Lessons learned from unbundling experiences from the perspective of a transmission company

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Background of this paper

The European natural gas network was constructed in a few decades, starting in the early 1960s. After the giant Groningen gas field was discovered, natural gas was sold in the Netherlands and neighbouring markets of Germany, Belgium and France. In this period, transmission systems were built, owned, and controlled by monopolistic regional or national midstream companies. In the 1980s, the European gas market and its supply capacity developed rapidly and additional import pipelines from Russia and Norway were built.

The European gas market was mainly organised around an oligopoly of producer-exporters (public companies in Algeria, Norway, Russia and the Netherlands) and a buyers oligopoly, including gas companies in European countries, which were in monopolist (or quasi-monopolist) positions within their national wholesale markets. This institutional structure facilitated the development of stable and mature gas supply systems. Relations between the production oligopoly and the national import monopolies were structured by long-term contracts of 20-25 years, through which risks are shared. Key elements of this risk sharing were the 'Take or Pay' clause, the 'Final Destination' clause and a clause by which prices were set by a 'netback' relation to oil prices.

By the end of the 1990s, the EU Directives started a liberalisation of the EU's energy markets. The former monopolistic or quasi-monopolistic players were forced to compete for market shares. An essential element in the EU strategy was that these midstream monopolies would have to open up their networks to competitors, at fair tariffs and under reasonable conditions. Regulators were established to judge the fairness of the tariffs and the conditions. From its original role of connecting producers efficiently and directly with their markets, the transmission network now became an essential instrument in enabling competition and international gas trade. After the start of the EU gas market liberalisation, the transmission systems had to be functionally, financially, but not legally, unbundled from their parent companies and converted into Transmission System Operators (TSOs).

In the last decade, a trend of further liberalisation has emerged in the European gas market. The TSOs are required to operate fully independently from the commercial interests of the parent companies, leading to complete unbundling of previously integrated companies into two separate entities. One of these - the trading arm - represents the company exposed to commodity risks. These risks are high and are consequently the reason for allowing high margins on natural gas trading. On the other hand, regulated gas transmission is assumed to be a less risky business, and is therefore allowed lower margins by regulators. Moreover, transmission companies are put under high pressure by the regulators to lower their costs, resulting in further lower regulated tariffs. The question is whether this short-term reduction of transmission costs is the best solution in the long run, given the aim to keep gas prices as low as possible for consumers and industries.

Aim of this paper

This paper describes the lessons learned from the transition from an integrated company to a separate transmission company within a time frame of several years. The experience described in this paper is written from the point of view of the transmission arm of Gasunie in the Netherlands, called Gas Transport Services (GTS). As described in the methods section, Gasunie has an important role in energy delivery in the Netherlands as well as in Western Europe.

Experience with liberalisation shows that the new roles and responsibilities that are given to and expected from new transmission companies do not always fit the low risk profile that these companies are thought to possess. On the one hand this new role brings a challenge to the new companies to do new business, but on the other hand confronts them with a range of rules from the regulator and expectations from the market. These lead to new procedures and tasks for the TSO, partly because of the special needs stemming from the integrated environment that cannot be fulfilled in the new liberalised world.

This paper will contribute to an awareness of these phenomena for several stakeholders by sharing, from various angles, positive as well as negative experiences, and responses, that highlight the tensions resulting from liberalisation in the gas transmission sector of today and the future.

Method

The analysis of the effects and consequences of unbundling described in this paper is based on the practical experience of Gasunie in the gas business in Western Europe over the past years. Similar to the UK, where liberalisation was implemented already in the nineties of the last century, unbundling in the Netherlands was primarily instigated by national politicians, ahead of the Directives at the European level.

In order to gain more understanding about the impact of unbundling in the Netherlands, the history and development of the natural gas sector and its structure before liberalisation will be described briefly.

The history of Gasunie began with the introduction of natural gas as a fossil fuel in the first half of the 20th century, following the development of the Groningen gas field. This giant Groningen gas field was discovered in 1959 and developed in 1963. It is by far the largest field in Europe with a total volume of about 3000 bcm.

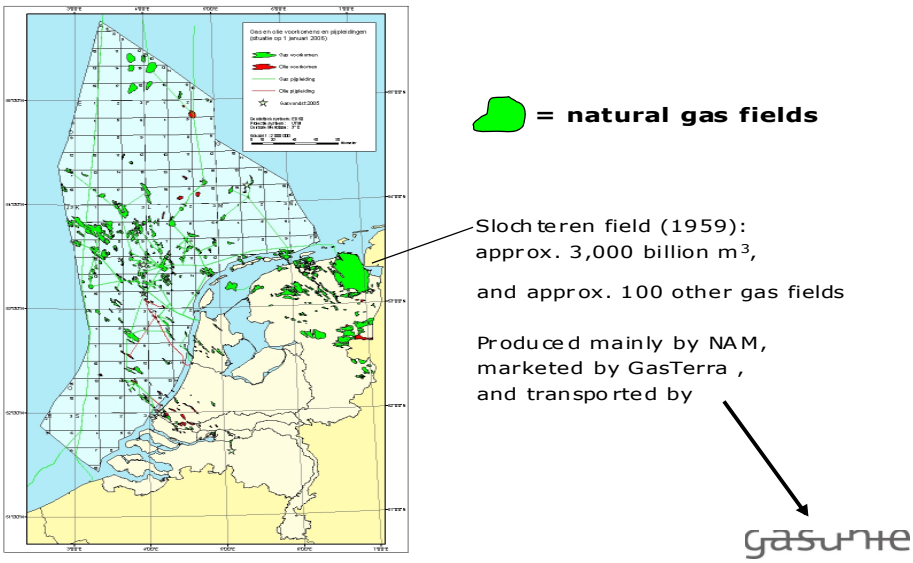
In 1963 Gasunie was formed to purchase, transmit, and market natural gas. The company fulfilled its goal of both ensuring a continuous supply of gas under all circumstances, and marketing it on a commercial basis by operating a transmission network. It submitted an annual sales and marketing plan, projecting 25 years, for approval by the minister of economic affairs. A commercial sales policy to provide the nation with the highest gas revenues was implemented and a balanced approach was taken regarding competing energy supplies, with the expectation that nuclear energy would cater to most needs by the year 2000. Ministerial approval for long-term strategy was to be submitted annually, as well as approval for rates and conditions of delivery.

