
# Gas Transmission Tariffs

# An ERGEG Benchmarking Report

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# Table of contents

## Executive summary

As the European nations strive for a more integrated European market, differences between transmission systems must be investigated in order to promote greater trade and lower transaction costs for market participants.

ERGEG has prepared a benchmark study of six different transmissions systems (TSOs) across Europe. The benchmark compares transmission tariffs and balancing penalties of Fluxys (Belgium), GTS (The Netherlands), Energinet.dk (Denmark), MOL (Hungary), TIGF (France) and GRTgaz (France).

Regarding transportation tariffs, for some profiles the tariffs of the most expensive TSO are almost two times as high as for the cheapest TSO. For other profiles, tariffs of the most expensive TSO is only around 1,5 times higher than the tariffs of the cheapest TSO. Thus, the comparison shows that there are not only differences in tariff levels but also differences in how different customers are charged. Results show that volume does not seem to have an influence on tariffs while load factor on the other hand play a vital role. The conclusion is that the higher the load factor the less (more) expensive are the tariffs of GTS, TIGF and GRTgaz (Energinet.dk, Fluxys and MOL) compared to the average tariffs in the comparison – and vice versa.

Overall the transportation tariffs of TIGF and GTS are the least expensive in the benchmark although this is not true for all profiles and distances. GRTgaz and Fluxys have intermediate positions, whereby the tariffs are still below average. Energinet.dk and MOL have the most expensive tariffs of the six TSOs.

Regarding balancing penalties, results show that there are similar differences in both the absolute level of the penalties and in how TSOs penalize different customer profiles. Thus, Fluxys and GTS penalize all profiles in the comparison while other TSOs only penalize customers with high levels of imbalances but with a relatively higher penalty. Thus, on overall the penalties of Fluxys and GTS are the highest in the comparison, while the penalties of Energinet.dk are among the lowest.

It is very important to note that the results of the transportation tariff comparison and the balancing penalty comparison are strongly influenced by the benchmark methodology. Thus, for instance the benchmark only compares tariffs and penalties for a few standard profiles which may not be equally relevant for all TSOs.

At the same time it is just as important to remember that differences in tariffs can be caused not only by differences in the effectiveness of the TSOs but also by natural differences in geographical and geological circumstances, physical specificities, market conditions, etc. Thus, differences in tariffs can to some extent be explained.

The CEER has concurrently with this tariffs and balancing benchmarking study also prepared a cost benchmark report [C06-GWG-31-04] with the purpose of investigating a part of the reason for differences in tariffs.

What the preparation of this transmission tariff benchmark study indeed has shown, is that there is a great lack of transparency in transmission systems across Europe. Thus, it has proven a very difficult task to prepare a useful setup for comparing both transportation tariffs

and balancing penalties. The CEER believes that a step towards a unification of tariff structures, services and products across TSOs would be very beneficial in regard to benchmarking tariffs and penalties.

# Benchmarking

### Introduction

A benchmarking exercise was undertaken the goal of which was in first place, to help the national regulators to develop more knowledge and experience in using benchmarks for their tariff regulation. Secondly, the benchmark can be used to identify differences in tariff levels which can then be investigated further.

The work on the benchmarking of tariffs and balancing payments may also be useful to national regulators when implementing the Regulation (EC) No 1775/2005 of 28 September 2005 on conditions for access to the natural gas transmission networks. Article 3 of this regulation says that tariffs, or the methodologies used to calculate them, shall reflect actual costs incurred, insofar as such costs correspond to those of an efficient and structurally comparable network operator and are transparent, whilst including appropriate return on investments, and where appropriate taking account of the benchmarking of tariffs by the regulatory authorities. The results of the current study do not prejudice any views of CEER/ERGEG or national regulators on the appropriate role of benchmarking in setting tariffs or on the appropriate methodology.

Due to practical reasons and workability, the benchmark is primarily limited to TSOs with an entry-exit tariff and capacity system. For that reason, the benchmark compares transportation tariffs in The Netherlands, Belgium, France, Hungary and Denmark.

UK, Italy and Germany also have entry-exit tariff and capacity systems but while Germany has been unable to provide data, the entry-exit charging model that applies in the UK is not directly comparable to the tariff systems in the rest of the benchmark. The regulator in the UK has therefore been unable to provide data for the benchmark as well. The regulator in Italy has chosen not to participate in the benchmark because the distances which are used in the benchmark do not represent the generally transported distances in Italy. The French regulator has – on the other hand - accepted to participate in the benchmark although French TSO GRTgaz is the biggest TSO in the comparison and may thus not be directly comparable with the other smaller TSOs.

For comparison the Austrian regulator has provided data on the Austrian transmission tariffs even though the Austrian transmission system is not an entry-exit system but a hybrid system, which combines elements of distance-based, postal and entry/exit tarification. For this reason this data will not be incorporated directly in the benchmark, but it will be used to compare the level of tariffs in systems which employ entry-exit tariffs with tariffs in a system.

The benchmark of transmission tariffs is divided in two separate parts. Part One provides a comparison of transportation tariffs; Part Two provides a comparison of balancing penalties. In order to benchmark transmission tariffs thoroughly, it is necessary to include both parts in the analysis.

In Part Three, country specific reasons for differences in tariffs are discussed. Differences in tariffs could for example be caused by differences in the design of the entry/exit system,

differences in market conditions and differences in geographical/geological circumstances which are impossible to adjust for. It is important to have in mind that some of these parameters are likely to influence the comparison significantly.

The CEER has tried to use profiles which form a relevant basis for tariff comparisons. However, it cannot be ruled out that some profiles may be less relevant for individual TSO's, which would make some of the calculated tariffs somewhat less representative. Nevertheless, the comparison is still informative with respect to actual tariffs and tariff structures.

Part Four summarizes the conclusions of the benchmark. Part Five is the Appendix.

# Part One: Transportation tariffs

## 1) Methodology

The comparison of transportation tariffs is based on a set of assumptions on volumes of gas, booking of maximum hourly capacity, load factor, duration of contracts and the distance of transportation. The parameters are described in detail in the paragraphs below.

On the basis of these assumptions, national regulators were asked to calculate transportation tariffs for TSO's in their own country. The calculations are shown in the Appendix (Part Five). These calculations form the basis of the transportation tariff benchmark.

## 2) Standard profiles

The transportation tariff value comparison is based on 10 standard profiles. The standard profiles vary in volumes, maximum hourly capacity and in load factor. The profiles are supposed to reflect size and characteristic of typical shippers and are based on information from various TSOs and on advice from Gas Infrastructure Europe.

Standard profiles in former tariff benchmarks are often based on end user profiles but when using end user profiles one does not include any pooling possibilities in the tariff comparison. The issue of interest though is the actual payment which the TSO receives for transporting gas. Thus, we are interested in analysing the payment from the shipper to the TSO and not a hypothetical payment from an individual end user to the TSO. For this reason it has been chosen to use shippers in the standard profiles.

The 10 standard profiles are:

| Profile | Volume ($m^3$/year) | Max. Hourly Cap. ($m^3$/hour/year) | Load Factor |
|---|---|---|---|
| 1 | 5,000,000,000 | 650,000 | 0.88 |
| 2 | 5,000,000,000 | 800,000 | 0.71 |
| 3 | 5,000,000,000 | 1,000,000 | 0.57 |
| 4 | 500,000,000 | 65,000 | 0.88 |
| 5 | 500,000,000 | 80,000 | 0.71 |
| 6 | 500,000,000 | 100,000 | 0.57 |
| 7 | 500,000,000 | 170,000 | 0.34 |
| 8 | 50,000,000 | 8,000 | 0.71 |
| 9 | 50,000,000 | 10,000 | 0.57 |
| 10 | 50,000,000 | 17,000 | 0.34 |

In theory, a shipper with a relatively large portfolio of customers, *ceteris paribus,* has a higher load factor than a shipper with a relatively small portfolio of customers. This is caused by the possibilities of pooling. Profiles with relatively high volumes are therefore combined with relatively high load factors and vice versa. Practically, some relatively low load factors (i.e. profiles 3, 6, 7, 9) are not generally encountered in countries where competitive access to

storage is available. In those countries, shippers “flatten” their subscription curve on the whole year and therefore make their load factor higher.

### 3) Calorific Value

Volumes in the standard profiles are based solely on cubic metres of gas and not on the quantity of energy. Contrary to some former benchmark studies there is no conversion of calorific values. Thus, the benchmark compares tariffs for transporting the exact same quantity of gas through the transmission system.

If calorific value conversations were made or the standard profiles were based on quantity of energy, the compared quantity of transported physical gas would vary between countries because of natural differences in calorific values. Thus, the benchmark would compare tariffs for TSOs performing different tasks which would not be informative.

When standard profiles on the other hand are based on cubic metres without conversion of calorific values the TSOs in each country are performing the exact same task which justifies a comparison of the tariffs.

### 4) Distance of transportation

Compared to a distance-based tariff system, an entry-exit tariff system does not depend on the distance of transportation as such. But because of differences in how each of the entry-exit systems is designed, distance is still an important parameter when comparing tariffs.

Some countries use a specific entry-exit system designated as the postal stamp system. This implies that the transportation tariff is the same no matter the entry/exit point. Other countries on the other hand have varying tariffs depending on the specific entry/exit points.

In order to perform a fair comparison of tariffs it has been chosen to benchmark these for a variety of distances. For countries with postal stamp systems tariffs will by definition be the same no matter the distance as tariffs are the same for all entry/exit points. But for countries with varying entry/exit tariffs the distance of transportation determines which specific entry/exit points are used for the tariff calculation. In that way, tariffs can be calculated as an average for all exit points located the exact given distance from the entry points. Thus, when benchmarking for a variety of distances, several combinations of entry/exit points are used to calculate the tariffs. This secures that the comparison between countries with varying entry/exit tariffs and countries with postal stamp tariffs provides a true and fair view.

Tariffs in Belgium, Denmark and Hungary are the same for all entry/exit points while tariffs in France and the Netherlands vary between entry/exit points. Thus, when distance increases only tariffs in France and the Netherlands are affected while tariffs in Belgium, Denmark and Hungary are unaffected. This is reflected in the results of the benchmark.

It is important to note that even though tariff systems in Belgium, Denmark and Hungary are postal stamp systems, they are still entry/exit systems. The only difference from the other entry/exit systems is that in these countries tariffs are the same for all entry/exit points.

The distances used in the benchmark are supposed to reflect typical distances of gas transportation in the participating countries. The chosen distances are based on suggestions from various regulators/TSOs.

| Benchmark | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| Distance on regional transmission network (km) | 10 | 10 | 10 | 10 |
| Distance on main transmission network (km) | 50 | 100 | 250 | 340 |
| Total distance (km) | 60 | 110 | 260 | 350 |

As the Belgian territory is smaller than 350 km., it has been chosen not to include the Belgian tariffs for this particular distance in the benchmark.

## 5) Assumptions

Throughout the tariff calculations, some basic assumptions are made:

- The duration of the contract period is one year.
- No quality conversion charges are included in the tariffs. Only firm transportation services are compared.
- No payments for emergency supply are included in the tariffs.

The assumptions are made in order to ensure the most transparent benchmark as possible. While some TSO's offer short-term contracts, the standard contract duration is still one year and the prices for the short-term contracts are often set on the basis of the tariffs for a yearly contract. The exclusion of quality conversions and emergency supplies ensures that only tariffs for the same services across TSO's are benchmarked.

## 6) Results

The national regulators in the countries participating in the benchmark have calculated transmission tariffs for the 10 standard profiles for each of the selected distances. The results can be found in the tables below.

*Notes*:

1. The tariffs of Danish TSO Energinet.dk have been changed after the completion of the comparison. Capacity charges have fallen by 9,87% while commodity charges have fallen by 23,11%. As the capacity/commodity split in Denmark on average is 75/25, tariffs have on average fallen by 13,18% compared to the figures in the benchmark. Tariffs for both primary and secondary emergency supply have risen by 18,26% but these are not included in the benchmark.
2. In the case of GTS and for the distance of 350 kilometres, the report provides two tariffs per profile. These two tariffs form the upper and lower bounds of the tariffs over this distance. Incorporating this spread in tariffs was thought to be more informative than the (weighted) average of tariffs over this distance.
3. The transmission tariffs of GRTgaz and Tigf have been changed since 1st of January 2007. These tariffs have been included in the benchmark.

*Table 1: Tariffs (EUR/1000m$^3$), distance of transportation = 60km*

| *Country* | *TSO* | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| France | GRTgaz | 4,64 | 5,72 | 7,14 | 4,65 | 5,72 | 7,15 | 10,55 | 5,79 | 7,22 | 12,22 |
| France | TIGF | 4,20 | 5,17 | 6,47 | 4,21 | 5,18 | 6,47 | 11,00 | 5,21 | 6,50 | 11,03 |
| Belgium | Fluxys | 5,70 | 6,91 | 8,52 | 5,70 | 6,91 | 8,52 | 14,16 | 6,91 | 8,52 | 14,16 |
| Denmark | Energinet.dk | 9,77 | 11,30 | 13,34 | 9,77 | 11,30 | 13,34 | 20,46 | 11,30 | 13,34 | 20,46 |
| Hungary | MOL | 8,33 | 9,51 | 11,08 | 8,33 | 9,51 | 11,08 | 16,57 | 9,51 | 11,08 | 16,57 |
| The Netherlands | GTS | 3,23 | 3,97 | 4,96 | 3,23 | 3,97 | 4,96 | 8,44 | 3,97 | 4,96 | 8,44 |
| Average | | 5,98 | 7,10 | 8,58 | 5,98 | 7,10 | 8,59 | 13,53 | 7,11 | 8,60 | 13,81 |
| For comparison: | | | | | | | | | | | |
| Austria | TAG | 1,22 | 1,50 | 1,87 | 1,22 | 1,50 | 1,87 | 3,18 | 1,50 | 1,87 | 3,18 |
| Austria | BOG | 2,42 | 2,98 | 3,72 | 2,42 | 2,98 | 3,72 | 6,32 | 2,98 | 3,72 | 6,32 |

*Table 2: Tariffs (EUR/1000m$^3$), distance of transportation = 110km*

| *Country* | *TSO* | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| France | GRTgaz | 5,01 | 6,17 | 7,71 | 5,02 | 6,17 | 7,71 | 13,11 | 6,24 | 7,78 | 13,17 |
| France | TIGF | 4,21 | 5,18 | 6,48 | 4,21 | 5,19 | 6,48 | 11,01 | 5,22 | 6,51 | 11,05 |
| Belgium | Fluxys | 5,70 | 6,91 | 8,52 | 5,70 | 6,91 | 8,52 | 14,16 | 6,91 | 8,52 | 14,16 |
| Denmark | Energinet.dk | 9,77 | 11,30 | 13,34 | 9,77 | 11,30 | 13,34 | 20,46 | 11,30 | 13,34 | 20,46 |
| Hungary | MOL | 8,33 | 9,51 | 11,08 | 8,33 | 9,51 | 11,08 | 16,57 | 9,51 | 11,08 | 16,57 |
| Netherlands | GTS | 3,32 | 4,09 | 5,11 | 3,32 | 4,09 | 5,11 | 8,68 | 4,09 | 5,11 | 8,68 |
| Average | | 6,06 | 7,19 | 8,71 | 6,06 | 7,19 | 8,71 | 14,00 | 7,21 | 8,72 | 14,01 |
| For comparison: | | | | | | | | | | | |
| Austria | TAG | 2,02 | 2,49 | 3,11 | 2,02 | 2,49 | 3,11 | 5,28 | 2,49 | 3,11 | 5,28 |
| Austria | BOG | 3,84 | 4,73 | 5,91 | 3,84 | 4,73 | 5,91 | 10,04 | 4,73 | 5,91 | 10,04 |

