later stage, partly on the basis of this Monitor, but will not be considered further in this report.

Objective

NMa/DTe sees monitoring as a necessary precondition for drawing up the agenda to improve the operation of market forces in the wholesale gas market and gauging the effect of previous actions. Monitoring also increases the transparency in the market, which is of great importance for the efficient operation of market forces. NMa/DTe wishes to point out that it has been aware for some time (informally) of most of the problems indicated here. For the sake of transparency and to support discussion and action, the signs and observations are substantiated by facts in this report. The legislator also acknowledges the importance of monitoring, since NMa/DTe has a statutory duty to monitor the operation of market forces in the gas market.

Monitoring method

This Monitor builds on earlier research by NMa/DTe, and in particular on the 2005 Gas Monitor. This year's Monitor has the same structure as last year's, so the 2006 results can be properly compared with those of previous years. However, the methodology used this year has been improved on the basis of input from market participants. For example, hourly flow data[2] have been used this year and greater attention has been devoted to quality conversion, flexibility and interruptions.

The report reflects the state of affairs in the wholesale gas market as far as possible quantitatively and at the system level, with analyses being kept as simple as possible (and hence transparent). Analyses of figures are supported by answers to opinion-based questions and qualitative reports. This report does not discuss the behaviour of individual parties.

This factual report draws on an extensive data survey conducted among both shippers and GTS. All shippers completed a compulsory CODATA module; this survey comprised figure-based questions on transmission capacity, commodity and conversion. Over half of the shippers also completed a non-compulsory survey which in particular requested estimates and opinions. GTS reported at the system level on reservations and the use of the infrastructure (transport, conversion) and its services.

In addition to the data obtained from market participants, this report also uses public sources. These include in particular prices and information on trading volumes in various markets. Data from the *Olie en Gas Jaarboek 2006* have been used with the assistance of TNO-NITG.

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[2] In order to prevent the disclosure of commercially sensitive information, it has been decided to aggregate all hourly data on a monthly level. The underlying analyses were nevertheless conducted on an hourly level.

Reader's guide

The Monitor is divided into four sections: an annual overview of 2006, an overview of market conditions, a discussion of the market structure and an analysis of the market outcomes.

The annual overview details the main events in the Dutch gas market in 2006. It also considers events relating to production, transport and the supply of gas. It also concentrates on the events which were relevant for the operation of market forces in the Dutch wholesale gas market.

In the Dutch wholesale gas market – more than is the case for example in the electricity market – a great deal of attention must be focused on access to physical resources (commodity, transport, quality conversion, flexibility) which players in the wholesale market – shippers – require in order to compete. The "market conditions" chapter of this report deals among other things with the question of whether there is a contractual and/or physical scarcity of import capacity and quality conversion capacity.

In addition to the physical infrastructure, the organisation of the market is an important indicator of the operation of market forces. This report presents analyses in figures of concentration through the wholesale chain, and qualitative information on the degree of transparency and barriers to entry (insofar as they are not already clear from the infrastructure). These are set out in the chapter on "market structure".

In a market in which there is good access to physical resources and the market structure promotes competition, liquid marketplaces will develop in which there is efficient price formation and a varied range of products. The final part of this report considers the stated market outcomes, once again quantitatively where possible, and analyses price developments with regard to neighbouring countries, volatility and liquidity.

The chapters relating to market conditions, market structure and market outcomes each begin with a summary of observations. For each of the areas discussed, an overview of the state of affairs is then provided, followed where applicable by a conclusion setting out the issues and knowledge gaps. The issues observed may be used subsequently by NMa/DTe as the basis for formulating actions to improve the operation of market forces. The identified knowledge gaps will be used to improve next year's monitoring report. The market requirement for good information will also be weighed against the burden of information provision on the basis of this year's input from market participants.

2 Overview of market developments in 2006

Various developments took place in 2006 which had an effect on the Dutch gas market. Before the operation of the market is considered, a brief account is provided of the context in which the market developed last year. An overview[3] is provided below of the main events in the field of production, transport and supply of gas in 2006.

January	NMa/DTe draws up the policy guideline for flexibility services: supervision of tariffs and conditions under which Gasunie Trade & Supply, GuTS (now GasTerra), provides flexibility services for GTS. Tariffs must be within a range determined by prices of flexibility services from alternative providers and market prices for alternative flexibility services. Gaz de France brings four gas fields to the north of Terschelling on stream. The total reserves, together with a field which recently came on stream to the north-west of Den Helder, are estimated by GdF at 18 billion cubic metres of natural gas.
February	NMa/DTe requests adjustments to a number of points in a proposal by the joint TSOs to amend the GTS balancing regime. This proposal relates to the tariff structure for flexibility services which GTS is to offer and is generally seen as definite progress.
March	*Visie op de gasmarkt* (Ministry of Economic Affairs) is published: in order to further develop the Netherlands' unique position as a gas roundabout, it is necessary to invest in the national gas transmission grid and in interconnection capacity. The *Visie* also acknowledges the importance of the TTF being able to develop into a European trading point. In response to the "gas letter" from the Minister, Gasunie begins working hard to make the gas roundabout a reality: laying of the BBL pipeline to the UK; participation in the new pipeline through the Baltic Sea to connect Russia to Europe; and completion of the LNG terminal in the Maasvlakte. Endex futures exchange begins trading in TTF contracts in high-calorific gas.
April	Fluxys announces investigation of potential for underground gas storage in the Limburg region of Belgium. The ground is expected to contain porous sandstone packages with the right characteristics for underground gas storage. GTS wishes to expand the gas transmission grid with 500 km of mains and four compressor stations. This involves in particular the section running from the north-east of the Netherlands (Oude Statenzijl border entry point) to the south-west of the Netherlands (Zelzate border entry point). GTS states that these plans also contribute to the strengthening of the Dutch position as a gas roundabout for Europe.

[3] Source: Energeia news archive

May GuTS is already sold out in May for high-calorific gas for 2007. GuTS says that is due to low oil-related prices compared to prices in the gas-to-gas market. GuTS states that it will be able to supply high-calorific gas at the TTF in 2007.

June NAM and Gasunie are to investigate the possibilities for expanding the capacity for gas storage at Grijpskerk and Norg. This will involve the installation of additional compressors to withdraw gas from storage more rapidly.

Interconnector UK has plans to expand capacity on the Interconnector between Zeebrugge and Bacton by a further 2 billion cubic metres to 25.5 billion cubic metres per year.

In response to requests (among others from the Confederation of Netherlands Industry and Employers and the Association for Energy, Environment and Water) to purchase more high-calorific gas for industry, GuTS announces that it is unable to comply. GuTS obtains high-calorific gas from the small fields, which are already running at maximum production, and from Russia and Norway, which are also sold out.

Statoil says it wants to lay a new gas pipeline from the Norwegian continental shelf to the UK or continental Europe (the Netherlands and Belgium are possible landing options).

July Additions are made to the gas codes, including provisions whereby shippers must obtain specifications of their customers' consumption from the natural gas TSOs and GTS must have sufficient gas available to ensure security of supply on cold days. A new balancing regime is also introduced to enable shippers to transport gas more efficiently through the national network.

GuTS increases the prices of high-calorific gas by 10% on 1 January 2007 (price rises must be announced six months in advance). According to GuTS, tariffs were too low, which was also why H-gas for 2007 sold out so rapidly.

RWE will expand underground gas storage at Epe by 73 million cubic metres to 500 million cubic metres.

European regulators co-operate with market participants to create a larger, regional gas market. The priorities for creating a north-west European gas market are transparency in the market, efficient trading between gas hubs, access to gas pipelines and promotion of investments in networks.

Work starts on laying the 230 km BBL natural gas pipeline between the Netherlands and the UK.

The EU publishes a list of priorities for electricity and natural gas transmission projects. This list includes the north European gas pipeline, in which Gasunie is participating, the

Jamal pipeline (from Russia to Germany via Poland) and a second pipeline from Germany to Zeebrugge (Interconnector with the UK).

August	Minister promises parliament an order in council instructing GuTS to offer more gas in marketplaces such as the TTF.
September	GuTS changes its name to GasTerra.
	Eurohub discontinues operation as a physical marketplace in the Emden - Oude Statenzijl – Bunde region. Trading at the hub was too low and there are now alternatives, such as the TTF virtual trading point.
October	The European TPA (third-party access) directive is transposed into Dutch law.
	Endex futures exchange begins clearing for TTF.
November	Gate terminal (Vopak and Gasunie) and Liongas terminal (Petroplus) obtain an environmental permit for the construction of LNG terminals and can commence construction.
	The Trade and Industry Appeals Tribunal (CBb) annuls the Method Decision and x-factor. GTS lodged an objection to the 4.2% efficiency discount for 2006 to 2009 as laid down by NMa/DTe. CBb judges that specific tariffs for individual services should be regulated rather than total income.
December	The first gas is transported through the BBL pipeline between Balgzand and Bacton.
	NMa advises the Ministry of Economic Affairs on the assessment of the Electricity and Gas Acts.

3 Market conditions

The market conditions and the extent to which they are fulfilled in practice can be subdivided into four main aspects. First, there must be sufficient gas available (also referred to as commodity) to meet market demand. There must also be sufficient transmission capacity to transport the gas from the point of delivery to the point of supply. It is also possible that the required quality of the gas will differ from the quality which has been purchased and quality conversion capacity must be available in order to convert it to the required quality. Finally, shippers must have flexibility to match the supply to demand at a particular time. After all, supply and demand must be in balance at any time (see also the sections on the reservation system and balancing).

For each of the above aspects, this chapter considers whether there is sufficient (physical and/or contractual) capacity, or whether there is a scarcity which impedes the operation of market forces. It also considers for each of these aspects the extent to which the available capacity is being well utilised.

- The declining domestic production, the additional exports through the BBL to the UK and the decreasing availability of firm import capacity due to congestion at Oude Statenzijl and the (temporary) reduction of firm import capacity at Zelzate may have significant consequences for the operation of market forces in high-calorific gas in the Netherlands up to 2012. The possible consequences for the liquidity of the market and arbitrage possibilities between Zeebrugge and the NBP are therefore viewed with great concern.
- Despite the fact that there will probably be sufficient physical quality conversion capacity available in the years ahead, it can no longer be reserved. This limits the access which market participants have to the low-calorific market. Moreover, access to the low-calorific market is impeded all the more by the fact that the flexibility requirement in the delivery of low-calorific gas is high and the supply of "loose" flexibility is very limited.
- Although the availability of physical flexibility is sufficient at present, the limited supply of flexibility resources and the inadequate steering information mean that market participants are not sufficiently able to structure their own flexibility. As a result, they have to rely on "non-nominated" products (e.g. Combiflex, tolerance) in order to minimise the risks of imbalance.
- The longer-term decline in the supply of flexibility from Groningen can only be supplemented in part by imports and will have to be absorbed by new investments in seasonal storage.

3.1 Origin and destination of gas

This section considers in more detail the origin of the gas transported and traded within the Netherlands and its destination, in 2006 but also up to 2016. A distinction is drawn between imports and domestic production and exports and domestic consumption. It also looks specifically at the flows of different gas qualities.

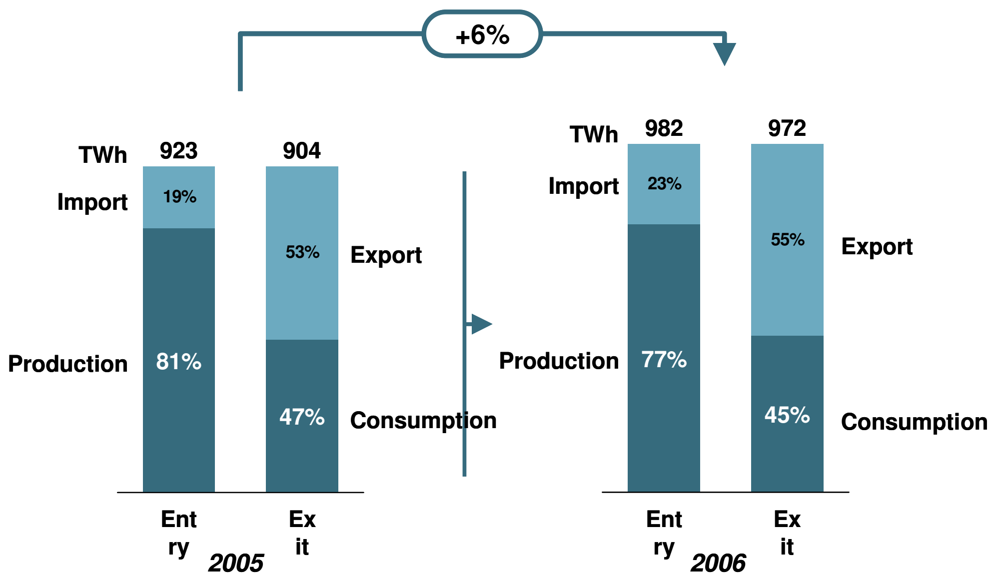
This chapter provides an overview of the gas balance in 2006 in terms of gas quality, followed by a detailed account of the entry and exit flows on a daily basis and the developments in domestic production and finally an overview of developments at the import points.

- The domestic production of H-gas will decrease in the years ahead and it is likely that Groningen, due to the production ceiling imposed, will not be able to make up for all of the decline in production in the years ahead. The role of the Netherlands as a net gas exporter will therefore decline over time.
- Imports of high-calorific gas increased sharply in 2006 (30% higher than in 2005). A large number of projects are under way for both pipelines and LNG, so imports will be able to increase further in the years ahead. Whether and to what extent imports will also be able to absorb the decline in domestic production in the future is not yet sufficiently clear.
- Exports of high-calorific gas have increased sharply in the past year, indicating that the Netherlands' role in gas transit is growing.
- Unless sufficient import capacity is available, the increase in exports may jeopardise the availability of H-gas in the Netherlands up to 2012.

3.1.1 Gas balance in 2006

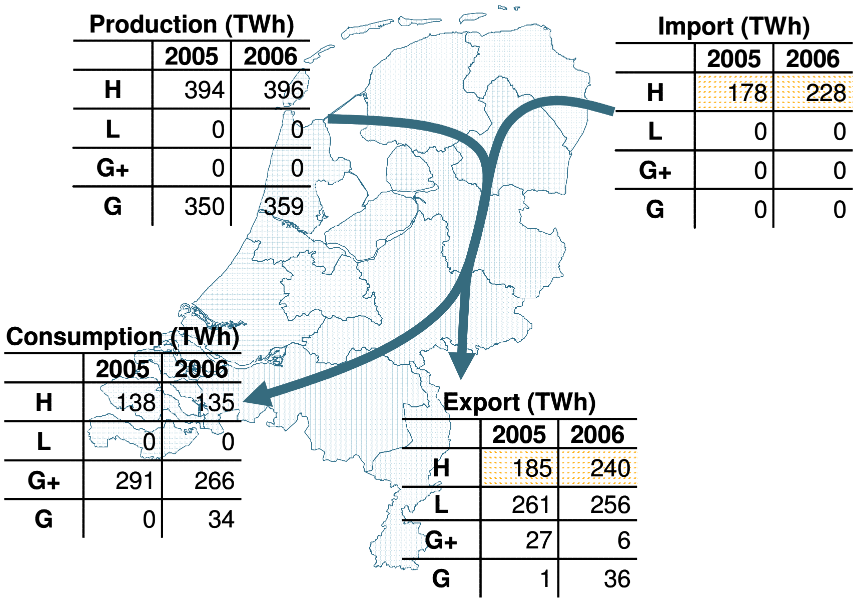
The total (transported) gas volume (in TWh) increased by 6% in 2006 compared to 2005. As in 2005, the Netherlands was once again a net exporter of gas in 2006 (see Figure 1).

Figure 1: Entry and exit in the Netherlands in 2006; source: GTS



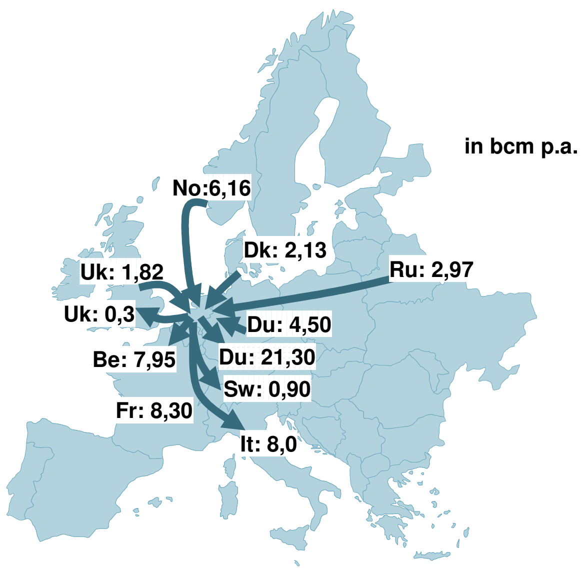
The proportion of transit gas in particular has increased compared to the previous year and is predicted to increase further in the future. The proportion of import on entry rose from 19% (178 TWh) in 2005 to 23% (228 TWh) in 2006 (see Figure 2). That amounts to a relative rise of almost 30%. Of the exit in 2006, 55% (537 TWh) was intended for export, which also represents a significant rise compared to 2005. The rise in exports from 53% to 55% was mainly the result of increasing foreign demand for H-gas. Demand for the other gas qualities has remained more or less the same or even declined slightly together with the supply.

Figure 2: Gas balance by gas quality 2006; source: GTS



With regard to the origin of imports in 2006, it can be seen that they come mainly from Norway and from Russia via Germany (see Figure 3). Exports from the Netherlands go mainly to Germany, Italy, France and Belgium.

Figure 3: Origin and destination of natural gas in 2005[4]; source: Cedigaz

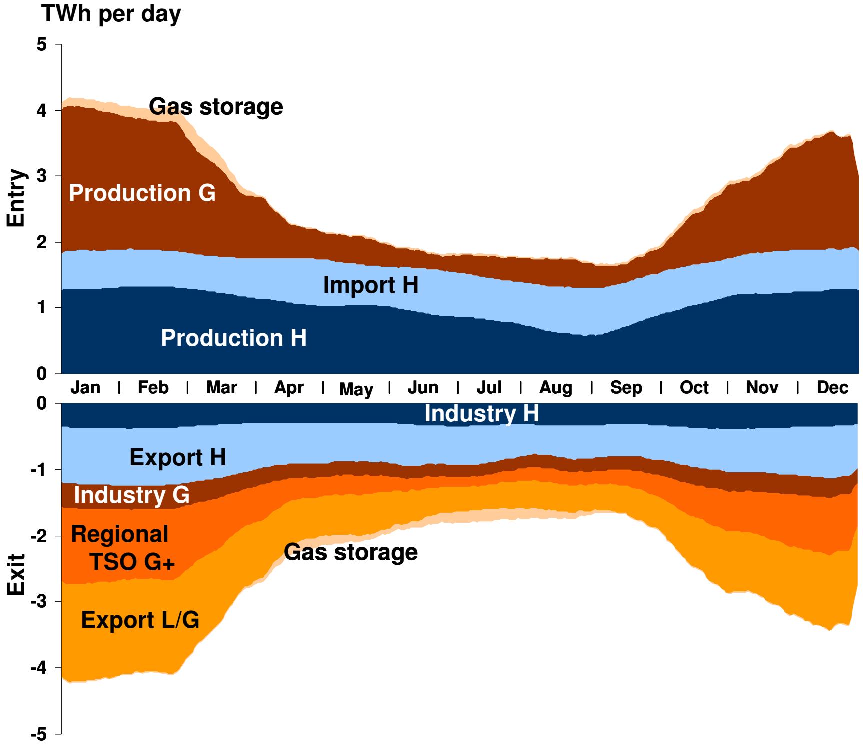


[4] NB: *information from 2005, lags behind other data used in the Monitor by 1 year*

3.1.2 Gas balance in 2006

Once again in 2006, the vast majority of the flexibility during the year came from the production of G-gas from the Groningen field, supplemented by storage gas (see Figure 4). By contrast, imports and (to a lesser extent) domestic production of H-gas show a fairly flat entry flow over the year.

Figure 4: Daily gas flows into and out of the Dutch gas grid in 2006[5]; source: GTS



On the exit side it is notable that exit H (mainly gas supplies to industry), industry G and export H are fairly flat. The greatest flexibility requirement arises in domestic demand for G+ and exports of L and G. The demand for low-calorific gas comes from small consumers (mainly G+ for regional TSOs) and is highly temperature-dependent due to the fact that small consumers use more in cold weather. That can also be seen in the fact that demand in the summer months is significantly lower than in the winter months.

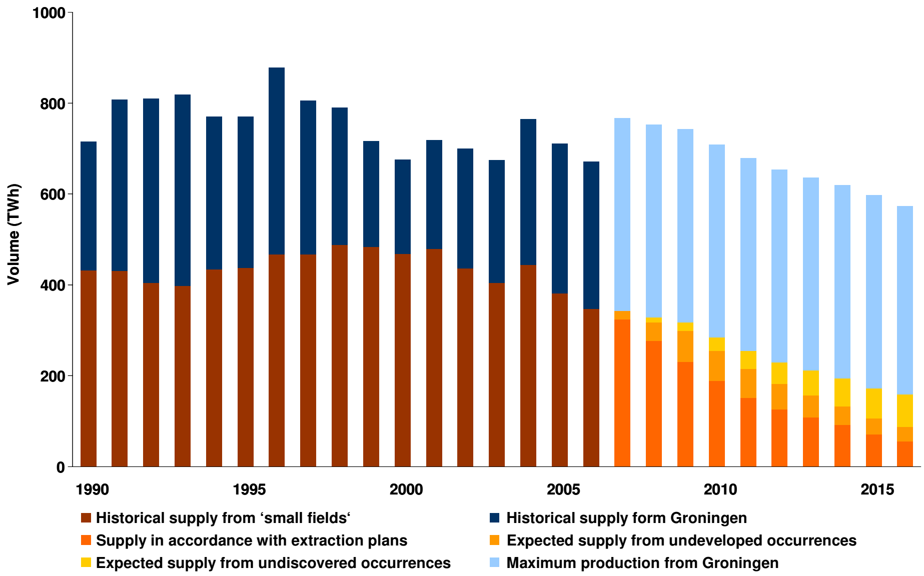
3.1.3 Trend in the Dutch gas balance

As in previous years, there is currently sufficient gas in the Netherlands. However, the relationships in the gas balance will probably change greatly in the years ahead due to a number of developments. The important factors in this regard are the decreasing domestic production and the increase in import and export flows.

[5] For the sake of clarity the daily gas flows have been smoothed by applying a 30-day moving average. The actual flows differ more widely from day to day. The storages of various gas qualities in this figure have also been aggregated to preserve clarity.

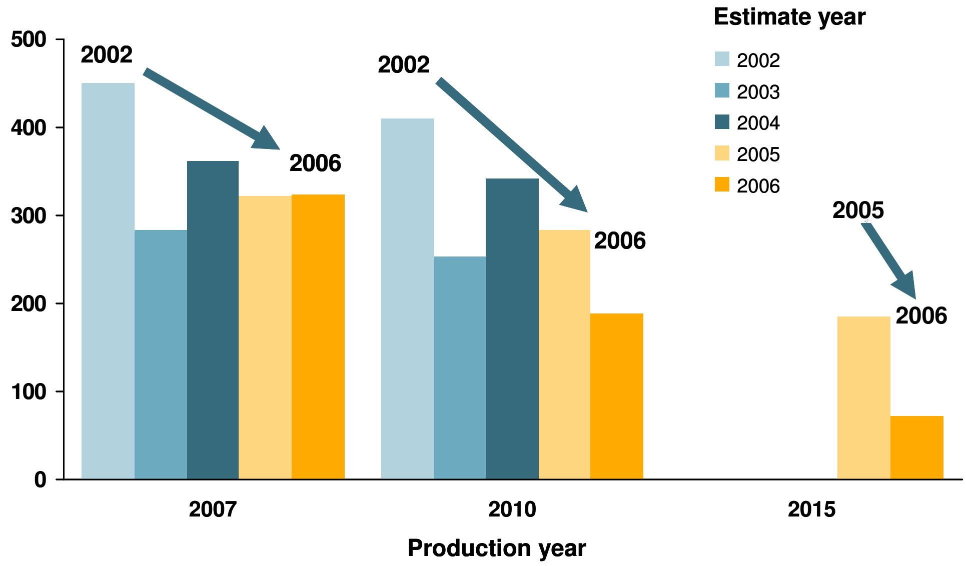
Dutch production is set to fall sharply in the years ahead due to a decrease in production from the small fields (high-calorific gas) (see Figure 5).

Figure 5: Expected domestic production up to 2016; source TNO-NITG



The above figure shows that a decrease in H-gas production of an average of 22 TWh a year is already expected from 2007. The small fields fall more sharply than expected. The forecasts for these fields have already been adjusted downwards a number of times in the past few years[6] (see Figure 6).

Figure 6: Projections of domestic production, non-Groningen; source TNO-NITG



[6] The projections do not take into account the planned Waddenzee production from 2004.

A production ceiling has been imposed in order to conserve the Groningen field. This ceiling is an average of 425 bcm (4,151 TWh) over a ten-year period (2006-2016). Consequently it will not be possible in the long term to supplement the declining production from the small fields with additional production from Groningen. This must be achieved in another way. Unless gas exports and/or domestic consumption decrease in the years ahead, additional (net) import capacity will have to be established in the years ahead.

Since the Netherlands has the objective of becoming the gas roundabout of the north-west European market, the capacities for (import) entry and (export) exit must be increased in order to keep export volumes stable (and even increase them). Several projects are currently under way which are intended to contribute to this. In order to increase the import and export capacity, a number of developments are taking place first in the pipeline transport network. Imports are also being further increased by the construction of LNG terminals. Below is a brief list of the main developments in both areas.

- At the end of 2006 the Balgzand-Bacton Line (BBL) entered service, allowing a maximum of 16 bcm per year to be exported to the UK. In order to accommodate this transport, various reinforcements were carried out in the East-West section of the grid. Currently, BBL can carry physical flows only to the UK, not in the opposite direction. Backhaul (administrative reverse flow) through the BBL is also impossible at present, as a result of which the Netherlands is not readily able to take advantage of any lower prices in the UK. Backhaul is due to be introduced in the BBL in 2008. Whether and when the BBL will become physically bidirectional is not known as yet.
- GTS held an Open Season in 2005 which led to an investment programme for the expansion of the Dutch gas network in the period 2010-2012. The main features of this programme are as follows: 450 kilometres of additional pipeline, mainly on the north-east to south-west and north-east to south-east axes; two new compressor stations and expansion of two existing compressor stations, allowing an additional 3 million m^3 per our entry into the north-east Netherlands, 0.7 million m^3 per hour exit at Zelzate and 0.45 million m^3 per hour exit for domestic industry.
- Depending on the choice made by a number of gas producers as to whether to land gas from Norway, additional investment will be necessary in entry capacity in North Holland and exit capacity at Zelzate and in Limburg.
- From 2009 no firm entry will be possible from Belgium through Zelzate. Fluxys has announced that it is changing the pressure in its network, as a result of which GTS will be (temporarily) unable to offer any further firm entry capacity at Zelzate. Until the current investments have been completed, entry capacity will be limited to entry on an interruptible basis from 2009.

LNG is also beginning to play a greater role in the Netherlands. Below is a list of the projects announced by market participants, together with their status.

- In 2006 an exemption was granted to the Gate LNG terminal for a maximum capacity of 12 billion cubic metres per year. Construction work is already under way.
- 4Gas has planned the Liongas terminal in the Rijnmond area with a maximum capacity of 18 billion cubic metres per year.
- Eemshaven LNG B.V. has announced its intention to construct a terminal in Eemshaven, mainly for its own use, with a maximum capacity of 12 billion cubic metres per year.

As yet, no firm investment decisions have been taken for any of the aforementioned terminals. Consequently it is not known how many terminals will actually materialise and what their actual annual entry capacity will be, let alone how much LNG will actually be landed in the Netherlands.

Some major developments are also under way in surrounding countries which may have a greater or lesser effect on the conveyance and supply of gas to the Netherlands.