In 1963 Gasunie contacted the Bechtel Group of San Francisco, which possessed the building expertise that was lacking in the Netherlands. As a result, the most ambitious construction project ever seen in the Netherlands was established between 1963 and 1968, with a second phase until 1972. Thousands of kilometres of pipeline were laid all over the country. A conversion program to enable households to use natural gas instead of coal gas was launched, aiming at one million conversions a year. Natural gas had to be made available as soon as household conversions were completed, to ensure an uninterrupted supply. In 1968, after four and a half years, the conversion was formally completed and more than 90% of Dutch households had switched its energy source to natural gas, the highest percentage in the world.

After the successful introduction of natural gas in the Netherlands, the success of export contracts with Belgium, Germany, Italy, Switzerland and France greatly increased in the 1970s following upward revision of proven gas reserves.

Confidence was at its peak at the beginning of the 1970s and supplies seemed endless. This mood soon changed, however, when Gasunie realised that the production capacity could not keep pace with growing demand, and it seemed that too much gas was being squandered at too low a price. In addition, the Rome Report published in 1972 and the oil crisis changed official thinking about natural resources. As nuclear energy could no longer be expected to fulfil all energy needs by the year 2000, owing to its costliness and public opposition, Gasunie had to change its long-term policy completely. It was time for vigorous conservation rather than exploitation. The Groningen gas field would therefore be considered a strategic reserve, not to be tapped, except to supplement production from smaller fields, which were being developed and include those on the recently partitioned North Sea (see figure 1).

Figure 1: Natural Gas Fields in the Netherlands.



But the small fields in the North Sea in most cases had a far different quality from the Groningen field. This is because the gas from the Groningen field has a rather low calorific value due to its 14% Nitrogen content. Since the combustion equipment of households was based on Groningen quality, a solution had to be found to accommodate these non-Groningen gasses. This challenge of supplying the same quality gas as Groningen has been met very successfully by mixing and diluting with nitrogen. Mixing plants, including some to add nitrogen from the air, were added over the years following the discovery of new types of gas.

The most important challenge for Gasunie from then on, in its task of matching supply and demand, has been to deal with the expected decline in production speed once the pressure in the Groningen field would become too low. Just as transport and blending were dominant issues in previous decades, now volume flexibility, the fine-tuning of supply and demand, require attention. A detailed study showed that underground storage facilities were the best solution to tackle this problem. Therefore, in the mid nineties three underground storages were realised in the Netherlands.

At that moment, the gas network in the Netherlands consisted of 11.600 km, 1100 supply stations, 13 export stations, 9 compressor stations, and 10 blending stations.

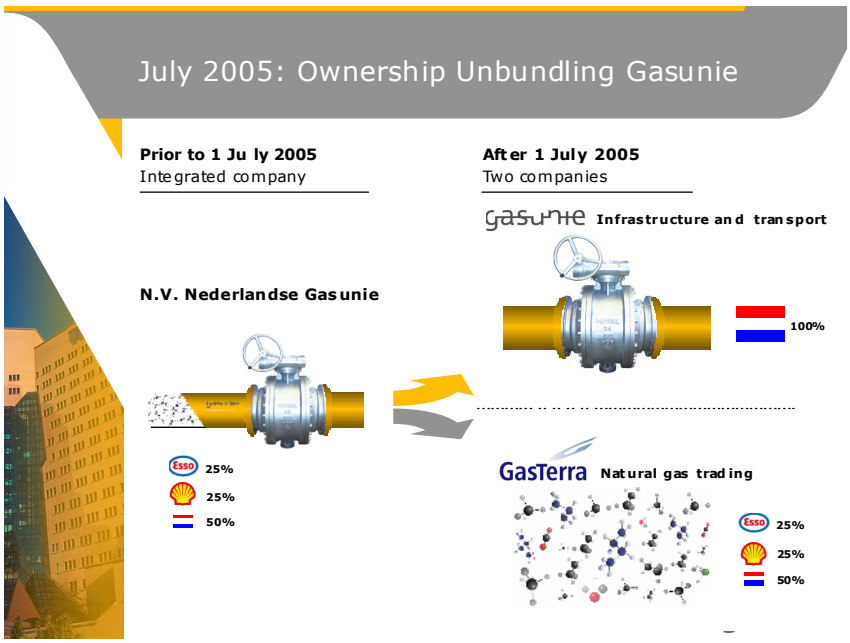
Evaluating the company history it should be noted that Gasunie had a very convenient position since it was founded in 1963. Gasunie was the owner of all contracts with suppliers of gas and the underground storages, as well as contracts on the demand side. In addition, it was the operator of the transportation system. This meant that Gasunie could decide by itself which gas was taken from where, in order to fulfil the requirements on the demand side. As such, Gasunie was in a position to optimise the system using the production sources in the Netherlands to a certain extent in order to minimise both fixed costs, i.e. keeping investments in the transmission system low, and operational costs.

This structure was set to undergo fundamental change due to liberalisation of the gas market, which has been prescribed by the EU's 1998 Gas Directive and has been elaborated on by a

Directive, voted on in 2003. The latter Directive involves a major institutional evolution, implying upheavals in organisation of the European gas market.

In the Netherlands this led to a Gas Act that prescribed full ownership unbundling of the trading and transport activities of Gasunie. Therefore, in 2005, the company was split in an infrastructure company, Gasunie, and a Trade and Supply company, GasTerra. While the original Gasunie had basically 3 shareholders (Shell, ExxonMobil and the Dutch State), as shown in the picture below, Shell and ExxonMobil sold their transport activities to the Dutch State. This resulted in the current 100% ownership by the Ministry of Finance of the infrastructure company Gasunie. On the other hand GasTerra (consisting of the previous trading arm of Gasunie) is still owned by ExxonMobil, Shell and the Dutch State (see figure 2).