*Table 3: Tariffs (EUR/1000m$^3$), distance of transportation = 260km*

| *Country* | *TSO* | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| France | GRTgaz | 5,16 | 6,35 | 7,94 | 5,17 | 6,36 | 7,94 | 13,50 | 6,42 | 8,01 | 13,57 |
| France | TIGF | 4,43 | 5,46 | 6,82 | 4,44 | 5,46 | 6,82 | 11,60 | 5,49 | 6,86 | 11,63 |
| Belgium | Fluxys | 5,70 | 6,91 | 8,52 | 5,70 | 6,91 | 8,52 | 14,16 | 6,91 | 8,52 | 14,16 |
| Denmark | Energinet.dk | 9,77 | 11,30 | 13,34 | 9,77 | 11,30 | 13,34 | 20,46 | 11,30 | 13,34 | 20,46 |
| Hungary | MOL | 8,33 | 9,51 | 11,08 | 8,33 | 9,51 | 11,08 | 16,57 | 9,51 | 11,08 | 16,57 |
| Netherlands | GTS | 4,62 | 5,68 | 7,10 | 4,62 | 5,68 | 7,10 | 12,07 | 5,68 | 7,10 | 12,07 |
| Average | | 6,34 | 7,53 | 9,13 | 6,34 | 7,54 | 9,13 | 14,73 | 7,55 | 9,15 | 14,74 |
| For comparison: | | | | | | | | | | | |
| Austria | TAG | 4,43 | 5,45 | 6,82 | 4,43 | 5,45 | 6,82 | 11,59 | 5,45 | 6,82 | 11,59 |
| Austria | BOG | 8,11 | 9,98 | 12,47 | 8,11 | 9,98 | 12,47 | 21,20 | 9,98 | 12,47 | 21,20 |

*Table 4: Tariffs (EUR/1000m3), distance of transportation = 350km.*

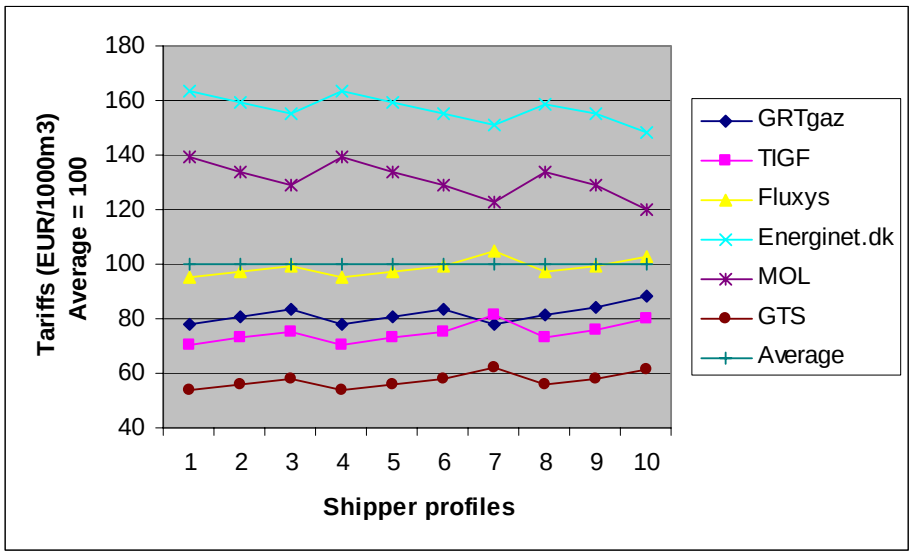
| *Country* | *TSO* | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| France | GRTgaz | 5,72 | 7,03 | 8,79 | 5,72 | 7,04 | 8,80 | 14,95 | 7,11 | 8,86 | 15,02 |
| France | TIGF | 4,44 | 5,46 | 6,83 | 4,44 | 5,46 | 6,83 | 11,61 | 5,50 | 6,86 | 11,64 |
| Denmark | Energinet.dk | 9,77 | 11,30 | 13,34 | 9,77 | 11,30 | 13,34 | 20,46 | 11,30 | 13,34 | 20,46 |
| Hungary | MOL | 8,33 | 9,51 | 11,08 | 8,33 | 9,51 | 11,08 | 16,57 | 9,51 | 11,08 | 16,57 |
| Netherlands | GTS (1) | 6,93 | 8,53 | 10,66 | 6,93 | 8,53 | 10,66 | 18,12 | 8,53 | 10,66 | 18,12 |
| Netherlands | GTS (2) | 4,98 | 6,13 | 7,66 | 4,98 | 6,13 | 7,66 | 13,02 | 6,13 | 7,66 | 13,02 |
| ***Average*** | | 6,69 | 7,99 | 9,73 | 6,70 | 8,00 | 9,73 | 15,79 | 8,01 | 9,74 | 15,81 |
| *For comparison:* | | | | | | | | | | | |
| Austria | TAG | 5,88 | 7,23 | 9,04 | 5,88 | 7,23 | 9,04 | 15,37 | 7,23 | 9,04 | 15,37 |
| Austria | BOG | 10,67 | 13,13 | 16,41 | 10,67 | 13,13 | 16,41 | 27,90 | 13,13 | 16,41 | 27,90 |

*The tariffs for GTS (1) are for a transportation of gas from Groningen to the South West of The Netherlands (Goes) while the tariffs for GTS(2) are for a transportation of gas from Groningen to the South East of The Netherlands (Botlek). GTS (1) provides an upper bound of the tariff over this distance, and GTS (2) the lower bound.*

The tariffs in the tables above (except for the Austrian tariffs) are also shown in the charts below as index figures where the average tariff for each profile is equal to 100. As it can be seen from the tables, the tariffs for the non entry-exit system in Austria are lower - for short distances - than the average tariff of the systems in the benchmark which use entry-exit tariffs. For the shortest distance (60 km) the Austrian tariffs are lower than the tariffs in *all* the countries using entry-exit tariffs. On the other hand, for the largest distances, the Austrian tariffs are very high compared to the entry-exit systems.

This is a natural effect of the differences between entry-exit systems and non entry-exit systems (like the Austrian transmission system) as non entry-exit systems usually include a distance based tariff. Because of this, tariffs of non entry-exit systems often rise relatively more than tariffs of entry-exit systems when the distance of transportation increases.

*Figure 1: Tariffs (EUR/1000m3), Average = 100, distance of transportation = 60km.*

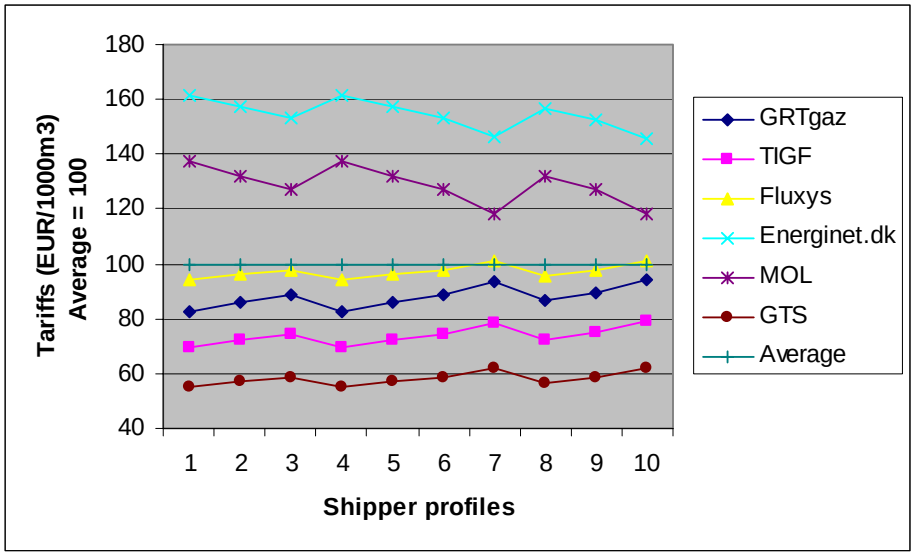


As it can be seen from the graph, the least expensive TSO concerning transportation of gas for a distance of 60km is GTS. Tariffs of GTS are approximately 40% below average depending on the specific shipper profile. The tariffs of GTS are followed by TIGF and GRTgaz. Tariffs of TIGF are approximately 20-30% below average, while tariffs of GRTgaz are approximately 20% below average. Fluxys is very close to the average for all profiles at this distance. The highest tariffs are the tariffs of MOL which are approximately 10-40% above average and the tariffs of Energinet.dk which are approximately 50-60% above average.

The differentiation in tariff levels between TSO's is highest for profile 1 and 4 while lowest for profiles 3, 7 and 10. This indicates that tariffs for shippers with relatively high load factors differ the most among the TSO's concerned. It can be seen from the graph as well that **compared to the average tariffs**, the tariffs of Energinet.dk, MOL and TIGF decline when the load factor decreases. In contradiction to this, **compared to the average tariffs**, the tariffs of GTS, Fluxys and GRTgaz increase when the load factor decreases.

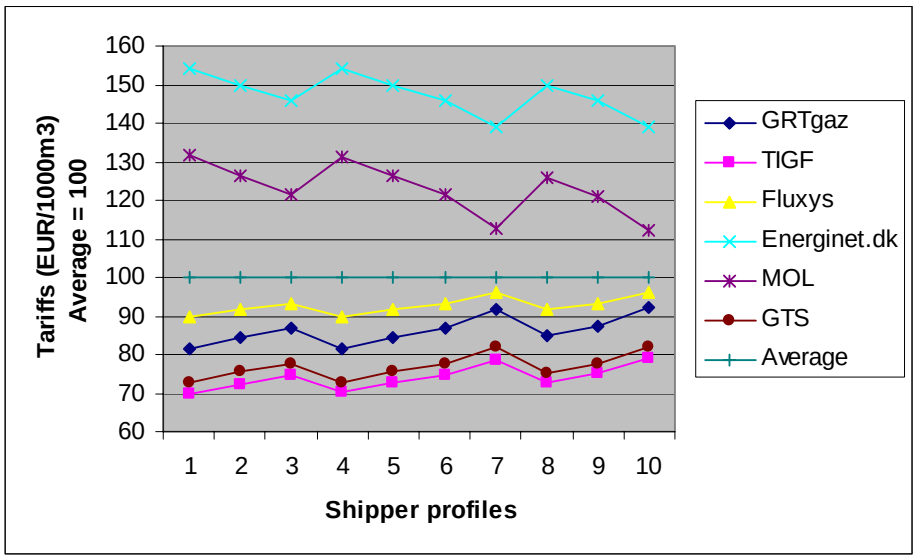
Finally the graph illustrates the fact that differing volumes do not influence the relative price per 1,000m$^3$ significantly. Thus, for similar load factors the index for each of the TSO's is almost the same for differing volumes.

*Figure 2: Tariffs (EUR/1000m3), Average = 100, distance of transportation = 110km.*



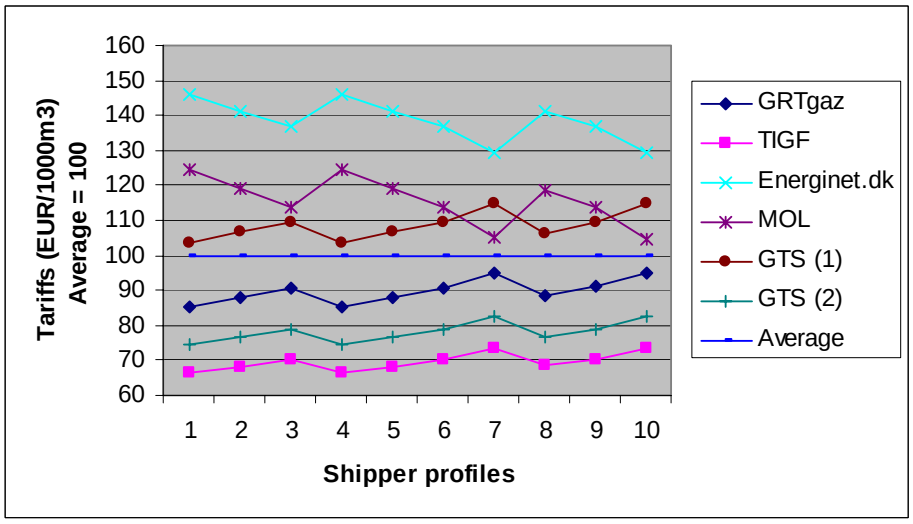

Transmission tariffs for the transportation of gas of a distance of 110km are slightly less differentiated within the TSO's than for the shorter distance of 60km. Again the difference is most significant for profiles 1 and 4 (high load factor) while least significant for profiles 7 and 10 (low load factor). GTS still has by far the lowest tariffs for all profiles with tariffs around 40-50% below average. TIGF and GRTgaz have the second and third lowest tariffs, respectively, both in a range of approximately 10-30% below average. Fluxys is again close to the average (although slightly below it for most profiles). The tariffs of MOL vary from 20-40% above average, while Energinet.dk again has the highest tariff levels for transportation distances of 110km with tariffs around 40-60% above average.

*Figure 3: Tariffs (EUR/1000m3), Average = 100, distance of transportation = 260km.*




At a distance of 260 kilometres, there is a change in the ranking and position of TSO's. Also, the differentiation of tariffs between TSO's decreases somewhat compared to the lower distances. The lowest tariffs for a transportation of gas over a distance of 260km are now the tariffs of TIGF, which vary in a range of 20-30% below average. The tariffs of GTS follow a similar pattern, but are slightly higher. The tariffs of GRTgaz are now 10-20% below the average. Fluxys is now also clearly below average by about 5-10%. The highest tariffs are the tariffs of Energinet.dk, which vary in a range of 40-55% above average. The tariffs of MOL are above average by 10-30%; the pattern of tariffs by profile is somewhat different from the other TSO (e.g. tariffs decrease moving from profile 1 to profile 3).

*Figure 4: Tariffs (EUR/1000m3), Average = 100, distance of transportation = 350km.*




*Note: The tariffs of Fluxys are excluded from the benchmark for the distance of 350 km.*

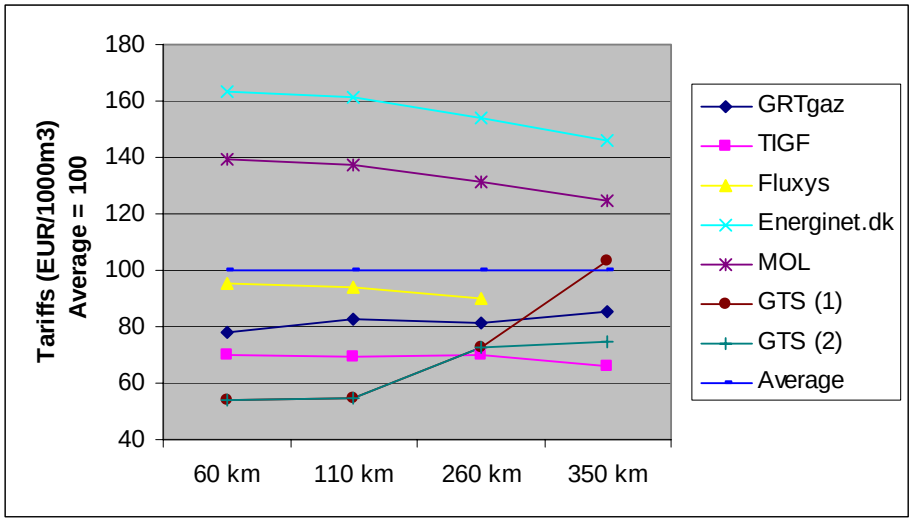
For a distance of transportation of 350km the differentiation of tariffs between the TSO's concerned is again smaller. The lowest tariffs are found for TIGF and for GTS (2) for a

transportation of gas to the South East part of the Netherlands. The tariffs in these cases are about 20-30% below average. Tariffs of GRTgaz are also below average, from about 5% to up to 15%. Striking is the fact that the GTS tariffs to the South West part of the Netherlands (GTS (1)) are actually above the average by about 5-15%. This indicates a substantial degree of tariff differentiation at this distance even within the Netherlands. For relatively low load factors (profiles 7 and 10), GTS (1) is more expensive than MOL. Energinet.dk again has the highest tariffs, but at this distance the tariffs are only 30-50% above average.