- The southern part of the Ormen Langeled pipeline from Norway to the UK opened in October 2006. Production will commence in October 2007 with a maximum capacity of 20 bcm per year. This pipeline will relieve the pressure on the supply and price of gas in the UK and is therefore of importance for the export flows from the Netherlands through the BBL and indirectly for imports to the Netherlands through Zelzate.
- The start-up of several LNG terminals in the UK (i.e. Isle of Grain, Dragon LNG, Southhook) and the various expansions to gas storage capacity will further ease pressure in the UK market.
- The pipeline from Russia to Germany (Nord Stream) via the Baltic sea floor is expected to enter service in 2012 with an annual capacity of approximately 27.5 bcm. Objections from a number of countries bordering the Baltic Sea have recently caused some uncertainty. An expansion of the pipeline adding 27.5 bcm per year had previously been announced.

Issues

It is possible that the above developments at the entry and exit points will increase the shortage in the market in the next few years until the additional investments in entry capacity are completed. The fact that firm entry at Zelzate will be unavailable in the next few years due to agreements between GTS and Fluxys will only add to the problem. This development may have serious consequences for the Dutch gas market. In the first place, arbitrage between the individual markets will be impossible or only possible to a limited extent, which may have negative consequences for the availability and price of gas.

Moreover, during that period it will not be possible to use gas from the Belgian and UK markets to make up in full any shortages in the Dutch market. After all, access to the Zelzate entry point is being temporarily reduced and for the moment the BBL is only operating in one direction (both physically and administratively). High prices at Zeebrugge and the NBP may lead to higher prices at the TTF, but, conversely, lower prices at the NBP and Zeebrugge will not lead to lower prices at the TTF to the same extent.

Knowledge gaps

On both the demand and supply sides, the development of gas flows depends greatly on the decisions which market participants take in practice. Uncertainties in that context relate for example to the extent to which new electricity plants are supplemented with gas-fired plants or coal-fired and nuclear plants. Major uncertainties also remain on the supply side, such as the fact that it is still difficult to predict future production capacity (see prediction of production from small fields) and it is not at all certain how international gas flows will develop in the future. A great deal also appears to depend on the policy and investment decisions taken on this matter in the years ahead.

3.2 Transmission capacity

This section considers in greater detail the availability of transmission capacity in the GTS gas transport network. Prior to an evaluation of the transport services, a brief explanation is first given of the way in which transport services can be used (the reservation system). Using this as a reference, the transport capacities for import H, export H, export G+ and export L are considered in turn. The transmission capacity of the domestic network is not dealt with further here.

For each of the aforementioned capacities, a separate analysis is made of the available (physical) capacity, the extent of contractual reservation and the extent of utilisation. These analyses provide an insight into whether there is any contractual or physical congestion.

- There is contractual and physical congestion at all H import points (Oude Statenzijl and Zelzate). Moreover, congestion at Oude Statenzijl will increase up to 2012 due to the loss of the firm import capacity at Zelzate.
- At the export point for H-gas in Zuid Limburg there is contractual congestion. There may also be physical congestion at specific times.
- The reservable firm export capacity for H-gas will remain more or less unchanged up to 2020. Any additional capacity released as a result of the Open Season investments and/or LNG landing capacity was not yet reservable in 2006 and is not included in this Monitor.

3.2.1 Reservations of entry and exit capacity

In order to feed gas into (entry) or withdraw gas from (exit) the Dutch system, a contract must be entered into with GTS as the national TSO. The contracts are entered into for a specific point and apply to a specific capacity (in m^3/u or MW). Each entry or exit point can have a single gas quality (four are transported in the GTS network: H, L, G+ and G).

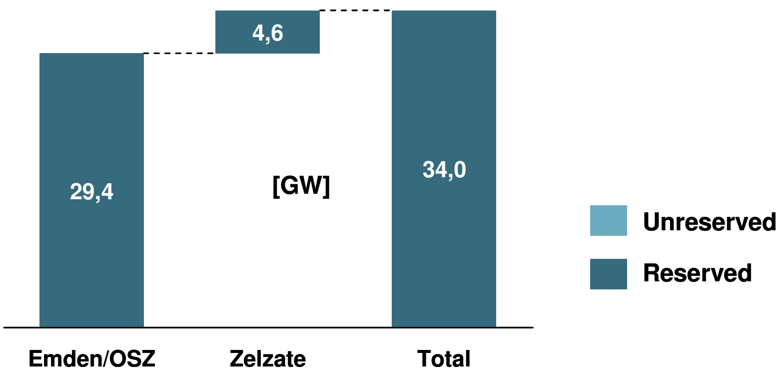
GTS accepts reservations for capacity on a “first come, first served” basis. As long as the required capacity is certain not to exceed the available capacity, a firm reservation is made. However, because in practice shippers frequently consume less than they have reserved, since they generally are contracting their peak requirement, GTS can continue to take reservations. Reservations above the total available capacity are then made on an interruptible basis. Interruptible capacity is cheaper than firm capacity, but there is a chance that the capacity will not be available. There are several tranches with different combinations of prices and certainties.

Shippers (non-balancing) who have reserved capacity must nominate one gas day previously the amount they are actually going to use. They can change these values (renominate) up to two hours beforehand. In principle, a shipper will lose any capacity which has been contracted but is not nominated two hours beforehand (“use it or lose it”). If the actual entry differs from the exit by more than the permitted limit, there is an imbalance. If a shipper has an imbalance, an imbalance charge is levied, the level of which depends on the type of imbalance. There are three categories: hourly imbalance, cumulative imbalance and daily imbalance.

3.2.2 Import capacity for high-calorific gas

The Dutch import capacity for H-gas is determined by the two import clusters at Zelzate and Emden/Oude Statenzijl (see Figure 7). Of these, Emden/Oude Statenzijl (Emden/OSZ) is by far the largest.

Figure 7: Average available and reserved firm import capacity for H-gas in 2006; source GTS

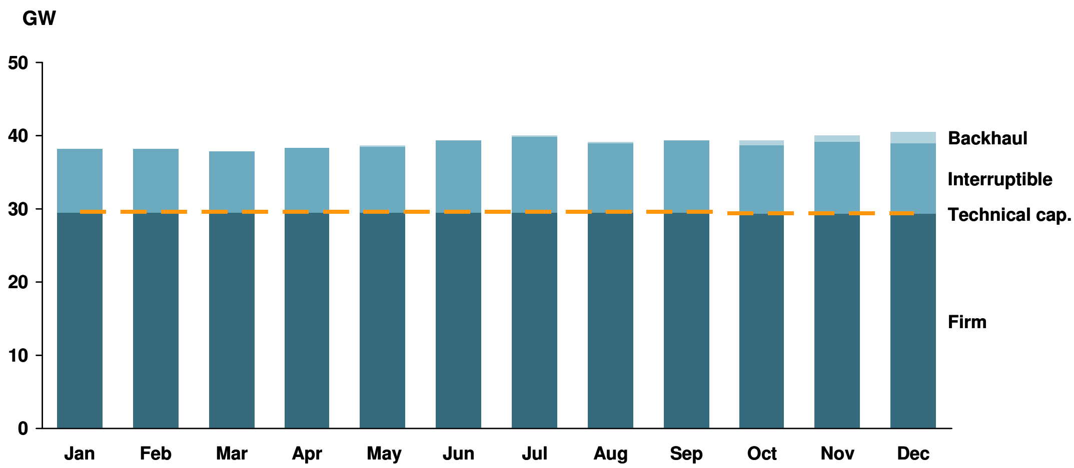


For both points, the technical capacity, the allocated firm, interruptible and backhaul capacity, the utilisation and interruptions and the future available capacity are considered in turn.

Emden/Oude Statenzijl

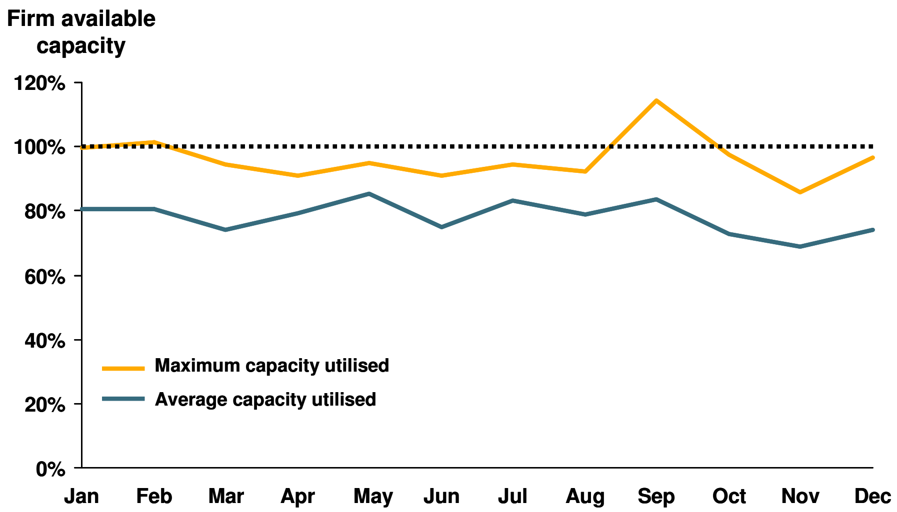
In comparison with 2005, the (technically available) capacity at Emden/OSZ increased in 2006. This was due to investments in the Midwolda – Oude Statenzijl section. Despite the increase in available capacity, all firm capacity at Emden/OSZ was sold out in 2006 (see Figure 8). As a result, approximately 33% of the capacity at Emden/OSZ was reserved on an interruptible forward basis. It therefore seems clear that there is contractual congestion.

Figure 8: Available and allocated import capacity for H-gas at Emden/OSZ in 2006; source GTS



The utilisation at Emden/OSZ was very high in 2006 (see Figure 9). The maximum monthly capacity used was often practically equivalent to the maximum technical capacity (100%), and sometimes even more. This indicates physical congestion and possibly a conservative estimate of the available technical capacity[7]. The average utilisation in 2006 therefore amounts to 78%, or an operating time of 6,800 hours. Utilisation in 2005 was approximately 73%, an absolute difference of five percentage points.

Figure 9: Level of utilisation of import capacity for H-gas at Emden/OSZ in 2006; source GTS

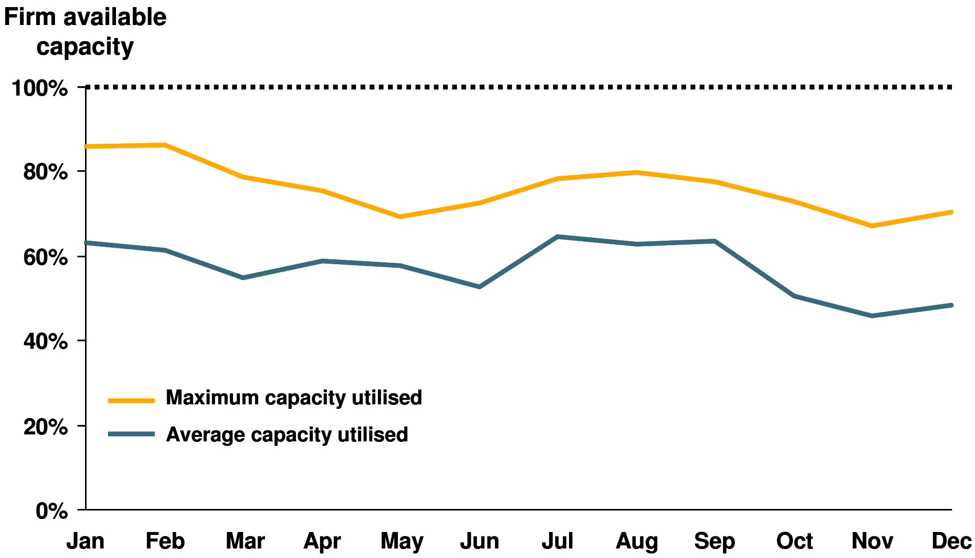


Shippers who had reserved interruptible capacity at Emden/OSZ were interrupted a number of times in 2006. This happened in January, March, May, July and December, in around 6% of the total number of hours in 2006. The total interrupted flow was approximately 0.1%. Therefore, in addition to contractual congestion, there is sometimes also physical congestion.

The above figure shows the utilisation based on the allocation of the technical capacity. However, since Emden/OSZ is a bidirectional point, firm export capacity can also be reserved here (see also section 3.2.3). When the import and export allocations cancel each other out, it can be seen that the actual physical utilisation of the point is considerably lower (see Figure 10). However, since capacity allocations are only available shortly before realisation, these capacity surpluses can no longer be made available to the market on a firm basis.

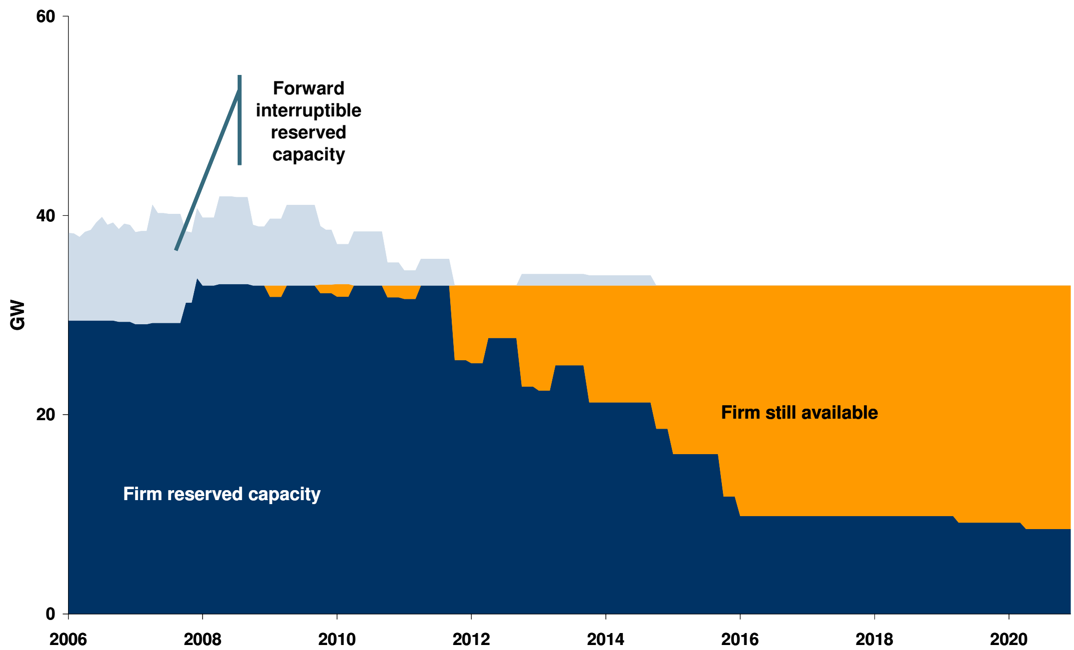
[7] The calculation of the utilisation is based on the technically available capacity. Because the origin or destination of reserved exit and entry cannot be determined in a decoupled entry/exit system, additional capacity is required to accommodate this uncertainty. Technical capacity therefore refers not to the capacity of individual pipelines, but to the system as a whole (including parameters such as pressure and temperature), so in some cases the utilisation of the individual entry and exit points may be higher than 100% of the technical capacity (of the system).

Figure 10: Actual utilisation of transmission capacity for H-gas at Emden/OSZ in 2006



Shippers have reserved capacity several years ahead on a large scale at Emden/OSZ (see Figure 11). Most firm capacity is fully reserved until 2012, but owing to contracting as part of the Open Season, capacity will only become available again around 2016. The available capacities stated in this Monitor do not yet include the additional capacities becoming available due to the Open Season investments and the additional entry as a result of the LNG landing that is yet to be realised.

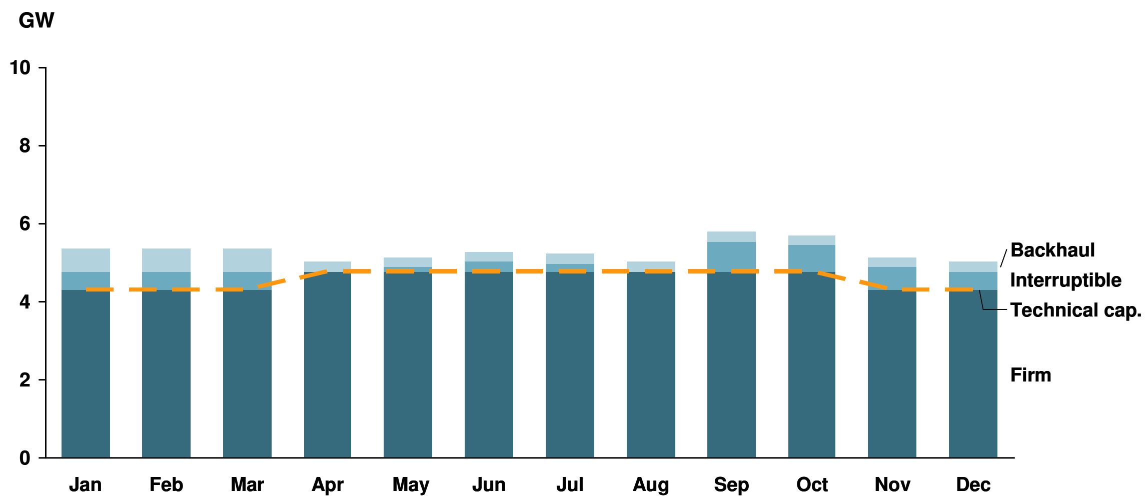
Figure 11: Reserved and available import capacity at Emden/OSZ, 2006-2020; source GTS



Zelzate

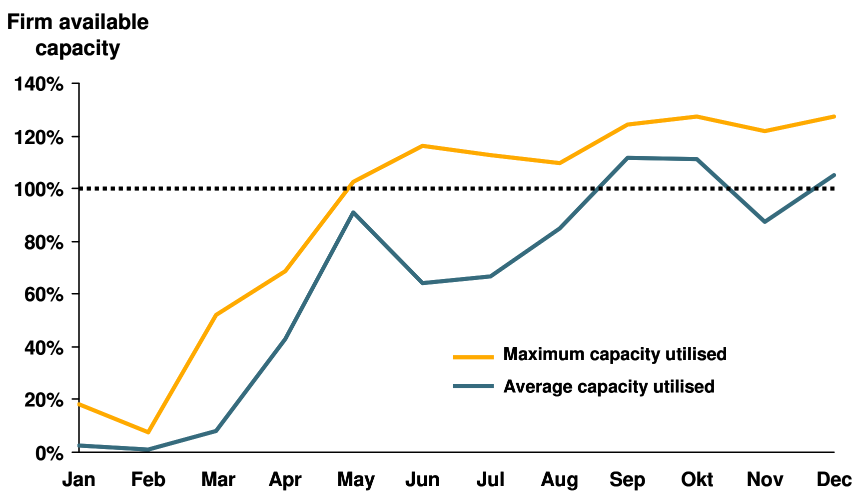
The Zelzate entry point also sold out of all firm available capacity in 2006 (see Figure 12). Shippers reserved both interruptible forward and backhaul capacity over the entire year, possibly to exploit arbitrage opportunities between Zeebrugge and the TTF. Since the available import capacity at Zelzate is being reduced to zero in the next few years, no further unreserved firm capacity is currently available for any period at Zelzate, in contrast to Oude Statenzijl. This is considered further in section 3.1.3 and later in this chapter. On the basis of this information it can be stated unequivocally that there is contractual congestion at the Zelzate import point.

Figure 12: Available and allocated import capacity for H-gas at Zelzate in 2006; source GTS



The level of utilisation at Zelzate differs from Oude Statenzijl in that the utilisation of the interconnection point stagnates when prices are higher at Zeebrugge (see Figure 13). As a result, the utilisation at the beginning of the year was low (physical reverse flow is not currently possible at Zelzate), while utilisation during the year rose due to price trends. The maximum capacity used after April exceeded 100% of the available capacity, and even the average capacity used in September and October rose above 100%. Further attention is devoted to the effects of arbitrage between Zeebrugge and the TTF in chapter 5.3.3. In view of the particularly high utilisation of Zelzate at times of higher prices at the TTF, it can be concluded that there is physical congestion.

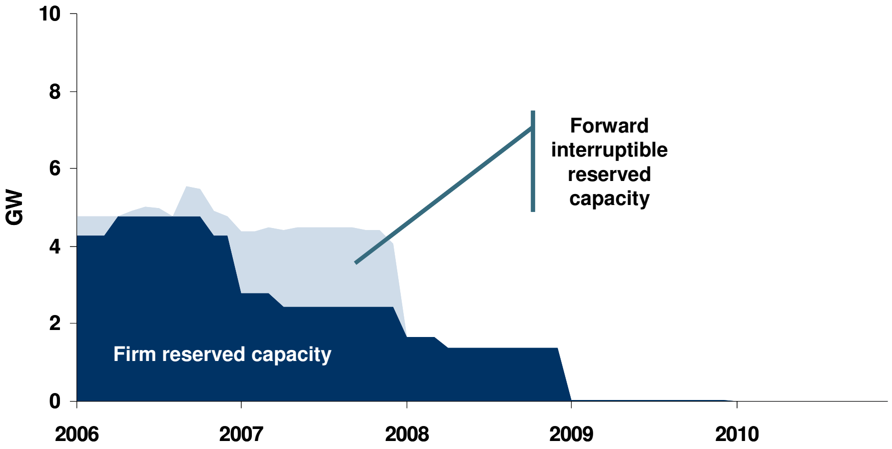
Figure 13: Utilisation of import capacity for H-gas at Zelzate in 2006; source GTS



Shippers were interrupted at Zelzate a number of times in 2006. This happened in June, September and October 2006. Interruptions affected an average of 2% of hours over the year.

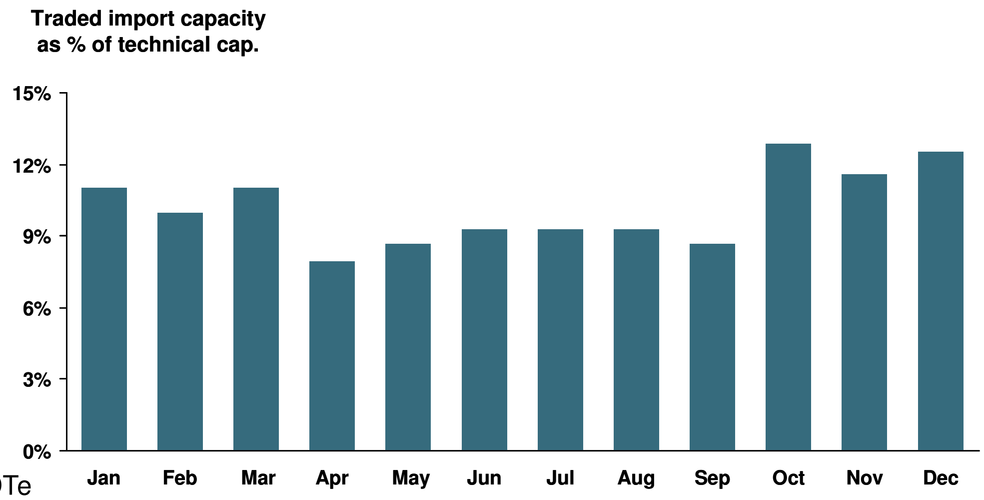
No firm (import) capacity will be available at Zelzate after 2009 (see Figure 14). GTS has stated that the (temporary) reduction in capacity is due to pressure changes which Fluxys is introducing in the Belgian transmission grid. GTS also wishes to convert Zelzate technically into a bidirectional point in order to meet the growing demand for export capacity and arbitrage in both directions. The congestion will therefore only increase in the years ahead. The possible consequences for the operation of market forces in relation to high-calorific gas in the Netherlands and in particular the liquidity and arbitrage potential are viewed with great concern.

Figure 14: Reserved and available import capacity for H-gas at Zelzate, 2006-2010; source GTS



The shipper questionnaire revealed that many shippers would have liked to reserve more firm capacity. However, it is not known how much more demand there was for firm capacity, since no record is kept of rejected capacity reservations and shippers themselves state that they do not enquire if they know that it is fully reserved. Most shippers also state that they prefer to reserve on a firm rather than on an interruptible basis, because for the moment they are not able to estimate accurately the probability of interruption and manage this risk effectively due to a lack of historical interruption data.

Figure 15: Traded import capacity for H-gas in the secondary market in 2006; source GTS



Secondary trading of import capacity in 2006 amounted to around 10% (see Figure 15). A slight rise can be seen in trading in the secondary market in the winter months. This may be due to the fact that it is easier for shippers to reserve on a flat rather than a profile basis. The capacity which they do not use is then offered in the market.

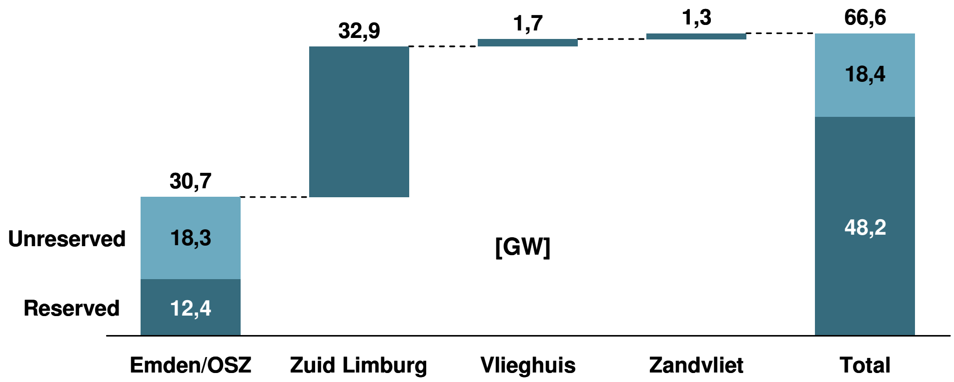
Issues

There is contractual and physical congestion at both Oude Statenzijl and Zelzate. Moreover, the available (firm) import capacity will if anything decrease up to 2012 as a result of the conversion of Zelzate for bidirectional flows and the creation of a net export point. It is unclear whether the remaining available import capacity in combination with decreasing H-gas production from the small fields will be sufficient to continue to meet demand for gas, particularly in the event of high gas demand.

3.2.3 Export capacity for high-calorific gas

The export capacity for H-gas in the Netherlands is divided among four clusters of exit points, namely Emden/OSZ, Zuid Limburg, Vlieghuis and Zandvliet. Oude Statenzijl and Zuid Limburg represent over 95% of the available export capacity for H-gas (see Figure 16) and are thus the most important.

Figure 16: Available and reserved firm export capacity for H-gas in 2006; source GTS

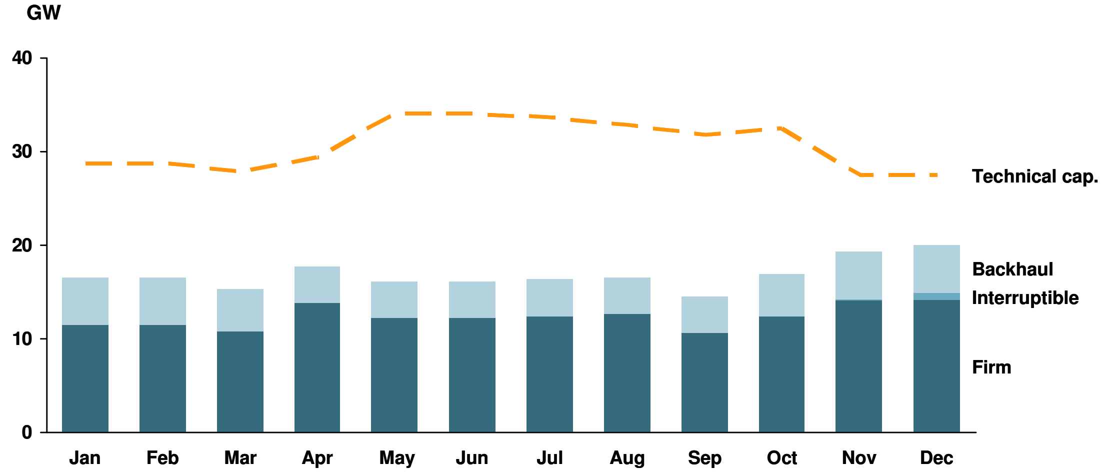


The Balgzand-Bacton Line (BBL) entered service in November 2006 and carried the first volumes of H-gas on a test basis in the final weeks of 2006. At the beginning of 2007, the BBL became fully operational for commercial transport, providing additional annual export capacity of a maximum of 16 bcm (approximately 1.8 million m^3 per hour, or 18 GW). For 2006, the Monitor is limiting itself to the Emden/OSZ and Zuid Limburg points. The analysis that follows covers in turn the technical capacity, allocated firm, interruptible and backhaul capacity, the utilisation and interruptions and the future available capacity.