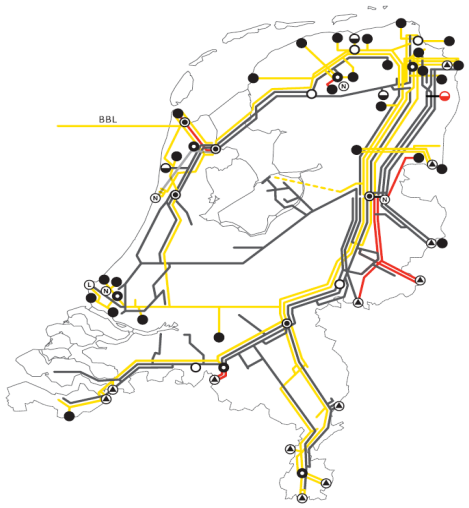
Figure 2



In figures 3 and 4 on the next page, some important data of the infrastructure is given.

Figure 3

Gas transmission infrastructure

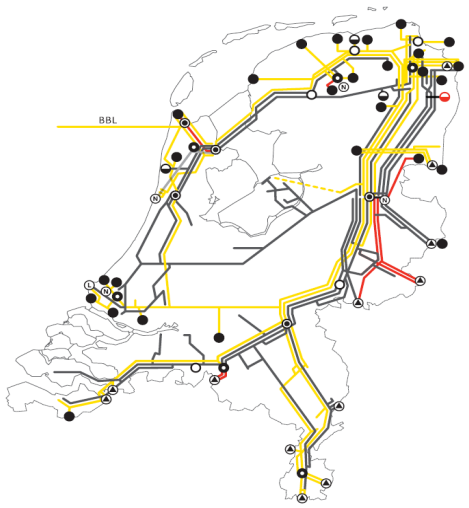


Length	~12000 km
# Compressorstations	10
# Blending stations	12
# Exit points	~1000
# Entry points	~50
# LNG peakshaver	1
# Nitrogen production facilities (incl. storage)	3
# Connections to domestic UGS	5
Connection to LNG terminal	1

gas transport services

Figure 4

Gas transmission system throughput



Transported volume (2010)	111 mrd m^3
Turnover (2010)	€ 1,2 mrd
Total exit capacity	~ 35 mln m^3/h ~ 350 GW
Domestic peak gas demand	~ 20 mln m^3/h ~ 200 GW
Domestic peak power demand	~ 20 GW

gas transport services

Results

As mentioned before, the history of natural gas in Europe started in the Netherlands. Due to the sale of Dutch gas in several Western European countries, integrated companies were founded in order to deliver the gas to their customers. These companies all owned the contracts on the supply as well as the demand side and of course were the owner of the gas transportation system. As such, integrated companies were established all over Europe; in fact they were real monopolist in the view of politicians. Integrated companies were viewed to dictate the business, protect their markets, and control the prices.

In the mid nineties of the last century an enormous boost was given by the European Commission to change this playing field. New and alternative roles, responsibilities, and exposures for transmission companies emerged, and are still emerging, in many areas. Some are part of the regular business of the transmission companies, but also a significant and growing part is outside the original scope of a transmission company.

To deal with these new responsibilities, a number of innovations were developed by Gasunie over the past years that may provide important lessons learned. Nonetheless, several challenges remain, in part because the process of liberalisation is still evolving. In this chapter an overview is given of these new responsibilities, innovations, and challenges, as experienced by the Dutch TSO arm of Gasunie, Gas Transport Services (GTS).

Need for investments

Aside from declining European gas production, liberalisation of the European gas market also leads to growing investments in European gas infrastructure. Declining gas production must be replaced with either LNG bought at European LNG terminals from Qatar, Algeria, Trinidad, etc., by biogas, or supplied through a long-distance pipeline from gas producers in Russia, Norway, Algeria, Iran, etc. Since long-distance gas does not generally have the in-built flexibility of domestic gas production, this is leading to a growing demand for gas storage facilities within Europe. Moreover, market players in Europe are also trying to build capacity positions, which will maximise their opportunities and options, thereby creating a need for transmission capacity, storage capacity and LNG terminal capacity that surpasses the traditional customised monopoly situation. While these additional investments in infrastructure come with costs, they will eventually lead to increased competition and enhanced security of supply. Most argue that, since midstream transmission costs are relatively low relative to commodity prices, this mechanism will ultimately benefit consumers.

Availability of Transmission Capacity

In order to meet this new and growing demand for transmission and storage capacity, a revision of the network expansion strategy was required. As mentioned before, the Dutch TSO GTS was founded when Gasunie was split in a trading and a transport company (2005). Because the core business of the former Gasunie was focused around trading, the transport system was tailor made to fit the exact need of the trading arm. This means that after the split there was hardly any spare capacity available for new shippers.

Because expansion of the network is very capital intensive and requires long lead times, GTS puzzled on how to investigate the need for such an expansion. Until 2005 several consultation rounds were organised in which GTS attempted to establish indications for capacity interests/needs by the customers. The results indeed showed a significant need for

additional capacity but often in single shipper requests, which were commonly not substantial enough to justify investments. Moreover for GTS it was very difficult to judge whether the requested capacity was really needed by shippers or only meant as a future option.

For this reason GTS developed an alternative approach since 2005, called Open Seasons. In these Open Seasons a new marketing process is organised with binding capacity bookings, instead of previously used informal indications. By combining and aggregating single request to bookings for the entire system, one project with efficient investments could be realised. First of all, these Open Seasons are characterised by an **integrated** approach: one open season for the entire network with one investment decision. And, secondly, the Open Seasons have a **synchronised** approach with Neighbouring Network Operations (NNO's). And last but not least there are no upfront limitations; more gas qualities, new entry and exits if needed.

Such an integrated and synchronised Open Season process has different steps:
First of all, interested parties are registered and a confidentiality agreement is signed. Then, a Letter of Intent is signed in which the shippers' capacity requests are written down. Finally, this results in a signed Precedent Agreement (PA) in which the shipper commits himself to the new capacity.

After signing a PA, the TSO is investigating the measures needed to fulfil these PAs and the amount of money required for the investment. After taking the Investment Decision the TSO commits itself to the investment.