It has been the case for all distances of transportation that compared to the average tariffs, tariffs of Energinet.dk and MOL decrease when the load factor decreases, while the opposite is the case for the other TSO's.Thus, the relative tariffs for differing shipper profiles vary across TSO's as it is relatively more expensive to have an even gas transport at Energinet.dk, MOL and TIGF while it is relatively more expensive to have an uneven gas transport at GRTgaz, Fluxys and GTS.

In the following diagrams the results are shown for profiles 4, 5, 6 and 7 individually. These figures underline the importance of the distance of transportation on the tariff comparison. Profiles 4, 5, 6 and 7 are chosen because of the differing load factors and because volume alone does not seem to influence the results significantly.

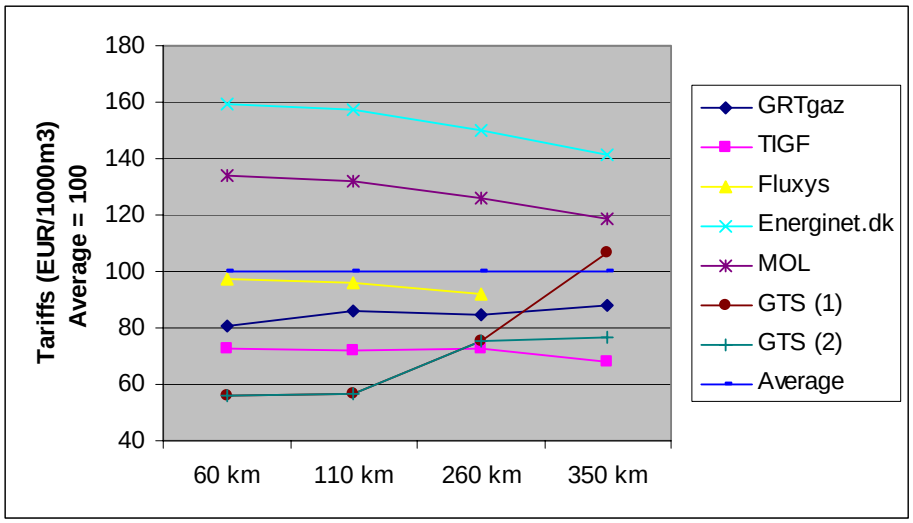
*Figure 5:* Tariffs (EUR/1000m$^3$), Average = 100, profile 4 (Volume = 500 mil. m$^3$, LF = 0.88).




The graph illustrates that when the distance of transportation increases, the tariffs of GTS increase rapidly **compared to the average tariffs**. This is primarily due to the fact that tariffs of the other TSO's are relatively independent of the distance of transportation. The downward sloping line for Energinet.dk, Fluxys and MOL is an artefact of the increase in the GTS tariffs as distance rises, as the tariffs of the two former TSO's are independent of distance in absolute terms. The tariffs of TIGF stay roughly within the same range, whereas the tariffs of GRTgaz increase by about 20% as distance rises from 60 to 350 km.

The graph also shows that the differentiation of tariffs for profile 4 is relatively large as tariffs of GTS are almost 50% less expensive than the average tariffs while the tariffs of Energinet.dk are more than 60% more expensive than the average tariffs for a distance of 60km. As the distance increases the differentiation between TSO's diminishes because of the differing tariff systems mentioned before.

*Figure 5: Tariffs (EUR/1000m$^3$), Average = 100, profile 5 (Volume = 500 mil. m$^3$, LF = 0.71).*




For shipper profile 5 the differentiation between TSO's is a bit smaller than for profile 4. Thus, as also seen from the earlier graphs, a lower load factor implies that the difference between the most expensive TSO's and the least expensive TSO's diminishes.

Otherwise the picture is more or less the same as for profile 4, in the sense that compared to the average tariffs, the tariffs for GTS rise rapidly as the distance of transportation increases. At the same time tariffs for the other TSO's, and definitely for those TSO's whose tariffs are independent of distance (Energinet.dk, Fluxys and MOL), decrease compared to the average tariffs.

*Figure 6: Tariffs (EUR/1000m$^3$), Average = 100, profile 6 (Volume = 500 mil. m$^3$, LF = 0.57).*

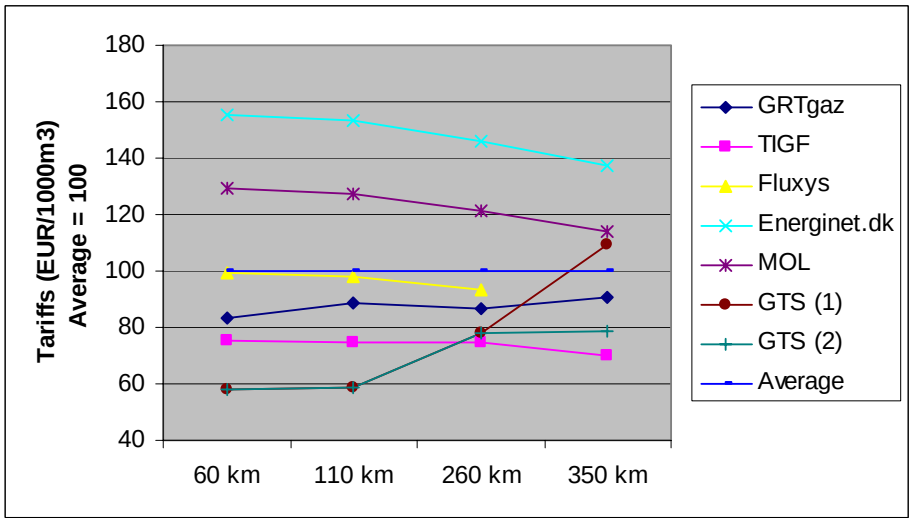
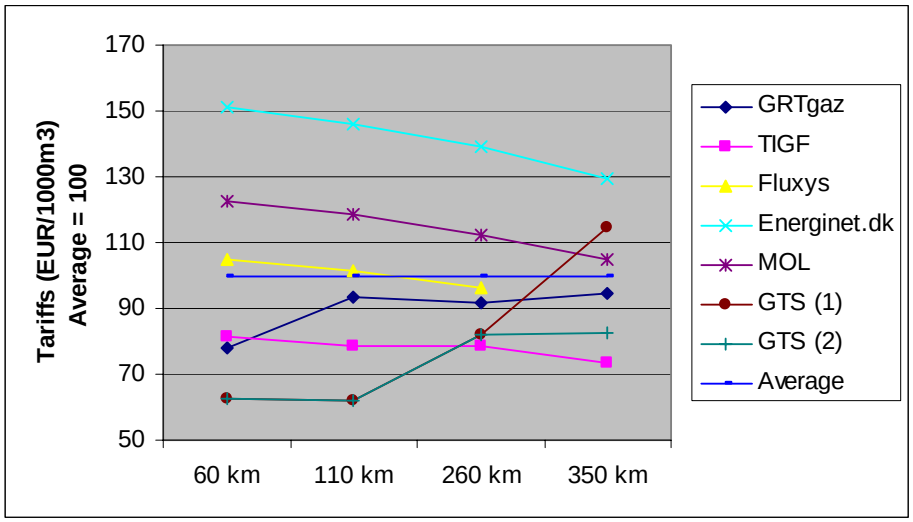



Figure 7 shows that once again the differentiation of the TSO's is reduced when the load factor declines. Other than that, there are little changes.

*Figure 7: Tariffs (EUR/1000m$^3$), Average = 100, profile 7 (Volume = 500 mil. m$^3$, LF = 0.34).*




The illustration of profile 7 shows that for a load factor of 0.34 the tariffs of GTS are around 40% below average for a distance of 60km, while for a distance of 350 km the GTS tariffs are almost the most expensive for transportation to the South West of the Netherlands. The tariffs of Energinet.dk are approximately 50% above average. As the distance increases the difference between the least expensive TSO and the most expensive TSO diminishes. Thus, for a distance of 350km the least expensive TSO is TIGF with tariffs approximately 30% below average while Energinet.dk is the most expensive TSO with tariffs approximately 30% above average.

In conjunction with figures 1-7, Figure 8 illustrates even more clearly that both the distance and the load factor have a great impact on the ranking of the TSO's. The conclusion is that the larger the distance, the less (more) expensive are the tariffs per $m^3$ of Energinet.dk, MOL, Fluxys and TIGF (GTS and GRTgaz) compared to the average tariffs and the higher the load factor, the less (more) expensive are the tariffs of GTS, GRTgaz and TIGF (Energinet.dk, MOL and Fluxys) compared to the average tariffs, and vice versa.

Besides the transmission tariffs, the TF BTT has collected information about the split between capacity/commodity charges and the split between entry/exit tariffs.

*Capacity/Commodity split*

The capacity/commodity split for each of the participating TSO's is shown in Table 5 below.

*Table 5: Capacity/Commodity split for profiles 1-10.*

| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| France | GRTgaz | 100/0 | 100/0 | 100/0 | 100/0 | 100/0 | 100/0 | 100/0 | 100/0 | 100/0 | 100/0 |
| France | TIGF | 100/0 | 100/0 | 100/0 | 100/0 | 100/0 | 100/0 | 100/0 | 100/0 | 100/0 | 100/0 |
| Belgium | Fluxys | 92/8 | 93/7 | 95/5 | 92/8 | 93/7 | 95/5 | 97/3 | 93/7 | 95/5 | 97/3 |
| Denmark | Energinet.dk | 68/32 | 72/28 | 76/24 | 68/32 | 72/28 | 76/24 | 85/15 | 72/28 | 76/24 | 85/15 |
| Hungary | MOL | 61/39 | 66/34 | 71/29 | 61/39 | 66/34 | 71/29 | 80/20 | 66/34 | 71/29 | 80/20 |
| The Netherlands | GTS | 100/0 | 100/0 | 100/0 | 100/0 | 100/0 | 100/0 | 100/0 | 100/0 | 100/0 | 100/0 |

As it can be seen from the table, the capacity/commodity splits for both GRTgaz, TIGF and GTS are 100/0 for all profiles. Thus, a commodity payment only exists for Fluxys, Energinet.dk and MOL. As tariffs for all of the latter TSO's are independent of distance, the capacity/commodity split is constant for all TSO's regardless of distance.

For Fluxys, Energinet.dk and MOL the load factor on the other hand has a minor influence on the split. The table shows that a decrease in load factor increases the capacity part of the payment. Lower volumes transported under a given reserved capacity yields a lower degree of commodity cost in the overall payment and hence increases the capacity part of the split. For Fluxys, the capacity payment makes up for between 92-97% of the total payment while the capacity part makes up for between 68-85% and between 61-80% of the total payment for Energinet.dk and MOL respectively.

According to the regulators in Hungary, Belgium and Denmark the capacity/commodity split in each of these countries are cost reflective. The relatively high commodity payment in Denmark also encourages the entry of new shippers as portfolio advantages are reduced. The capacity/commodity split in Netherlands reflects fact that the costs of GTS depend mainly on the capacity of the infrastructure and not really on the amount of gas transported. The French split also signifies that costs mainly originates from the investment in infrastructure and not on the actual gas transported.

*Entry/Exit split*

The entry/exit split for each of the participating TSO's is shown in Table 6 below.

*Table 6: Entry/Exit split for distances 60km, 110km, 260km and 350km.*

| | | 60 km | 110 km | 260 km | 350 km |
|---|---|---|---|---|---|
| France | GRTgaz | 83/17 | 73/27 | 63/37 | 59/41 |
| France | TIGF | 34/66 | 34/66 | 32/68 | 33/67 |
| Belgium | Fluxys | 19/81 | 19/81 | 19/81 | 19/81 |
| Denmark | Energinet.dk | 50/50 | 50/50 | 50/50 | 50/50 |
| Hungary | MOL | 77/23 | 77/23 | 77/23 | 77/23 |
| The Netherlands | GTS | 59/41 | 54/46 | 38/62 | 26/74 (1)<br>50/50 (2) |

As entry/exit tariffs for Fluxys, Energinet.dk and MOL are independent of the chosen entry/exit points, the entry/exit split is constant for these TSO's for all distances. As tariffs for TIGF differ very little, the entry/exit split is almost constant for TIGF as well. The entry/exit split for GRTgaz and GTS on the other hand decline as the distance increases. This reflects the fact that entry tariffs are constant while exit tariffs tend to increase, when the distance from the entry point to the exit point increases.

It can be seen from the table that the entry/exit split differs considerably between TSO's. There can be a number of causes for this. For some countries the split is caused by political reasons such as the desire to avoid differentiating between customers while for other countries the entry/exit split is cost reflective. In Hungary exit tariffs reflect the costs accrued at the gas stations while entry tariffs reflect all other costs in the network. In Belgium the fixed costs are allocated on both entry and exit tariffs according to the basic functions and services provided by the TSO. In the Netherlands the split is decided on historical reasons and small field policy and in Denmark the decision is based on political reasons.

## 7) Conclusion on transportation tariff comparison

The results of the transportation tariff comparison show that there is a telling difference between tariffs in the participating countries. For some profiles, the tariffs for the most expensive TSO is almost two times as high than for the cheapest TSO while for other profiles the most expensive TSO is only 1,5 times more expensive as the cheapest TSO. Thus, the comparison shows that not only are there huge differences on tariffs but there are also huge differences in how different customers are charged.

Three of the participating TSOs (Fluxys in Belgium, MOL in Hungary and Energinet.dk in Denmark) have postal stamp entry/exit systems. This means that no matter which entry/exit points are used, tariffs are the same. This is however not the case for the three remaining TSOs in the comparison (GRTgaz and TIGF in France and GTS in the Netherlands) which have differing tariffs for their entry and exit points.

The benchmark compares tariffs for a distance of transportation of 60 km, 110 km, 260 km and 350 km respectively. Because of the differences in entry/exit systems mentioned above, tariffs for Fluxys, MOL and Energinet.dk decrease **compared to the average tariffs** when the distance of transportation increases. Thus, in order to state anything on the level of tariffs for each of the participating TSOs, it is necessary to look at the four different distance comparisons as a whole. Otherwise one would leave out important characteristics of the compared entry/exit systems.

Besides the benchmarking of tariffs for different distances of transportation, tariffs have also been benchmarked for differences in volumes and in load factors. Results show that differences in volumes do not seem to have an influence on tariffs (price per $m^3$) while differences in load factor on the other hand play a vital role. The conclusion is that the higher the load factor the less (more) expensive are the tariffs of GTS, GRTgaz and TIGF (Energinet.dk, MOL and Fluxys) compared to the average tariffs, and vice versa. Thus, it is relatively more expensive to have an even gas transport at Energinet.dk, MOL and Fluxys while it is relatively more expensive to have an uneven gas transport at GRTgaz, TIGF and GTS.

The results for different load factors say little about the frequency in which they occur. Besides the tariff structure, the average load factor is also influenced by the presence of competitive access to storage. For networks where a competitive access to storage is offered to transmission network users (like GRTgaz and Tigf), uneven profiles are seldom encountered. For instance, on the GRTgaz network system a shipper with a low load factor (profile 7) will tend to use underground storage facilities and then reduce his total transportation charges. As a result, the total transmission charges would fall by 30,0% for a distance of 100 km as the Table 7 shows.

*Table 7: The impact of using storage facilities on total transportation charges. Profile 7. GRTgaz.*

| | 50 km | 100 km | 250 km | 340 km |
|---|---|---|---|---|
| Total transportation charges (EUR/1000$m^3$) **without** storage modulation | 10.55 | 13.11 | 13.50 | 14.95 |
| Total transportation charges (EUR/1000$m^3$) **with** storage modulation | 7.38 | 9.94 | 10.33 | 11.79 |

| | | | | |
|---|---|---|---|---|
| Difference | -30,0% | -24,2% | -23,5% | -21,2% |

The overall result of the transportation tariff benchmark is that based on the 10 standard profiles, the average tariffs for each of the participating TSOs is illustrated in the table below.