Emden/Oude Statenzijl

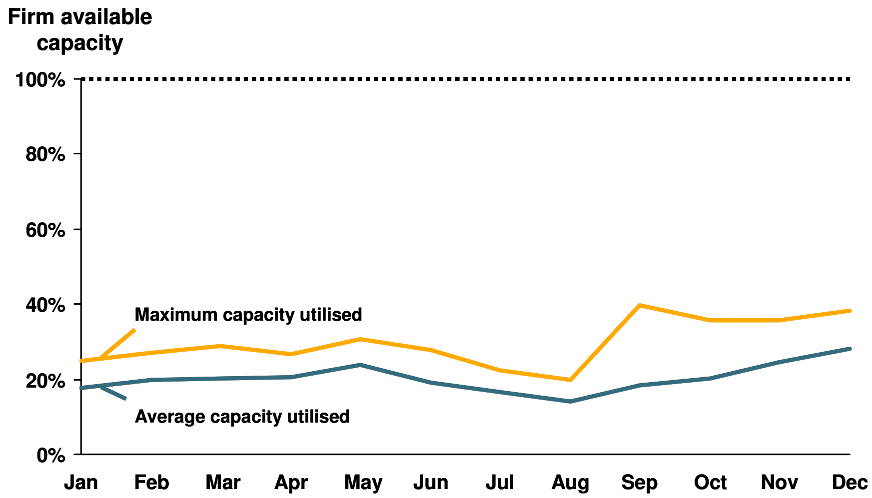
The available export capacity at the Emden/OSZ H-gas export point was not fully utilised in 2006. The quantity of available firm capacity (averaging 3.1 million m^3 per hour, or 30.7 GW) was not fully reserved in 2006. The average reservation level in 2006 was 40% (see **Figure 17**). In view of the net imports of H-gas at the Emden/OSZ entry point, this low utilisation is not surprising. In addition, hardly any interruptible forward capacity was reserved in 2006 (<0.5%). By contrast, backhaul was higher, with 14% being reserved (as a percentage of the available firm forward capacity).

Figure 17: Available and reserved export capacity for H-gas at Emden/OSZ in 2006; source GTS



The utilisation of Emden/OSZ shows the same picture. The average utilisation at that point in 2006 amounted to 20%[8] (see Figure 18).

Figure 18: Utilisation of export capacity for H-gas at Emden/OSZ in 2006; source GTS

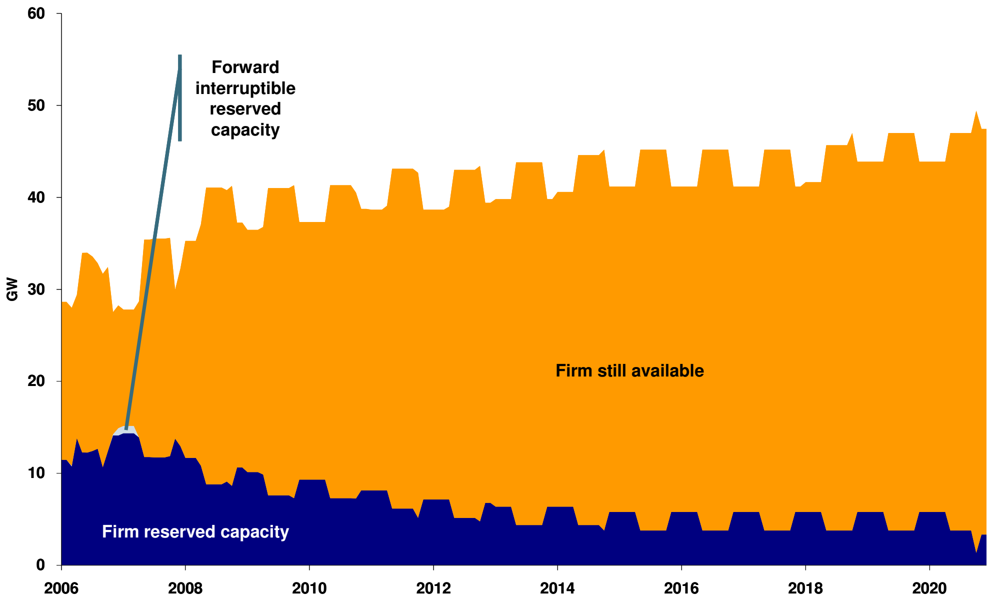


The available export capacity at Emden/OSZ increases from around 3.1 million m³ per hour (30.3 GW) in 2006 to 4.7 million m³ per hour (45.9 GW) in 2020 (see

Figure 19). Hence there is currently sufficient capacity available for reservations.

[8] As a percentage of the available firm forward capacity

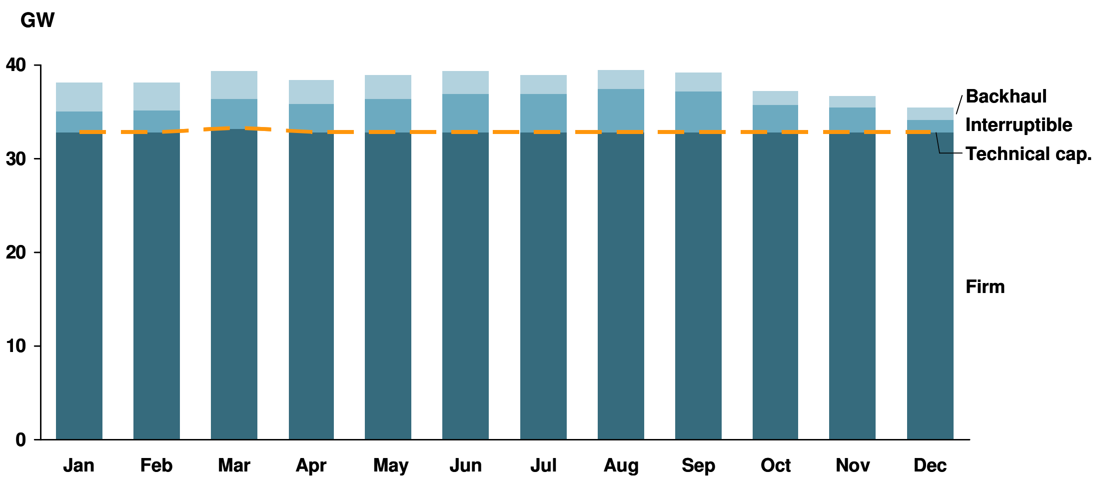
Figure 19: Available and reserved export capacity for H-gas at Emden/OSZ 2006-2020; source GTS



Zuid Limburg

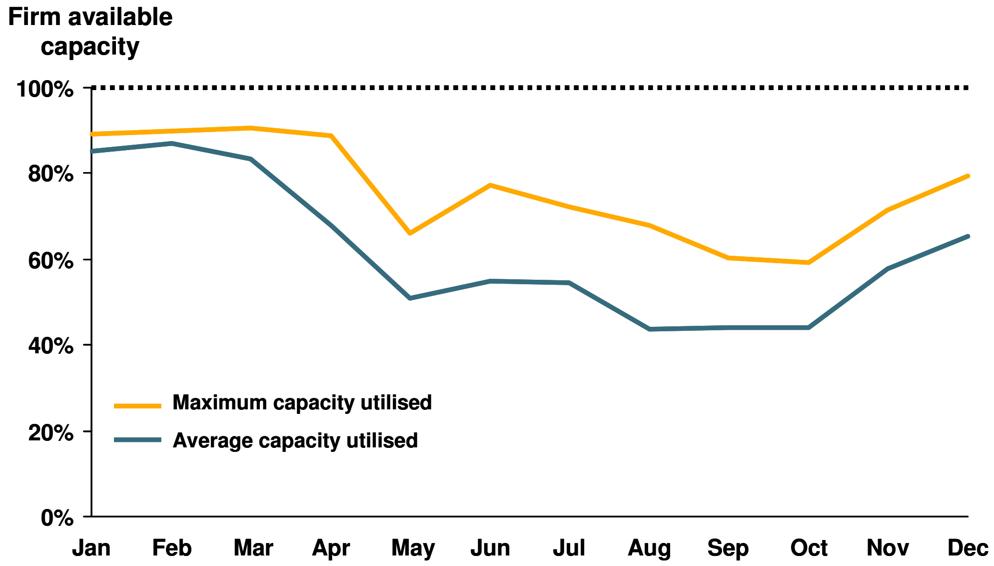
The Zuid Limburg cluster is the most important point for the export of H-gas. The available capacity for exports at this point over the year averaged 3.36 million m^3 per hour (32.9 GW) and was sold out for the entire year. In addition, interruptible capacity was reserved amounting to 10% and backhaul amounting to 68% of the available technical capacity (see Figure 20). The extent to which interruptible capacity was purchased suggests that there is some contractual congestion.

Figure 20: Available and allocated export capacity for H-gas at South-Limburg in 2006; source GTS



The utilisation of Zuid Limburg shows that the available capacity during the winter months was almost fully utilised, but that during the summer months the use of the available capacity was low. (see Figure 21).

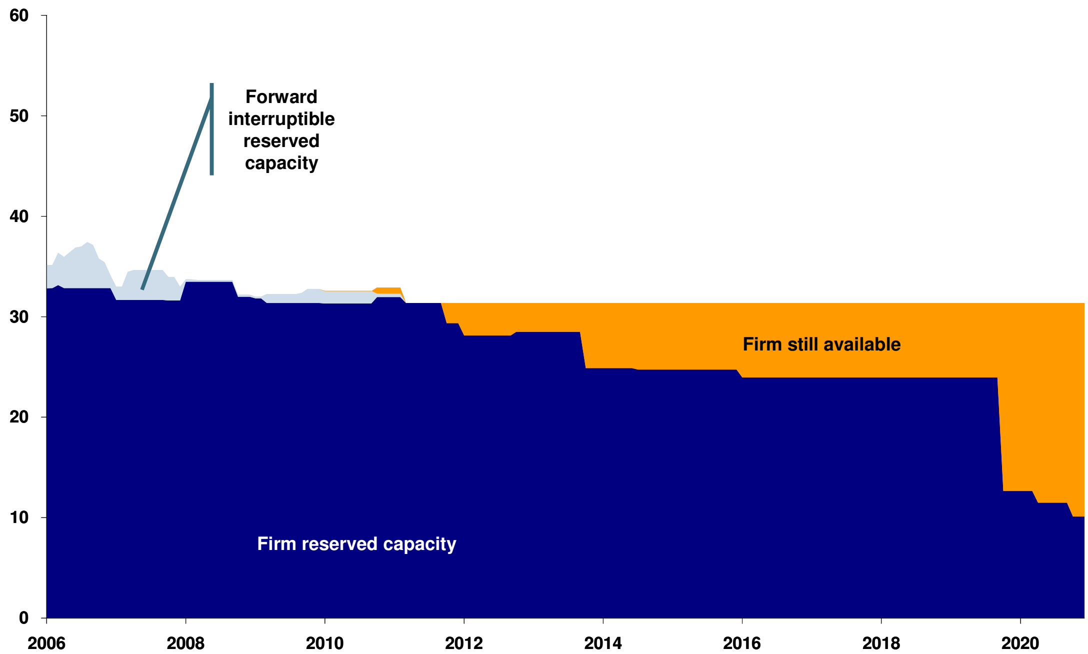
Figure 21: Utilisation of export capacity for H-gas at South-Limburg in 2006; source GTS



In accordance with the above, it emerges that interruptions took place mainly in the first quarter. Physical congestion appears to have been a possibility only during that period.

All available capacity is already reserved up to 2011 (see Figure 22). As part of the Open Season, however, the remaining capacity has been contracted in advance up to 2020. The figure below does not include the investments in additional capacity resulting from the Open Season.

Figure 22: Available and reserved export capacity for H-gas at Zuid Limburg 2006-2020; source GTS



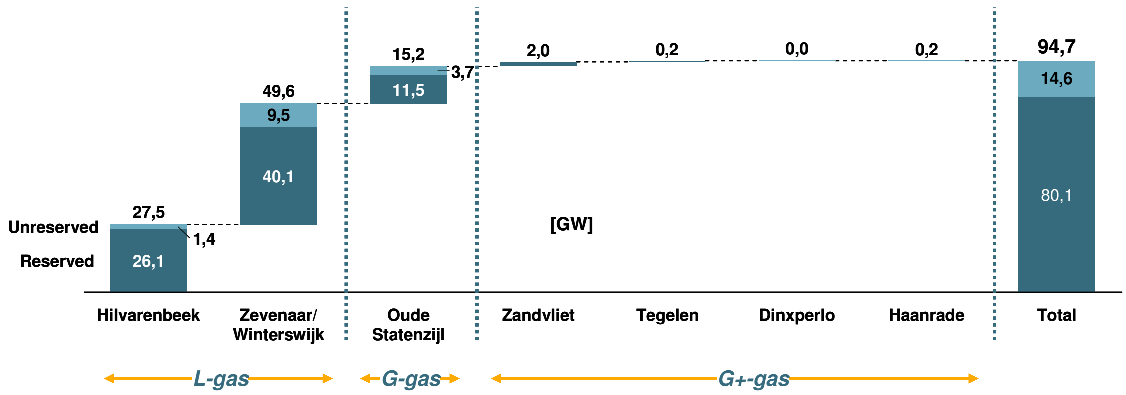
Knowledge gaps

The capacity information obtained this year does not include all of the developments to be carried out with regard to export capacity for H-gas. The additional capacity due to become available as part of the Open Season will play a key role. This must be clarified in the short term in order to gain a proper insight into the gas balance for the Netherlands.

3.2.4 Export capacity for low-calorific gas

Over 95% of all the low-calorific export capacity relates to L-gas (81%) for Germany and Belgium and G-gas (16%) for Germany (see Figure 23). The remaining capacity is intended for exports of G+ gas. For exports of L-gas, the Netherlands has two major points, namely Hilvarenbeek and Zevenaar/Winterswijk. G-gas is only exported at Oude Statenzijl.

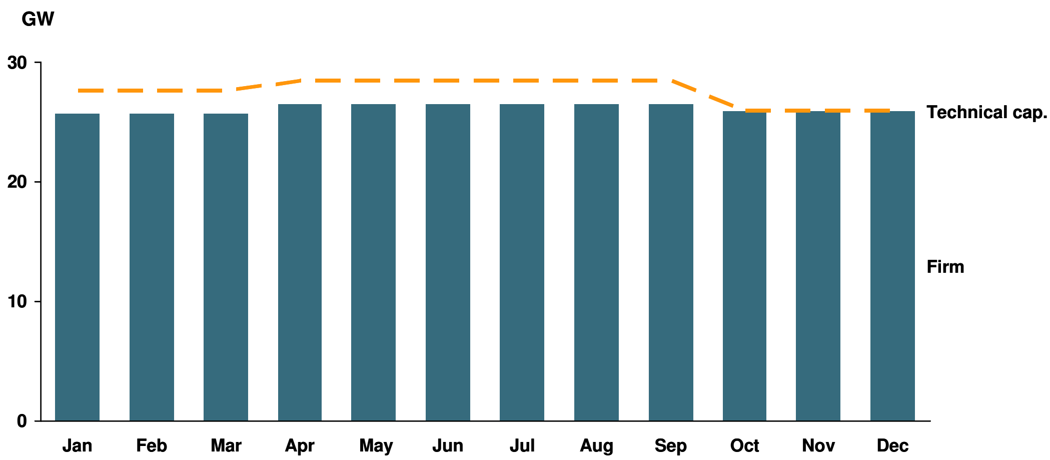
Figure 23: Available and reserved firm export capacity for low-calorific gas in 2006; source GTS



Hilvarenbeek

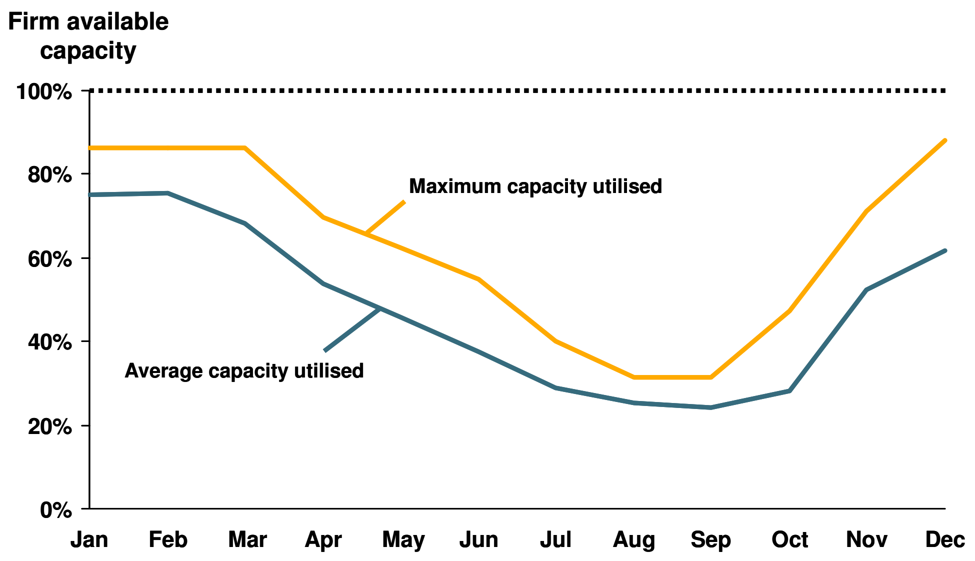
Only firm export capacity was reserved at Hilvarenbeek in 2006. The average reserved capacity during the year amounted to around 95% of the technically available capacity (see Figure 24).

Figure 24: Available and reserved export capacity for L-gas at Hilvarenbeek in 2006; source GTS



The utilisation of the capacity at Hilvarenbeek was considerably lower, with an annual average of 48% (see Figure 25). This is not surprising, however, since L-gas exports are generally intended for households and are thus dependent on seasonal factors.

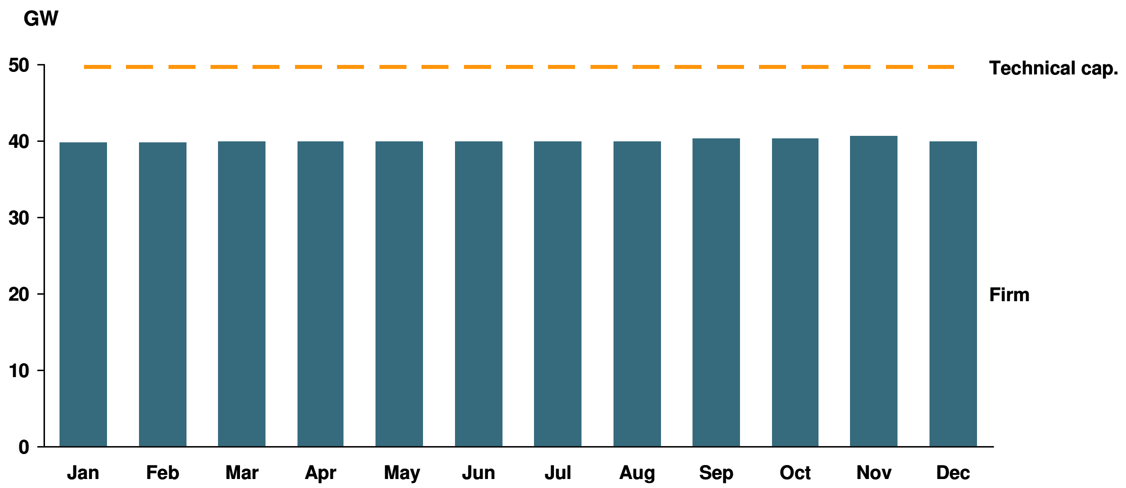
Figure 25: Utilisation of export capacity for L-gas at Hilvarenbeek in 2006; source GTS



Zevenaar/Winterswijk

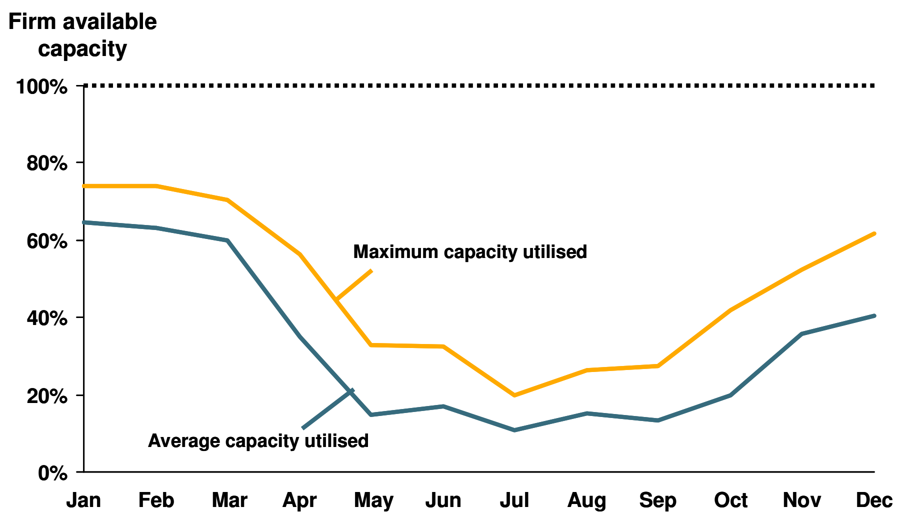
The level of reservation at Zevenaar/Winterswijk was substantially lower in 2006 in comparison with Hilvarenbeek and amounted to an average of 81% during the year (see Figure 26). Once again, only firm capacity was reserved here.

Figure 26: Available and reserved export capacity for L-gas at Zevenaar/Winterswijk in 2006; source GTS



The utilisation of Zevenaar/Winterswijk during the year amounted to an average of 32% (see Figure 27).

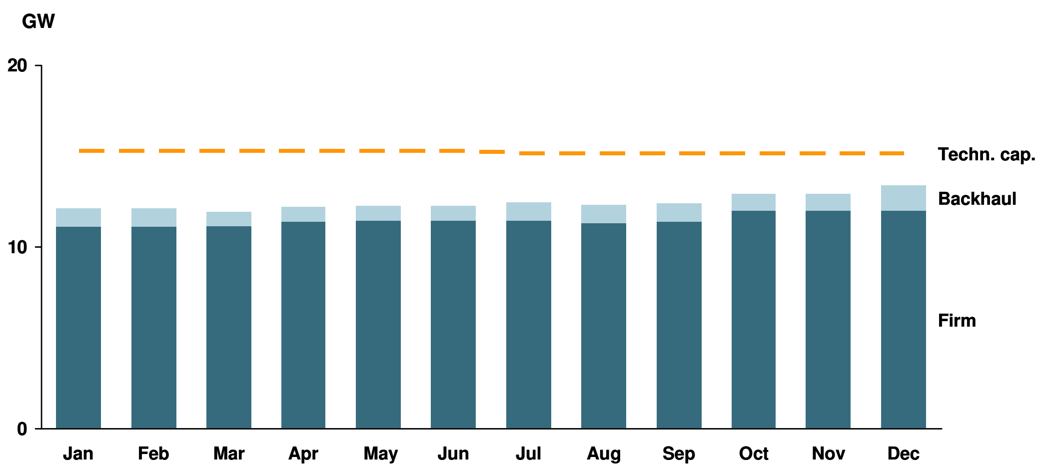
Figure 27: Utilisation of export capacity for L-gas at Zevenaar/Winterswijk in 2006; source GTS



Oude Statenzijl

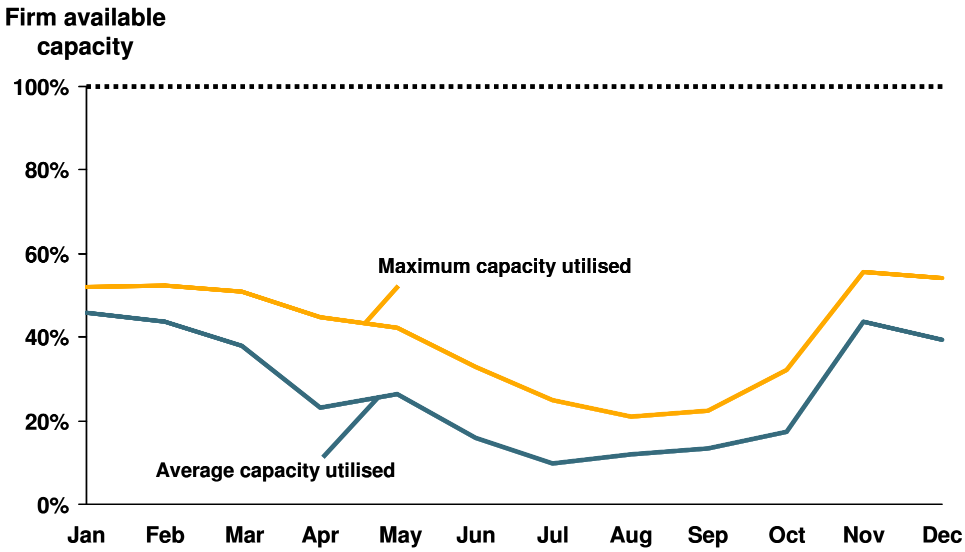
At Oude Statenzijl, not only firm capacity but also backhaul was reserved in 2006 (see Figure 28).

Figure 28: Available and reserved export capacity for G-gas at Oude Statenzijl in 2006; source GTS



Despite the fact that the firm reservations were fairly high (average reservation level of 76% during the year), the utilisation turned out to be fairly low in 2006 (see Figure 29). The annual average for 2006 amounted to 27%.

Figure 29: Utilisation of export capacity for G-gas at Oude Statenzijl in 2006; source GTS



Knowledge gaps

Many foreign households (including in Belgium) have had the possibility of consuming both low-calorific and high-calorific gas for a considerable time. Whether, when and to what extent regions will be able to switch their gas grids to high-calorific gas is not known. What is known is that the discussion in Belgium is still ongoing and that the priority at the moment lies with industrial customers, who may consequently be able to derive a financial benefit. Such a development may have considerable consequences for the gas flows through the various quality networks, since it will lead to additional demand for high-calorific gas and decreasing demand for low-calorific gas (and hence demand for quality conversion).

3.3 Quality conversion

Various qualities of natural gas are introduced into the grid in the Netherlands. In order to match supply and demand for the various qualities of gas, GTS can convert them into each other by means of quality conversion. GTS uses two methods: blending and nitrogen dilution. In the case of blending, flows of high-calorific (H-gas) and low-calorific (e.g. G-gas) natural gas are blended in order to form natural gas with an intermediate calorific value (e.g. G+ gas or L-gas). In the case of nitrogen dilution, a single gas quality (generally H-gas) is diluted with nitrogen until the desired calorific value is attained. Therefore, these quality conversion methods can only be used if the conversion is “downward”. It is not physically possible to convert to a higher gas quality.

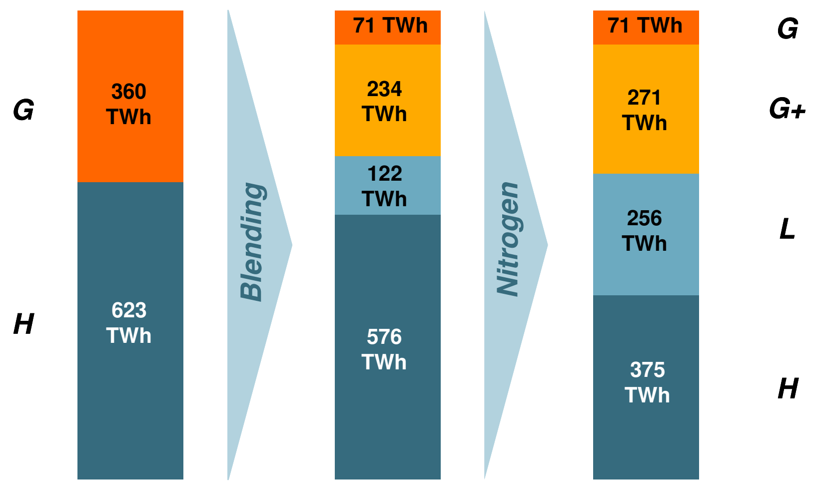
Annex 1 to this Monitor describes the operation of quality conversion and provides a list of the current quality conversion stations. This chapter deals in turn with the demand for quality conversion in 2006 and the extent to which it was available. It also considers the extent to which quality conversion capacity was reserved and used in practice in 2006. Finally, it considers the extent to which capacity is already reserved up to 2010.