To date, three major Open Seasons were organised in order to deliver additional capacity for the market. This resulted in an additional firm booked entry and exit capacity for GTS of approximately 20% for a period of at least 10 years.
The total investments that were needed were about 2.5 bln Euro.
From all the projects the investment decision is taken and in the mean time the first parts of the expansion has been taken in operation.

This successful Open Season approach also plays an important role in the development a Gas Roundabout concept by the Dutch Government in The Netherlands (figure 5). This Gas Roundabout strategy plays a key role in attracting new gas flows and related capacities to the Netherlands.

These activities are:

- Creation of a liquid trading hub
- Access to the LNG market by an LNG terminal;
- Access to Norwegian and Russian supplies;
- New pipeline imports and transits;
- Storage initiatives;
- Improved connection to neighbouring countries including a connection to the United Kingdom; and
- Expansion of the grid by taking over a transmission company in Germany.

Figure 5

Decoupled entry/exit (e/e) systems and the need for an enhanced planning methodology.

An important aspect of liberalisation in the European gas markets was the establishment of decoupled e/e systems with virtual hubs (part of 3rd energy package). The integrated gas business in Europe was originally mostly developed by point-to-point connections between suppliers and consumers. The objective of the 3rd package was to facilitate trading possibilities but this would increase costs of transport. The transmission network should now facilitate any e/e combination shippers want to use, requiring additional network investments.

Importantly, a decoupled e/e system requires an entirely different and new planning methodology. In the integrated world Gasunie owned all the supply and demand contracts and could in fact influence and optimise the gas flows in the system using the flexibility in the upstream production facilities and/or contracts. Now the TSO owns no commodity contracts anymore and the control room has to act and react on the nominations of the shippers.

In the new situation trade is performed by very many shippers (more than 80) that all are working outside the company, trying to maximise their profits in the commodity market. Their only connection to the transport system is a transport contract, based on which decisions are made bearing in mind only their commodity interest. We have observed that trading behaviour results in rather unpredictable flow patterns. While in the past gas flows were mainly dependent on gas demand and hence on temperature, nowadays gas flows are dependent on price differences between hubs, which are difficult to forecast for a TSO that is not itself active in that market.

This is very well illustrated in the graphs below (figures 6 and 7).

Figure 6

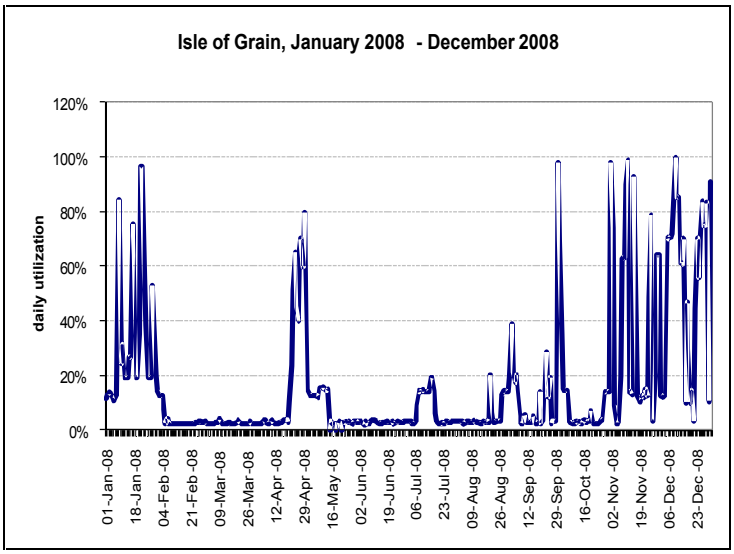
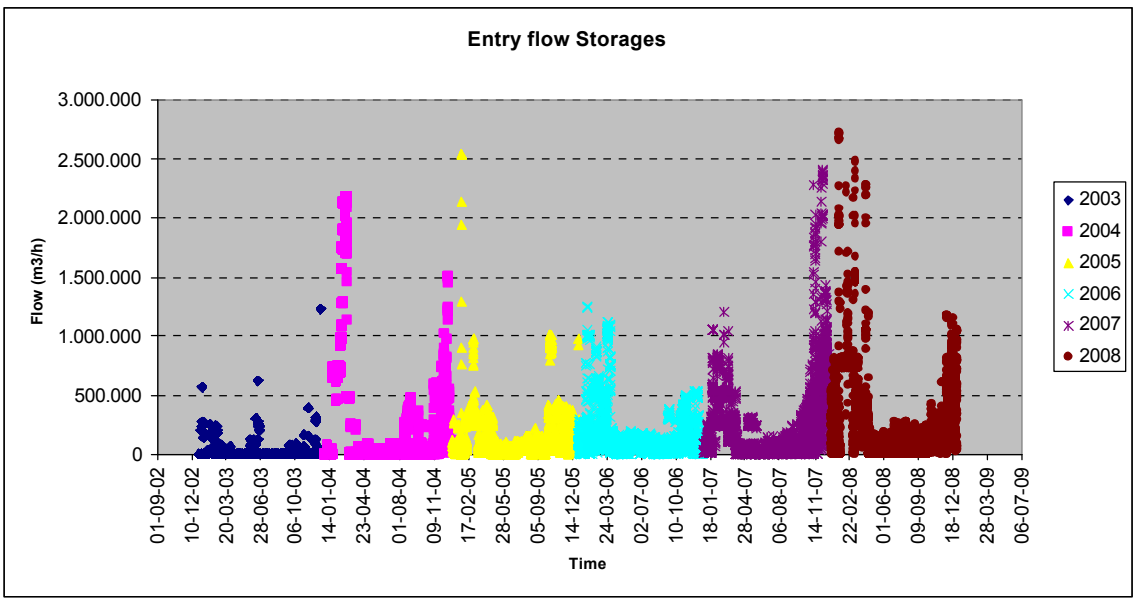


Figure 7

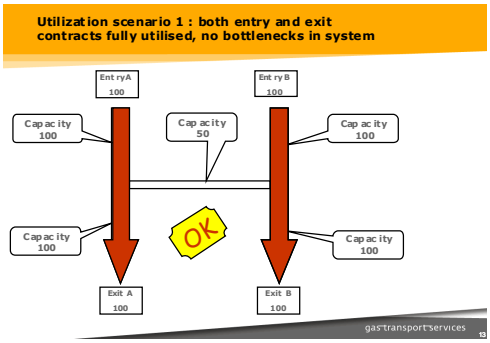


Thus, the TSO has no influence and insight on when and how capacity is used. This means that GTS had to change its planning methodology fundamentally. And in fact, this is (or will be) the case for almost all unbundled gas transmission companies in Western Europe employing decoupled entry/exit systems.