*Table 8: Average tariffs and spread for each TSO for all profiles and distances, Average = 100.*

| Country | France | France | Belgium | Denmark | Hungary | Netherlands |
|---|---|---|---|---|---|---|
| TSO | GRTgaz | TIGF | Fluxys | Energinet.dk | MOL | GTS |
| Average tariff, Avg. =100 | 86 | 73 | 96 | 149 | 125 | 76 |
| Spread | 78-95 | 66-81 | 90-105 | 129-163 | 105-139 | 54-115 |

As it can be seen from the table, the transportation tariffs of TIGF and GTS are on average the least expensive although for some profiles and the highest distance the GTS tariffs are more expensive than the average of all TSO's. The table also shows that the transportation tariffs of Energinet.dk are by far the most expensive in the comparison. The Danish tariffs are almost 50% higher than the average.

As seen from tables 1-4 the Austrian tariffs were the lowest for the short distance of 60 km and among the most expensive for the largest distance of 350 km. Because the Austrian system is not an entry-exit system, it is not included as a full member of the benchmark countries but is used to compare the entry-exit systems with a single non entry-exit system only.

The result of the comparison of these different systems show that there is an indication that entry-exit systems - compared to transmission systems with distance based tariffs - are relatively more expensive for short distances and relatively less expensive for large distances.

As the compared tariffs in this section are only pure transportation payments, one must have in mind that there are other types of payments which the TSOs charge their shippers, like balancing penalties. This means that the tariff comparison in Part One does not show the entire picture of costs to a shipper to use the transmission networks in the participating countries.

# Part Two: Balancing penalties

In order to provide a more comprehensive picture of the payments for the transportation of natural gas through the transmission system it is necessary to include balancing payments. Some TSOs might have high prices for the transportation of gas combined with low penalty payments for unbalancing. Some TSOs might have the opposite. Thus, it is necessary to look at the transportation tariffs and the balancing penalties as well in order to benchmark the total transmission tariffs of TSOs.

The balancing payments are relevant for the following reasons. If the amount of gas taken off the network is higher than the amount of gas put into the network, it will lead to a reduction in pressure. If the amount of gas taken off the network on the other hand is lower than the amount put into the network, pressure will rise. If pressure is allowed to continue to either fall or increase it will ultimately lead to a network failure. Thus, in order to transport gas safely trough the transmission system inputs and off takes must be in some kind of balance. System balancing is achieved between shippers and the TSO. Shippers have the primary responsibility to ensure balancing while the TSO has a residual role. Penalties for unbalancing play a vital role in ensuring that each shipper balances its own individual portfolio and thus limiting the necessary actions from the TSO.

The current analysis does not address whether penalties are set at an appropriate level, as this will depend on the relative balancing costs which may vary from country to country. Economically, the costs for balancing the transmission network should be made where balancing can be done the cheapest. In other words, the penalties should reflect the actual and efficient costs of balancing the system. So, where shippers can balance their portfolio more efficient than the TSO could, they should be stimulated to do so by an appropriate penalty. However, where it is relatively cheap for the TSO to balance, the penalty should also send the appropriate economic signal.

The benchmark compares the penalties which shippers pay when they are out of balance; hence the compared figures are not the total balancing payments but only the part of the payment which constitutes the *penalty*. The benchmark also does not take shipper responses to the penalties into account. For example, relatively high penalties would stimulate shippers to avoid imbalances as much as possible, even at relatively high costs. In that case, shippers would not have to pay the balancing penalty to the TSO but shippers would have to pay the cost of balancing themselves. The approach taken in this benchmark is to look at the penalties shippers would have to pay *given* a certain imbalance.

## 1) Neutral gas price

In most systems, the penalty is realised trough a buying (or selling) price which is higher (or lower) than the daily traded gas price at hubs (the neutral gas price). Thus, when shippers are in a negative imbalance they have to pay a price for the extra gas they need (in order to be in balance) which is higher than the neutral gas price traded at hubs. Oppositely, the selling price for shippers with positive imbalances is lower than the neutral gas price. The difference between the neutral gas price and the buying (or selling) price is the penalty.

The neutral gas price differs from country to country as it often depends on the spot prices traded at the nearest hub. The neutral gas prices used in this benchmark are illustrated in the following table.

*Table 9: Neutral gas prices.*

| Country | France | Denmark | Belgium | The Netherlands | Hungary |
|---|---|---|---|---|---|
| Neutral gas price | Day-ahead price at the Zeebrugge hub | The TTF neutral gas price. The period used in the benchmark is June July 2006. | Assumed to be 20 EUR/MWh, with a spread of +/- 1 EUR for the buy and sell price around the neutral gas price | The high price for being long in gas and the low price for being short in gas, which is the highest or lowest of the<br>- APX TTF Hi-DAM All day index<br>- APX Zeebrugge DAM All-day index<br>- APX Gas UK OCM SAP<br>The period used in the benchmark is September 2006. | 0,27 €/M$^3$ |

## 2) Balancing period and tolerance bands

The balancing period varies between countries. Some countries have systems with hourly balancing periods while other countries have systems with daily balancing periods. The difference between hourly and daily balancing periods is that in an hourly balancing systems the shippers have to be in balance every hour of the day (i.e. hourly gas input = hourly gas extraction). In a daily balancing system the shippers only have to be in balance over the day (i.e. accumulated daily gas input = accumulated daily gas extraction). Thus, an hourly balancing system is *ceteris paribus* more strict than a daily balancing system.

Regardless of the length of the balancing period, the shippers are often allowed a tolerance band (balancing margin). If the shipper in the end of the day (or hour) are within this tolerance band they do not have to pay an imbalance fee. The size of the tolerance band varies across different gas balancing systems.

As each balancing system contains much more detailed rules and specifications than is possible to illustrate in a simple table, it is necessary to calculate balancing payments for standard profiles in order to be able to compare different balancing systems.

## 3) Methodology

The balancing payment comparison is based on assumptions on typical hourly input levels over the day from hypothetical shipper profiles. The profiles are not meant to be representative of any typical imbalances. The profiles are merely used to determine penalties at a specific imbalance. Using 4 of the 10 standard profiles from the transportation tariff comparison combined with a series of assumptions on the level of hourly imbalances a set of balancing profiles is found.

As the comparison involves both hourly balancing regimes and daily balancing regimes it has been necessary to construct a setup which incorporates the structure of both. This has been done by assuming hourly imbalances for a 24-hour period. In this way both hourly imbalances and daily imbalances can be measured and the total daily imbalance penalties for each profile can be calculated for both balancing systems.

On the basis of the balancing profiles the national regulators has been asked to calculate the balancing penalties which shippers incur when they are in imbalance. These calculations form the basis of the balancing payment comparison.
In most countries shippers have the possibility of entering a balance service agreement which enlarges the margin for which they are allowed to be out of balance. Thus, by initially entering a balance service agreement, shippers can reduce the penalty payment for being in imbalance. As balance service agreements are widely used among shippers, it is necessary to bear in mind that the balance service agreements can influence the cost attained by shippers quite significantly.

## 4) Standard Profiles

The balancing payment comparison is based on 4 of the 10 standard profiles used in Part One (the transportation tariff comparison).

As imbalance positions are calculated as a percentage of maximum hourly capacity, absolute differences in capacity between profiles have no importance when comparing balancing penalties. Thus, it has been decided to base the balancing payment comparison on the 4 standard profiles which vary in load factor but have the same capacity (profile 4, 5, 6 and 7 from Part One). Inclusion of standard profile 1-3 and 8-10 from Part One would bring little or no additional information to the benchmark.

The 4 standard profiles (from now on: Profile 1-4) used to construct the balancing profiles are:

| Profile | Volume ($m^3$/year) | Max. Hourly Cap. ($m^3$/hour/year) | Load Factor | Daily vol. ($m^3$) |
|---|---|---|---|---|
| 1 | 500,000,000 | 65,000 | 0.88 | 1,369,863 |
| 2 | 500,000,000 | 80,000 | 0.71 | 1,369,863 |
| 3 | 500,000,000 | 100,000 | 0.57 | 1,369,863 |
| 4 | 500,000,000 | 170,000 | 0.34 | 1,369,863 |

Combined with information from shipper profiles the following input profiles are constructed:

Profile 1:

| From | To | shipper profile for LF=0.88, % | input profile, $m^3$ |
|---|---|---|---|
| 00:00 | 01:00 | 0.036 | 49,315 |
| 01:00 | 02:00 | 0.036 | 49,315 |
| 02:00 | 03:00 | 0.038 | 52,055 |
| 03:00 | 04:00 | 0.040 | 54,795 |
| 04:00 | 05:00 | 0.044 | 60,274 |
| 05:00 | 06:00 | 0.041 | 56,164 |
| 06:00 | 07:00 | 0.041 | 56,164 |
| 07:00 | 08:00 | 0.042 | 57,534 |
| 08:00 | 09:00 | 0.047 | 64,384 |
| 09:00 | 10:00 | 0.046 | 63,014 |
| 10:00 | 11:00 | 0.042 | 57,534 |
| 11:00 | 12:00 | 0.045 | 61,644 |

| From | To | shipper profile for LF=0.88, % | input profile, m³ |
|---|---|---|---|
| 12:00 | 13:00 | 0.044 | 60,274 |
| 13:00 | 14:00 | 0.044 | 60,274 |
| 14:00 | 15:00 | 0.044 | 60,274 |
| 15:00 | 16:00 | 0.044 | 60,274 |
| 16:00 | 17:00 | 0.041 | 56,164 |
| 17:00 | 18:00 | 0.045 | 61,644 |
| 18:00 | 19:00 | 0.043 | 58,904 |
| 19:00 | 20:00 | 0.041 | 56,164 |
| 20:00 | 21:00 | 0.043 | 58,904 |
| 21:00 | 22:00 | 0.039 | 53,425 |
| 22:00 | 23:00 | 0.037 | 50,685 |
| 23:00 | 00:00 | 0.037 | 50,685 |
| | **Total** | **1** | **1,369,863** |

Profile 2:

| From | To | shipper profile for LF=0.71, % | input profile, m³ |
|---|---|---|---|
| 00:00 | 01:00 | 0.013 | 17,808 |
| 01:00 | 02:00 | 0.014 | 19,178 |
| 02:00 | 03:00 | 0.016 | 21,918 |
| 03:00 | 04:00 | 0.017 | 23,288 |
| 04:00 | 05:00 | 0.022 | 30,137 |
| 05:00 | 06:00 | 0.028 | 38,356 |
| 06:00 | 07:00 | 0.037 | 50,685 |
| 07:00 | 08:00 | 0.051 | 69,863 |
| 08:00 | 09:00 | 0.059 | 80,822 |
| 09:00 | 10:00 | 0.057 | 78,082 |
| 10:00 | 11:00 | 0.056 | 76,712 |
| 11:00 | 12:00 | 0.052 | 71,233 |
| 12:00 | 13:00 | 0.05 | 68,493 |
| 13:00 | 14:00 | 0.046 | 63,014 |
| 14:00 | 15:00 | 0.047 | 64,384 |
| 15:00 | 16:00 | 0.051 | 69,863 |
| 16:00 | 17:00 | 0.054 | 73,973 |
| 17:00 | 18:00 | 0.055 | 75,342 |
| 18:00 | 19:00 | 0.055 | 75,342 |
| 19:00 | 20:00 | 0.054 | 73,973 |
| 20:00 | 21:00 | 0.052 | 71,233 |
| 21:00 | 22:00 | 0.049 | 67,123 |
| 22:00 | 23:00 | 0.039 | 53,425 |
| 23:00 | 00:00 | 0.026 | 35,616 |
| | **Total** | **1** | **1,369,863** |

Profile 3:

| From | To | shipper profile for LF=0.57, % | input profile, m3 |
|---|---|---|---|
| 00:00 | 01:00 | 0.013 | 17,808 |
| 01:00 | 02:00 | 0.013 | 17,808 |
| 02:00 | 03:00 | 0.014 | 19,178 |
| 03:00 | 04:00 | 0.017 | 23,288 |
| 04:00 | 05:00 | 0.022 | 30,137 |
| 05:00 | 06:00 | 0.028 | 38,356 |
| 06:00 | 07:00 | 0.036 | 49,315 |
| 07:00 | 08:00 | 0.061 | 83,562 |
| 08:00 | 09:00 | 0.073 | 100,000 |
| 09:00 | 10:00 | 0.066 | 90,411 |
| 10:00 | 11:00 | 0.057 | 78,082 |
| 11:00 | 12:00 | 0.045 | 61,644 |
| 12:00 | 13:00 | 0.041 | 56,164 |
| 13:00 | 14:00 | 0.038 | 52,055 |
| 14:00 | 15:00 | 0.04 | 54,795 |
| 15:00 | 16:00 | 0.047 | 64,384 |
| 16:00 | 17:00 | 0.055 | 75,342 |
| 17:00 | 18:00 | 0.069 | 94,521 |
| 18:00 | 19:00 | 0.061 | 83,562 |
| 19:00 | 20:00 | 0.053 | 72,603 |
| 20:00 | 21:00 | 0.048 | 65,753 |
| 21:00 | 22:00 | 0.044 | 60,274 |
| 22:00 | 23:00 | 0.036 | 49,315 |
| 23:00 | 00:00 | 0.023 | 31,507 |
| | **Total** | **1** | **1,369,863** |

Profile 4:

| From | To | shipper profile for LF=0.34, % | input profile, m³ |
|---|---|---|---|
| 00:00 | 01:00 | 0.013 | 17,808 |
| 01:00 | 02:00 | 0.016 | 21,918 |
| 02:00 | 03:00 | 0.019 | 26,027 |
| 03:00 | 04:00 | 0.025 | 34,247 |
| 04:00 | 05:00 | 0.03 | 41,096 |
| 05:00 | 06:00 | 0.036 | 49,315 |
| 06:00 | 07:00 | 0.05 | 68,493 |
| 07:00 | 08:00 | 0.083 | 113,699 |
| 08:00 | 09:00 | 0.119 | 163,014 |
| 09:00 | 10:00 | 0.053 | 72,603 |
| 10:00 | 11:00 | 0.028 | 38,356 |
| 11:00 | 12:00 | 0.021 | 28,767 |
| 12:00 | 13:00 | 0.015 | 20,548 |
| 13:00 | 14:00 | 0.017 | 23,288 |
| 14:00 | 15:00 | 0.03 | 41,096 |

| From | To | shipper profile for LF=0.34, % | input profile, m³ |
|---|---|---|---|
| 15:00 | 16:00 | 0.036 | 49,315 |
| 16:00 | 17:00 | 0.05 | 68,493 |
| 17:00 | 18:00 | 0.083 | 113,699 |
| 18:00 | 19:00 | 0.124 | 169,863 |
| 19:00 | 20:00 | 0.053 | 72,603 |
| 20:00 | 21:00 | 0.028 | 38,356 |
| 21:00 | 22:00 | 0.026 | 35,616 |
| 22:00 | 23:00 | 0.024 | 32,877 |
| 23:00 | 00:00 | 0.021 | 28,767 |
| | **Total** | **1** | **1,369,863** |

Based on assumptions of both positive and negative hourly imbalances of 2%, 5%, 8%, 12% and 18% respectively the national regulators have calculated the total daily balancing penalties for each TSO. Balancing penalties have also been calculated for varying positive and negative imbalances over the day of 2%, 5%, 8%, 12% and 18% respectively under the assumption of a positive imbalance whenever the hourly input is above the average hourly input for that specific profile and vice versa for a negative imbalance.