- No physical shortage of quality conversion capacity was observed in 2006.
- Since demand for quality conversion capacity may decrease (temporarily) due to a decline in the domestic supply of H-gas and the fact that additional capacity will come on stream in 2010, it appears unlikely that insufficient physical quality conversion capacity will be available in the future.
- Nevertheless, all available capacity is fully reserved up to 2010, which means there will be only limited price competition in the low-calorific market in the Netherlands.

3.3.1 Demand for quality conversion

It can be calculated from the gas balance for 2006 that around 250 TWh of high-calorific gas and approximately 290 TWh of Groningen gas was converted to G+ and L-gas in 2006 (see Figure 30)[9].

Figure 30: Gas balance in 2006 based on gas quality; source GTS



[9] The use of nitrogen is not specifically linked to L-gas production. Blending and nitrogen dilution take place simultaneously for the conversion to both G+ and L.

Approximately 75% of the total quality conversion capacity utilised (blending and nitrogen dilution) was used to produce L-gas for the export market. The remainder was used to produce G+ for the domestic market.

On the supply side of the gas balance, the capacity for quality conversion is limited by the supply of H-gas from the small fields, the availability of G-gas and the available capacity for nitrogen blending. It was previously stated that the production of H-gas from the small fields is decreasing (see Figure 5) and is even declining faster than was originally believed (see Figure 6). It was also shown previously that congestion is currently occurring at the entry points for H-gas (and that entry at Zelzate will not even be possible from 2009). An expansion of import capacity will take place at the earliest after 2012, when the capacity based on the Open Season for the North-South line becomes available. Furthermore, it is likely that exports (including through the BBL) will create additional demand in the H-cal market in the years ahead. Overall, it can be concluded that in all probability less H-gas will be available up to 2012.

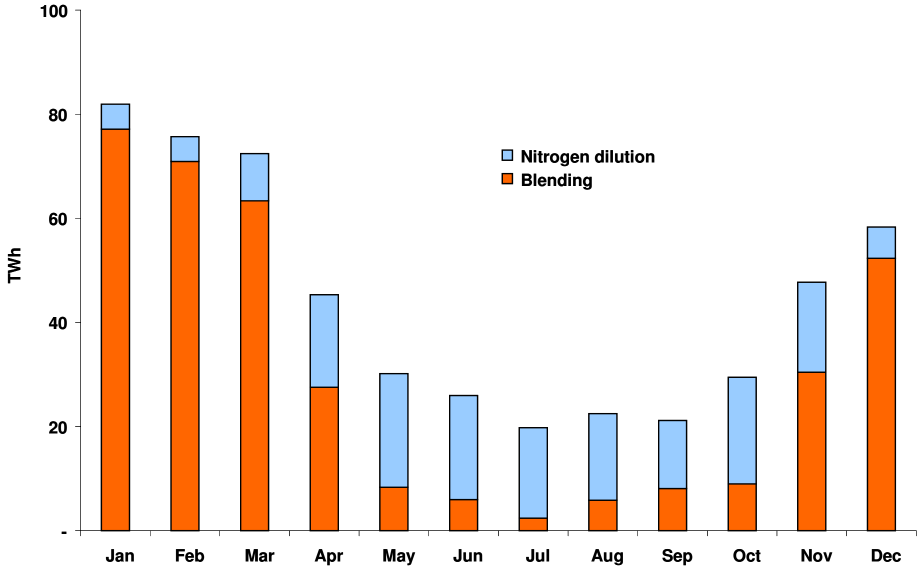
In order to meet demand from the Dutch market, it may be necessary to produce more gas from Groningen. Since production from the Groningen field has remained below the production ceiling in the last few years, that should be possible in principle. With increasing availability of G-gas, more can be blended, so less nitrogen will be necessary for the production of L and G+ gas. In principle, therefore, there will be more spare quality conversion capacity which can be used to open up the L-cal market in the Netherlands.

On the demand side of the Gas balance, it has already been seen that the majority of the quality conversion capacity is intended for L-gas production, which is exported. Foreign demand for L-gas in the long term is uncertain, however. Households in Belgium have been able for some time to consume not only low-calorific but also high-calorific gas. If all or part of the low calorific gas exports to Belgium and Germany were ultimately switched to H-cal consumption, a considerable amount of conversion capacity would be released for the Dutch market.

3.3.2 Supply of quality conversion capacity

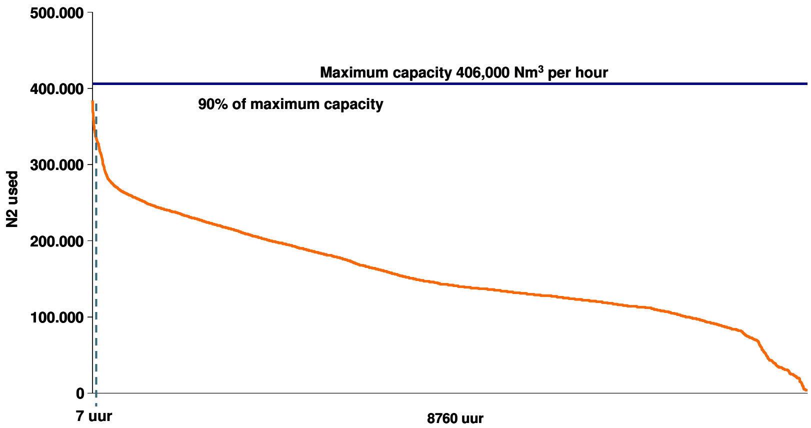
As stated above, GTS has two methods for meeting demand for quality conversion: blending and nitrogen dilution. If an analysis is made on a monthly basis of the volume of quality conversion and the extent of utilisation of blending and nitrogen dilution, it can be seen that in the winter months quality conversion was mainly carried out by blending, while in the shoulder and summer months the use of nitrogen increased strongly (see Figure 31). Since capacity is generally contracted on the basis of peak requirements, it could be concluded that if more quality conversion were to take place on the basis of blending in the shoulder and summer months, there would be more space for competition in the L-cal market. However, this would mean a loss of flexibility, since production at Groningen would be “flatter” in such a scenario.

Figure 31: Monthly use of blending and nitrogen dilution for quality conversion[10]; source GTS



Since blending is limited only by the amount of low-calorific gas available for blending with high-calorific gas, no real physical capacity restriction can be indicated other than the supply of G-gas for quality conversion purposes. However, quality conversion by nitrogen dilution is subject to a maximum limit. In 2006, a maximum of 406,000 m^3 of nitrogen per hour could be used for quality conversion purposes. However, this maximum capacity was not fully used at any time in 2006 (see Figure 32). By comparison, the available quality conversion capacity was used fully on one occasion in 2005. Utilisation exceeded 90% of the available capacity in only seven hours in 2006. Hence there was no physical congestion in 2006. It should be noted that 2006 was not a representative year in terms of the temperature pattern, and the fact that no physical congestion occurred in 2006 is therefore not necessarily illustrative of the "colder" years. The average utilisation of the nitrogen dilution part of the quality conversion capacity in 2006 was around 40%.

Figure 32: 2006 load duration curve of nitrogen use for quality conversion; source GTS



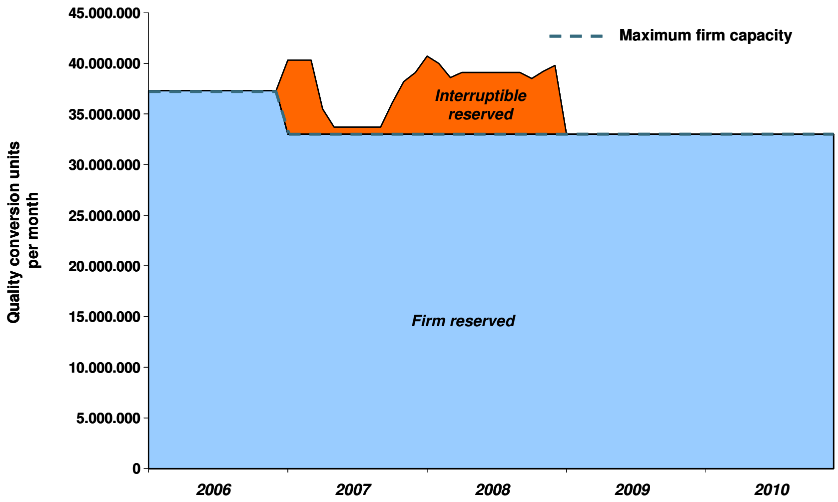
[10] Quality conversion expressed in production of L and G+ gas in TWh units

3.3.3 Available and reserved quality conversion capacity

Although no physical congestion occurred in 2006, it is likely that contractual congestion occurred. First, all (firm) quality conversion capacity for 2006 had been fully reserved, and it was not yet possible to contract quality conversion as an interruptible service in 2006. The proportion of re-traded capacity in 2006 was also barely significant. Finally, it is likely that in practice the capacity which was released in 2006 as a result of the "use it or lose it" (UIOLI) policy is hardly used, if at all, by market participants, since the time prior to realisation is too short to make effective use of it.

From 1 January 2007, quality conversion can also be contracted as an interruptible service. This is only possible if the "firm" quality conversion capacity is sold out. In addition, the capacity for quality conversion will rise by 50% in 2012 due to the construction of a nitrogen storage cavern[11]. However, quality conversion capacity is sold out up to the end of 2010 (see Figure 33). It will also be shown later that the (current) capacity reservations are held by a very small number of parties.

Figure 33: Available and reserved quality conversion capacity; source GTS



Issues

Despite the fact that there is no physical shortage of quality conversion capacity and the expectation that the capacity requirement will decrease in the years ahead, all available capacity is fully reserved up to the end of 2010. It can be concluded from this that it is practically or completely impossible for entrants to gain access to the low-calorific market with H-gas and immediate quality conversion.

Knowledge gaps

NMa/DTe does not have an entirely clear view of how the reservation system operates in practice. For example, used Quality Conversion Units (QCUs) cannot be submitted. It is also not yet entirely clear how demand for quality conversion and flexibility influence each other. Furthermore, it is unclear how the export market for low-calorific gas will develop in the future and how much quality conversion capacity will need to be contracted for it.

[11] Source: GTS shippers' meeting of 4 April 2007; additional capacity does not yet appear to have been included in the available capacity.

3.4 Flexibility

In addition to the purchase and sale of gas as a commodity (bulk) and gas transport to the destination, shippers must also match the purchased gas to the actual demand. The actual demand for gas fluctuates over time due to both predictable (e.g. more gas consumption in the winter) and unpredictable events (e.g. unpredictable temperature variations or production problems), while the supply of gas is often reasonably constant. In order to ensure that the supply of gas matches the ultimate demand for gas, shippers require flexibility both in the shorter term (hour, day) and in the longer term (month, season).

This chapter deals with the availability of access to flexibility. It considers the demand for and use of the various flexibility resources by market participants and specifically gas storage. Finally it considers the current balancing regime in greater detail.

- The Groningen field is by far the largest source of flexibility in the Netherlands. In second place come the large storage facilities in empty former gas fields. Finally, the TTF is an important source of flexibility in both the short and long term.
- A large part of the flexibility in the Netherlands is exported, while domestic shippers state that they have few flexibility options.
- The decrease in production from the Groningen field and the small fields combined with more baseload imports will cause a further increase in demand for new flexibility sources, particularly gas storage.
- Shippers state that they have too little storage capacity available for the seasonal market, while there is demand for it and the current storage capacity is only utilised to a limited extent.
- Shippers are not provided with steering information in sufficient time to actively manage their imbalance position. As a result, they have to rely largely on non-nominated flexibility resources as such as Combiflex and tolerance.

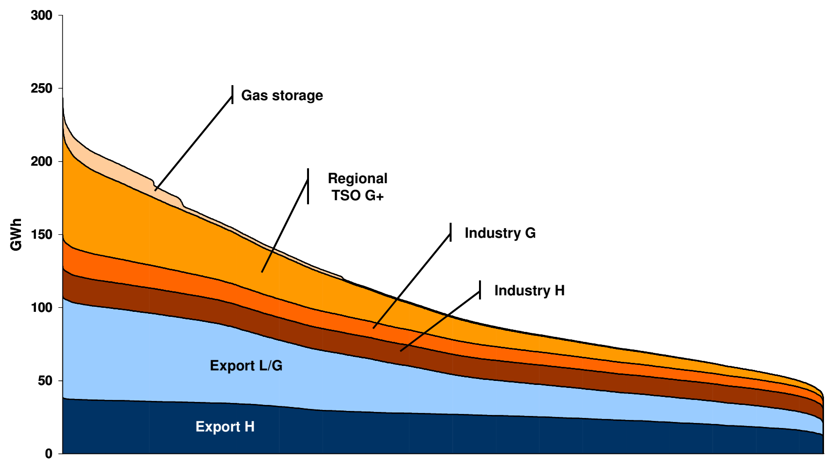
3.4.1 Demand for and supply of flexibility resources

Demand for flexibility resources

The demand for flexibility resources can best be illustrated by using a load duration curve in which the hourly realised exit flows in 2006 are sorted by size (see Figure 34)[12]. The load duration curve shows that a great deal of flexibility was required in 2006, mainly for supplies to Dutch households (G+ for regional TSOs) and low-calorific export customers in Germany and Belgium (export L), since it is there that the difference between the maximum and minimum hourly consumption is greatest. The remaining consumption of gas from the GTS grid was relatively constant in 2006, as in other years, and therefore also required less use of flexibility sources.

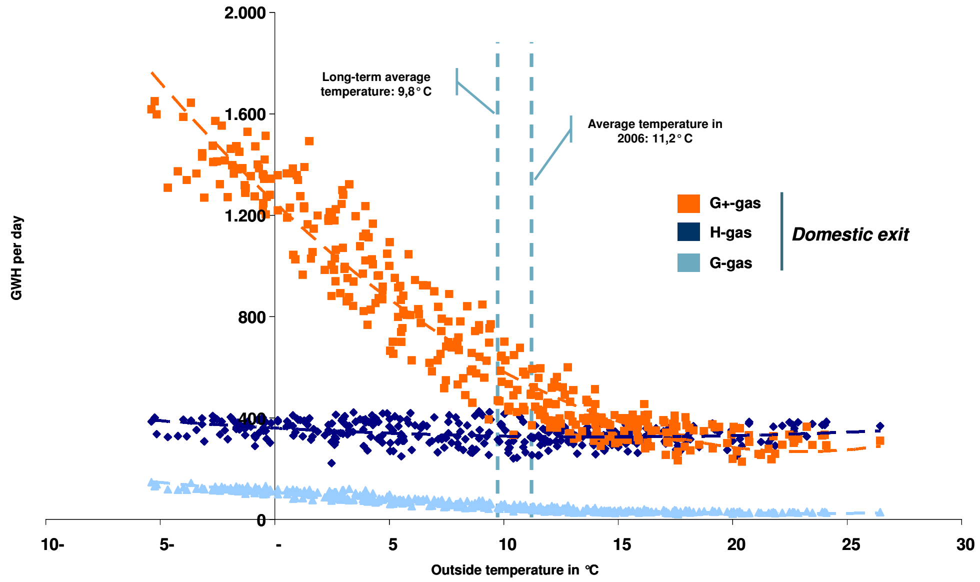
[12] For reasons of clarity and confidentiality, the load duration curve has been "smoothed" using a 30-day moving average.

Figure 34: Load duration curve of exit flows in 2006[13]; source GTS



The flexibility requirement is mainly the result of two factors. First, consumption by households is highly temperature-dependent and gas demand fluctuates with the temperature (see Figure 35). This gives rise to a flexibility requirement for each time unit, but particularly to a seasonal and annual flexibility requirement. It can also be deduced from the figure that as a result of the relatively high average temperature in 2006 compared to the long-term average, the average national gas consumption for G+ gas (mainly households) in 2006 was approximately 75 GWh per day lower than usual. On an annual basis (based on a linear relationship between the outside temperature and gas demand!) that would amount to approximately 25 TWh. The other domestic exit flows show a lower correlation with the outside temperature.

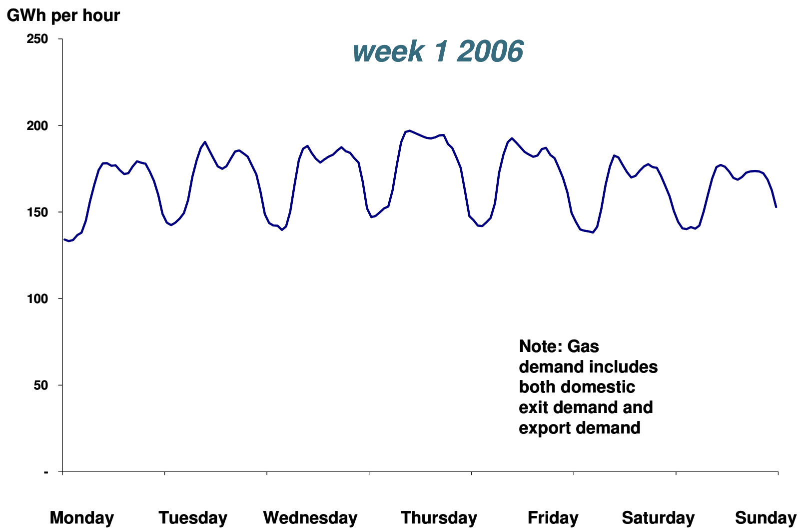
Figure 35: Influence of outside temperature on domestic gas demand; source GTS, KNMI (Royal Dutch Meteorological Institute)



[13] The various exit flows are sorted separately in the figure. The peak demand is therefore not a genuine peak demand, but the maximum of the individual peak times.

Secondly, households' consumption often follows a specific pattern, with peaks in demand during the morning ('getting up peak') and during the evening ('homecoming peak'). This pattern mainly gives rise to an hourly flexibility requirement (see Figure 36).

Figure 36: Influence of 'time of day' on gas demand (G+); source GTS



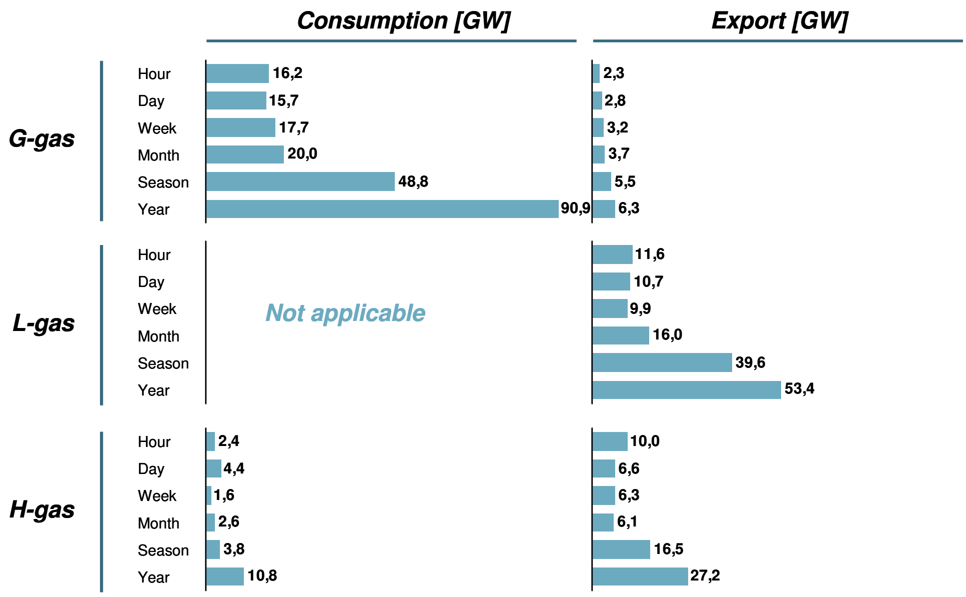
It follows from the above that for the flexibility requirement a distinction can be made in terms of the duration for which the flexibility requirement is measured. Depending on the type of users being supplied, each shipper's flexibility requirement will therefore differ greatly.

In this Monitor a distinction is made (for the entire market) in terms of hour, day, week, month, season and annual flexibility. An analysis of the maximum differences for the average hourly amount of gas consumed in successive time periods (hours, days, weeks, etc.)[14] supports the above conclusion; in particular Dutch households and low-calorific export customers in Germany and Belgium (including many households) have a requirement for flexibility (see Figure 37). After all, G- and L-gas is mainly used for supplies to consumers.

[14] In the Gas Monitor the maximum flexibility requirements for 2006 are defined as follows:

Maximum hourly flexibility requirement:	Biggest difference in hourly consumption between consecutive hours.
Maximum daily flexibility requirement:	Biggest difference in average hourly consumption between consecutive days.
Maximum weekly flexibility requirement:	Biggest difference in average hourly consumption between consecutive weeks.
Maximum monthly flexibility requirement:	Biggest difference in average hourly consumption between consecutive months.
Maximum seasonal flexibility requirement:	Biggest difference in average hourly consumption per month between different, not necessarily consecutive, months.
Maximum annual flexibility requirement:	Biggest hourly difference in consumption in the whole of 2006. Not necessarily between successive hours.

Figure 37: Maximum flexibility requirement in domestic consumption and exports by gas quality; source GTS

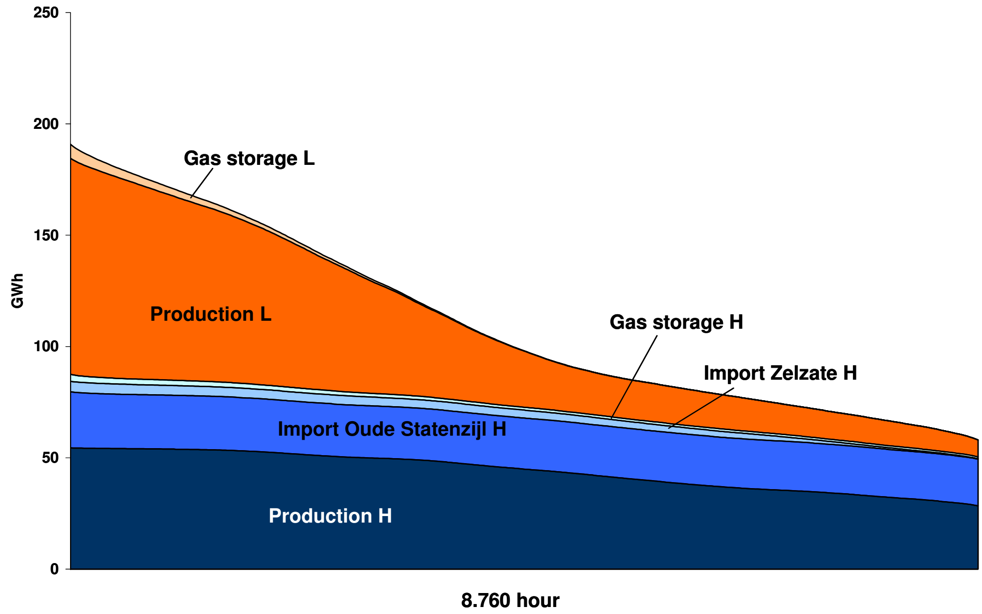


Two comments must be made on the above estimates of the (total) flexibility requirement. First, the estimates are based on the largest difference in consumption. This is based on the assumption that parties have to bridge the total difference with flexibility. However, it is likely that in the purchasing of gas market participants will contract the average of the minimum and maximum consumption. This would mean that the above analysis overestimates the flexibility requirement. Second, the analysis is based on system data and hence on the ultimate physical demand for flexibility. However, the physical demand for flexibility is only the net (aggregate) result of the total commercial demand for flexibility. Therefore, the physical demand for flexibility underestimates the actual size of the flexibility market. For the purposes of this Monitor, however, this analysis appears to provide a sufficient view of the flexibility requirement.

Supply of flexibility resources

From the load duration curve for entry flows in 2006 it is possible to deduce how demand for physical flexibility in 2006 is met (see Figure 38). It is clear that by far the largest part of demand for flexibility is covered by the flexible production capacity in the Groningen field. Gas storage and H-gas production played a much smaller role in 2006. The physical supply from these flexible sources is offered to shippers in the form of commercial products.

Figure 38: Load duration curve of entry flows in 2006; source GTS



In order to ensure that they can meet actual demand, shippers have various flexibility instruments at their disposal. Depending on the type of flexibility requirement (hourly flexibility to seasonal flexibility), these instruments range from the use of tolerance and (virtual) storage to the conclusion of flexible contracts (including contracts with ACQ and DCQ flexibility[15]).

Figure 39 lists the various flexibility instruments used by shippers.

Figure 39: Utilisation and importance of flexibility resources by type of flexibility requirement; source: shipper questionnaire

Type flexibility requirement	Tolerance (services)	Combiflex	Flexibele production contracts	Interruptible contracts with customers	Virtual storage	Physical storage	Flexible contracts (e.g. ACQ & DCQ flex)	Structuring via TTF
Within day	Most important	Most important	Important	Least important	Important	Important	Least important	Important
Within week	Least important	Least important	Important	Important	Least important	Important	Important	Important
Within month	Least important	Least important	Least important	Least important	Least important	Important	Important	Most important
Within year	Least important	Least important	Least important	Least important	Important	Important	Important	Most important
Several years	Least important	Least important	Least important	Least important	Least important	Important	Important	Important

Least important | Important | Most important

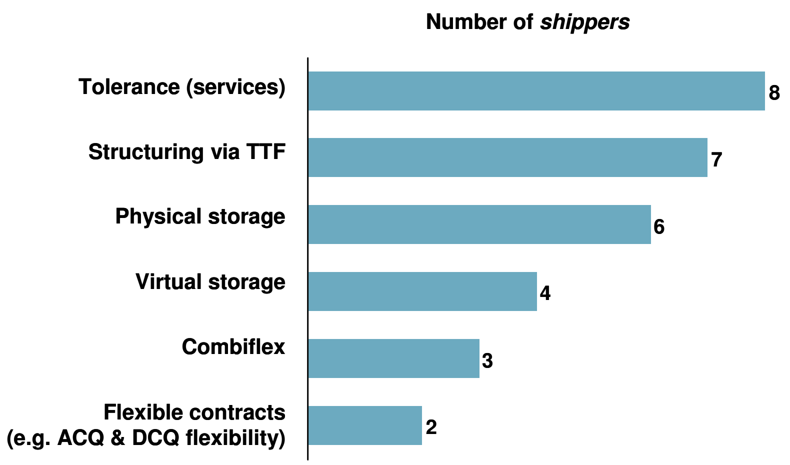
[15] ACQ: Annual Contracted Quantity; DCQ: Daily Contracted Quantity

The instruments differ on the basis of the speed at which they can be utilised, the period for which they can be used and the source of flexibility which they use. The chart shows how much importance shippers attach to the use of the various flexibility resources in the various flexibility portfolios.

The shipper questionnaire clearly shows that market participants use the various flexibility instruments for different purposes. The tolerance and the Combiflex offered by GTS prove to be the main instruments used to match the hourly gas flows transported with ultimate demand. However, flexible production contracts, the use of (virtual) gas storage and trading at the TTF are also seen by shippers as important resources for meeting flexibility requirements in the shorter term. In the longer term, from one month to several years, shippers state that the TTF is one of the most important instruments for matching the supply of gas with demand. Alternatives to meet the longer-term flexibility requirement are flexible contracts and physical storage. It is notable that the TTF is seen as an important flexibility instrument in all areas.

Although on the basis of the system data the physical demand for flexibility has been met, the shipper questionnaire shows that there is an urgent need for more (different) flexibility resources (see Figure 40). Shippers state that for the short-term flexibility requirement there is demand for more liquid 'within-day' trading at the TTF so that shippers can be confident that they can always balance their position through the TTF. This would require shippers to be given faster access to the necessary steering information, so that they can react in time to imbalance situations. In addition, shippers would like to have more imbalance tolerance available to them and would welcome the provision of flexibility products at the TTF. In the longer term, a number of market participants see a greater role for Combiflex, want a more varied offering of virtual storage products and better access to existing storage facilities.

Figure 40: Additional requirement for flexibility instruments among shippers. source: shipper questionnaire



Issues

Shippers state that they want to be better able to manage their own flexibility, partly through TTF structuring. However, due to the current quality of the steering information, shippers are not sufficiently able to react appropriately to imbalance situations.