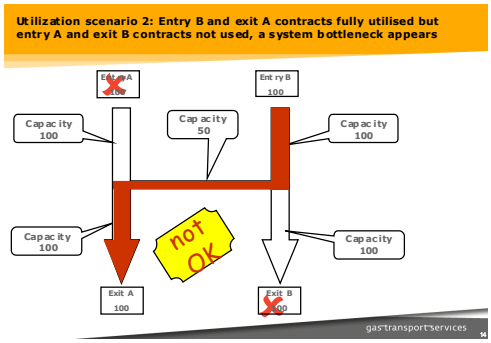
In a decoupled entry/exit system the most difficult question by far is how the system will be utilized in different scenarios in the future. This can be illustrated by the following simplified pictures (figure 8).

Figure 8

Scenario 1



Scenario 2

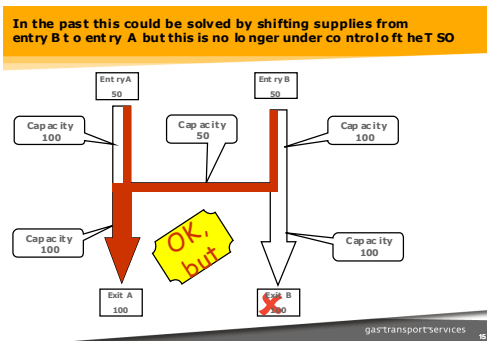


Assume a very simple situation with 2 entries and 2 exits, with 2 flow lines and 1 connection line in between.

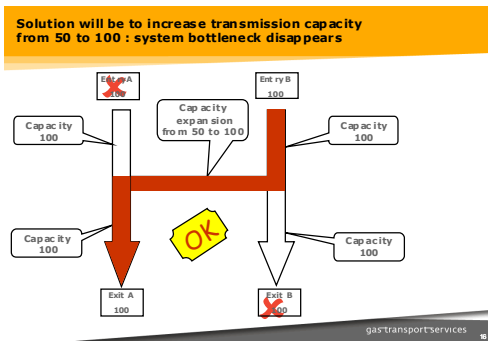
In scenario 1 exit A is delivered by entry A and exit B is delivered by entry B. In fact, these are two point-to-point connections without any interference: the connection flow is 0.

In a decoupled entry/exit system, such as in scenario 2, the situation might occur that exit A has to be delivered by entry B, which leads to a bottleneck for the connection line.

Scenario 3



Scenario 4



Prior to unbundling, a solution could easily have been found. An integrated company could decide to shift part of the supply from entry B to entry A like in scenario 3, making the bottleneck disappear.

In the unbundled situation this is not possible because the contracts are no longer under control of the TSO. The result is that the capacity of the connection line has to be increased (scenario 4). This shows that in a liberalised world with decoupled entry/exit systems, additional investments are required.

In reality, the system is much more complicated because it consists of very many entry and exit points. For example, the GTS system has about 50 entry points, connected to upstream markets, and about 20 major exit points, connected to another set of markets. Moreover, the GTS system has approximately 1100 local exit points in the Netherlands itself. Additionally the network has two different gas qualities with interaction by mixing stations and injection of nitrogen.

In a decoupled entry/exit system shippers have the complete freedom to utilise their contracted capacity at their preferred moment. Planning on all possible entry/exit combinations would lead to an enormous amount of potential flow patters and the risk that some patterns could result in major bottlenecks that would require significant investments to overcome.

In order to avoid this, GTS developed the following approach:

- Translate the shippers' behaviour in realistic and relevant entry/exit combinations, which will result in utilisation scenario's;
- Test whether all these combinations can be transported; and
- If not, grid expansions are required.

It should be clear that very many calculations will be needed and this would be very time consuming. A special planning model was developed in order to do this in a rather efficient and fast manner.

GTS has experience with this methodology and computer model for more than 5 years now, but we are convinced that, as the West European gas market further develops, there will be a continuous need in the coming years to evaluate and develop additional improvements.

Development of Trading

In addition to realising increased competition and trade through enlarged capacity and a decoupled e/e system, GTS also developed a Title Transfer Facility (TTF) in order to directly facilitate trading by its shippers. The TTF is a virtual market place on which GTS offers market parties the opportunity to transfer gas that is already present in the GTS system ('entry-paid gas') to another party. Using TTF, gas that is brought into the national grid via an entry point can easily change ownership before it leaves the national grid at an exit point. TTF serves to promote gas trading. TTF can serve as a virtual entry point in the portfolio of a shipper or trader who buys gas on the TTF, or as a virtual exit point in the portfolio of a shipper or trader who sells gas on the TTF.

Next to the 'over the counter' (OTC) trading between parties, the TTF also facilitates the operation of a gas exchange. A gas exchange allows parties to buy or sell gas anonymously on the TTF. The gas exchange operator is responsible for bringing together the two parties and for the financial transaction, including the credit risk. If a gas trade is handled via a gas exchange, the gas exchange operator will execute the TTF nomination on behalf of the party concerned, where the amount nominated is based on balance of all transactions between the gas exchange operator and mentioned party. A TTF subscription with GTS is required for shippers to trade on the TTF via the gas exchange. The Dutch Minister of Economic Affairs has appointed APX-ENDEX as the Gas Exchange Operator. APX operates as a physical, short-term exchange with delivery on the TTF. Futures contracts are traded on ENDEX, also with delivery on the TTF.