The imbalances of 12% and 18% are not as relevant for all the shippers as in some countries these imbalances have a very low probability of occurrence.

The reason for these profile assumptions is that by using alternating positive and negative imbalances the differences between hourly and daily balancing regimes are better displayed. Thus, in an hourly balancing regime, the shippers have to pay a penalty whenever the hourly imbalance (positive or negative) exceeds the imbalance margin but in a daily balancing regime the shipper will not have to face a penalty if positive and negative hourly imbalances offset each other during the day.

## 5) Results

The national regulators in the countries participating in the benchmark have calculated balancing penalties for the four profiles at different levels of hourly imbalances. The results can be found in the tables and figures below.

*Notes:*

1. For MOL there are two different tariffs. This is caused by the fact that in Hungary there is a dual market. MOL (1) is an authority controlled market for public utilities and customers with a consumption greater than 500 $m^3$/h. MOL(2) is a competitive market for the rest of the customers.
2. As the balancing payments for Energinet.dk differ in the winter period and the summer period, the results are an average of the yearly balancing payment.
3. New balancing rules and penalties entered into force on 1st of January 2007 on GRTgaz and Tigf transmissions systems. These transmission penalties are included in the benchmark.

*Table 10: Balancing penalties, Euro, Profile 1.*

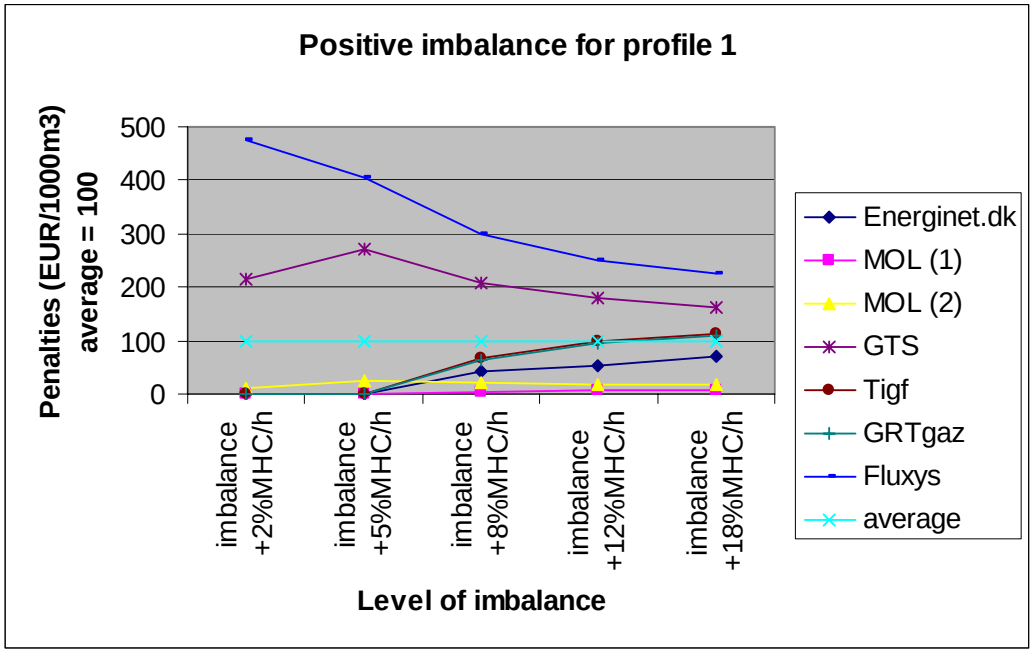
| **positive imbalances** | imbalance +2%MHC/h | imbalance +5%MHC/h | imbalance +8%MHC/h | imbalance +12%MHC/h | imbalance +18%MHC/h |
|---|---|---|---|---|---|
| Energinet.dk | 0 | 0 | 2.703 | 6.306 | 14.415 |
| MOL (1) | 0 | 0 | 136 | 692 | 1.526 |
| MOL (2) | 49 | 654 | 1.259 | 2.066 | 3.276 |
| GTS | 1.002 | 7.016 | 13.030 | 21.048 | 33.076 |
| Tigf | 0 | 0 | 4.097 | 11.723 | 23.162 |
| GRTgaz | 0 | 0 | 3.915 | 11.203 | 22.134 |
| Fluxys | 2.221 | 10.437 | 18.710 | 29.741 | 46.287 |
| **average** | 467 | 2.587 | 6.264 | 11.826 | 20.554 |

| **negative imbalances** | imbalance +2%MHC/h | imbalance +5%MHC/h | imbalance +8%MHC/h | imbalance +12%MHC/h | imbalance +18%MHC/h |
|---|---|---|---|---|---|
| Energinet.dk | 0 | 0 | 2.703 | 6.306 | 14.415 |
| MOL (1) | 0 | 0 | 136 | 692 | 1.526 |
| MOL (2) | 49 | 654 | 1.259 | 2.066 | 3.276 |
| GTS | 1.349 | 9.446 | 17.542 | 28.337 | 44.530 |
| Tigf | 0 | 0 | 12.292 | 35.169 | 69.486 |
| GRTgaz | 0 | 0 | 11.746 | 33.608 | 66.402 |
| Fluxys | 2.455 | 11.536 | 20.680 | 32.872 | 51.160 |
| **average** | 551 | 3.091 | 9.480 | 19.864 | 35.828 |

| **Positive/negative imbalances** | imbalance +2%MHC/h | imbalance +5%MHC/h | imbalance +8%MHC/h | imbalance +12%MHC/h | imbalance +18%MHC/h |
|---|---|---|---|---|---|
| Energinet.dk | 0 | 0 | 0 | 0 | 0 |
| MOL (1) | 0 | 0 | 0 | 0 | 0 |
| MOL (2) | 0 | 0 | 0 | 0 | 0 |
| GTS | 0 | 0 | 0 | 0 | 0 |
| Tigf | 0 | 0 | 0 | 0 | 0 |
| GRTgaz | 0 | 0 | 0 | 0 | 0 |
| Fluxys | 0 | 0 | 0 | 1.210 | 6.652 |
| **average** | 0 | 0 | 0 | 173 | 950 |

The data in the table above is also shown in the charts below as index figures where the average penalty for being in imbalance is equal to 100 for each profile.

*Figure 8: Balancing penalties, positive imbalances for profile 1.*
*Average = 100, (Volume = 500 mil. $m^3$, LF = 0.88).*

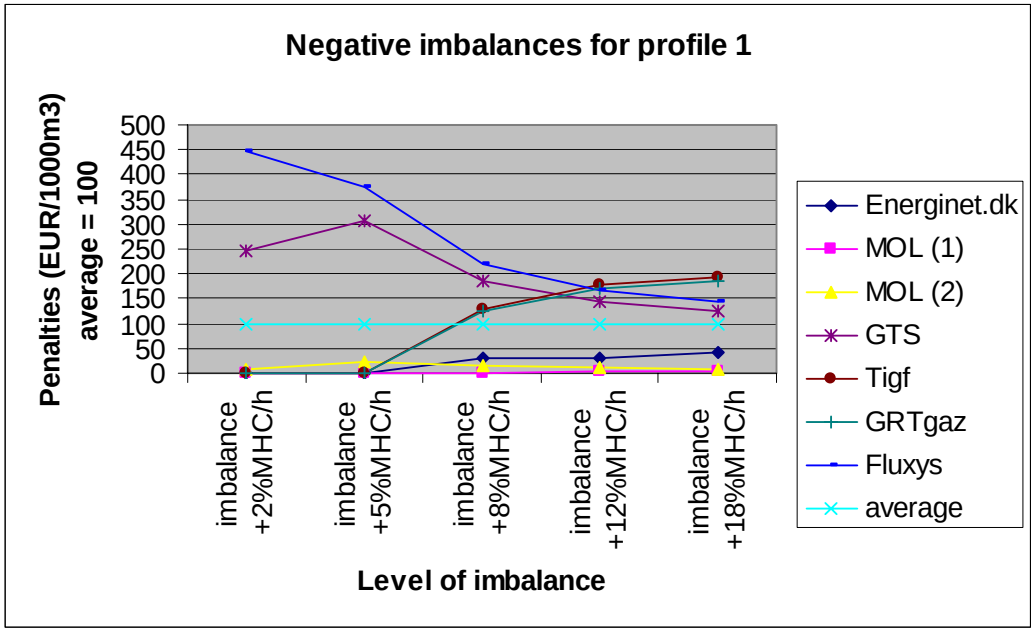



For profile 1 with positive hourly imbalances (the shipper brings more gas into the system than he extracts) as reflected in Table 10 and Figure 9 that the penalties of Fluxys and GTS are generally by far the biggest in the comparison. Thus, for some level of imbalances the penalties of Fluxys are almost 5 times higher than the average balancing penalty (index 100). GTS is about twice the average.

As a result of the relatively high penalties in Belgium and The Netherlands, the other TSOs have balancing penalty payments mostly below or around average. The French TSO's GRTgaz and Tigf have very similar imbalance penalties. For small imbalances the penalty is zero; starting with an imbalance of 8% their penalties approach the average and even exceed it for the highest imbalance. The penalties of MOL are well below average, both for the competitive part (MOL (2)) and for the regulated part (MOL (1)). For the regulated part of MOL (MOL (1)) the penalties are zero or very close to zero for all levels of imbalances. Finally, the balancing penalties of Energinet.dk are zero for the smallest levels of imbalances and reach an index of 70 for the highest levels of imbalance.

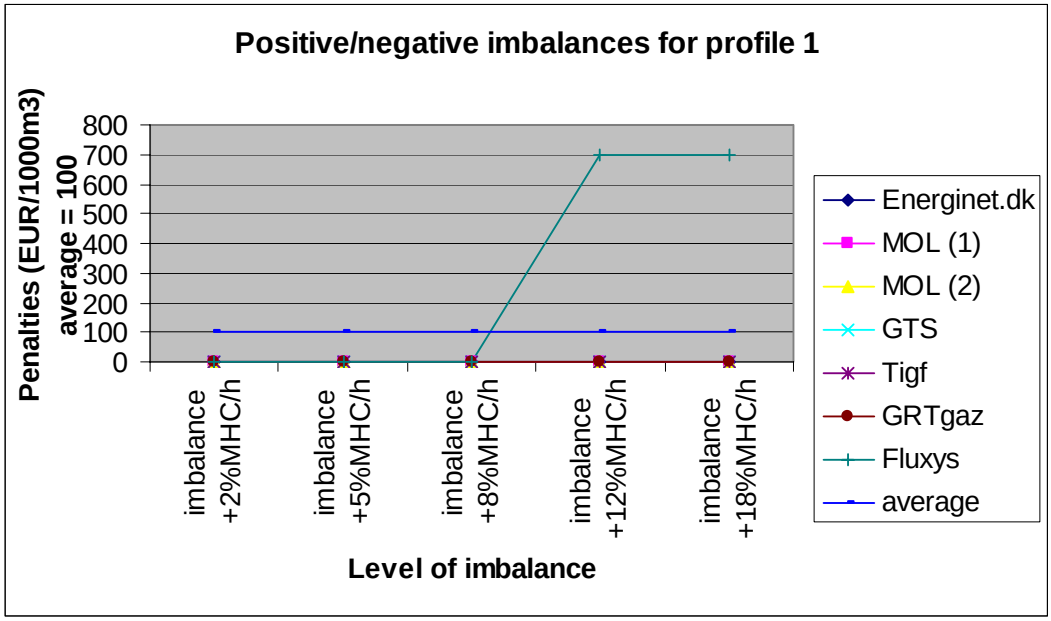
As reflected in both Table 10 and Figure 9, the differentiation between the balancing penalty payments of Fluxys and GTS and the rest of the TSOs diminishes as the level of imbalance increases. This indicates that Fluxys and GTS penalize relatively small levels of imbalances relatively hard compared to the other TSOs, but as the level of imbalance increases, the balancing penalties of Fluxys and GTS rise relatively less than the penalties of most of the other TSOs.

*Figure 9: Balancing penalties, negative imbalances for profile 1*
*Average = 100, (Volume = 500 mil. m3, LF = 0.88).*




For profile 1 with negative hourly imbalances (the shipper brings less gas into the system than he extracts) the picture is somewhat different from the positive imbalances, except for MOL and Energinet.dk which do not differentiate between positive and negative imbalances. The other TSO's tend to penalize negative imbalances more than positive imbalances. This is especially visible in the case of the two French TSO's, where the penalty for negative imbalances is three times as high as for positive ones. The French TSO's also penalize relatively high imbalances more than the other TSO's. Fluxys and GTS are also above the average for all imbalances, but the distance form the average is higher for the relatively smaller imbalances.

*Figure 10: Balancing penalties, positive/negative imbalances for profile 1. Average = 100 (Volume = 500 mil. m3, LF = 0.88).*




For profile 1 with alternating positive and negative hourly imbalances (the shipper brings more gas into the system than he extracts whenever the hourly input is above the average hourly input and the shipper brings less gas into the system than he extracts whenever the hourly input is below the average hourly input) the results are significant.

Hourly balancing systems potentially could penalize every hourly imbalance while daily balancing systems in principle only penalize shippers if there is an accumulated imbalance over the entire day. Thus, as the assumption of alternating positive and negative imbalances reduces the daily imbalance, the total balancing penalty is expected to be relatively smaller for daily imbalance systems than for hourly imbalance systems.

As it can be seen from Figure 11 only Fluxys penalizes shippers with the profile concerned in cases of relatively large imbalances. For comparison, it can be seen from Table 10 that the absolute value of the penalty of Fluxys for the positive/negative imbalance profile is about 5-15 % of the corresponding penalty for the positive imbalance profile.

The difference between the negative balancing penalty payments (compared to the average) are insignificant. Put differently, Figure 10 looks very similar for the different profiles. For shortness of presentation, we only illustrate the results for the positive and the positive/negative imbalance profiles for profiles 2-4 in figures.