Knowledge gaps

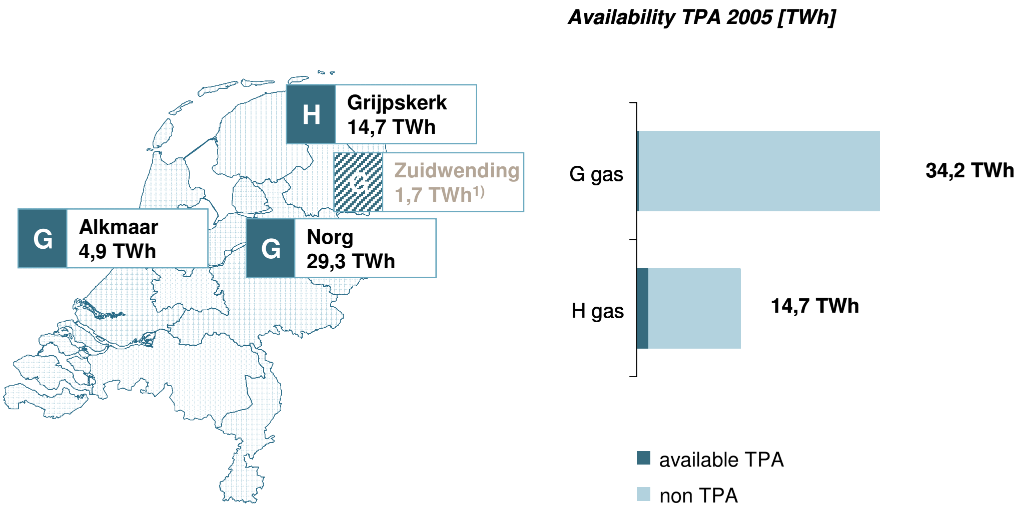
It is unclear to what extent the current offering of flexibility resources is insufficient (diverse) and to what extent this leads to higher costs overall.

3.4.2 Gas storage in the Netherlands

As shown in Figure 39, gas storage is a principal source of both short-term and long-term flexibility. However, the storage capacity in the Netherlands has hitherto remained relatively limited in comparison with other countries. The reason for this is that from the 1970s the Netherlands was able to pride itself on the great flexibility of the Groningen field. However, with the declining production capacity and flexibility of the Groningen field and the liberalisation of the gas market, the importance of storage is increasing. For this reason shippers also state that there is a need for more physical and virtual storage (see Figure 40).

In comparison with 2005, little changed in the Dutch gas storage market in 2006 (see Figure 41). The operating volume of gas storage in the Netherlands is almost 50 TWh. Of this, 34 TWh relates to G-gas storage and 15 TWh to H-gas storage. However, only 2 TWh of the total of 50 TWh of storage capacity was available to third parties. 1.6 TWh for H-gas at Grijpskerk and 0.4 TWh for G-gas at Alkmaar. This limited access to these gas storage facilities is viewed by shippers as a serious barrier to meeting their flexibility requirement.

Figure 41: Availability of gas storage in the Netherlands and TPA in 2005[16]; source: shipper questionnaire



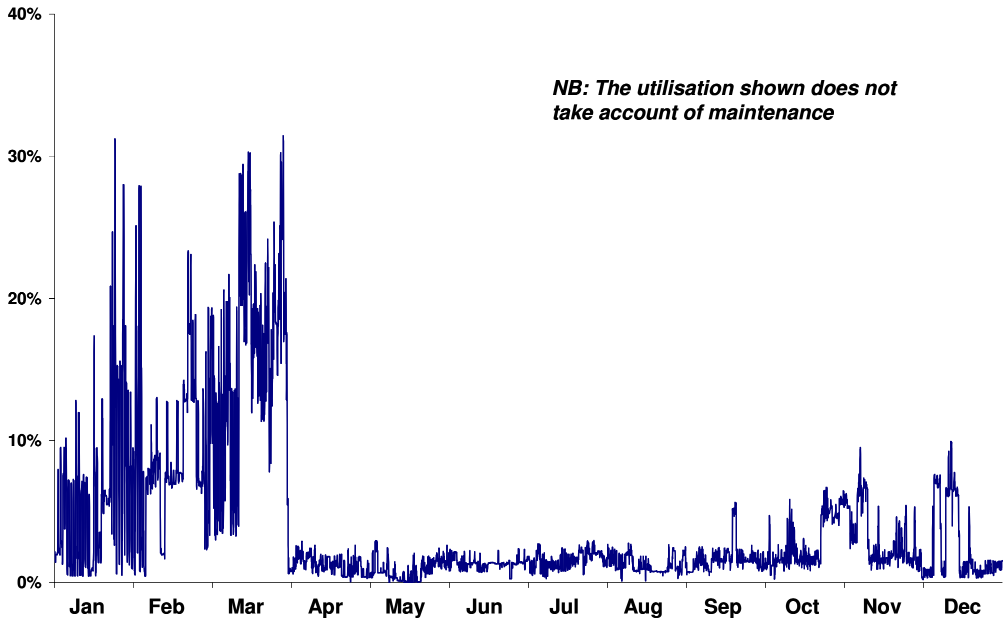
1) Zuidwending not operational until 2010/2011

The reason why only 4% of the storage capacity in the Netherlands is made available to third parties is that the three storage facilities are actually considered to be additional production capacity for the Groningen system.

However, the production from the small fields is gradually decreasing and the production from the Groningen field is limited by the production ceiling of 425 bcm over 10 years. Therefore, the traditional role of the storage facilities will gradually disappear and it is necessary to assess whether they should be made available to third parties in the future in order to meet the growing flexibility requirement. This is a particular focus of attention in view of the low utilisation of the storage facilities in the Netherlands (see Figure 42).

[16] Data from NMa/DTe Gas Monitor 2005; no up-to-date data are available for 2006.

Figure 42: Utilisation of Dutch gas storage facilities; source: shipper questionnaire



New storage capacity amounting to 1.7 TWh (salt cavern) in Zuidwending is due to become available by 2010/2011. In addition, there is a considerable amount of storage capacity just over the border in Germany, from which gas storage services can be supplied to the Dutch wholesale market. A number of market participants are offering services including "virtual storage", combining storage with transport to the Netherlands.

With regard to the investment climate for gas storage in the Netherlands, market participants see the building of short-term storage (e.g. using salt caverns) as fairly attractive. The size of the investment in short-term storage is small compared to long-term storage, the construction period is often manageable and there is high demand for short-term storage (including for own use) due to factors such as the balancing regime and arbitrage possibilities.

There appears to be high demand for extra long-term storage capacity and several knowledge institutions are even predicting big shortages of gas storage in the future unless investment takes place now. Nevertheless, there are a number of aspects that are currently deterring companies from investing in longer-term storage (i.e. empty gas fields). The scale of such an investment in terms of both finance (with the costs of cushion gas playing an important role) and time, combined with the uncertainty regarding future (European) regulations/legislation, is an important reason for companies' reticence. In addition, despite the many good underground storage locations in the Netherlands, only a few locations are available for potential investors. The reason for this is that these locations are largely owned by a single party.

Issues

The need to construct more (seasonal) gas storage appears to be increasing. For the moment, however, the market has insufficient incentives to actually construct seasonal storage. More research is needed to ascertain what the obstacles are and what measures can be taken to eliminate them.

The next important issue is the extent to which gas storage is available in practice to third parties. The vast majority of the storage capacity is currently qualified as production capacity and therefore does not have to be offered to third parties.

Knowledge gaps

On the basis of the data currently available, it is not possible at this stage to make a judgment on the market for gas storage in the Netherlands. There is a lack of precise facts. For example, it is not clear what the actual requirement is over the years and what the actual availability of storage capacity is. Nor is it clear how the costs (prices) of the existing and new storage facilities relate to other flexibility instruments (e.g. virtual storage) and to what extent these provide or should provide incentives for investments in new construction projects.

3.4.3 Balancing regime

GTS is responsible for the integrity of the grid and therefore uses shipping rules to maintain the system balance. In the hybrid balancing regime, shippers must be in balance on an hourly, cumulative and daily basis. In principle, a party is in balance if the difference between hourly consumption at time 't' and hourly input at time 't+2' is smaller than the permitted tolerance value[17].

In the event that a market participant is in imbalance, GTS will levy a charge depending on the type and extent of the imbalance, and the day-ahead price prevailing in the market at that time. In addition, market participants will be charged at the end of the day on the basis of their ultimate position. If market participants have withdrawn too much gas from the grid, they must supplement this gas virtually at the highest of the prevailing day-ahead prices at the NBP, Zeebrugge and the TTF. If the parties have fed too much gas into the grid, they will receive the lowest of the prevailing day-ahead prices at the NBP, Zeebrugge and the TTF.

In principle, shippers have three methods for bringing their portfolio into balance. First, they can trade imbalances with each other through short-term products. Second, they can use short-term flexibility products (storage, Combiflex). Third, in the case of large customers and power plants, they can adjust the level of demand.

A precondition for all these methods is that the shipper must have an insight into his balance position at a given time. The information required for this is known as "steering information". Many parties state that they consider sufficient steering information to be crucial for determining their balancing position and thereby assessing the possible imbalance risks they are incurring. One interest group says "good control information removes a barrier which prevents shippers entering into short-term gas trading and will lead to substantially more liquidity in the day-ahead and intra-day gas market." For some parties, this is even the most important measure for the development of the TTF. GTS does point out that steering information will have to come partly from the regional TSOs. Co-operation is therefore required from GTS with the shippers, regional TSOs and metering companies, in order to understand and fulfil the information requirement.

Most market participants state in the consultation that they wish to be able to balance their physical position through the TTF, but lack the necessary steering information. It is noted that balancing through the TTF can lead to a considerable rise in liquidity. GTS could also balance more through the TTF and thus levy cost-reflective imbalance surcharges when necessary. In that context, a number of shippers are of the opinion that the current imbalance charges are too high, and that settlement at the end of the day is unreasonable. They state that the current measures are not cost-effective and are unnecessarily burdensome.

Issues

As in the previous year, there is still too little measurement and steering information for balancing. As a result, shippers have to rely on "non-nominated" flexibility products, such as Combiflex and tolerance to remain in balance.

[17] GTS determines the tolerance values each year based on the technically available and virtual grid buffer. The total tolerance is divided among the market parties on the basis of their portfolio size, with larger portfolios being allocated relatively less tolerance because they already benefit from an internal portfolio effect.

The levy system for imbalance is also not always cost-reflective in its structure. Because the market participants are unable or scarcely able to manage their imbalance due to the lack of steering information, the costs may turn out higher than is strictly necessary. This is reinforced by the fact that shippers state that the current settlement period is too long.

Knowledge gaps

For this Monitor, MNa/DTe has used information taken from the assessment of the balancing regime compiled by GTS. However, the assessment contains no detailed information to cast light on the relative costs of imbalance for the individual shippers. Moreover, the information on offer provides no insight into the costs incurred by market participants in order to avoid imbalance.

4 Market structure

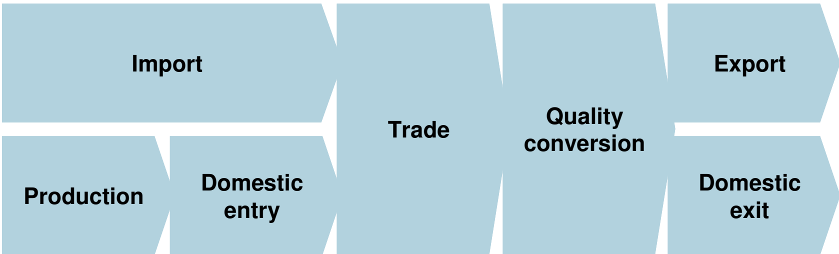
This chapter deals with the overall characteristics of the market structure. In order to assess the effect of the market structure on the operation of market forces, the concentration of market participants is first assessed along the value chain. That is followed by an analysis of the extent of transparency in the market and finally an analysis of barriers to entry.

- With the exception of the TTF, the concentration along the whole of the gas value chain is high to very high and well above the HHI test value of 1,800.
- Trading in high-calorific gas at the TTF is moderately concentrated, which indicates a reasonably functioning market. With regard to trading in low-calorific gas, however, the concentration is very high. This is due to the fact that hardly any low-calorific gas is traded at the TTF. The gas offering at the TTF is expected to increase sharply in the years ahead, partly due to the entry of a number of large players. If these parties enter, the concentration is expected to rise.
- The higher concentration level in 2006 for both imports of high-calorific gas and quality conversion is very unfavourable for the development of competition among shippers in the low-calorific market.
- In particular, shippers view the transparency of the steering information, storage capacity and quality conversion as poor. They also perceive hardly any improvement compared to 2005. Only in the field of gas prices and transmission capacity are shippers positive about the extent (and development) of transparency.
- Shippers state that barriers to entry exist mainly in the limited availability of capacity. This shortage of capacity arises in gas transport, quality conversion and flexibility. Shippers state that the shortage of transmission capacity is the largest barrier and that it has if anything increased compared to 2005.

4.1 Concentration

The assessment of the degree of concentration is based on an analysis of seven different components of the gas value chain (see Figure 43). The degrees of concentration may differ in each of these components, so they must be assessed separately.

Figure 43: Value chain for gas



The paragraphs below consider first the degrees of concentration in production, import and domestic entry. They then consider TTF trading and quality conversion. Finally, they consider the concentrations in domestic exit and exports. For the levels of concentration at the import and export points, an analysis is made of the concentration on a capacity basis and on the basis of actual "flowed" volumes.

- With the exception of the TTF, there is a highly concentrated market in almost all components of the gas value chain, with HHIs above the threshold value of 1,800.
- The market for low-calorific gas is more concentrated than the market for high-calorific gas. However, the degree of concentration in domestic entry for low-calorific gas has decreased compared to 2005.
- There has been an increase in the degree of concentration both in import capacity for high-calorific gas and for quality conversion compared to 2005. In the low-calorific market, there has therefore been no improvement in the position of shippers, partly due to the extremely limited trading in low-calorific gas at the TTF.
- Trading at the TTF in high-calorific gas is moderately concentrated, which indicates a reasonably operating market. With regard to trading in low-calorific gas at the TTF, the concentration is currently very high, since hardly any low-calorific gas is traded at the TTF.
- The gas offering at the TTF is expected to increase sharply in the years ahead, partly due to the entry of a number of large players. If these parties enter, the concentration is expected to rise.

4.1.1 Concentration in production, imports and domestic entry

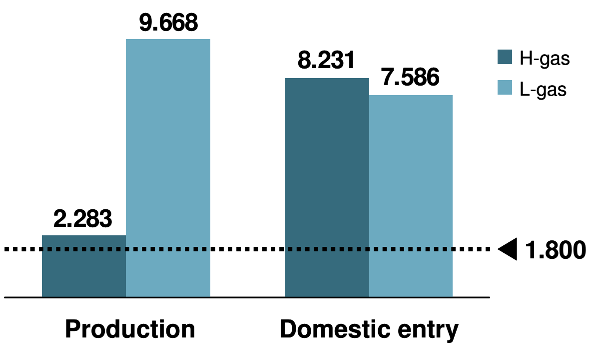
The production of natural gas in the Netherlands has long since been highly concentrated (see Figure 44). A considerable difference can be seen between the production of H-gas and L-gas.

In 2006, the HHI[18] for H-gas amounts to 2,283, while the concentration for L-gas is 9,668 (almost monopolistic). This difference can also be seen in the joint market share of the three largest players, 73.6% and 99.9% for H-gas and L-gas respectively. In comparison with the previous year, the degree of

[18] Hirschmann-Herfindahl Index: an indicator for the degree of concentration in a market. The HHI is defined as the sum of the squares of the individual market shares of every firm in the market.

concentration in the production of H-gas has decreased slightly, while the degree of concentration in the production of L-gas has remained almost unchanged.

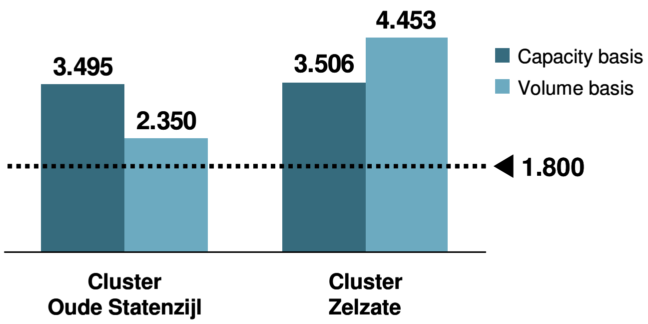
Figure 44: HHI degree of concentration in production and domestic entry; source: GTS



The domestic entry and import points are also highly concentrated. The HHI for domestic entry is over 8,200 for H-gas and 7,500 for L-gas. This is well above the threshold value of 1,800 for high concentration. The C3 value confirms this picture. The entry market shares of the three largest parties jointly amount to well over 90%.

The import capacity shows an HHI of 3,120 (only H-gas), with the combined market shares of the three largest players above 80%. A distinction can be drawn between the Oude Statenzijl and Zelzate import clusters (see Figure 45).

Figure 45: Degree of concentration in import clusters; source: GTS

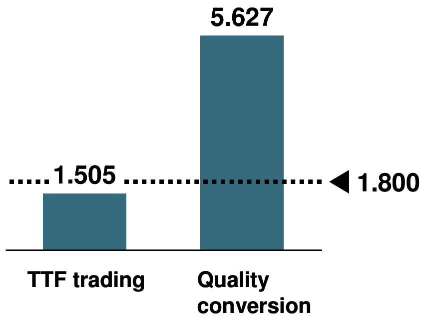


For both the Oude Statenzijl cluster and the Zelzate cluster, the degrees of concentration on the basis of transmission capacity (reservations for firm imports of H-gas) are almost identical at around 3,500 (highly concentrated). However, the degree of concentration based on the actual gas flows (volume basis) shows that the degree of concentration for the Oude Statenzijl cluster is over 1,000 points lower, while that of Zelzate is almost 1,000 points higher. This may have to do with the differences in the size of interruptible reservations at the two points. The concentration of import capacity has increased compared to 2005. The C3 has increased by approximately 10% in 2006 and the HHI by approximately 700 points.

4.1.2 Concentration in TTF trading and quality conversion

The number of trading parties at the TTF is more than sufficient, which is beneficial for the operation of market forces in the wholesale market (see Figure 46). The degree of concentration (HHI), with a value of 1,500, is well below the threshold value of 1,800, but relates almost exclusively to trading in H-gas. Up until now there has hardly been any trading in L-gas through the TTF. It does not account for more than 2% of total trading volume at the TTF.

Figure 46: Degree of concentration in TTF trading and quality conversion; source: GTS

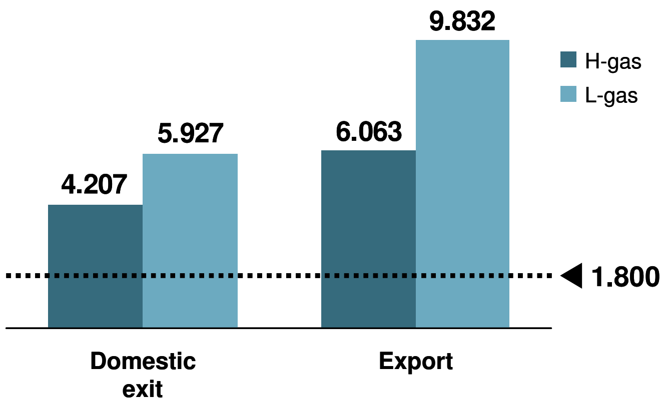


Quality conversion is highly concentrated, with an HHI of over 5,600 (see Figure 46). It can be deduced from this that the proportion of capacity reservations accounted for by quality conversion is in the hands of a very small number of parties. Compared to the previous year, there is even a (slight) increase in the concentration. It is impossible to say at this stage whether the rise is structural or incidental.

4.1.3 Concentration in domestic exit and exports

In comparison with 2005, the market at the exit points for H-gas is more concentrated, while at the L-gas exit points the concentration has decreased (see Figure 47).[19] Possible contributory factors are the increase in L-gas trading at the TTF, the rise in quality conversion and/or more bilateral trading at entry points.

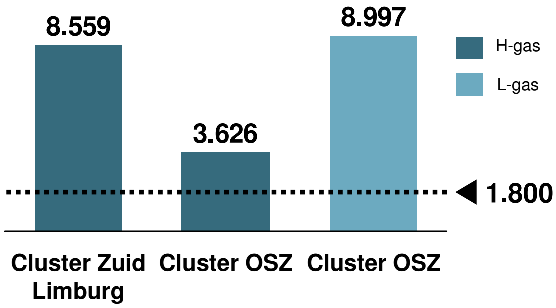
Figure 47: Degree of concentration in domestic exit and exports; source: GTS



[19] In view of the method of calculating the HHI (squaring of market shares) a change from near monopoly to a situation in which another player gains (a small) market share may have a major effect on the outcomes.

The export capacity contracted by market participants also shows a high degree of concentration. The combined market shares of the three largest players for exports exceed 90%. For export capacity of H-gas, the degree of concentration in 2006 decreased. The reserved export capacity for L-gas was already highly concentrated and increased further in 2006.

Figure 48: Degree of concentration in export clusters[20]; source: GTS

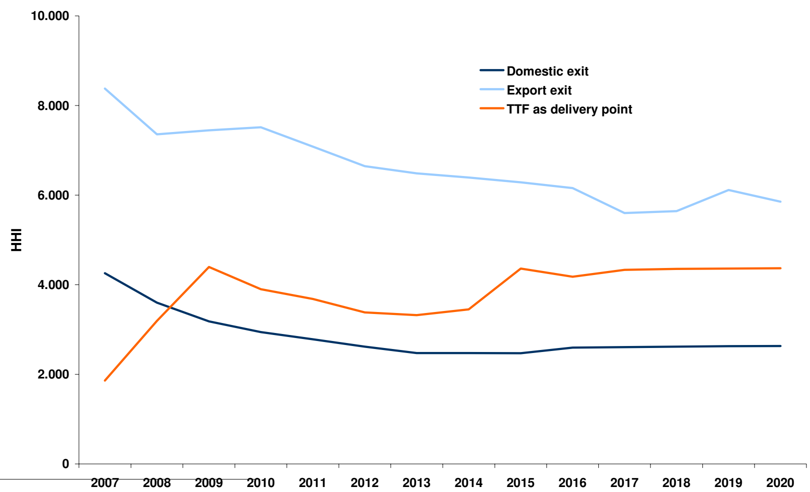


If we look at the differences between the individual export clusters for H-gas, it can be concluded that the Zuid Limburg cluster is clearly more concentrated than the Oude Statenzijl cluster (see Figure 48).

4.1.4 Trend in concentration at exit points

On the basis of the shipper questionnaire, an estimate can be made of the future trend in the degree of concentration at the exit points (see Figure 49). Particular attention is focused on the domestic exit points, the cross-border exit points and exit at the TTF. In that context, it is notable first of all that the exceptionally highly concentrated export flows are expected to decrease between 2007 and 2020 from an HHI of over 8,000 to less than 6,000. Despite this decrease, the export market remains highly concentrated. The domestic exit fares somewhat better. On the basis of the shippers' estimates, its degree of concentration is expected to fall from over 4,000 to less than 3,000. However, this also remains a highly concentrated market. Finally, with regard to the exit at the TTF, it is notable that on the basis of the estimates the current degree of concentration of around 1,800 will increase in the years ahead to over 4,000 in 2020. This is mainly due to the expected entry of a number of large players at the TTF, which with their extensive portfolio will represent a large proportion of the trading at the TTF.

Figure 49: Trend in HHI at domestic, cross-border and TTF exit points; source: shipper questionnaire



[20] For reasons of confidentiality, some HHIs are not shown.

Issues

Having regard to the exclusive production and marketing of low-calorific gas, the lower degree of concentration at exit points for L-gas in 2006 is a favourable development. However, this degree of concentration remains very high. The concentration of import capacity for H-gas has also increased. This means that competing shippers have only a limited possibility of acquiring L-gas through quality conversion. With regard to quality conversion itself, there too the concentration has increased. The situation appears to be growing more difficult for competing shippers in the low-calorific market.

4.2 *Transparency*

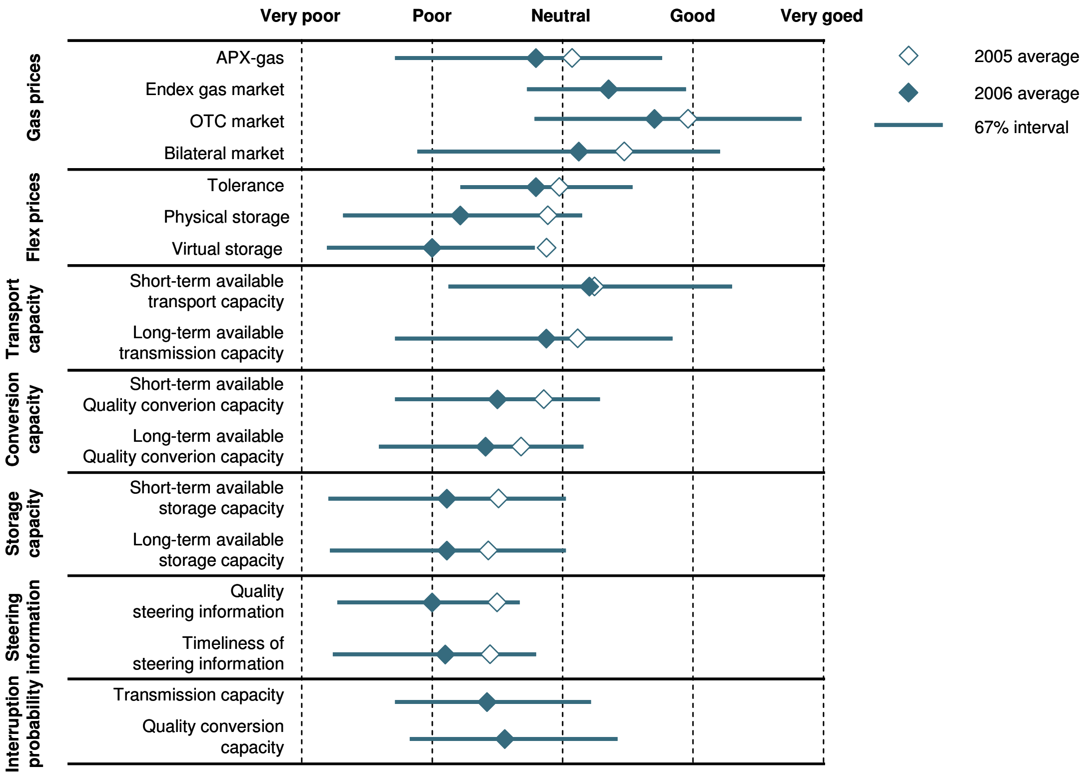
Transparency is of vital importance for the proper operation of a market. Market participants can only take the right decisions and the costs of a transaction can only be kept as low as possible if all the relevant market information is available and transparent to the market participants. This chapter therefore considers the transparency situation in the wholesale market in 2006 and how it developed in comparison with 2005. Particular attention is devoted to transparency of information on market prices, available capacity, steering information and the possibility of interruption.

- The transparency relating to steering information, storage capacity and available conversion capacity is viewed as particularly poor.
- In comparison with the previous year, shippers perceive hardly any improvement in transparency.
- The implementation of a new website by GTS providing an insight into transport services and their availability is a step in the right direction.

4.2.1 Trend in transparency

Market participants mainly view the transparency in the wholesale gas market as neutral to poor. Market players are least positive about the transparency of steering information, available storage capacity and available conversion capacity (see Figure 50).

Figure 50*:* Shippers' opinions on transparency; source: shipper questionnaire



According to shippers, no improvement was made in 2006 in the quality and timeliness of steering information. They give the same low assessment with regard to information on storage capacity, where the situation actually seems to have deteriorated compared to 2005. There also appears to be a low rating of transparency on quality conversion, and here too the situation appears to have worsened compared to the previous year.

Market participants also believe that the information on flexibility prices has decreased across the board. It should be stated that the only areas in which market participants are not dissatisfied with the extent (and development) of transparency are gas prices (in particular the Endex and OTC markets) and transmission capacity.

A new transparency category which has been monitored for the first time this year concerns transparency of the probabilities of interruptions to transmission capacity and quality conversion capacity. The transparency of these areas also receives a poor rating, with the transparency of interruption probabilities for transmission capacity being seen as particularly poor.

The renewed GTS website should give shippers a better picture of transport services and their availability. However, because the data for this monitor was requested before the new website was implemented, this is not reflected in the questionnaire results.