The graphs below give a schematic view of the monthly (figure 9) and daily (figure 10) volumes traded within the TTF between January 2007 and December 2011 as observed by GTS. Since not all trades are mentioned to GTS, the amount of gas traded, as disclosed in the figure, are believed to be conservative. The yellow column represents the traded volume, as registered by GTS, the black column represents the net volume.

Figure 9

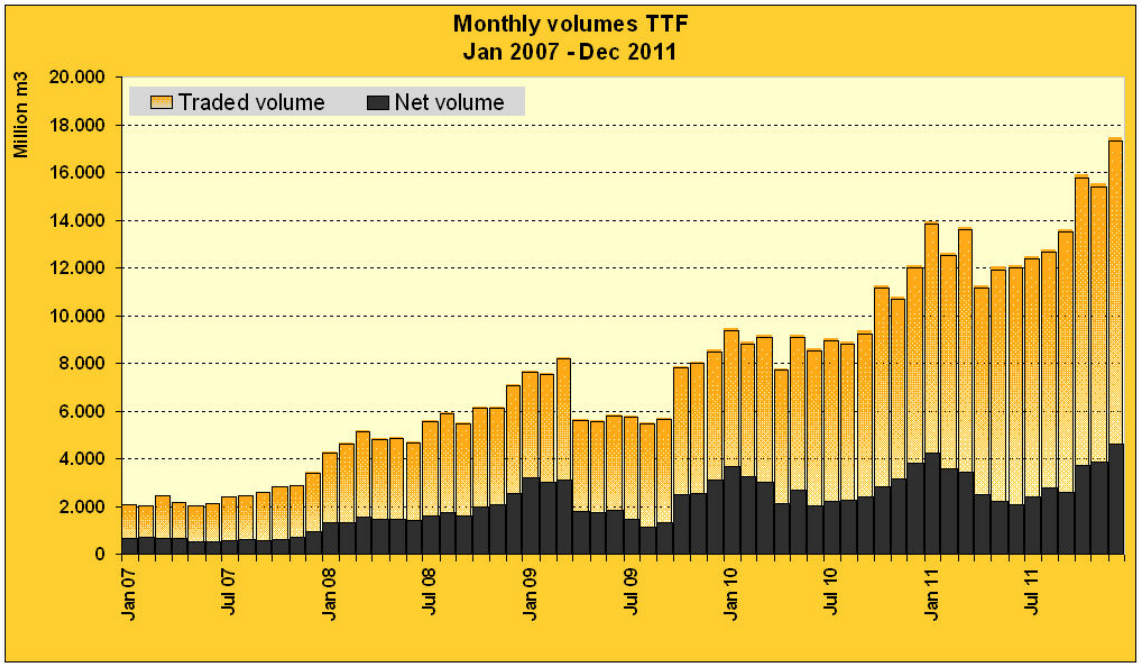
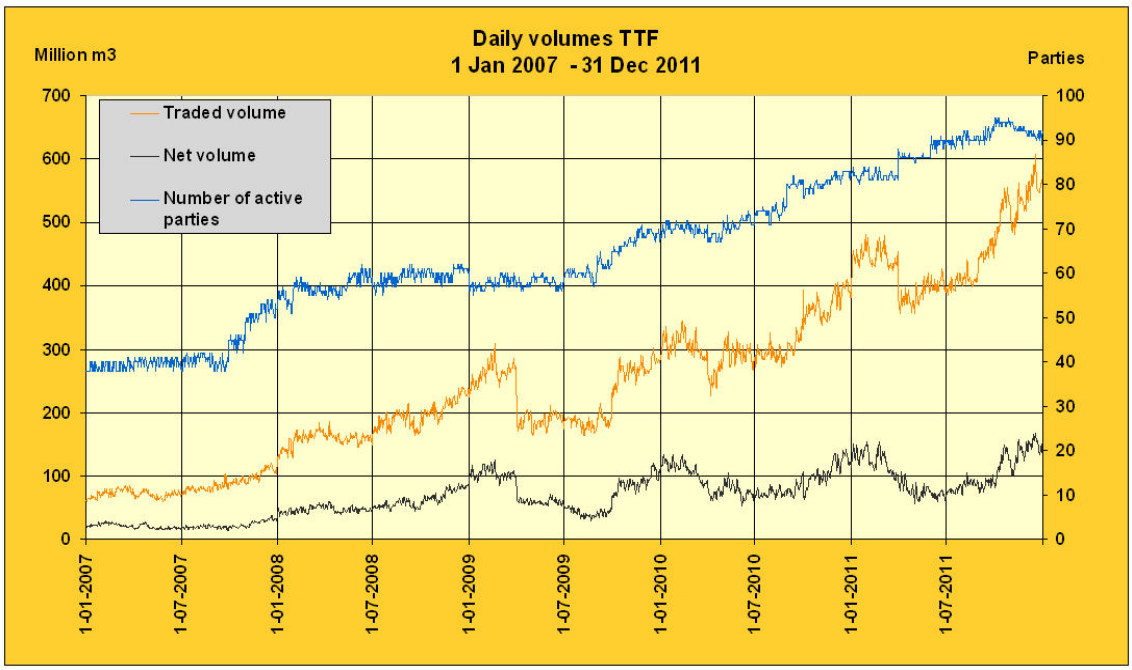


Figure 10



Note that these graphs clearly show the very positive effect of the aforementioned Open Seasons. The first phase was completed in 2010 and the graph clearly shows the effect on the traded and net volumes, as well as the number of active parties on the TTF.

Challenges

Despite the innovative way in which GTS has been able to adapt to liberalisation, various challenges remain that need further investigation. These include:

- Excessive focus on tariffs by the regulator;
- From long-term to short-term contracts;
- Transmission companies have rigid and capital-intensive assets;
- Utilisation of network is decreasing;
- Lack of information;
- Unclear responsibility surrounding security of supply.

Excessive focus on tariffs

One of the driving forces behind liberalisation is competition, which should result in lower gas prices for consumers and industries. To achieve this, regulators tend to focus excessively on lowering tariffs set by TSOs. The reason behind this focus on tariffs for transport is that this is an area where clear targets for them can be defined. The result, however, is that financial capabilities of the transmission companies are reduced, lessening the capability for them to invest. Consequently, reducing tariffs might be attractive in the short-term, but in the long run may cause network congestions limiting competition, which was, after all, the main aim of unbundling.