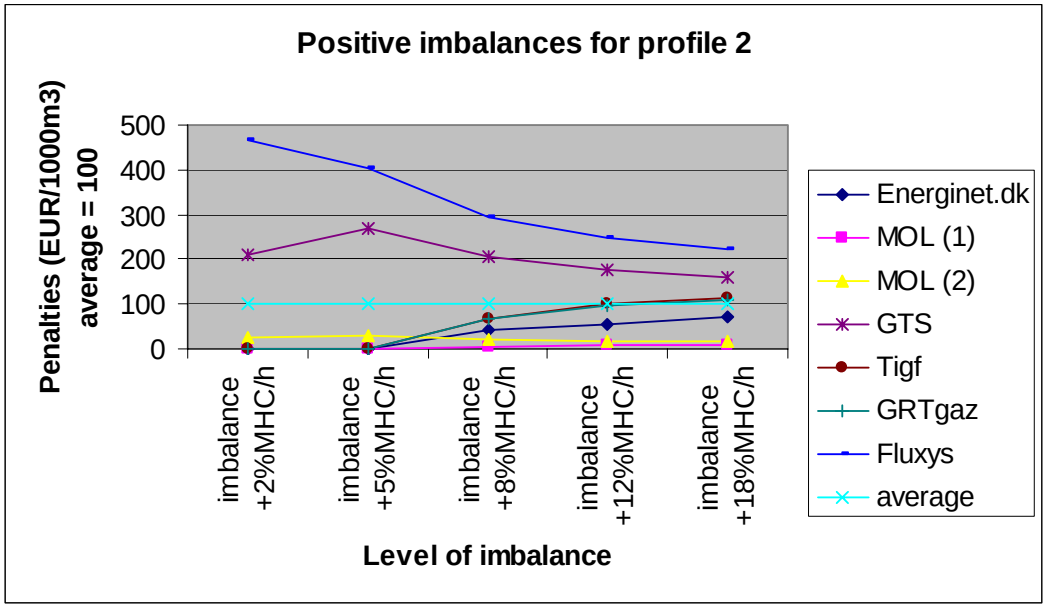
*Table 11: Balancing penalties, Euro, Profile 2.*

| **Positive imbalances** | imbalance +2%MHC/h | imbalance +5%MHC/h | imbalance +8%MHC/h | imbalance +12%MHC/h | imbalance +18%MHC/h |
|---|---|---|---|---|---|
| Energinet.dk | 0 | 0 | 3.326 | 7.762 | 17.741 |
| MOL (1) | 0 | 0 | 392 | 1.077 | 2.104 |
| MOL (2) | 142 | 887 | 1.632 | 2.624 | 4.114 |
| GTS | 1.234 | 8.635 | 16.037 | 25.906 | 40.709 |
| Tigf | 0 | 0 | 5.417 | 14.803 | 28.881 |
| GRTgaz | 0 | 0 | 5.177 | 14.146 | 27.600 |
| Fluxys | 2.734 | 12.846 | 23.028 | 36.604 | 56.969 |
| **average** | 587 | 3.195 | 7.858 | 14.703 | 25.445 |

| **negative imbalances** | imbalance +2%MHC/h | imbalance +5%MHC/h | imbalance +8%MHC/h | imbalance +12%MHC/h | imbalance +18%MHC/h |
|---|---|---|---|---|---|
| Energinet.dk | 0 | 0 | 3.326 | 7.762 | 17.741 |
| MOL (1) | 0 | 0 | 392 | 1.077 | 2.104 |
| MOL (2) | 142 | 887 | 1.632 | 2.624 | 4.114 |
| GTS | 1.661 | 11.626 | 21.590 | 34.877 | 54.806 |
| Tigf | 0 | 0 | 16.251 | 44.408 | 86.644 |
| GRTgaz | 0 | 0 | 15.530 | 42.438 | 82.799 |
| Fluxys | 3.022 | 14.198 | 25.452 | 40.458 | 62.966 |
| **average** | 689 | 3.816 | 12.025 | 24.806 | 44.453 |

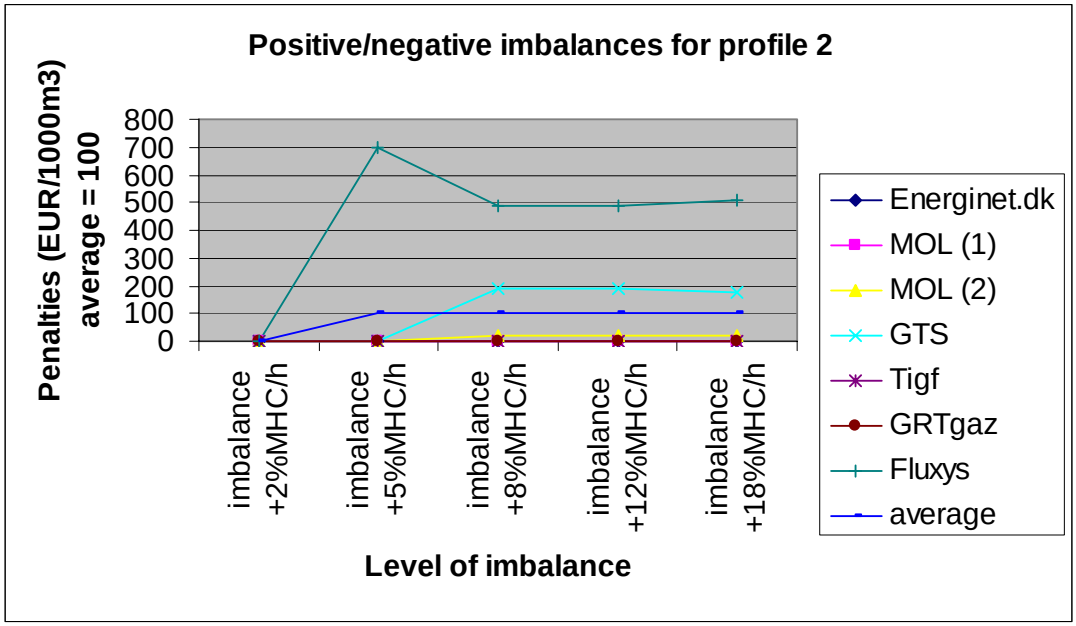
| **Positive/negative imbalances** | imbalance +2%MHC/h | imbalance +5%MHC/h | imbalance +8%MHC/h | imbalance +12%MHC/h | imbalance +18%MHC/h |
|---|---|---|---|---|---|
| Energinet.dk | 0 | 0 | 0 | 0 | 0 |
| MOL (1) | 0 | 0 | 0 | 0 | 0 |
| MOL (2) | 0 | 0 | 142 | 390 | 763 |
| GTS | 0 | 0 | 1.234 | 3.701 | 7.402 |
| Tigf | 0 | 0 | 0 | 0 | 0 |
| GRTgaz | 0 | 0 | 0 | 0 | 0 |
| Fluxys | 0 | 943 | 3.203 | 9.418 | 21.451 |
| **average** | 0 | 135 | 654 | 1.930 | 4.231 |

*Figure 11: Balancing penalties, positive imbalances for profile 2.*
*Average = 100, (Volume = 500 mil. m3, LF = 0.71).*




The differences between profile 1 and 2 (for positive imbalances) are relatively small. In general, the absolute values of the differences are higher for profile 2. For all TSOs it can be seen from Tables 10 and 11 that when the load factor decreases (from profile 1 to profile 2), the balancing penalty payments rise. This is caused by the fact that a lower load factor combined with the same volume transported demands a higher maximum hourly capacity which in the standard profiles is used as the basis for the levels of imbalance. Thus, a higher maximum capacity yields a higher absolute imbalance, which naturally leads to a higher penalty payment. However, in relative terms (compared to the average of all TSO's for each profile) the differences are negligible (compare Figures 9 and 12).

*Figure 12: Balancing penalties, positive/negative imbalances for profile 2. Average = 100, (Volume = 500 mil. $m^3$, LF = 0.71).*




Only GTS, Fluxys and the part of MOL that is for the competitive market penalize shippers of profile 2 with alternating positive and negative imbalances. For the rest of the TSOs the accumulated daily imbalance is within the free balancing margin.

Fluxys again has by far the largest penalties; the penalties of GTS are approximately one third of the penalties of Fluxys for all levels of imbalances. MOL only penalizes shippers with imbalances of 8 %, 12 % and 18 %. For MOL the penalty is relatively small, however, compared to Fluxys and GTS.

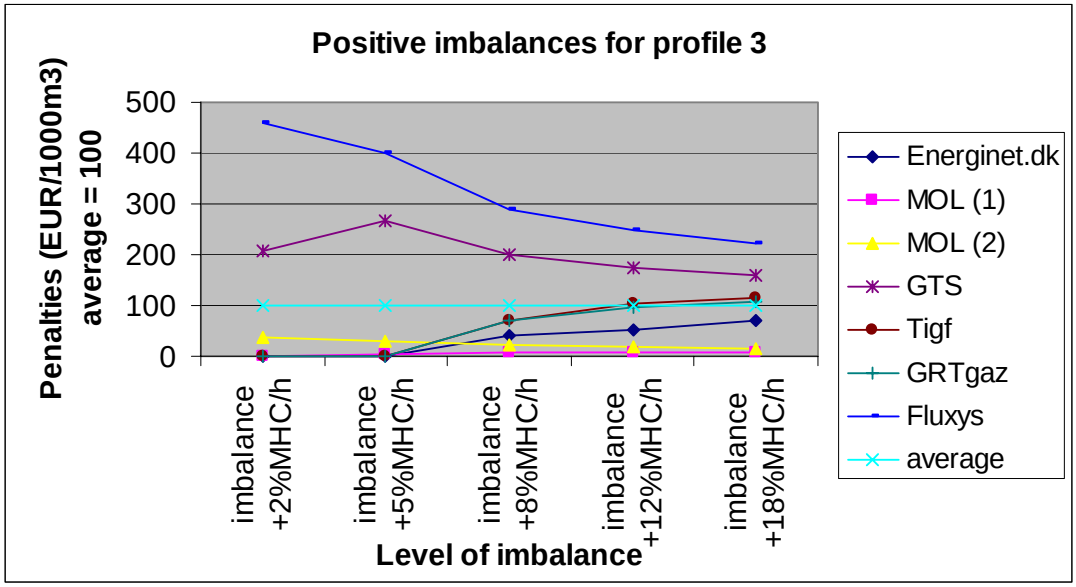
*Table 12: Balancing penalties, Euro, Profile 3.*

| **Positive imbalances** | imbalance +2%MHC/h | imbalance +5%MHC/h | imbalance +8%MHC/h | imbalance +12%MHC/h | imbalance +18%MHC/h |
|---|---|---|---|---|---|
| Energinet.dk | 0 | 0 | 4.158 | 9.702 | 22.176 |
| MOL (1) | 0 | 93 | 735 | 1.590 | 2.874 |
| MOL (2) | 266 | 1.197 | 2.128 | 3.369 | 5.231 |
| GTS | 1.542 | 10.794 | 20.046 | 32.382 | 50.886 |
| Tigf | 0 | 0 | 7.177 | 18.909 | 36.507 |
| GRTgaz | 0 | 0 | 6.858 | 18.070 | 34.887 |
| Fluxys | 3.418 | 16.057 | 28.785 | 45.756 | 71.211 |
| **average** | 747 | 4.020 | 9.984 | 18.540 | 31.967 |

| **negative imbalances** | imbalance +2%MHC/h | imbalance +5%MHC/h | imbalance +8%MHC/h | imbalance +12%MHC/h | imbalance +18%MHC/h |
|---|---|---|---|---|---|
| Energinet.dk | 0 | 0 | 4.158 | 9.702 | 22.176 |
| MOL (1) | 0 | 93 | 735 | 1.590 | 2.874 |
| MOL (2) | 266 | 1.197 | 2.128 | 3.369 | 5.231 |
| GTS | 2.076 | 14.532 | 26.988 | 43.596 | 68.508 |
| Tigf | 0 | 0 | 21.531 | 56.727 | 109.522 |
| GRTgaz | 0 | 0 | 20.575 | 54.210 | 104.661 |
| Fluxys | 3.777 | 17.747 | 31.815 | 50.572 | 78.707 |
| **average** | 874 | 4.796 | 15.418 | 31.395 | 55.954 |

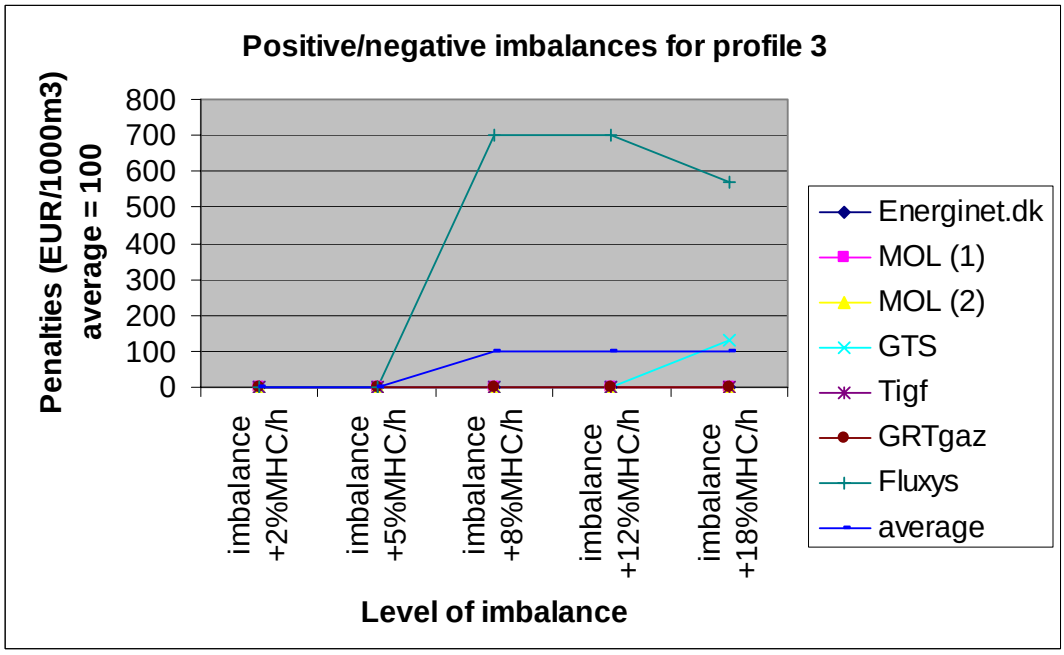
| **Positive/negative imbalances** | imbalance +2%MHC/h | imbalance +5%MHC/h | imbalance +8%MHC/h | imbalance +12%MHC/h | imbalance +18%MHC/h |
|---|---|---|---|---|---|
| Energinet.dk | 0 | 0 | 0 | 0 | 0 |
| MOL (1) | 0 | 0 | 0 | 0 | 0 |
| MOL (2) | 0 | 0 | 0 | 0 | 0 |
| GTS | 0 | 0 | 0 | 0 | 2.827 |
| Tigf | 0 | 0 | 0 | 0 | 0 |
| GRTgaz | 0 | 0 | 0 | 0 | 0 |
| Fluxys | 0 | 0 | 586 | 4.201 | 12.407 |
| **average** | 0 | 0 | 84 | 600 | 2.176 |

*Figure 13: Balancing penalties, ), positive imbalances for profile 3.*
*Average = 100, (Volume = 500 mil. m$^3$, LF = 0.57).*




Once again the picture for the positive imbalances is more or less the same as it were for the previous profiles. The only difference is that the absolute level of the penalties for all TSOs has once again risen as the load factor has fallen. But the index of each TSO relative to the average is almost the same as for profile 2 for all levels of imbalances.

*Figure 14: Balancing penalties, positive/negative imbalances for profile 3.*
*Average = 100, (Volume = 500 mil. m$^3$, LF = 0.57).*




As it can be seen from Figure 15 as well as from Table 12 that only Fluxys and GTS penalize shippers for having alternating positive and negative imbalances.