With regard to the above assessments of transparency, it should be stated that this is a subjective assessment by the shippers and that it is difficult to compare individual years because the assessment took place one year earlier and may therefore have been conducted in a different (more positive or more negative) reference framework. Since the market did not have less or worse information at its disposal in 2006 than in 2005, the NMa/DTe considers that the more negative rating reflects the greater urgency which shippers attribute to transparency.

Issues

Judging by the opinions of the market participants, the lack of transparency in the market appears to be becoming a more pressing problem which is impeding the further development of the wholesale market. The lack of steering information makes it impossible to take timely action to balance the portfolio. As a result, the development of within-day and other products still lags far behind the general development of the TTF. The lack of information on available storage capacity also makes it harder for the parties to manage their required flexibility. Finally, market participants have scarcely any access to the market for low-calorific gas due to the severe lack of quality conversion capacity and the lack of transparency with regard to the available quality conversion capacity.

4.3 Barriers to entry

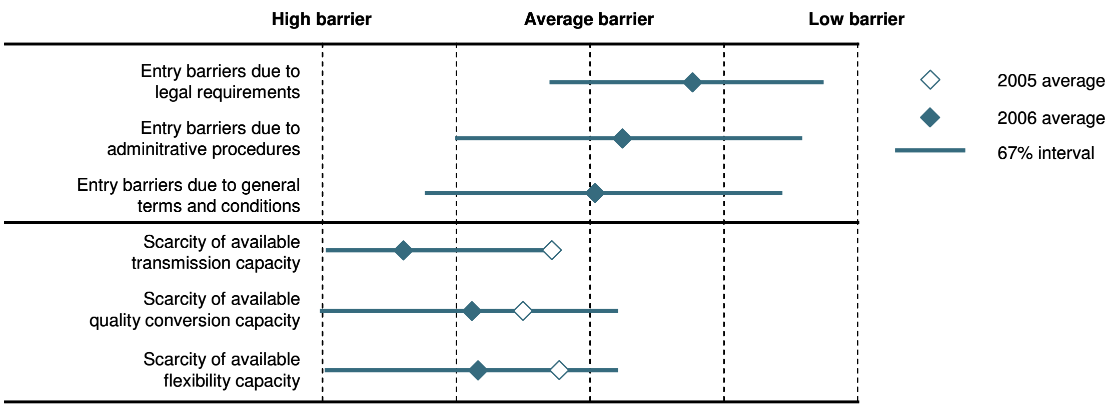
This section considers in greater detail the various barriers to entry in the wholesale market and their development in the past year. On the one hand it considers whether the parties (shippers) were able to participate without hindrance in the main market activities (shipper conditions) and whether the required market-facilitating services were actually available (contractual or physical scarcity). It then also looks in particular at the accessibility of the reservation systems used.

- Shippers see capacity shortages in gas transport, quality conversion and flexibility as the biggest barriers to trade
- In particular the lack of transmission capacity in comparison with the previous year is seen as a larger (and increasing) barrier
- Reservation systems and shipper conditions are rated as neutral to slightly positive

4.3.1 Trend in barriers to entry

Market players consider legal, administrative or general terms and conditions to be at most a limited barrier to entry. A completely different picture emerges with regard to the shortage of capacity. Capacity shortages in transport, quality conversion and flexibility are seen as above-average impediments to market entry. This mostly applies to the available transmission capacity. The shortages of available transmission capacity, available quality conversion and available flexibility were also cited as barriers to entry in the 2005 Monitor. Shippers' perception is that the shortage of transmission capacity has become a larger barrier to entry in comparison to the previous year (see Figure 51).

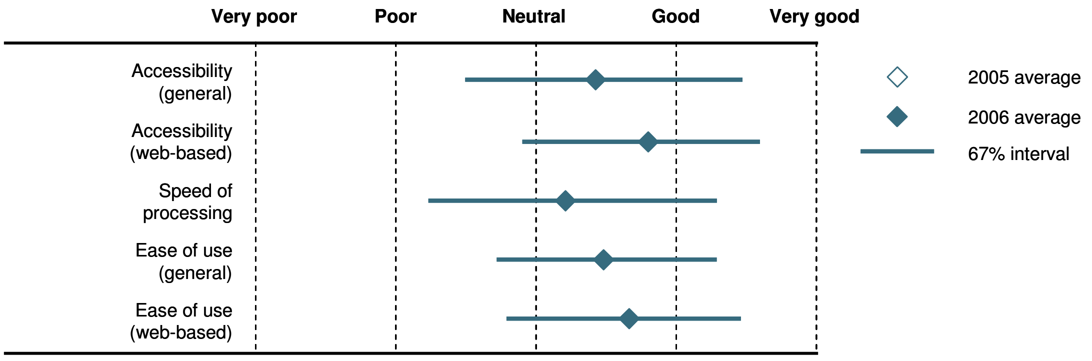
Figure 51: Shippers' opinions on the level of barriers to entry;



4.3.2 Trend in accessibility of reservation systems

Market players do not see the reservation systems as barriers (see Figure 52). Shippers rate aspects of accessibility, speed and ease of use as neutral to good.

Figure 52: Shippers' opinions on accessibility of reservation systems; source: shipper questionnaire



5 Market outcomes

Until recently, the purchase and sale of gas in the Netherlands took place mainly at the entry and exit points of the GTS gas transmission network. Because of the large number of points (particularly the large number of gas receiving stations), the liquidity in these "marketplaces" has always remained low, as a result of which no efficient marketplace has been able to develop. In 2003, a virtual marketplace, the Title Transfer Facility, was therefore created, in which shippers could easily trade 'entry-paid gas'.

All gas qualities can be traded at the TTF, regardless of the entry or exit point. The number of transactions at the TTF has grown steadily since its launch and serves as a gauge of the development of the Dutch wholesale gas market. This is because many aspects of the Dutch gas market have a direct or indirect influence on the liquidity of the TTF.[21] On the other hand, a liquid marketplace in turn contributes to an efficient, competitive and reliable marketplace. For these reasons, NMa/DTe monitors the state of trading and liquidity in the Netherlands in order to ascertain whether market forces are having an effect on the Dutch wholesale market.

In order to determine the status of the TTF, an analysis was made of the extent of the traded flows and the liquidity of the trade. In a liquid market, the parties can easily find each other, transactions are conducted without any appreciable costs and individual transactions do not lead to wide price fluctuations. An analysis was also made of the composition of the portfolios which shippers maintain, as some products can be very liquid while others are not. Finally, in order to place the development of the TTF in context, the Dutch marketplace is compared to those of the UK (NBP) and Belgium (Zeebrugge). Attention is focused on the volume of trade, the trends in prices and the extent to which marketplaces are linked to each other. This shows how the TTF relates to the other marketplaces and whether the various marketplaces are gradually converging with regard to these aspects.

- The volume, liquidity and confidence in the (future of the) TTF among the market players are steadily increasing. Trading is nevertheless limited to high-calorific gas. Hardly any low-calorific gas is traded at the TTF.
- Since over 93% of the total trading volume in the Netherlands is not traded at the TTF, the TTF still does not constitute a fully-fledged source of gas for market participants. However, they state that they expect to see enormous growth in the use of the TTF as a source of gas (particularly high-calorific gas) in the years ahead.
- The integration of the TTF, Zeebrugge and NBP markets increased further in 2006, but the TTF is still small compared to the NBP.
- Since the BBL flows both physically and administratively only towards the UK, the possibilities for arbitrage with the UK are limited and only benefit the UK. The arbitrage potential is further limited buy the fact that imports from Zelzate are being reduced.

[21] E.g.: a shortage of import capacity limits the supply of gas at the TTF and barriers to market entry limit the number of trading parties at the TTF. For further information see "Acceleration of the Development of the TTF and the Gas Wholesale Market".

5.1 *Trading and liquidity in the Netherlands*

This chapter discusses the development and the current situation of trading and liquidity in the Netherlands by considering in greater detail the relevant aspects of liquidity at the TTF.

- The overall growth of the TTF (in terms of volume) is continuing, but involves almost exclusively trading in H-gas. There is currently scarcely any trading in L-gas.
- Although the TTF shows higher growth than the NBP and Zeebrugge, the (relative) trading volume is still considerably lower.
- The churn (extent of re-trading of gas), the number of market participants and the number of (liquid) products which can be traded at the TTF have increased sharply once again in the past year.
- Price formation is becoming more reliable, since the bid-ask spread in both the day-ahead market and the year-ahead market is gradually decreasing.
- At present, the TTF is not a fully-fledged alternative source of high-calorific gas, but its development compared to 2005 is positive.

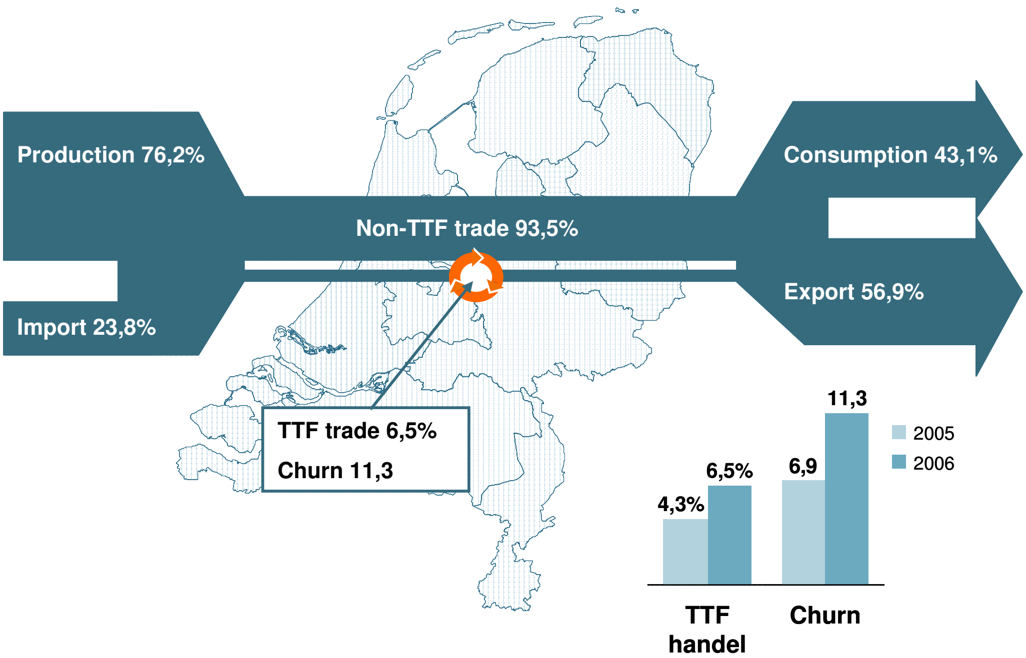
5.1.1 Trend in the market share of the TTF

In 2006, approximately 6.5% of the gas in the Dutch market was supplied and traded at the TTF (see Figure 53). Almost all of this gas has a high-calorific value (i.e. H-gas).[22] The other 93.5% of the gas bypasses the TTF. In this way, all the G-gas from the Groningen field flows directly to the gas receiving station and is therefore not available for trading at the TTF. There is no further trading at the gas receiving station. This means that this volume (all the G-gas and the vast majority of the H-gas) cannot be traded but can only be delivered. This observation was also made in 2004 and 2005. The main change compared to 2005 is the increase in trading of H-gas at the TTF.

There is still hardly any trading at the entry and exit points. This situation is unchanged compared to 2005. In addition, still only a modest percentage of gas is delivered at the TTF, and the gas which is delivered is often re-traded several times. It can be seen from the ‘churn’ (ratio of traded to delivered volume) that trading at the TTF is brisk.

[22] Of the total H-gas market, 13% passes through the TTF, while hardly any gas reaches the TTF from the L-gas market.

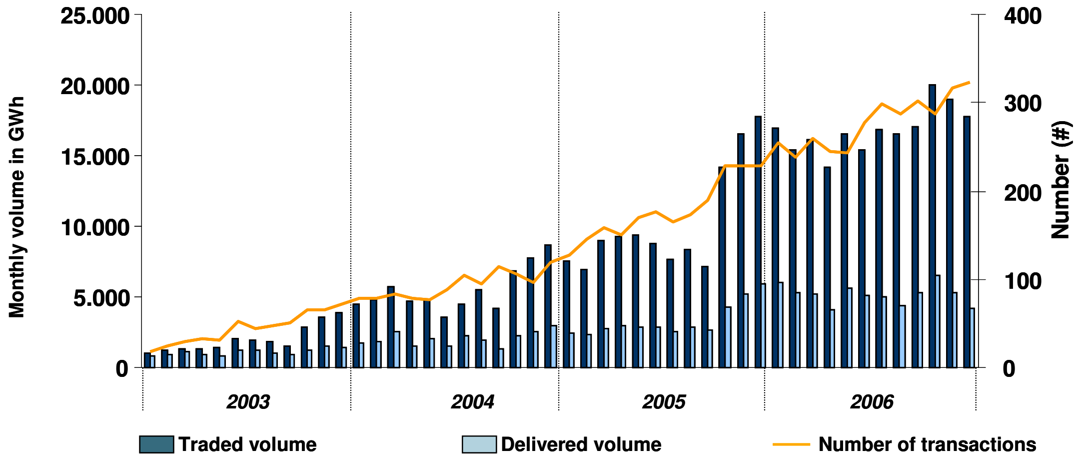
Figure 53: Trading flows and churn in the Netherlands; source: GTS, shipper questionnaire



5.1.2 Trend in trading volume at the TTF

The ratio of traded to delivered gas as recorded by GTS amounts to 3.25. However, not all interim trading transactions are reported to GTS. From the churn, it can be seen that the gas is re-traded approximately 11 times.[23] The figure below shows that the TTF is growing at a considerable rate. The number of transactions, the net volume delivered and the trading volume all increased in 2006 (see Figure 54).

Figure 54: Development of the TTF; source: GTS



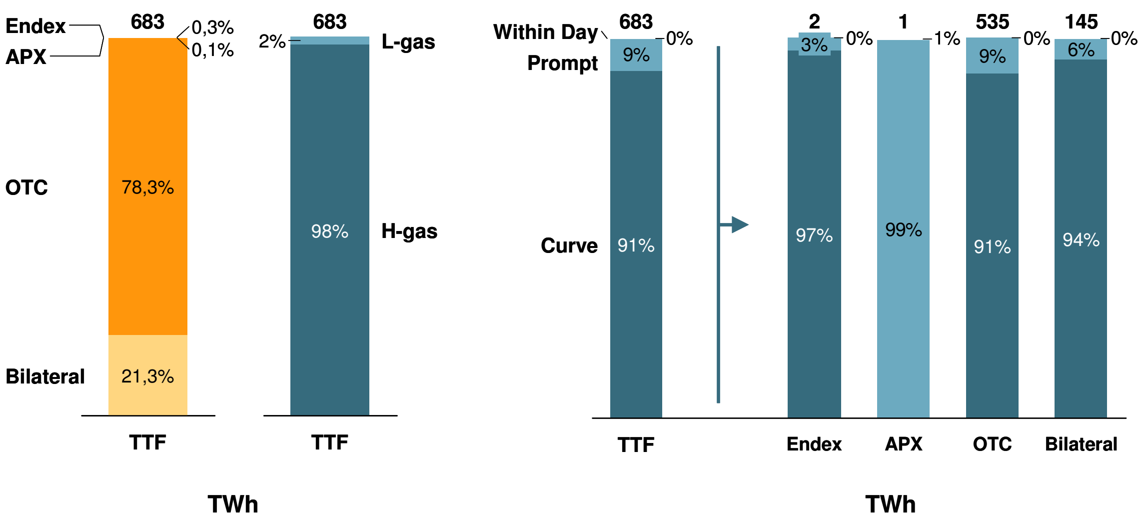
[23] The total churn has been estimated on the basis of returns from shippers. This also includes transactions which were conducted by market participants but were already 'netted' prior to clearing at the TTF. These are not shown in the TTF trading volumes reported by GTS. The churn based on the transactions recorded by GTS is 3.25.

Most of the gas which changes owner at the TTF is traded in the OTC (over the counter) market through brokers or directly between market participants on a bilateral basis (see also Figure 55). These (traditional) trading channels offer parties greater scope to purchase products which match their requirements. The trading on the APX and Endex, where standard products are offered, accounts for a smaller proportion of the total trading volume. A possible explanation for the difference in scale is that market participants mainly use the gas exchanges for portfolio optimisation and the number of transactions is therefore lower.

5.1.3 Trends in TTF marketplaces, products and liquidity

In addition to the breakdown of trading by platform, the breakdown of trading by type of product is very uneven. No less than 91% of the total trading volume relates to curve products, while within-day products account for only 0.1%. This can be explained in the first place by the fact that curve products are mainly used to meet part of the baseload demand, whereas within-day products are mainly used to meet short-term fluctuations in demand (low volume) and thereby achieve a better balance among the positions of market participants. Second, due to lack of steering information, market participants are less prepared to use within-day products for balancing purposes. Without good steering information, parties cannot use within-day products for balancing and they incur the risk of imbalance charges. This is also discussed in the chapter on balancing.

Figure 55: Breakdown of TTF trading by marketplaces and products; source: GTS

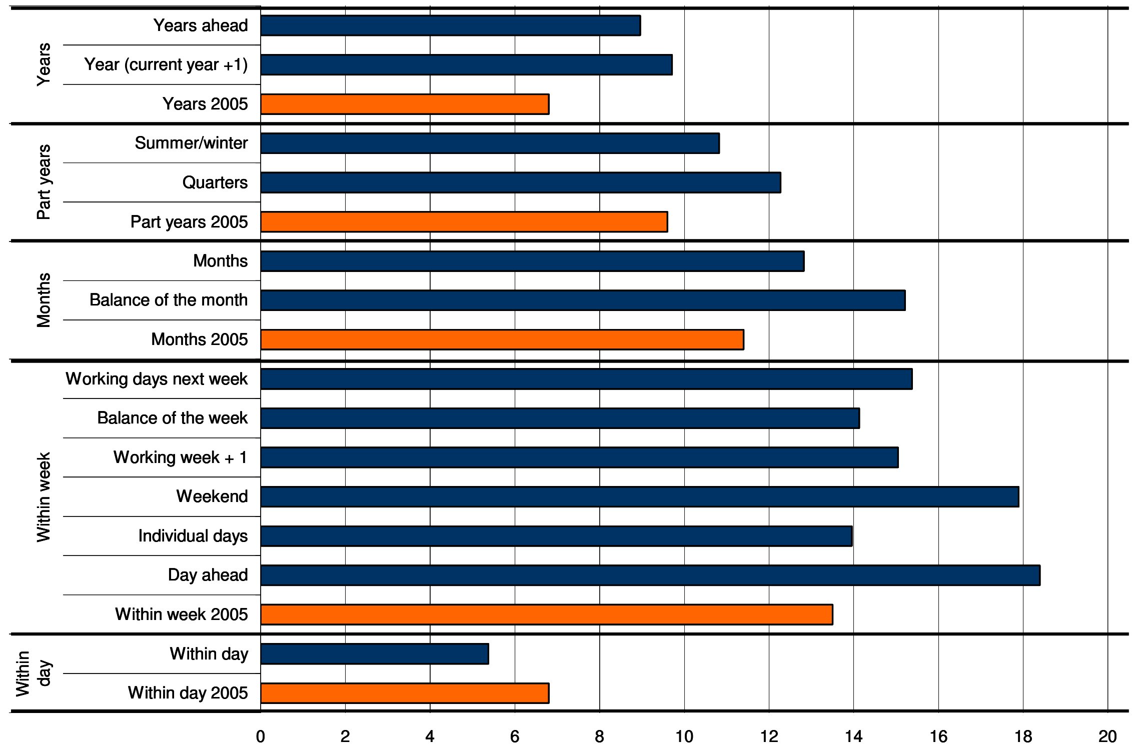


The development of the TTF can be further illustrated by an estimate of the increase in the number of counterparties in the markets for the various products. This shows that the TTF is gradually becoming a more reliable source and delivery market for gas. The Monitor shows that in 2006 there were a large number of counterparties for "prompt" products in particular (see

Figure 56). An increase can also be seen in the number of trading parties for 'curve' products compared to 2005. However, the number of trading parties for long-term products is lagging behind the number of trading parties for short- and medium-term products. A reason for this is that confidence in the TTF may only grow if liquidity in prompt products increases and parties are prepared to trade products over the longer term.

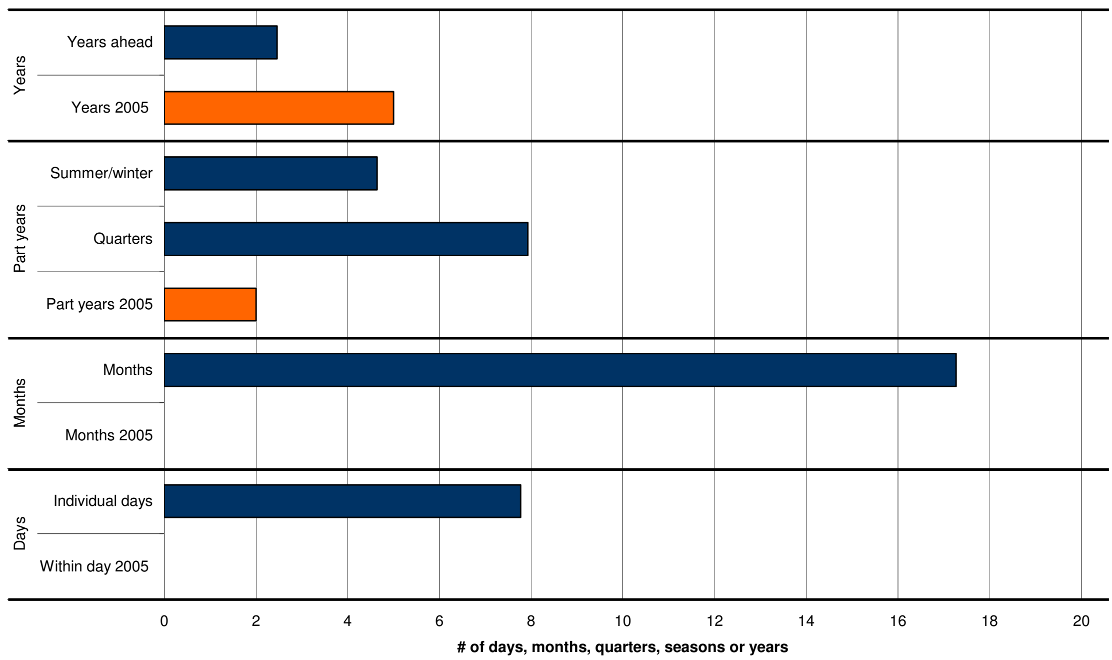
For all products, market participants stated that a decrease in the number of trading parties compared to 2005 was only seen in the case of within-day products. In addition, the absolute number of trading parties for within-day products still lags far behind the number for other products.

Figure 56: Average number of trading parties per product; source: shipper questionnaire



In addition, shippers indicated that the depth of the products at the TTF (with the exception of years ahead) has increased (see Figure 57).

Figure 57: Average depth per product; source: shipper questionnaire

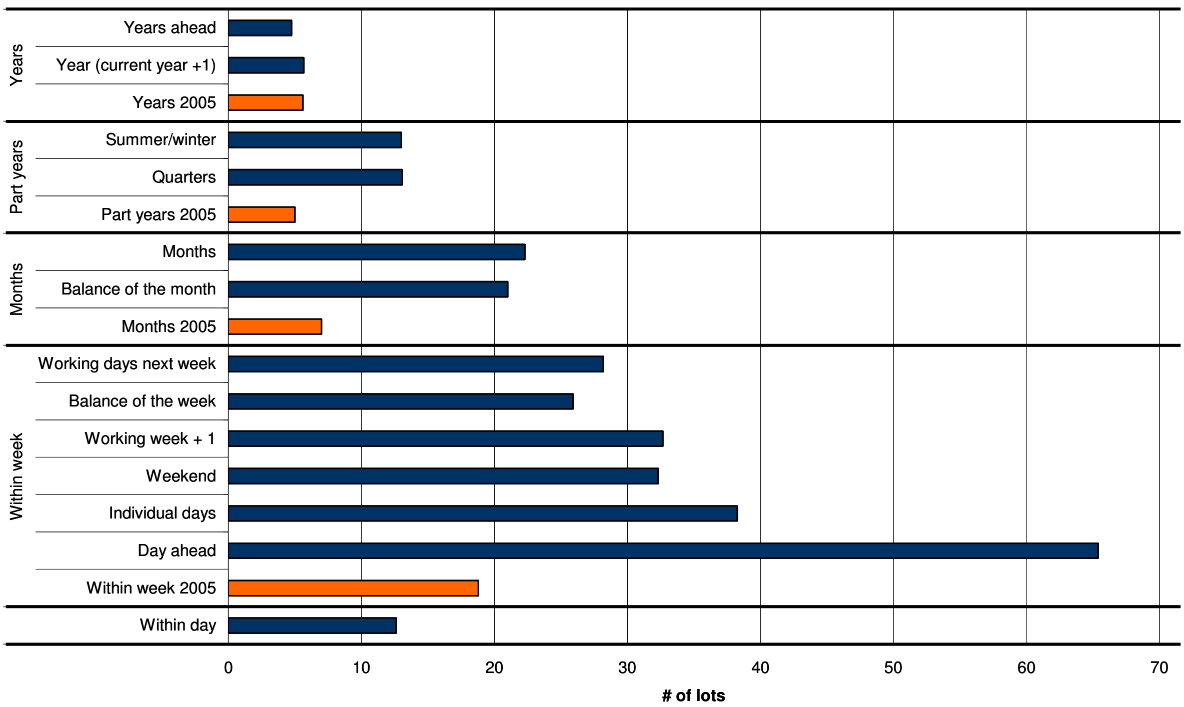


As a result of the increasing depth of the market, parties can trade further ahead and are thus less reliant on bilateral contracts for a diversified portfolio.[24]

Since the volume and the number of parties at the TTF have been able to continue the growth from 2005, the resilience of the TTF has gradually increased (see Figure 58). It can be seen that the extent to which the price is influenced by (individual) large transactions is decreasing. The price in the market is thus a more reliable reflection of the value at that time, as a result of which market participants can have greater confidence in good price formation. It can be deduced from the figure that the prices of TTF products, especially prompt products, are becoming more stable. As a result, the TTF is also playing a more valuable role as an indicator of prices.

Also with regard to resilience, shippers state that there is a clear difference between the liquidity of prompt products and that of curve and within-day products. In the case of within-day products, the limited liquidity once again appears to be due to insufficient steering information, which is impeding effective balancing through the market. The low liquidity in curve products appears to indicate that parties currently lack the confidence to use the TTF as a primary source of gas. However, it is expected that the liquidity of curve products will follow that of prompt products when parties have more experience with and confidence in trading at the TTF.

Figure 58: Resilience: number of lots tradable without price influence; source: shipper questionnaire



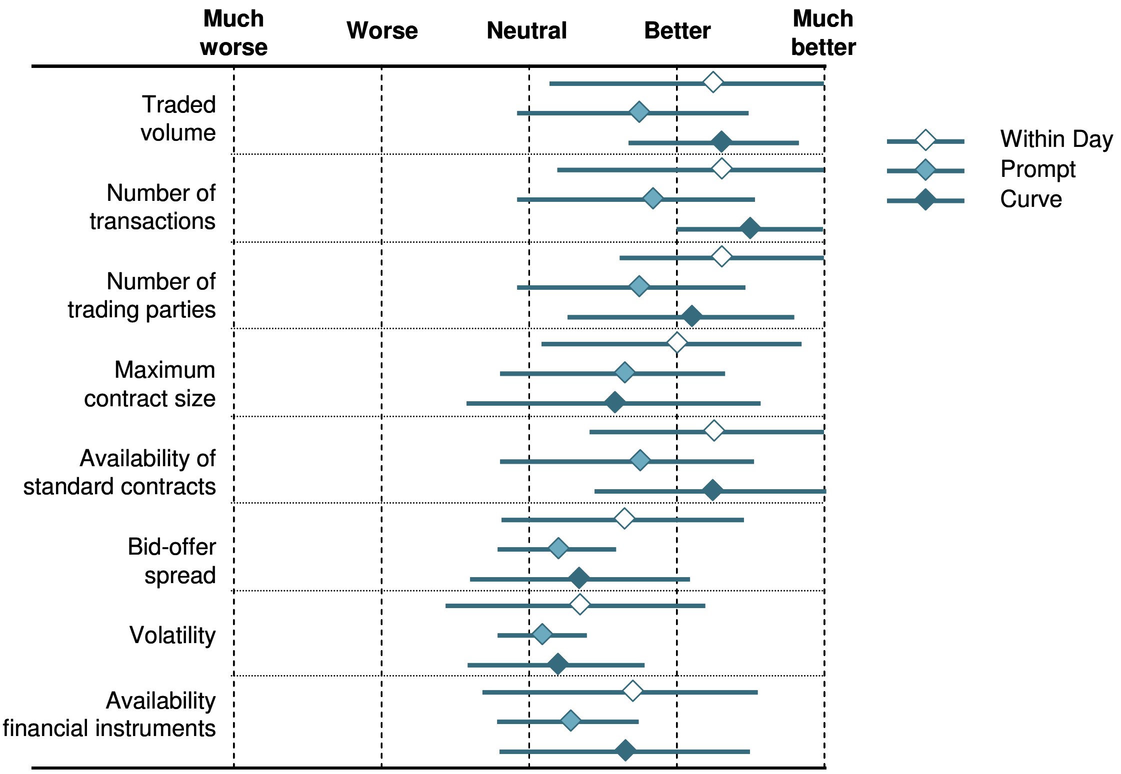
[24] The introduction of trading in TTF gas forward contracts on Endex may have had a positive effect on the depth of the products, since the market participants are now not reliant only on the OTC or the bilateral market for forward contracts.