The dominant risk for gas transmission companies is that a pipeline will be underutilised. The reason is that as soon as a pipeline is built the costs are sunk and can only be recovered if used sufficiently by shippers at an acceptable tariff. Underutilisation or lower tariffs than initially anticipated mean that the investment will not be recovered. It has been shown that investments in gas transmission require hundreds of millions of euros and have a high front-end risk. As the economic lifetime of pipelines – and hence the tariff basis for cost recovery – extends over several decades, risks of lower than anticipated use of the pipeline or changes in the tariffs remain significant. Consequently, investment decisions are not made easily, and any investment in a pipeline requires a very thorough investigation of the future market.

A recent report published by the Clingendael International Energy Programme (CIEP) called "Crossing Borders in European Gas Networks: The Missing Links" (2009), explains the following about the build-up of pipeline costs per unit of gas transported.

> "During the lifetime of an investment, the relative contribution of each cost factor varies. In the first years after the investment, capital costs are high; in later years other costs become more significant. In Table 1 the various cost components are averaged, assuming an economic life span of 25 years. The distribution shown is characteristic for a network comprising pipelines of various ages.
>
> Operational costs comprise mainly fuel (or electricity) for compressors and maintenance of the infrastructure. Fuel costs are dependent on actual usage of the pipeline and on the actual fuel prices. The network operator has little influence over fuel costs. During the lifetime of gas infrastructure, maintenance costs tend to increase over time, until replacement is economically more attractive than intensified maintenance or until safety can no longer be guaranteed. Assuming well-established cathodic protection, underground pipelines have a very long technical life (>50

years); economic life may be shorter. Replacement of the less capital-intensive surface structures will nevertheless be needed at some point.

Table 1: Build-up of gas transmission costs for a 42" pipeline based on 80% utilisation, averaged over the first 25 years after investment.

	Percentage	Costs €ct/m^3 per 100 km
Capital costs	50%	0.13
Depreciation	20%	0.05
Fuel costs	15%	0.04
Maintenance + Others	15%	0.04
Total	100%	0.26

The table above provides important information for running a pipeline business. Since 85% of the costs are fixed, there is not much opportunity for pipeline companies to respond to changes in the transmission market. To compensate for decreasing sales revenues, only maintenance costs can be minimised. However, safety laws and procedures limit the extent to which pipeline companies are allowed to reduce maintenance costs. In sum, practically all costs of running a pipeline are fixed as soon as the pipeline is built (CIEP, 2009)."

From long-term contracts to short-term contracts.

Long-term natural gas commodity contracts have been the solid basis of the EU security of supply for decades. From the 1970s, these contracts have been used to import more than 250 Bcm/year of natural gas to the EU area. The traditional view is that long-term take-or-pay contracts deliver a secure demand for the producer and steady supply for the purchaser. The producer has the certainty of demand and can plan for the necessary investments with a long-term rationale. The purchaser has the certainty of supplies and can therefore adopt a long-term strategy in downstream markets.

This traditional setting has now started to change in the EU. Due to the increasing flexibility provided by LNG, spot markets (TTF in the Netherlands), and possibly unconventional gas, the significance of long-term take-or-pay contracts from the purchaser point of view has started to change. These contracts and their built-in flexibility mechanisms are no longer the only sources of supply for the national incumbents. Instead, many purchasers in the EU can access LNG and spot markets and the development of international pipelines has the potential to further increase their different supply options. These alternative sources of supply, together with the possibility for storage of natural gas, create a new sense of flexibility in the incumbent's purchasing portfolio that reduces the need to rely on long-term contracts in order to cover all necessary supply for the downstream customers.

In addition, it is in and of itself a wish of traders, regulators, and authorities to reduce the contract duration. However, this is in conflict with the capital intensity of transmission companies and increases the risk of stranded assets. It endangers the necessary investments to facilitate a competitive market and to encouraging arbitrage. Understandably, traders want as much freedom in transmission as possible through sufficient transmission capacity at any time, contracting only for a short term (or rather not at all), and having very low tariffs. Achieving of all these goals at the same time, however, is not realistic.

Transmission companies have rigid and capital-intensive assets.

The reason in particular why the increasingly shorter duration of contracts poses a problem is the rigid and capital-intensive nature of the assets in the transmission sector. In earlier days the investments in transmission infrastructure were paid by the income of the sales of commodity. Because of the high ratio between commodity income and transportation cost the investments were almost never a real issue.

For a transmission company the costs of investments in infrastructure are relative high. The investment decisions are based on long-term transport contracts of basically 10-20 years and a given regulatory regime at a certain moment.

The regulated tariffs on transmission and distribution pipelines are based upon a long depreciation period (typically 30-50 years). Pipelines have the longest asset lives and therefore have the greatest risk of becoming stranded assets, when the utilisation is decreasing in time or even worse contracts are not prolonged.

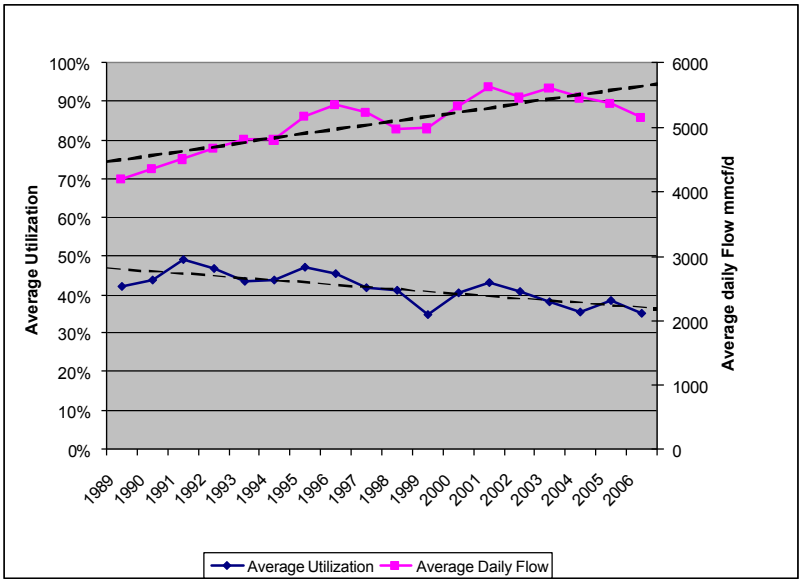
The assets (pipelines, compressor stations) constructed obviously cannot be moved elsewhere. Avoiding stranded assets is a major concern. A rapidly changing market is thus adding to the complexity of investment decisions and at the end the risks for the TSO's. Moreover regulatory methods and European & National gas laws are changed every 3-5 years and this poses a serious risk for any investment in the gas infrastructure in Europe.