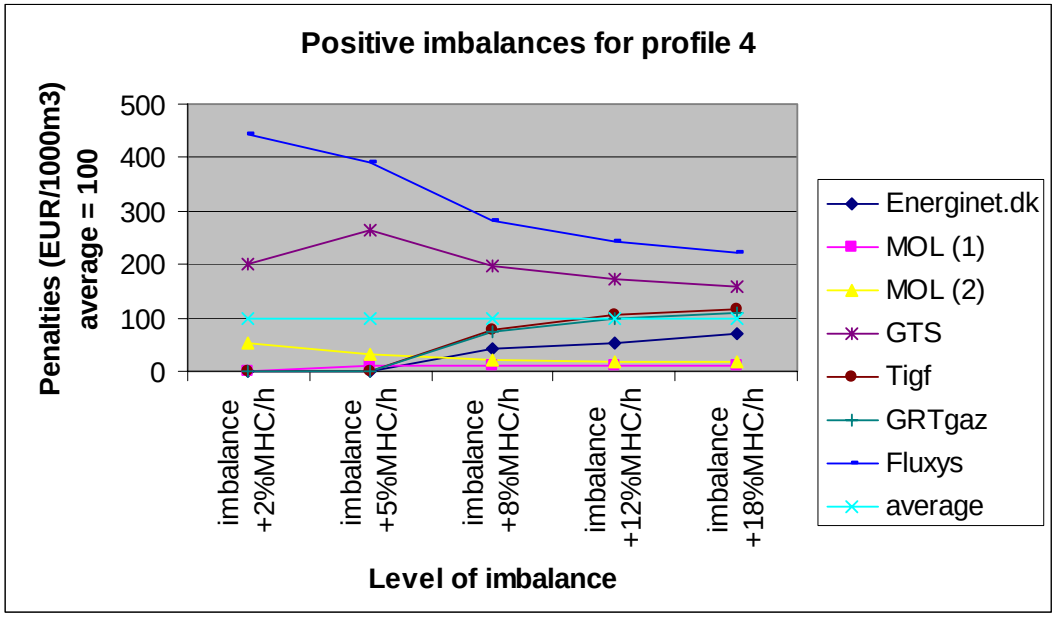
*Table 13: Balancing penalties, Euro, Profile 4.*

| **Positive imbalances** | imbalance +2%MHC/h | imbalance +5%MHC/h | imbalance +8%MHC/h | imbalance +12%MHC/h | imbalance +18%MHC/h |
|---|---|---|---|---|---|
| Energinet.dk | 0 | 0 | 7.069 | 16.494 | 37.700 |
| MOL (1) | 0 | 842 | 1.933 | 3.387 | 5.569 |
| MOL (2) | 701 | 2.283 | 3.865 | 5.975 | 9.140 |
| GTS | 2.621 | 18.350 | 34.078 | 55.049 | 86.506 |
| Tigf | 0 | 0 | 13.336 | 33.281 | 63.198 |
| GRTgaz | 0 | 0 | 12.744 | 31.804 | 60.393 |
| Fluxys | 5.810 | 27.297 | 48.935 | 77.784 | 121.059 |
| **average** | 1.305 | 6.967 | 17.423 | 31.968 | 54.795 |

| **negative imbalances** | imbalance +2%MHC/h | imbalance +5%MHC/h | imbalance +8%MHC/h | imbalance +12%MHC/h | imbalance +18%MHC/h |
|---|---|---|---|---|---|
| Energinet.dk | 0 | 0 | 7.069 | 16.494 | 37.700 |
| MOL (1) | 0 | 842 | 1.933 | 3.387 | 5.569 |
| MOL (2) | 701 | 2.283 | 3.865 | 5.975 | 9.140 |
| GTS | 3.529 | 24.704 | 45.880 | 74.113 | 116.464 |
| Tigf | 0 | 0 | 40.009 | 99.843 | 189.594 |
| GRTgaz | 0 | 0 | 38.233 | 95.412 | 181.180 |
| Fluxys | 6.422 | 30.171 | 54.086 | 85.972 | 133.802 |
| **average** | 1.522 | 8.286 | 27.296 | 54.457 | 96.207 |

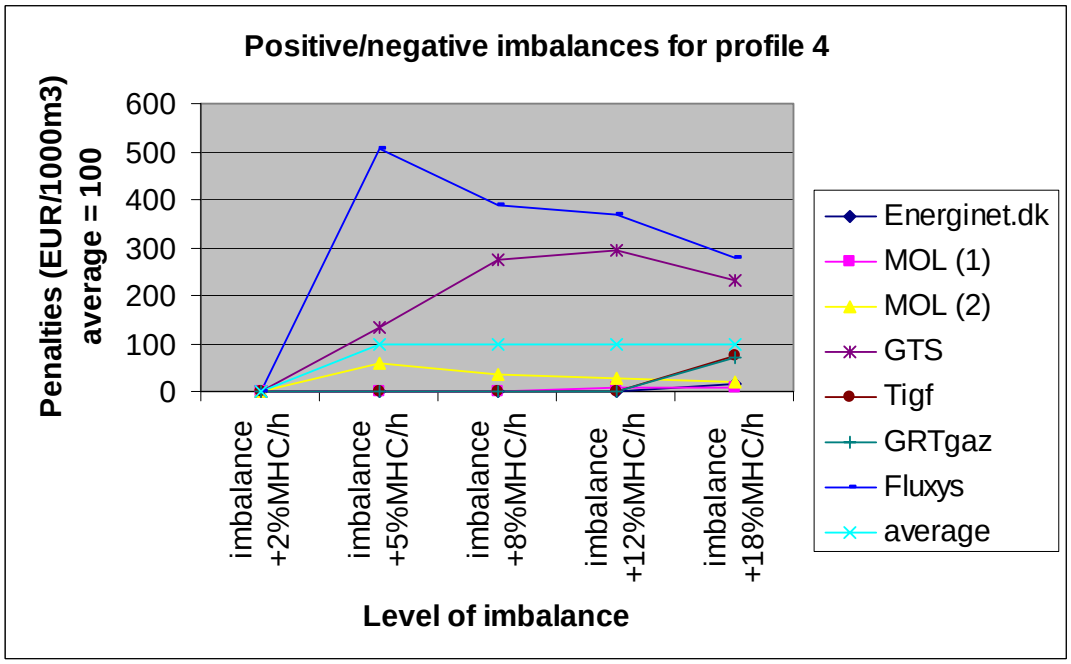
| **Positive/negative imbalances** | imbalance +2%MHC/h | imbalance +5%MHC/h | imbalance +8%MHC/h | imbalance +12%MHC/h | imbalance +18%MHC/h |
|---|---|---|---|---|---|
| Energinet.dk | 0 | 0 | 0 | 0 | 2.356 |
| MOL (1) | 0 | 0 | 0 | 478 | 1.205 |
| MOL (2) | 0 | 525 | 1.052 | 1.756 | 2.811 |
| GTS | 0 | 1.176 | 8.235 | 17.646 | 31.763 |
| Tigf | 0 | 0 | 0 | 0 | 10.092 |
| GRTgaz | 0 | 0 | 0 | 0 | 9.644 |
| Fluxys | 0 | 4.429 | 11.570 | 22.199 | 38.142 |
| **average** | 0 | 876 | 2.980 | 6.011 | 13.716 |

*Figure 15: Balancing penalties, positive imbalances for profile 4.*
*Average = 100, (Volume = 500 mil. m$^3$, LF = 0.34).*




For profile 4, the results in relative terms are almost identical to the previously analysed profiles. In absolute terms, the penalties are higher than for profiles 1-3 (see Table 13).

*Figure 16: Balancing penalties, positive/negative imbalances for profile 4.*
*Average = 100, (Volume = 500 mil. m$^3$, LF = 0.34).*



The main conclusion on the penalties of positive/negative imbalances for profile 4 is that for a positive/negative imbalance of +/- 18 % all TSOs penalize the shipper. Thus, the imbalances of +/- 18 % exceed the balance margin of all TSOs.

The results also show that Fluxys, GTS and MOL (2) start to penalise shippers starting from an imbalance of 5%. MOL (1) starts to penalise starting from an imbalance of 12%. Energinet.dk, TIGF and GRTgaz only penalize shippers with high levels of imbalances and by penalties which are much lower than the penalties of Fluxys.

## 6) Balance service agreement

Some TSOs offer the opportunity for shippers to engage in a balance service agreement. A balance service agreement is a contract in which shippers buy an expansion of the allowed balancing margin for which there is no penalty. This allows shippers to have an imbalance outside the original tolerance band (but within the purchased extra margin) and only having to pay the price of the balance service agreement instead of the penalty.

The amount shippers can save by engaging in a balance service agreement varies both between shipper profiles and between TSOs, but the amounts can be substantial. Not all regulators though have been able to calculate the precise prices for balance service agreements for the profiles in the benchmark. This is caused by the differences in how the transmission systems are structured. Thus, it has not been possible to make a direct comparison of the potential savings by entering balance service agreements for each TSO.

To illustrate the importance of the balance service agreement though, an example can be provided: For a shipper of profile 4 in the Danish market with a positive imbalance of 12%, the penalty is 16.494 Euro. But if the shipper beforehand had entered a balance service agreement which exactly covered his imbalance of 12%, the price would be only 284 Euro. Thus, the shipper could have saved more than 98% of the balancing penalty by entering a balance service agreement.

As the use of balance service agreements is very common in some countries and as the potential savings can be substantial, the prices of these agreements are very important when comparing balancing payments across TSOs. This should be kept very much in mind when analysing the differences in tariffs.

## 7) Conclusion on balancing payment comparison

The comparison of balancing penalties show that there is a substantial difference on the size of the penalties paid in the participating countries for being out of balance. For positive imbalances, the difference between the highest and lowest penalty for one particular profile can amount to more than 115.000 Euro. Fluxys tends to penalise positive imbalances the most, followed by GTS, Tigf and GRTgaz. Energinet.dk and MOL have relatively low penalties. For negative imbalances, the difference can amount to almost 185.000 Euro. In this case, Tigf and GRTgaz are the most expensive, followed by Fluxys and GTS. Energinet.dk and MOL have relatively low penalties for negative imbalances.

Furthermore, most TSOs do not penalize shippers with low levels of imbalances but in return the penalty rises sharply with the level of imbalance. Only Fluxys and GTS penalise relatively low imbalances.

The different balancing penalty systems used in order to sustain the pressure in the transmission network provides different incentives for shippers. A non-existing or low penalty for small imbalances combined with high penalties for higher imbalances provides shippers with an incentive not to let their imbalances rise to much. Oppositely, a penalty system with a medium but positive penalty payment for all levels of imbalances provides an incentive to avoid imbalances altogether. But in the latter system, the shipper will NOT however have a strong incentive to limit his imbalance whenever he should be in a situation where he has already exceeded the balancing margin as the penalty is fairly constant for all levels of imbalances. However, as the current benchmark shows, all TSO's tend to increase penalties when the level of imbalance rises, thereby providing an incentive to lower the imbalance.

Some TSOs have an hourly balancing regime while other TSOs employ daily balancing regimes. Thus, the balancing systems in the comparison have some structural differences as shippers more often will be out of balance in an hourly balancing system than in a daily balancing system where positive and negative hourly imbalances offset each other. This is probably a part of the reason as to why the penalties are higher for Fluxys and GTS than for the other TSOs. This holds for all positive and for negative imbalances which are relatively small. Only relatively large negative imbalances are penalised relatively heavily by daily balancing systems.

In the benchmark of balancing penalties four different profiles and three different types of imbalances were used. The four profiles were used to illustrate differences in penalties for varying load factors. As the load factor decreases, the maximum hourly capacity increases and so does the absolute size of the imbalance. Thus, the absolute value of the penalties also increase for all TSOs. From the results it can be seen that while some TSOs (e.g. Fluxys) penalize shippers for being out of balance for all load factors, some TSOs (e.g. MOL and Energinet.dk) only penalize shippers for being out of balance when the load factor is relatively low (i.e. the absolute value of the imbalance is high). The benchmark showed that even though the absolute balancing penalties of all TSOs increased as the load factor decreased, the index of the penalties compared to the average penalties did not vary much.

The three different types of imbalances (positive, negative and alternating positive/negative) illustrate the differences in the structure of the balancing payment systems. Thus, a constant positive (or negative) hourly imbalance could bring the shipper out of balance both on an hourly and on a daily basis. An alternating positive and negative hourly imbalance might, on the other hand, bring the shipper out of balance on an hourly basis but on the same time keep the shipper within the balancing margin on a daily basis, because of the offsetting positive and negative imbalances.

The differences in hourly and daily balancing regimes is illustrated in the comparison where the penalties of Fluxys and GTS (hourly balancing regime) are relatively higher than the penalties of the rest of the TSOs for alternating positive/negative imbalances. The French TSO's provide a relatively large disincentive for relatively large negative imbalances.

The table below illustrates the average balancing penalty (positive; negative and positive/negative) and for each TSO all profiles and types of imbalances.

*Table 14: Average balancing penalty.*
*for each TSO for all profiles and types of imbalances and at different levels of imbalances.*

| | France | France | Belgium | Denmark | Hungary | Hungary | Netherlands |
|---|---|---|---|---|---|---|---|
| Imbalance | GRTgaz | TIGF | Fluxys | Energinet.dk | MOL 1 | MOL 2 | GTS |
| 2 % | 0 | 0 | 2.488 | 0 | 0 | 193 | 1.251 |
| 5 % | 0 | 0 | 12.138 | 0 | 156 | 881 | 8.857 |
| 8 % | 9.565 | 10.009 | 22.238 | 2.876 | 533 | 1.580 | 17.055 |
| 12 % | 25.074 | 26.239 | 36.399 | 6.711 | 1.164 | 2.518 | 28.055 |
| 18 % | 49.142 | 51.424 | 58.401 | 15.535 | 2.113 | 3.925 | 44.790 |

As it can be seen from the table, Fluxys on average has by far the most expensive penalties for all levels of imbalances, followed by GTS. Fluxys and GTS also penalise relatively low imbalances. TIGF and GRTgaz have the second highest penalties. This is due to the relatively high penalties for large negative imbalances of the French TSO's. Energinet.dk and especially MOL (for both the regulated and the competitive market) have on average the lowest penalties.

It is important to note that the opportunity to enter a balance service agreement is likely to alter the results of the balancing penalties significantly. Thus, an example illustrated that by entering a balance service agreement a shipper with a certain profile was able to cut off more than 98 % of his balancing penalty to Energinet.dk. As the use of balancing service agreements is widely used these have a major impact on the results.

The impact different balancing systems have on trade in the regions of Europe are being investigated by the Regional Coordination Committees of regulators of the ERGEG Regional Initiatives. Hopefully the work being done in these groups will cast some light on the differences discovered in the balancing regimes.

# Part Three: Reasons for tariff differences

Differences in tariffs between TSOs can have a number of causes besides differences in the effectiveness of the TSOs. Thus, when comparing tariffs one has to be aware that the results may very well be greatly influenced by some of the parameters mentioned below.

*Methodology of benchmark*

The methodology itself is an important parameter when benchmarking transmission tariffs and the choice of standard profiles is of course one of the main parameters. Regulators from all the participating countries have had the opportunity to influence the choice of standard profiles but it is inevitably that some of the profiles will be irrelevant for some TSOs and thus make the results of the benchmark less useful. This is caused by the fact that TSOs are very different in size and shape and so are their customers. Therefore it is impossible to select standard profiles which are equally suitable for all TSOs.

The choice of distance is also an important parameter for the benchmark. Some of the distances used in the benchmark may easily have less relevance for some of the TSO's than for others but once again it would be impossible to find distances which are equally useful for all TSO's. By using a variety of distances some of the uncertainties should be dealt with in a broad outline although some single tariff comparisons still may not give quite the right picture as they are only theoretical.

Finally the list of TSO's involved in the benchmark will of course also have an impact on the results. The benchmark may show results which could have been a lot different if for example TSO's from Germany, UK or Italy had been a part of the project. Thus, the results of the benchmark can not be seen as the final truth of the tariffs of the participating TSO's but only as an indicator of the level of tariffs compared to the rest of the relatively narrow group of TSO's.

*TSOs physical specificities*

Differences in tariffs can somewhat be explained by the physical differences between TSO's. Age and size of the network and the pipe diameter all have a significant influence on tariffs. All three parameters influence the costs of transportation and thus the price of the shipper. Network age affects tariffs because older networks tend to be more depreciated and fully paid off which yields a lower cost than newer networks which are generally more indebted.

Pipe diameter influences cost in the following way. If the pipes are bigger, more gas can potentially flow through them which lowers the unit cost of transporting gas, but bigger pipes are more expensive to build so if the capacity is unused this might give higher tariffs. Steel prices at the time the networks were build will also reflect on tariffs as higher steel prices means higher costs and from this follows higher tariffs. The portfolio of debt also affects the level of tariffs. Thus, if the loans the TSOs made yields a high interest rate, these costs must be financed by high tariffs. Differences in transmission costs are currently being analysed by the CEER in a separate benchmark study.

For information, the age of the network, pipe diameter and general usage of the pipes is listed in the table below:

*Table 15: Network age, pipe diameter and average used capacity of pipes*.*

| | | Network age in years (average) | Average pipe diameter (Main pipes) | Capacity generally used in the main pipelines (approximated) |
|---|---|---|---|---|
| France | GRTgaz | 25 | 900mm. | 81% |
| France | TIGF | NA. | 750 mm. | 84% |
| Netherlands | GTS | 26 | 1.219 mm. | 95% |
| Belgium | Fluxys | 27 | 497 mm. | 46% |
| Denmark | Energinet.dk | 20 | 660 mm. | 80% |
| Hungary | MOL | 20 | 450 mm. | 95% in the winter<br>80% in the summer |
| Austria | TAG | 25 | 1.003 mm. | NA |
| Austria | BOG | 26 | 813 mm. | NA. |

** Note – the following assumptions for the general capacity used in the pipelines;*

The capacity is firm. No interruptible capacity has been taken into account in the calculation exercise. The quantity "transported" can be imported from other neighbouring TSOs or withdrawn from domestic storage facilities.