5.1.4 Perception of the liquidity of the TTF

In accordance with the above analyses, shippers state that the increase in the liquidity at the TTF was one of the most important developments in 2006 (see Figure 59). The increase in the volume delivered and the increase in the number of trading parties are cited as the main reasons for this. However, shippers also report improvements (in some cases slight) in all other aspects of the TTF in 2006.[25]

It is notable that market participants state that the development of liquidity of prompt products is lagging behind the liquidity of both within-day and curve products in all areas, while the above analyses suggest the opposite. A possible explanation is that market participants had higher expectations for prompt products and that these are consequently rated lower in the questionnaire. This remains speculation, however, and the result is difficult to explain.

Figure 59: Perception of liquidity in within-day, prompt and curve products at the TTF; source: shipper questionnaire



Issues

On the one hand, the volume, the number of trading parties and the number of transactions at the TTF increased by more than 50% in relative terms in 2006 compared to 2005. Shippers state that they consider the increase in liquidity to be a very important development. However, the volume of gas which actually reaches the TTF as a percentage of the total trading in gas remains very limited (6.5% of the total flow

[25] The least improvement is found in the availability of financial instruments. A comparison with other markets shows that it is often sensible to wait until the marketplace has become more liquid before introducing additional financial instruments.

through the network). In addition, the traded gas is mainly high-calorific gas (98%) and the trading in low-calorific gas is extremely marginal (2%). As a result, the liquidity and hence the operation of the TTF (e.g. reliable price signal, price firmness, available product portfolio) are limited.

Within-day products in particular are lagging behind the more liquid prompt products. This is probably due to the fact that too little steering information is available. It is important that this situation is resolved in the short term so that parties at the TTF can balance their position using within-day products. This will lead in the first place to less imbalance and in the second place to greater liquidity at the TTF. This additional liquidity can then give rise to greater confidence in pricing and thus contribute to what has hitherto been a lagging trade in curve products.

Finally, it is now impossible for many shippers to use the TTF to supply to small domestic consumers.[26] First, hardly any low-calorific gas is delivered at the TTF. Almost all traded low-calorific gas goes straight to the gas receiving station and not through the TFF. That means it is impossible for shippers to purchase sufficient low-calorific gas through the TTF, although they can purchase high-calorific gas and convert it into low-calorific gas by means of quality conversion. However, the conversion capacity is already fully reserved for the years ahead (see chapter on quality conversion) and is therefore unavailable or only available to a limited extent. Second, only a few necessary flexibility products are offered at the TTF which can compete in terms of price and characteristics with the flexibility offered in the low-calorific supply contracts. Therefore, it is not possible in practice for shippers to supply small consumers in the Netherlands with (low-calorific) gas through the TTF.

In short, TTF liquidity grew substantially again in the past year compared to the previous year. However, a number of structural aspects limit the liquidity which the TTF can achieve in the longer term. NMa/DTe has therefore recommended to the Ministry of Economic Affairs that a number of specific measures be taken to further stimulate liquidity at the TTF in 2007 as a supplement to organic growth.[27]

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[26] This large group of customers generally uses low-calorific gas and shows a high degree of swing in its consumption.

[27] See the open letter to the Minister of Economic Affairs concerning the increasing of liquidity in the wholesale gas market (ref: xxx).

5.2 Sourcing

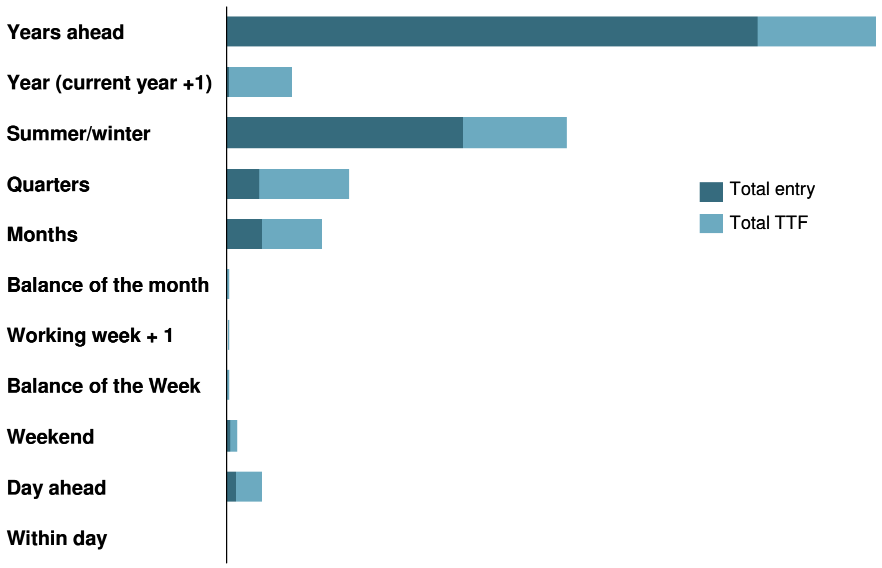
This chapter considers in greater detail the way in which market participants in the wholesale market fill their gas portfolio. It looks more specifically at the extent to which the TTF is developing as a central marketplace for the wholesale market.

- The TTF is not yet a fully-fledged alternative source of gas. Trading in high-calorific gas increased greatly once again in 2006. By contrast, low-calorific gas only accounts for a fraction of the total trade.
- Market participants expect that the use of the TTF as a source of gas will increase enormously in the years ahead.
- The increasing trade in profile products at the TTF shows that parties are increasingly structuring their own flexibility.

5.2.1 Structuring of the gas sourcing portfolio

Compared to 2005, a shift has taken place from long to shorter-term purchasing. Whereas previously almost all purchasing was through annual contracts, a large proportion is now also purchased on the basis of shorter-term contracts. In particular, monthly, quarterly, seasonal and annual products have increased relatively strongly in the shippers' purchasing portfolio (see Figure 60). The fact that the increase concerns in particular profile products may indicate that shippers increasingly want to reserve profile and have been better able to do so in the past year due to the development of the market. Another important difference compared to 2005 is the fact that the TTF has gained in significance as a purchasing point for all types of products. This shows that shippers have increasing confidence in the operation of the TTF.

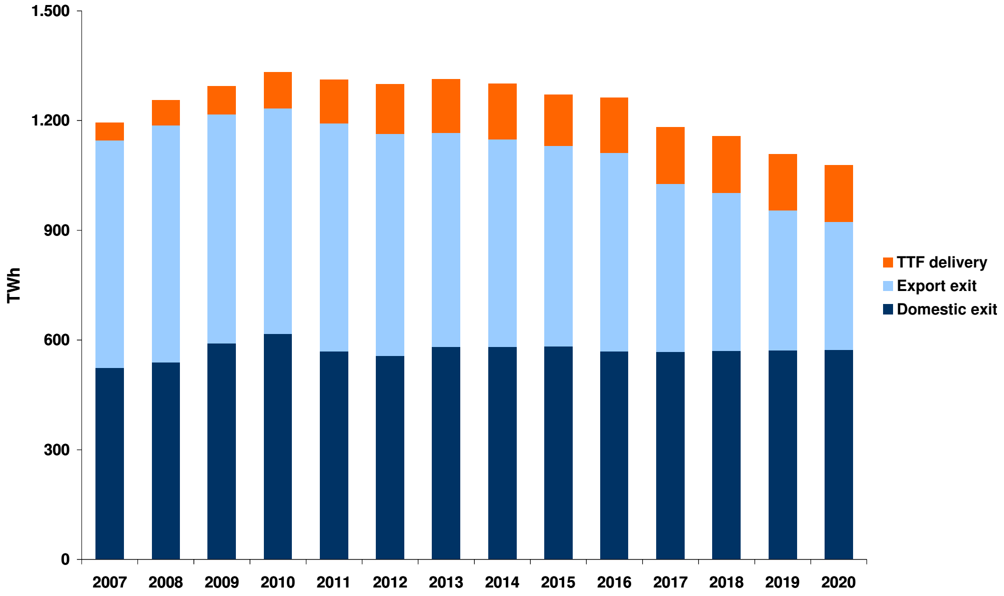
Figure 60: Type and source of purchases[28]; source: shipper questionnaire



[28] Comments concerning the figure: (1) In order to avoid double counting, purchases at exit points are not included and (2) 'Total entry' consists of production and import, 'TTF total' is a combination of purchases on the APX, Endex and the OTC market and through bilateral TTF contracts.

The growth of the TTF as a purchasing source in 2006 looks set to continue in the years ahead. It is clear that shippers expect the TTF to account for a growing proportion of the sale market (see Figure 61). They predict that in 2020 the volume delivered at the TTF will have increased by approximately 300% compared to 2006 and that in 2020 around 15% of the total supplies in the Dutch gas market will be traded at the TTF. Deliveries at the domestic exit points will remain almost unchanged, while deliveries at the border exit points are expected to decrease in volume.

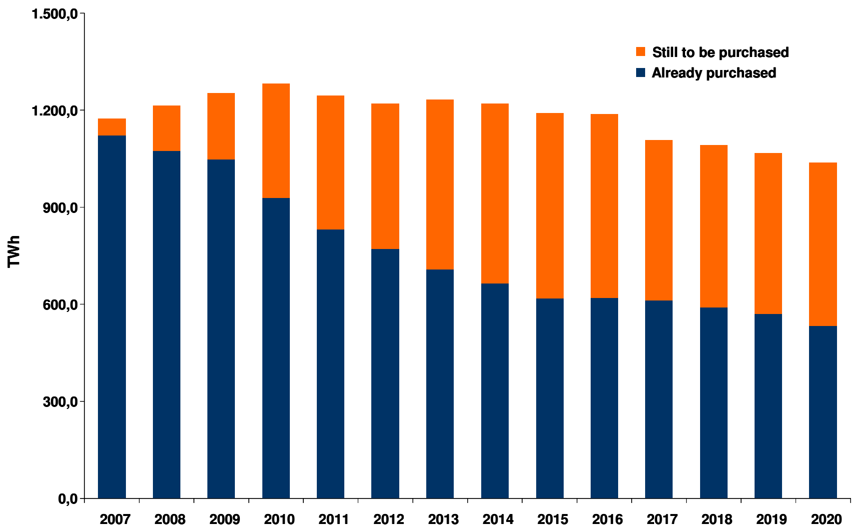
Figure 61: Long-term sales prediction, % of 2006; source: shipper questionnaire



The proportion of gas for delivery in 2007 which was still not committed in 2006 was around 4% of the volume to be supplied. This proportion increases towards 2020 to around 50% (see

Figure 62). Currently, therefore, a substantial part of the gas to be delivered is sold under long-term contracts.

Figure 62: Long-term purchases vs predicted demand; source: shipper questionnaire



Issues

Although parties increasingly use the Dutch market, the TTF is still not a fully-fledged alternative source of gas. This restricts the ability of the parties in the wholesale market to conduct a diversified sourcing policy. However, shippers predict that the TTF will develop gradually into a fully-fledged alternative source of gas in the years ahead.

5.3 *Trends in comparison with neighbouring countries*

This chapter deals in more detail with trends in gas prices, volatility and liquidity in comparison with neighbouring countries. It also considers the extent to which there is market coupling between the TTF and neighbouring markets. In that context it looks specifically at the National Balancing Point (UK) and the Zeebrugge hub (Belgium).

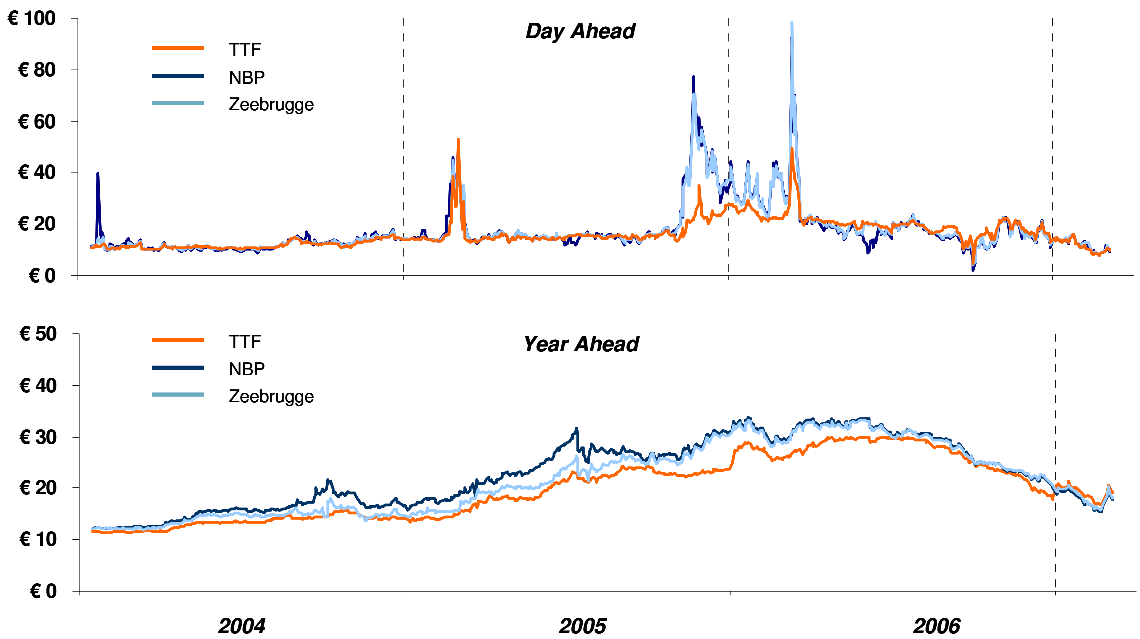
- The main wholesale markets for gas in the north-west European market converged further in 2006, the clearest example being the correlation between Zeebrugge and the NBP. Although the correlation with the TTF is smaller, it is increasing.
- The TTF is still a middle ranker in terms of liquidity and trading volume, comparable to Zeebrugge but lagging far behind the National Balancing Point.

5.3.1 Price trends in north-west European gas markets

Although the trend in day-ahead natural gas prices at the TTF has kept pace with the price trend at Zeebrugge and the National Balancing Point, the Dutch market appears to be fairly insulated from the major price shocks seen in the UK market in 2006. The gas shortages at the beginning of 2006 were caused in particular by 1) the outage at the Rough gas storage facility, 2) the relatively cold winter and 3) production and supply problems (particularly from Norway and France), which led to major price shocks. It can be inferred that these price shocks led to similar price levels in Zeebrugge due to the Interconnector between Zeebrugge and Bacton (see Figure 63). Although the Dutch gas market also experienced the consequences of these developments, they were not as significant as in the UK and Belgian wholesale markets.

The consequences of the 'price trough' in the UK in June 2006 barely reached the Dutch market if at all. Zeebrugge was also unable to take advantage of lower prices at that time, since the day-ahead gas price at Zeebrugge stuck closely to the TTF price.

Figure 63: Trends in day-ahead and year-ahead prices in the NWE market; source: Platts

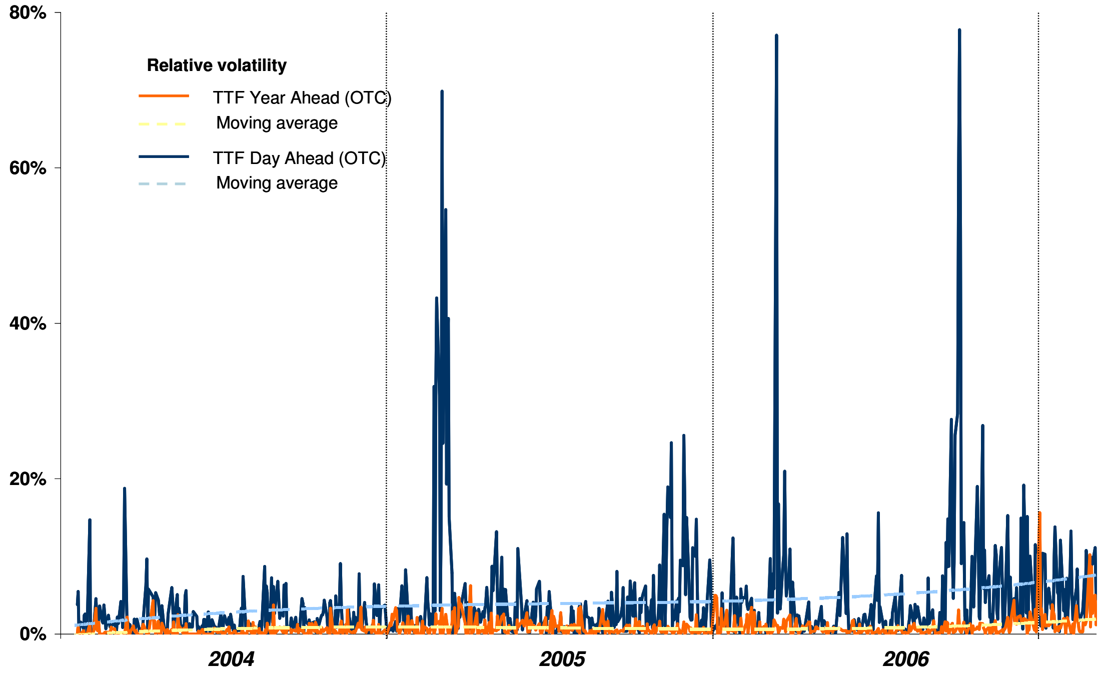


With regard to year-ahead prices, the Dutch market in 2005 was significantly cheaper than the UK for a large part of 2006. This may have been due to the fact that shippers in the UK had concerns as to whether there would be sufficient capacity for gas imports in order to offset the decline in domestic production. In the second half of 2006, the price differences between the UK and the Continent nevertheless narrowed sharply. This may have been due at least in part to the opening of the Balgzand Bacton Line (BBL) and the prospect of the start-up of the Langeled pipeline from the Ormen Lange field in Norway.

5.3.2 Trend in volatility

The volatility of gas prices at the TTF is still structurally lower than at the NBP or Zeebrugge. This was already the case in 2005 and remained so in 2006. A plausible explanation is that the sensitivity of prices at the TTF is lower than at the other two hubs because there is less gas-to-gas competition and still a strong link with oil prices, although it does appear that gas-to-gas competition is having an increasing effect on price volatility in the Dutch wholesale gas market. For year-ahead prices at the TTF, but even more for day-ahead prices, a trend analysis shows an increase in the relative volatility (see Figure 64).

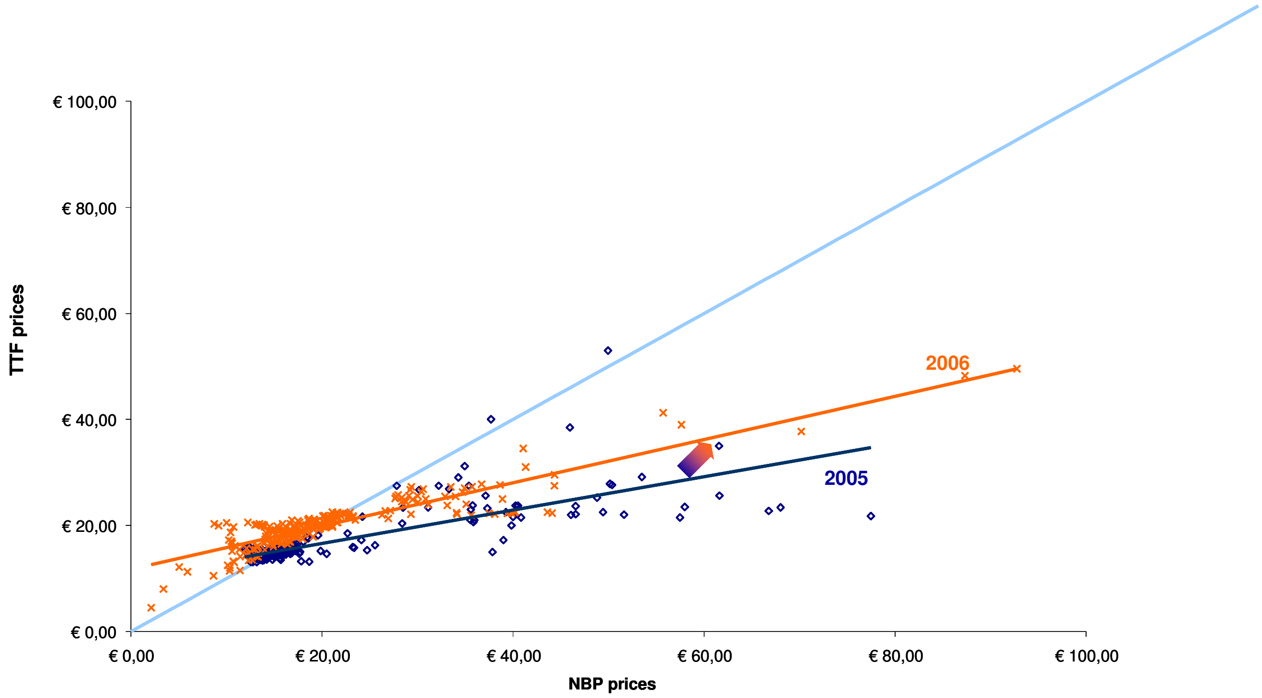
Figure 64: TTF gas price volatility based on daily (absolute) price changes; source: Platts



5.3.3 Market integration in the north-west European gas market

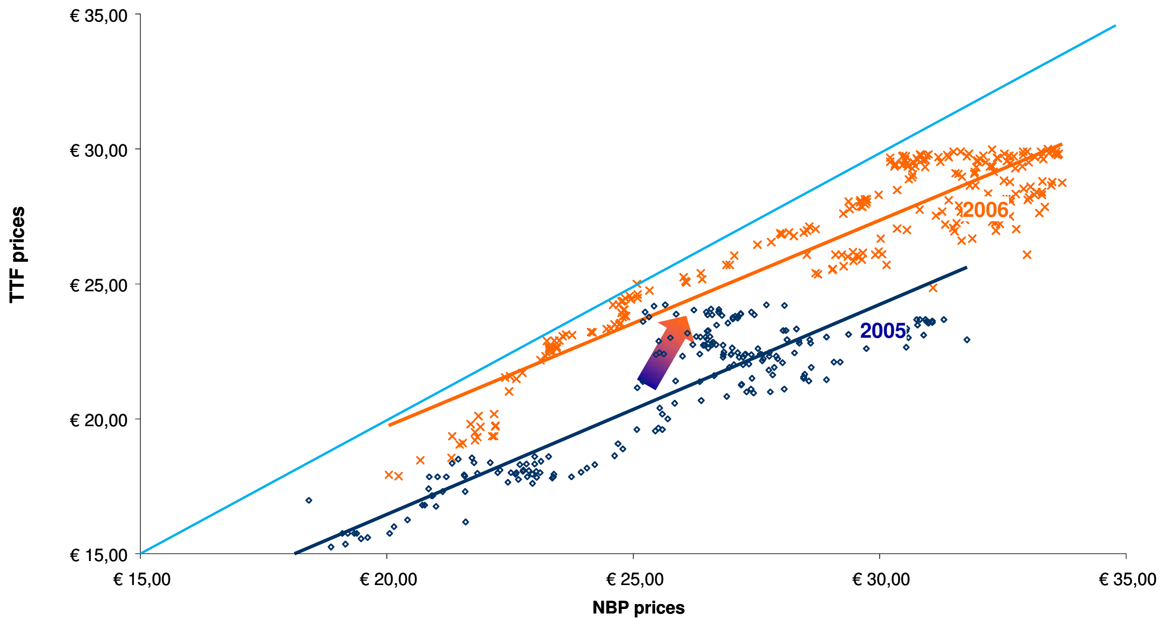
Even though the consequences of the various price shocks at the National Balancing Point last year were not entirely matched at the TTF, the price levels at the two hubs did nevertheless converge last year. Day-ahead prices at the TTF showed a greater correlation with prices at the National Balancing Point in 2006 than in 2005, despite various significant price shocks in the UK gas market (see Figure 65). What can be clearly seen, however, is that the spread in UK gas prices over the year was more than twice as wide as the spread in gas prices in the Netherlands in 2006. The UK market is clearly affected by gas-to-gas competition to a greater extent than the Dutch market, where a much greater proportion of the gas sales are currently indexed against oil and a much smaller proportion of the gas supplied is traded at the TTF.

Figure 65: Development in the correlation between day-ahead prices at the NBP and the TTF; source: Platts



The correlation between year-ahead prices at the NBP and the TTF also increased sharply in 2006 compared to 2005 (see Figure 66). It is notable, however, that year-ahead prices in the Dutch wholesale market were structurally lower than those in the UK market (albeit to a lesser extent than in 2005).

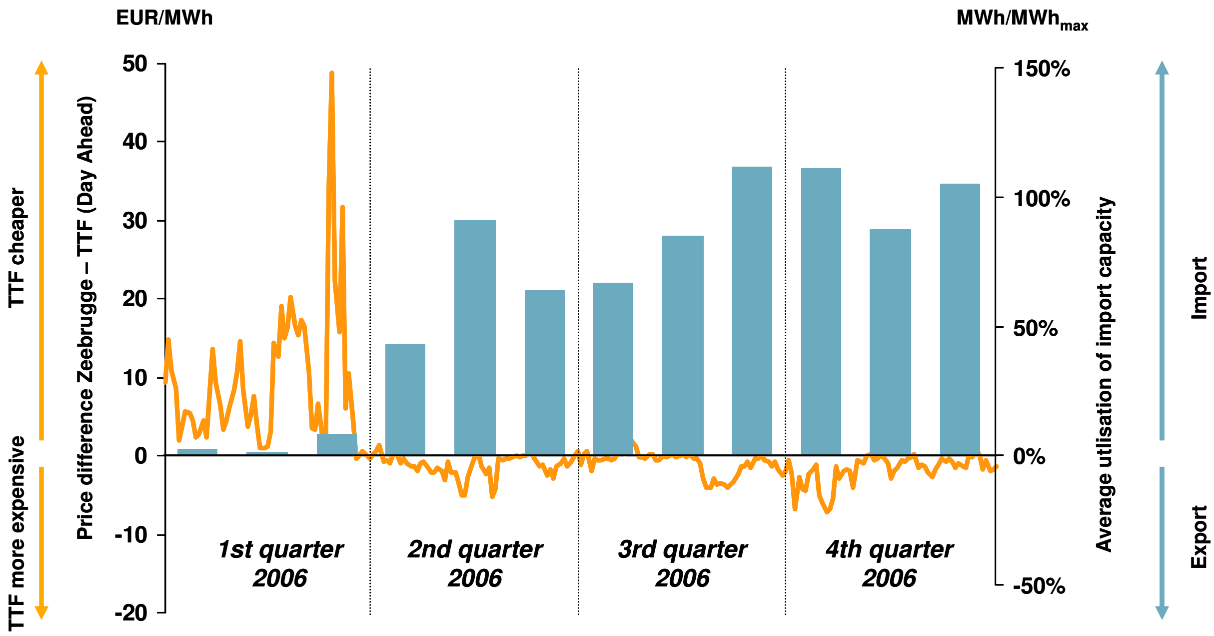
Figure 66: Trend in the correlation between year-ahead prices at the NBP and the TTF; source: Platts



Since the prices of the various products converged in 2006 and Zelzate is one of the main points from which market integration can occur between the three markets, it is likely that arbitrage is taking place between Zeebrugge and the TTF (see Figure 67). This shows that when gas from Belgium (Zeebrugge) becomes more expensive than gas from the Netherlands (TTF), the import volume through Zelzate decreases. This is a form of arbitrage.