Utilisation of network is decreasing.

As mentioned earlier, the liberalisation of the European gas market is aimed at two main objectives. The first involves the creation of competitive, integrated gas markets. This requires the provision of non-discriminatory access to the infrastructure. The second objective is to enhance efficiency and reduce the costs of using this infrastructure, in an attempt to lower final consumer prices. So far, these two objectives have been addressed by one single approach, namely by improving the utilisation rate of the pipeline infrastructure.

Competition and international trading of gas, however, requires transmission capacity to support the transactions. Additional transmission infrastructure is required, not only to accommodate a higher overall volume of gas, but also to enhance 'optionality' and manage the supply risks. Due to the low level of tariffs described earlier, the cost of transport does not outweigh the potential gain from commodity opportunities. For this reason shippers tend to book more rather than less capacity than they may expect, to be able to obtain gas from the cheapest supplier or engage in trading. This would reduce the average annual utilisation rate of the pipeline system, as can be seen in figure 11.

Figure 11: Average Utilization and Daily Flow.



Source: J. Bootsma, master thesis University of Groningen.

Total costs of transmission are rising because transport itself is getting less efficient and physical utilisation of the network is decreasing. There are many reasons for this as have been mentioned previously (e.g. short-term contracts and decoupled e/e systems). In theory, however, for the end consumer, gas prices could decrease as a consequence of competition. This effect is confirmed in practice, but this is only because the higher costs of transmission are compensated by lower commodity costs, decreasing the overall costs of gas.

Lack of information

In the integrated world all the necessary information for planning and operating the network was available. As mentioned before, the company was the owner of the supply and demand contracts and the transportation system. This led to a very efficient way of long term planning of the network and the outcome was that a tailor-made system could be developed.

Nowadays, a lot of information that is useful for operational and long-term planning is not available anymore for the transmission company. On the one hand this is due to the fact that shippers are more and more hesitating to provide the commercially sensitive information from a competitive point of view. On the other hand, even for the shippers this information is no longer available because of the increasing share of short-term contracts.

This hampers efficient long-term planning of the network, because information to operate and expand the transmission grid in an efficient way is increasingly difficult to obtain for the TSO.

Unclear responsibility surrounding security of supply

Security of supply concerns the degree to which, in both the short-term and the long-term, the prospect of uninterrupted supply of gas can be assumed. It means, in particular:

- Having the transport capacity to enable shippers to supply sufficient gas to consumers;

- Having the capability to maintain supply of gas to consumers, even in periods of peak demand;
- Minimising the risk of supply failure and ensuring the capability to cope with any such failures that do occur in the short-term; and
- Accessing adequate gas volumes for the medium and longer-term (where medium-term might be 5-10 years and longer-term might be 10–25 years).

There is an increasing interest in security of supply in the gas market after the Ukraine crisis of early 2009. Overall security of supply is a combination of availability of commodity and sufficient transport capacity. Formerly, security of supply was a responsibility of integrated companies. After unbundling, it became unclear who is now responsible for security of supply. Clearly the transmission company is responsible for security of transmission, but the question is whether security of the availability of commodity can be left to the (commercial) shippers/traders. This puzzle has not been completely solved yet, but more and more governments are looking at the transportation companies to play a role in this solving process.

The basic principle underlying the new Regulation concerning measures to safeguard security of supply (EU) No 994/2010, is to allow the market players (suppliers and consumers) to manage supply problems as far as possible. Gas companies would continue to have the main responsibility for keeping gas flowing to customers. Public authorities would only need to intervene as a last resort once companies, consumers, and producers have done all they can to resolve the difficulties.
The main objective is to increase the security of gas supply by making it easier to anticipate, avoid and respond to a gas supply disruption that seriously affects one or more country within the EU.

To this end, this Regulation creates a common indicator for gas security, known as N-1. The TSO shall ensure that in the event of a disruption of the largest gas supply infrastructure, the remaining infrastructure (N-1) has the capacity to deliver the necessary volume of gas to satisfy total gas demand of the calculated area during a period of one day of exceptionally high gas demand during the coldest period statistically occurring once every twenty years. As for the methodology for calculating the N-1 standard, the network configuration and actual gas flows as well as the presence of production and storage capacities should be taken into consideration.

The transmission system operators shall enable permanent physical capacity to transport gas in both directions on all interconnections within two years. The level of the bi-directional flow capacity shall be reached in a cost efficient way. Within that two-year period, the gas transmission system operator shall adapt the functioning of the transmission system as a whole so as to enable bi-directional gas flows.

Conclusions

Unbundling is a key element in enforcing liberalization of the energy market in Europe. What is lost – synergy, security of supply, efficiency – is regarded to be an unwanted side-effect of which the chosen solutions so far seem to lead to more regulation of and more responsibilities for transmission companies. Moreover, it turns out that the focus of regulation often lies with pressure on transmission tariffs, which - as shown - may be attractive on the short term but endangers competition in the longer run.

Unbundling has lead to considerable changes in the responsibilities and the method of working for TSOs. The entry of new market players together with a decoupled e/e system call for an increased transport capacity as well as a redesign of the business strategy through for instance Open Seasons and a Title Transfer Facility (TTF). In addition, investment decisions are now based solely on transport contracts, and have become more risky amongst others because of the increased tendency toward short-term contracts and lower tariffs. Liberalisation is still evolving, and will have a continuous impact on the way that transmission companies operate their business today and in the future.

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