A more active form of arbitrage, in which parties in the Netherlands also export in the event that prices in Belgium are higher, is ruled out by the fact that Zelzate is a unidirectional border point. No further firm import capacity will be available at Zelzate from 2009 (see section 3.2.2) Firm – bidirectional – interconnection capacity will only become available again from 2012 (after construction of the north-south line as a result of the “Gas Roundabout” programme). For the moment, however, a significant import point is being lost and direct arbitrage between Zeebrugge and the TTF will become more difficult.

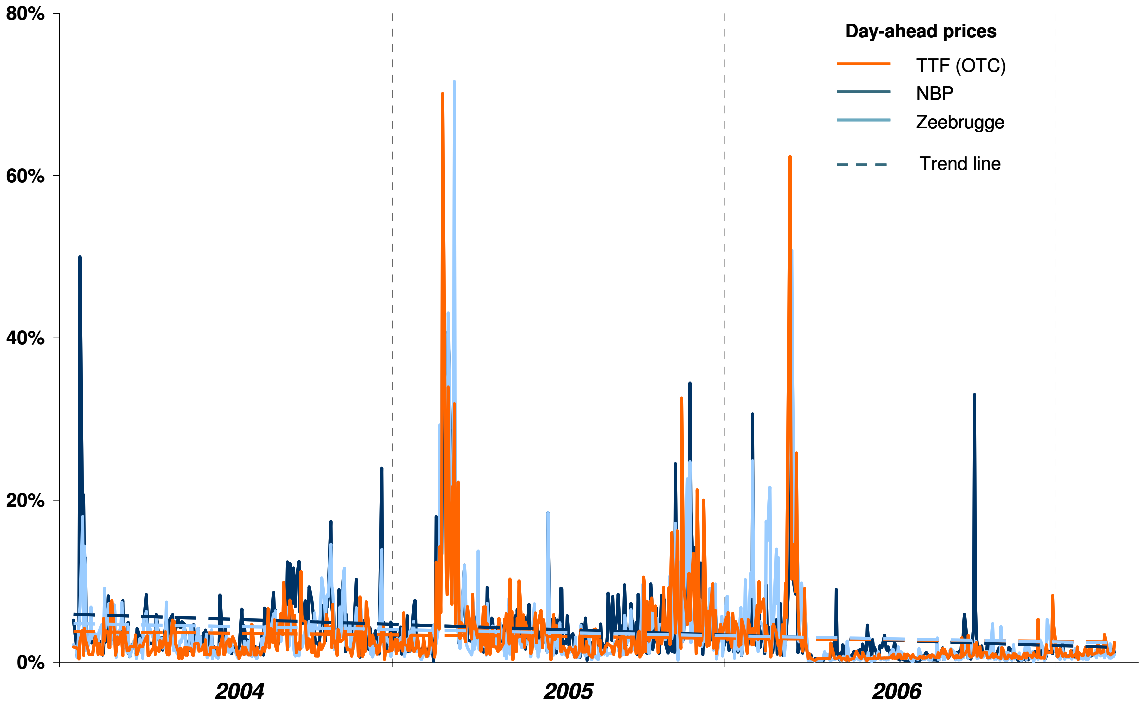
Figure 67*:* Arbitrage at Zelzate; source: Platts



5.3.4 Trend in the bid-ask spread

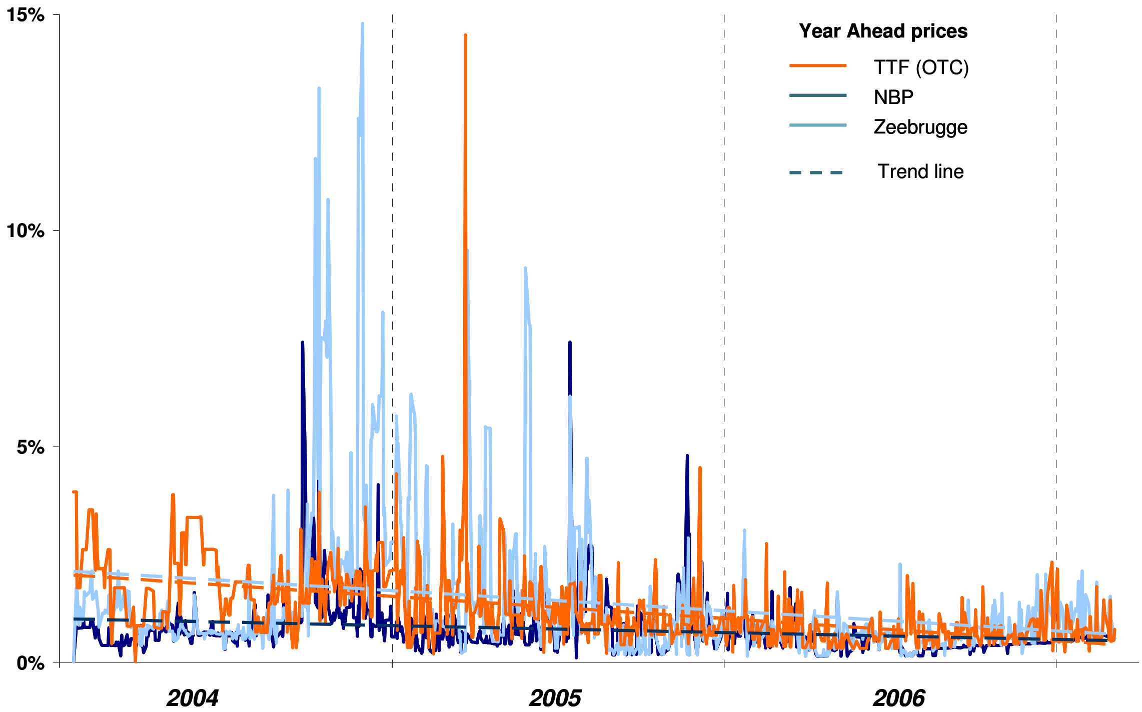
The bid-ask spreads for day-ahead and year-ahead products show a mixed pattern, although it does appear that the spread on year-ahead products at the various hubs is decreasing over the years (see Figure 68). This is often a sign that the liquidity is increasing. In the questionnaire, shippers stated that the bid-ask spread was one of the aspects which had improved least in 2006. If it is assumed that shippers can achieve better trading margins with a wider spread, a narrowing spread would indeed be described as a “deterioration”.

Figure 68: Spread on day-ahead products in European markets; source: Platts



The spread on year-ahead prices at the NBP and Zeebrugge narrowed further in the past year and at the end of 2006 was at the same level as TTF prices (see Figure 69).

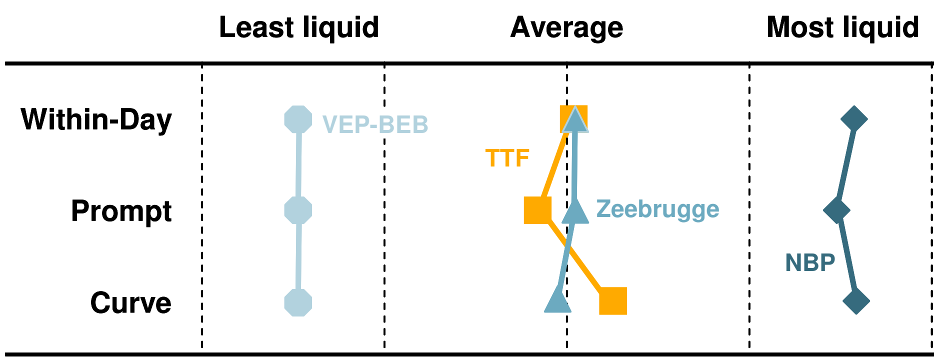
Figure 69: Spread on year-ahead products in European markets; source: Platts



5.3.5 Perception of market liquidity

The conclusion that the TTF is seen as important in the north-west European market but not yet as liquid as the NBP is also confirmed in the shipper questionnaire (see Figure 70). As in 2005, the NBP is seen as the most liquid market, followed by the TTF and Zeebrugge, with the TTF being seen as more liquid for within-day and Zeebrugge for prompt products. The VEP-BEB hub is placed in last position for all products.

Figure 70: Shippers' perception of liquidity of relevant markets; source: shipper questionnaire



6 Conclusions and recommendations

This chapter draws conclusions on the basis of the findings of the previous chapters, in order to set out the resulting recommendations.

6.1 Conclusions

The developments in the wholesale gas market were slightly positive in relative terms in 2006. However, the usual obstacles were found in all the main aspects of the wholesale market (market conditions, market structure and market outcomes).

- NMa/DTe finds that obstacles exist for practically all market conditions, and hardly any improvement appears to have taken place compared to 2005. For example, the Gas Monitor shows that the (contractual) availability of both import capacity and quality conversion capacity is a major point of concern for the efficient operation of the market. In addition, access to and availability of seasonal flexibility is one of the factors that is currently impeding the development of the low-calorific market. Finally, the speed at which shippers can access steering information and the availability of relevant market information is a major area of attention.
- The market structure is highly concentrated along almost the entire value chain. In particular, the trade in low-calorific gas is highly concentrated, which is of course not surprising since hardly any low-calorific gas is traded at the TTF. In addition, the degree of concentration both in import capacity for high-calorific gas and in quality conversion capacity has increased compared to 2005.
- Finally, with regard to market outcomes, it is striking to note the significant but in absolute terms limited growth of the TTF. It must be realised, however, that the TTF still handles only a very limited part of the total trading volume. Prices have also converged with those of neighbouring countries and market participants expect the integration to increase further in the years ahead. However, the (temporary) reduction of firm import capacity at Zelzate and the fact that at present the BBL is only flowing towards the UK, both physically and administratively, the arbitrage possibilities are limited.

Whereas the obstacles with regard to market structure and market outcomes mainly concern symptoms which provide an insight into the operation of the wholesale market, obstacles relating to market conditions provide genuine pointers for the measures to be taken. The obstacles recorded in that context can be divided into three categories:

1. The extent to which the gas transported in and through the Netherlands actually contributes to the operation of market forces in the wholesale gas market.
2. Issues which impede the extent to which the available infrastructure is used efficiently and effectively.
3. Obstacles limiting the extent to which market participants can anticipate market requirements appropriately by investing in socially desirable gas-related infrastructure and services.

In the sections below, the respective obstacles are divided into these three categories and explained in greater detail.

6.1.1 Market share in the wholesale gas market

In order to obtain an efficient wholesale gas market in the Netherlands, it is important that the gas which flows physically through the Dutch gas grid also actually contributes to the operation of market forces. When the maximum possible amount of gas supplied in the Netherlands or exported is traded at the TTF, the liquidity of the market will increase and the TTF will become a fully-fledged source of gas for market participants. Although the size and liquidity of the TTF grew strongly once again in 2006, this was due almost exclusively to high-calorific gas and the TTF represents only a limited part of the total volume transported. Moreover, scarcely any low-calorific gas is traded at the TTF at present. Over 93% of the total volume transported in the Netherlands is not traded at the TTF. Market participants nevertheless state that they expect the use of the TTF as a source of gas to increase significantly in the years ahead (particularly for high-calorific gas). NMa/DTe believes, however, that this development must be actively accelerated.

6.1.2 Utilisation of the existing infrastructure

Whether there is an efficient and effective market depends greatly on the way in which the physical infrastructure is utilised. In this context it is important that the market's "rules of play" are introduced in such a way that market forces can also operate optimally. NMa/DTe has had to conclude that in many areas this is not the case at present, that the existing infrastructure is far from being optimally utilised and that there are still many opportunities to make greater and better use of the existing infrastructure. A brief commentary on each of these points is given below.

- Congestion at import points threatens to impede the further development of the wholesale market.

  There was contractual congestion from time to time at all H import points in 2006. The congestion may increase further up to 2012 since no firm import capacity will be offered at Zelzate from 2009. Although physical shortages also occur at certain points, a large part of the congestion is contractual. This means that the existing infrastructure is not being optimally utilised and that even though capacity is available parties are not in a position to make effective use of it.

- Contractual congestion of quality conversion capacity constitutes a barrier to the low-calorific market.

  In the quality conversion capacity which it offers in the market, GTS currently only includes the capacity available at the blending stations. Any contractual potential to increase the quality conversion capacity on the basis of contractual agreements with market participants therefore remains unused at present. Moreover, since no shortage was recorded at the blending stations in 2006, coupled with the fact that additional quality conversion capacity will come on stream in 2010 and demand for quality conversion capacity may decrease (temporarily) due to a declining supply of H-gas from the small fields, there should be no shortage of physical quality conversion capacity in the short term. Nevertheless, the quality conversion capacity for the years ahead is already sold out. This limits the access which market participants have to the low-calorific market. Moreover, the fact that the flexibility requirement in the delivery of low-calorific gas is high and the supply of "loose" flexibility is very limited means that market participants' access to the low-calorific market is impeded all the more and therefore that market forces are hindered.

- **The current seasonal storage capacity is only available to the market to a limited extent.**

  The current storage capacity is only used to a limited extent because the storage facilities are currently considered to be production capacity and thus cannot be made available to the market through TPA. Partly for this reason, too little (contractual) storage capacity for TPA is available for the seasonal market, although shippers state that there is demand.

- **A lack of short-term flexibility resources and steering information impedes market participants in organising their imbalance independently.**

  Although the availability of physical flexibility was sufficient in 2006, market participants indicate that the supply of flexibility resources was not sufficiently diverse. Moreover, since the steering information is not provided on time, market participants are not sufficiently able to organise their imbalance themselves. As a result, they have to rely to a large extent on "non-nominated" products (e.g. Combiflex, tolerance) in order to minimise their imbalance risks. Nevertheless, the role of TTF as a source for flexibility increased in the short term in 2006 and this role is expected to become increasingly important in the future.

- **The transparency of the market has scarcely improved in comparison with the previous year.**

  Particularly the transparency relating to storage capacity and quality conversion is generally seen as poor by shippers. Moreover, across the board, shippers perceive scarcely any improvement in comparison with 2005 and there even appears to have been a deterioration. Since there have been no changes in information provision compared to 2005, this probably indicates that shippers are attributing increasing importance to transparency.

6.1.3 Required investments

In order for the Netherlands to develop from a net gas exporting country into a gas hub, various market participants will have to invest in the necessary support infrastructure in the years ahead. The need for additional investments can be seen among other things from the congestion observed in the Emden-Oude Statenzijl import cluster and the predicted decrease in production from the small fields. It will also be necessary to invest in additional seasonal gas storage capacity in the next few years to offset the decreasing flexibility of the Groningen field over time. Finally, increased and more diverse import and storage facilities will help counter the concentration in the market. For example, the GTS Open Season includes various new investments in transmission capacity. In addition, several market participants have published plans to build LNG terminals. These investments are all still in a preparatory phase.

In order to actually realise the investments, parties need sufficient transparency concerning the market (size of demand and competitive supply, prices and price mechanisms) and the regulation that applies in the market. On the basis of both the information requested for this Gas Monitor and the regular work carried out by NMa/DTe, we find that both of these conditions have not yet been sufficiently fulfilled. As stated above, however, the current lack of transparency constitutes a barrier to new investment. Market participants also state that the regulation system or the uncertainties in it create actual or potential obstacles.

6.2 Recommendations

In order to effectively address the above obstacles to the operation of market forces and realise Dutch ambitions in the international gas market, measures must be taken in the short term to improve the operation of market forces. The conclusions to that effect in this Gas Monitor are in line with the recommendations recently issued by NMa/DTe in the report entitled "Acceleration of the Development of the TTF and the Gas Wholesale Market" (hereinafter: TTF Report). A brief recap is provided below of the recommendations issued in the framework of the TTF Report. These are followed by the recommendations which have not previously been issued and which have resulted specifically from the Gas Monitor.

6.2.1 Recommendations in the TTF Report

Below are the main points of the TTF Report, structured in accordance with the "Conclusions" section of this Gas Monitor.

Market share in the wholesale gas market

In order to increase the quantity of gas which finds its way to the wholesale market, more gas from the Groningen field, including flexibility, must reach the TTF. This requires a package of structural measures to boost the operation of market forces in the low-calorific market. This package must include the possibility of transferring (mainly low-calorific) gas at the TTF rather than "behind the city gate". It must also be possible to do business in a more modular way, for example by means of more standardised (framework) contracts. This will increase the tradability of low-calorific gas and flexibility.

Utilisation of the existing infrastructure

In addition, to allow better utilisation of the existing gas infrastructure, a number of "rules of play" for the use of infrastructure must be amended:

- The harmonisation of transport procedures in the various countries of north-west Europe must be rapidly increased. This will simplify cross-border trade and transport and thus improve connections with the surrounding marketplaces. The allocation of otherwise unused import capacity must also be improved in the short term, so that more cross-border trade can take place in the short term.
- The shortage of quality conversion is mainly a contractual shortage in the current situation: both the demand for and the supply of quality conversion are to a large extent determined by the portfolio of GasTerra. When GTS enters into a contractual agreement with GasTerra, GTS can control the conversion balance "behind the scenes". Shippers then do not have to reserve any conversion capacity and need have no concerns about its availability.
- The balancing regime, including the availability of the information which shippers require (steering information and the linepack monitor) must be tackled in the short term. This must enable shippers to control the costs of imbalance and actively contribute to controlling the balance across the whole network. It will also be possible to limit the credit risks of imbalance.
- Although transparency concerning the utilisation of the infrastructure has recently improved (summer 2007), its effectiveness in practice has yet to be demonstrated and this must be attended to.

Required investments

In the medium term, additional investment is required in (seasonal) storage and quality conversion. In the longer term, additional investments in import capacity and LNG landing will provide a solution. This either is being or should be set in train now. It is also advisable to improve the existing connections with the UK and Belgian marketplaces, by ensuring that the connections can be used in both directions (import and export). This of course requires a favourable investment climate, and it is important to maintain a balance between facilitating the market and guarding against undesirable social risks.

6.2.2 Additional recommendations in the Gas Monitor

Two important points have been added to supplement those in the TTF Report: the development of interconnection capacity at Zelzate and increased concentration in transmission capacity and quality conversion capacity.

GTS intends to convert the Zelzate import point to a bidirectional point and has stated that it must be ready by 2012. This is a positive step in the coupling of the TTF particularly with the NBP via Zeebrugge. In the meantime, however, according to information from GTS, the coupling will worsen, since the firm capacity of the Zelzate import point will be withdrawn from 2009. Interruptible capacity, which is available, is not a sufficient alternative to firm capacity due to the uncertainty which it entails. There are no other alternatives, because the only other import cluster (Emden/Oude Statenzijl) is sold out and the BBL is currently only available for exports. The deterioration of the coupling with the NBP in such crucial years may restrict the development of the TTF. NMa/DTe will assess the quality and capacity documents to evaluate the development of the connections.

The second additional point, the increased concentration, may be reduced in the short term by improving the allocation (secondary trade, UIOLI) of transport and abolishing reservations of quality conversion. Investments offer a solution in the medium term.

Annex I: Comparison of 2005 and 2006

The table below compares the main outcomes in the 2006 gas monitor with the outcomes in the 2005 gas monitor.

2005			2006	
Entry and exit points in the Netherlands				
Entry	923 TWh		Entry	982 TWh
% import	19%		% import	23%
% production	81%		% production	77%
Exit	904 TWh		Exit	972 TWh
% export	53%		% export	55%
% domestic consumption	47%		% domestic consumption	45%
Gas balance by gas quality				
Production H	394 TWh		Production H	396 TWh
Consumption H	138 TWh		Consumption H	135 TWh
Export H	185 TWh		Export H	240 TWh
Import H	178 TWh		Import H	228 TWh
Production G	350 TWh		Production G	359 TWh
Consumption G	0 TWh		Consumption G	34 TWh
Export G	1 TWh		Export G	36 TWh
Consumption G+	291 TWh		Consumption G+	266 TWh
Export G+	27 TWh		Export G+	6 TWh
Export L	261 TWh		Export L	256 TWh
Level of utilisation by cluster				
OSZ H import	73.5%		OSZ H import	80%
Concentration in HHI				
Production H-gas	2,992		Production H-gas	2,283
Production L-gas	9,388		Production L-gas	9,668
Import H-gas	2,388		Import H-gas	3,120
Export H-gas	7,424		Export H-gas	6,063
Export L-gas	7,656		Export L-gas	9,832
Quality conversion	5,139		Quality conversion	5,627
Trading flows and churn in the Netherlands				
Non-TTF trade	95.7%		Non-TTF trade	93.5%
TTF trade	4.3%		TTF trade	6.5%
Churn	6.9		Churn	11.3

Annex II: Note on quality conversion in the Netherlands

Background

From the 2005 Gas Monitor it emerged that both DTe and the market had insufficient insight into the available capacity for quality conversion, and the way in which the available capacity was distributed among the market participants. No physical shortage was observed in 2005. There is concern, however, in view of the importance of quality conversion for competition in the low-calorific market and the replacement of domestic L-gas production by imported H-gas in due course. GTS has indicated that there is a physical shortage of quality conversion capacity. In response, DTe has decided to gain greater insight into the availability of quality conversion capacity in order to form a judgment on this matter.

Introduction

Various qualities of natural gas are introduced into the grid in the Netherlands. Some Dutch customers consume gas within the Wobbe band bandwidth from 43.8 to 44.4 MJ/ m^3 (G^+ gas). All other qualities of gas can be adjusted to this Wobbe-index by means of quality conversion. There are two possibilities: blending and nitrogen dilution.

Blending can be carried out in three ways:

1. The blending of H-gas with low-calorific gas; the blending of high- and low-calorific gas produces a gas which meets the specifications of the G-gas band.
2. Enrichment of G-gas; natural gas from Groningen has a Wobbe index of approximately 43.8 MJ/m3. It is therefore possible to blend high-calorific gas with this Groningen gas and remain within the Wobbe bandwidth of G-gas.
3. Enrichment of G-gas for export; the enrichment of Dutch G-gas to produce gas with the maximum Wobbe index of 46.5 MJ/m3 (L-gas) for export to Germany and Belgium through the Zevenaar, Winterswijk and Hilvarenbeek export stations.

Nitrogen dilution is the conversion of H-gas using nitrogen; by injecting nitrogen into H-gas, it is possible to produce a gas which meets the Wobbe specifications of G^+-gas.

Why is physical capacity relevant now?

The small fields policy was the original driver for quality conversion. This policy had a dual purpose:

1. To make the conditions for small fields so favourable that as many fields as possible could be brought on stream. This was achieved by enabling small field producers to sell their gas to Gasunie with a high load factor at an attractive tariff.
2. Conserving the flexible Groningen field for the future by producing gas first from the small fields and using the Groningen field to make up any shortfall.

In the meantime, production from the small fields is decreasing, while the consumption of low-calorific and high-calorific gas is increasing. It was expected that the Groningen field would produce more in the future, to compensate for the decline of the small fields. This would reduce the demand for quality conversion, so in the recent past there was little investment. This changed with the introduction of a ceiling on Groningen production. More gas will have to be imported in order to make up for the loss of supply from Groningen. These imports consist of H-gas, since there is no other quality of gas. Hence the demand for quality conversion will increase rather than decrease.

GTS no longer has a direct influence on the demand for quality conversion, since it no longer has the possibility of influencing the gas quality of production following the unbundling process at Gasunie. Whereas previously Gasunie had to ensure that an annual volume was provided from the fields and imports but was able to tailor the gas quality of the production to the availability of blending plants on an hourly basis, GTS now has to ensure that the gas balance is in order for each gas quality, without being able to influence the proportions of H- and G-gas supplied. This increases the demand for quality conversion.

At the same time, sufficient quality conversion is of great importance in view of the fact that shippers who have no access to the Groningen field can only sell to a low-calorific market if they have access to converted H-gas. The competitive pressure in the low-calorific market can only increase if there is sufficient quality conversion.

The question of whether there is sufficient quality conversion available to meet demand at any time is therefore very relevant.

The demand for quality conversion
There is demand for quality conversion throughout the year, and a distinction can be made between the temperature areas in which conversion takes place. On a conceptual level, these are summer, winter and shoulder months.

In the summer, there is little demand for G^{+}-gas, because households burn little gas in the summer. Hence there is no market for G-gas and consequently little demand for conversion. The conversion which does take place is based on nitrogen dilution. There is hardly any blending, because the Groningen field is at minimum level as the small fields have priority in terms of production.

In the winter, both the small fields and the Groningen field operate at a high level. The demand for export L-gas in the winter is also high. Gas is mainly blended, and nitrogen dilution is used to supplement it.

In the shoulder months, the demand for G^{+}-gas and L-gas can largely be met by H-gas production. As a result, demand for quality conversion increases, but the possibilities for blending are limited, so there is high demand for nitrogen. Ultimately, N_2 is the limiting factor.

The capacity for quality conversion is therefore limited by the supply of H-gas in the winter, the available G-gas market in the summer and the volume of nitrogen in the shoulder months. The capacity of the individual blending stations is not an obstacle.

Model for calculating the demand for nitrogen

The model used by GTS to determine the demand for nitrogen is a Monte Carlo simulation, with the following parameters as input:

- Domestic demand
- Export demand
- Weather pattern
- Possible use of blending stations without N_2
- N_2 capacity

The available quantity of nitrogen is converted into quality conversion units. These are reserved by shippers. The calculations are as follows.

$$QCU = Q_{gas} * \Delta W$$

where

QCU = quality conversion unit [MJ/m^3 x m^3/h]

Q_{gas} = flow [m^3/h]

ΔW = Wobbe administrative unit. E.g. 51.6 to 44.4 or 51.6 to 46.5 [MJ/m^3]

$$Q_{gas} = B * Q_{N2}$$

B = Dilution factor = indicative factor 10 for domestic use (from H-gas to G$^+$-Gas)

Example:

1 m^3/h N_2 + 9 m^3/h H_{gas} = 10 m^3/h G-gas

1 m^3 N2 = 10 m^3/h * 7.2 = 72 QCU

$$\Delta W = W_{entry} - W_{exit}$$

The Wobbe step, and hence the number of QCUs, is calculated on the basis of the administrative Wobbe labels of GTS. The dilution factor B is based on the actual gas quality.

$$Q_{average} \text{ (for QCU)} = (Q_{entry} + Q_{exit})/2$$

GTS has sold 37 million units to date. On the basis of the Monte Carlo model, it can be seen that the available volume of nitrogen can be used to produce slightly less than 30 million QCUs. This corresponds to the above indicative sum. In addition to nitrogen, blending also plays a role, making several million units available. Its role is much smaller than was believed in the past, although demand for nitrogen seldom reaches maximum levels.

A total of 33 million QCUs are available, of which 29.5 million are available through nitrogen conversion and the remainder through blending and timing differences in demand. (These 29.5 million QCUs are based on a nitrogen capacity of 406,000 m3/h). In addition to firm quality conversion, interruptible quality conversion will be offered from 2007. GTS is aiming to draw a more rigorous distinction between firm and interruptible quality conversion for 2007 and subsequent years.

The future

- GTS has conducted a study of the costs over time in the domestic market if the Groningen field is empty and concludes that it will probably be cheaper to continue to convert gas than to undertake a large-scale conversion of the domestic small consumer market. Such a choice will lead, however, to a further expansion of nitrogen capacity.

- A study of N_2 expansion was completed at the beginning of this year. Work is continuing on the functional specification. It will probably involve an installation on the North-South route. Two variants are being studied: one involving storage of liquid nitrogen in a cryogenic tank and one in which N_2 is stored in a cavern in gaseous form. Both require a relatively small air separation plant to produce nitrogen. The firm investment decision has yet to be taken.

- Gas storage will also play a more prominent role. Gas can be stored as H-gas or as already converted gas. Storage as H-gas means that the gas can subsequently also go to the international market, but more can be stored in calorific value. Already converted gas cannot go abroad and blending can take place in advance in the summer.

Conclusion

The discussion certainly provided a great deal of insight into quality conversion. It also emerged that quality conversion is not only a technical matter, but that transport and availability of gas from abroad are also important issues.

An important factor is the need for greater transparency on this subject. In other words, how much is there, when will it be available and at what cost, where are the blending stations and what are the factors in determining capacity?