A better way would be dividing the transported (imported+storage) quantity by the total (import+storage) capacity. Because storage capacity varies with time, additional assumptions would be needed. In the absence of such assumptions, the transported (imported+withdrawn) quantity has been divided by only the (firm) import capacity.

*Percentage of TSO's total income derived from tariffs*

There may be other forms of payments from shippers to TSOs besides the raw transportation tariff like for instance balancing payments, fees for being registered as a shipper in the transmission system, quality conversion charges, emergency supply charges, etc. This means that if TSOs receive additional income besides transportation tariffs and these incomes help finance the transmission costs, the compared tariffs could be much lower than they would be if these other forms of incomes had been taken into account.

These other forms of expenses which the shippers might incur are not always distributed as equally as the raw transportation tariffs. Thus, balancing costs are only paid by those shippers who are not able to predict their off take of gas from the system.

*Duration of transportation contract*

To compose a theoretical correct benchmark, the comparison would have to adjust tariffs for any differences in the possible options of contract duration. For instance, some TSOs open the opportunity for the shipper to choose from a variety of durations. Especially for customers with a low load factor this could lead to a lower tariff altogether if the customer would choose to combine a yearly contract with a low capacity with a short-term contract with a high capacity. Thus, the TSO may have to raise the tariffs for the yearly contracts in order to recoup the deficit following the customer's possibility of optimizing his transportation contract. The outcome of a direct comparison of the yearly tariff with another TSO which does not offer the possibilities of short-term contracts would therefore be that the TSO concerned has

higher tariffs - even though the customer actually has the opportunity to choose differently and pay less in total.

For information, the types of contracts offered to customers for each of the TSO's is shown in the table below:

*Table 16: Duration of contracts.*

| Duration | | Yearly | Monthly | Weekly | Daily | Other |
|---|---|---|---|---|---|---|
| France | GDF | X | X | X | X | Multiannual |
| France | TIGF | X | X | X | X | Multiannual |
| Netherlands | GTS | X | X | X | X | Multiannual |
| Belgium | Fluxys | X | X | X | | |
| Denmark | Energinet.dk | X | X | X | X | Multiannual |
| Hungary | MOL | X | X | | X | |
| Austria | TAG | X | X | | | |
| Austria | BOG | X | X | | | |

*Source: Information from national regulators*

The TF has not calculated the actual saving possibilities by entering short-term contracts with the TSO's for all of the profiles in question, but random tests show that savings can be significant. This has to be kept in mind when comparing the transmission tariffs for yearly contracts.

*Entry/Exit flexibility*

Some tariff systems are more flexible than others. The smaller the number of entry/exit zones is, the more pooling possibilities the shipper has. Thus, with a small number of exit zones the shipper is able to pool several of his end users and by that means obtain a lower total price than in a less "flexible" system with fewer possibilities of pooling (i.e. more entry/exit zones). Tariffs therefore have to be higher when pooling possibilities are high in order to be able to cover the expenses. Thus, differences in the flexibility of the compared tariff systems may influence the benchmark significantly.

*Market conditions*

The market conditions influence tariffs in several ways. First of all the share of natural gas of total energy consumption differ among countries. The lower the share of natural gas, the fewer people pay for the use of the transmission system. Thus, transmission tariffs have to be higher in order to cover the expenses of building the network.

The table below illustrates the share of natural gas of the TPES (Total Primary Energy Supply) in each of the participating countries:

*Table 17: Gas share of total energy consumption (Source: IEA Energy Statistics, 2000).*

| Total Primary Energy Supply (in thousand tonnes of oil equivalent), 2003 | France | Denmark | Belgium | Netherlands | Hungary |
|---|---|---|---|---|---|
| Gas | 39,371 | 4,659 | 14,398 | 35,988 | 11,883 |
| Total | 271,287 | 20,755 | 59,157 | 80,829 | 26,341 |
| Gas share | 15% | 22% | 24% | 45% | 45% |

As the table shows, use of natural gas is approximately twice as common in The Netherlands and in Hungary compared to Belgium and Denmark and three times as common compared to France.

Another market factor which influences tariffs is the population density. If the population density is very low, the transmission system presumably is relatively large in comparison with the number of customers connected to the network and once again tariffs have to be higher in order to cover the expenses of building and operating the network. The table below illustrates the population density in each of the participating countries:

*Table 18: Population density.*

| | France | Hungary | Denmark | Belgium | Netherlands |
|---|---|---|---|---|---|
| Population, mill. | 59.5 | 10.2 | 5.4 | 10.3 | 16.1 |
| Total Land Area, th.km^2 | 552 | 93 | 43 | 31 | 42 |
| Population Density | 108 | 110 | 126 | 332 | 383 |

*Source: Statistisk tiårsoversigt 2005, Danmarks Statistik*

As the table shows the population density is approximately three times larger in The Netherlands and in Belgium compared to France, Hungary and Denmark.

*Geography/Geology*

The geographical and geological differences across countries have a great influence on the costs of building a transmission network. Thus, differences in tariffs can be explained by differences in both geographical and geological circumstances. These factors can be such as the degree of mountainous land spanning the country, which causes difficulties when it comes to developing transmission networks and hence increases the cost.

The TF has not investigated differences in geographical and geological circumstances across TSO's.

*Other factors*

Even the above list of factors which may influence transmission tariffs may not to be exhaustive. Other factors, including factors not mentioned or analysed in this report, may also be relevant. For example, differences in relative efficiency or quality could also play an important role, but they are not analysed within the framework of this report.

# Part Four: Conclusion

ERGEG has carried out a benchmark of transmission tariffs and balancing payments of entry-exit systems. The conclusion below summaries the main findings of the benchmark and the discussion of some of the "lessons learned" from this exercise.

*Findings*

The transmission companies in the benchmark are GTS (The Netherlands), Fluxys (Belgium), TIGF (France), GRTgaz (France), Energinet.dk (Denmark) and MOL (Hungary). Due to the limited number of TSO's participating, the results cannot be generalised. The benchmark has shown significant differences in both transportation tariffs and balancing penalties. The transportation tariff part compared tariffs for different standard profiles and distances. The comparison revealed that differences in volumes did not seem to have an influence on tariffs (price per $m^3$) while differences in load factors played a vital role.

Overall, the transportation tariffs of TIGF and GTS are the least expensive in the benchmark although this is not true for all profiles and distances. GRTgaz and Fluxys have intermediate positions, whereby the tariffs are still below average. Energinet.dk and MOL have the most expensive tariffs of the six TSOs. The differentiation in tariffs was smallest for a low value of the load factor. The comparison also showed that it is relatively more expensive to have an even gas flow at Energinet.dk, MOL and Fluxys while it is relatively more expensive to have an uneven gas flow at GRTgaz, TIGF and GTS.

As transportation tariffs do not constitute all of the expenses shippers have to bear when using a transmission network, a benchmark of the balancing penalties was performed as well. The balancing benchmark compared balancing penalties for four different profiles under three different types of imbalances. The benchmark showed that the penalties – like the transportation tariffs - also vary significantly between TSOs. The results of the balancing benchmark also illustrated the differences between hourly and daily balancing regimes.

Regarding balancing penalties, the results reflect that there are similar differences in both the absolute level of the penalties and in how TSOs penalize different customer profiles. Thus, Fluxys and GTS penalize all profiles in the comparison while other TSOs only penalize customers with high levels of imbalances but with a relatively higher penalty. Thus, on average, the penalties of Fluxys and GTS are the highest in the comparison, while the penalties of Energinet.dk are among the lowest.

This result illustrates that it is useful not only to look at transmission tariffs themselves, but to also include other types of shipper payments such as balancing payments when comparing the tariffs of TSOs. The report also highlights that differences in tariffs can to some extent be explained by differences in the design of the entry/exit system, differences in market conditions and differences in geographical/geological circumstances. Differences in efficiency and costs also play a role. From the point of view of the end-consumer, it could even be argued that it is not the transmission tariff in itself which matters most, but the all-in price of gas (including the commodity price, transmission and distribution). This puts the results of the current benchmark, which only addresses part of the gas value chain, into perspective.

There are a number of reasons why the results of this report should be interpreted with caution, such as:

- the number of TSO's which have been included in the comparison is limited (only 6). This means, for example, that the comparisons in this report with respect to the European average are only of limited value. The relative position of TSO's may change when more TSO's are included in the comparison.
- the benchmark includes data of various years. This is due to the fact that some national regulators decided to update figures during the benchmarking process, while other regulators did not. The Danish and Hungarian data relates to 2005, the Belgian data relate to 2006, whereas the French and Dutch data are relevant for 2007.
- the results on balancing payments are influenced by the choice of the neutral gas price, which was not harmonised in the comparison. On the one hand, this may provide a more realistic picture of "typical" balancing payments given certain levels of imbalances, as gas prices can still differ significantly between countries. The drawback is, that the current benchmark does not make transparent whether differences in balancing payments are caused by differences in the neutral gas price or by other factors.
- the benchmark does not take shipper responses to balancing penalties into account. For example, relatively high penalties would stimulate shippers to avoid imbalances as much as possible. The approach taken in this benchmark is to look at the penalties shippers would have to pay *given* a certain imbalance, but the benchmark does not indicate whether it is *likely* that a certain level of imbalance occurs. The likelihood of the occurrence of certain imbalances is not only influenced by responses of shippers to penalties, but also by the presence of sufficiently competitive storage facilities. This is illustrated in the report for one of the French TSO's.
- it should be realised that the shipper profiles used in the comparison may not in all cases provide all the relevant information for making useful comparisons. The case of GTS shows that there can be significant differences in the transmission tariffs for a distance of 350 kilometres, even given a specific profile.

*Discussion*

This report is the first study by European regulators which benchmarks transmission tariffs and balancing payments for gas transmission networks. The goal of the benchmark was, in the first place, to help the national regulators to develop more knowledge and experience in using benchmarks for their tariff regulation and, secondly, to be used to identify differences in tariff levels which can then be investigated further. In this way, the added value of this type of benchmarking exercise is that it may provide a useful framework for a discussion of tariffs and balancing penalties in Europe. The benchmark may also be useful to national regulators when implementing Regulation 1775/2005/EC on access to national gas transmission networks. However, the current report does not prejudice any views on the appropriate role of benchmarking and the appropriate methodology to applied within the context of this Regulation.

The outcome of the benchmarking exercise shows that tariffs and tariff structures vary significantly between transmission networks. Part of these differences reflect the specificities of the different systems and countries. The approach taken in the current report has not been to correct for these specificities. Instead, the report aims to be as transparent as possible about the relevant factors which could have an influence on tariffs. Moreover, from the perspective of a European shipper, the main point of interest is the *level* of the tariffs and other fees paid for access and use of a transmission system. The reasons for tariffs being

higher or lower in a specific country are only of secondary interest from the shipper perspective. The value added of the comparison is that it shows how much a shipper with a given profile has to pay for a given transportation service at each TSO. In these ways, the report can provide a starting point for a discussion of the reasons for differences in tariffs and balancing penalties.

As a learning exercise, the benchmark has provided valuable lessons in a range of areas. A first lesson is that there are wide differences in both tariff structures and system designs in TSOs across Europe. Thus, it has proven a very difficult task to prepare a useful setup for comparing both transportation tariffs and balancing penalties that could be applied to a wide range of TSO's. Secondly, and in part driven by the large differences, there is still a lack of transparency of the tariff structures, balancing payments and possibilities to enter balancing service agreements. This is also illustrated by the fact that, within the context of this report, it has not been possible to compare the combined transportation tariffs, balancing penalties and balancing service agreements. The large differences and lack of transparency about them may hamper trade across transmission systems.

For future benchmarking projects, the report can inspire improvements in a number of areas, such as:

- the number of TSO's incorporated in the analysis could be increased, so that a sufficient number of relevant comparators exist for all distances;
- all data could relate to the same year;
- for the balancing payments comparison, neutral gas prices could be either harmonised or the effect of differences in neutral gas prices could be made transparent;
- an overall assessment could be made with respect to the attractiveness of a specific transmission network, at least with respect to transmission tariffs and balancing penalties. This assessment could also take likely or typical behavioural responses of shippers into account;
- the benchmarking methodology could be evaluated and refined. This could include an assessment of the factors which in practice are the most likely explanations for differences in tariffs. These differences could be investigated further and, if feasible, could be incorporated in the benchmarking methodology.

ERGEGintends to explore the possibilities for effective co-operation with TSO's to foster the future development of European benchmarking studies.

# Appendix

## 1) Description of the Belgian transmission tariff system

*Calculation of tariffs*

- The calculations are based on CREG's approved and regulated transport tariffs 2006 which are applied as such by the TSO.
- The calculations are firm-capacity only. Discounts are available for conditional entry capacity or interruptible capacity.
- There is no differentiation in tariffs at the moment. The following tariffs apply at all entry and exit points:
    - Entry tariff: 7,6 EUR/m³(n)/h/year
    - Exit tariff HP (High Pressure): 22,2 EUR/m³(n)/h/year
    - Exit tariff MP (Medium Pressure): 10,5 EUR/m³(n)/h/year
- The calculations are based on the interpretation that the main network equals usage of HP-grid whereas regional network equals MP-grid, however the distances in the benchmark profiles are not what one may see in Belgium: while 60km and 110km for the main grid is a suitable point of reference for the non-distant-related entry and exit tariff in Belgium, the 10km chosen for the regional network is too short.
- The reference taken for the calorific value of the gas is H-gas which has 11,63 kWh per (n)m³ and determines partially the value of the commodity part.
- The connection tariff is a regulated tariff for establishing new legal and financial links between Fluxys and a customer applying for a new connection. The connection tariff is fixed at 2,000 EUR per connection (tariff excl. VAT, not subject to indexation) but does not reflect actual (material) cost.
- It is also important to notice that a RF (Rate Flexibility)-basic capacity equal to 10% of the subscribed redelivery (exit) capacity is included in the exit tariff. In the current calculus, the entire (100%) of peak capacity is subscribed and not, e.g. 90%. So this additional RF is really on top off.

*Table 19: Calculation of the Belgian transportation tariffs (Entry/exit tariffs are constant).*

| Fluxys | | unit |
|---|---|---|
| Entry tariff | 7,6 | EUR/m³/hour/year |
| exit tariff, high pressure | 22,2 | EUR/m³/hour/year |
| exit tariff, medium pressure | 10,5 | EUR/m³/hour/year |
| volume tariff | 0,2 % of volume * Zeebrugge market price | |
| Lower calorific value, BEL | 11,63 | kWh/m³ |
| Zeebrugge market price | 19,88 | Average 2005 |

**Standard profiles**

| profile | volume, m³ | max hourly capacity, m³ | load factor | duration |
|---|---|---|---|---|
| **1** | 5.000.000.000 | 650.000 | 0,88 | 1 year |
| **2** | 5.000.000.000 | 800.000 | 0,71 | 1 year |
| **3** | 5.000.000.000 | 1.000.000 | 0,57 | 1 year |
| **4** | 500.000.000 | 65.000 | 0,88 | 1 year |
| **5** | 500.000.000 | 80.000 | 0,71 | 1 year |
| **6** | 500.000.000 | 100.000 | 0,57 | 1 year |
| **7** | 500.000.000 | 170.000 | 0,34 | 1 year |
| **8** | 50.000.000 | 8.000 | 0,71 | 1 year |
| **9** | 50.000.000 | 10.000 | 0,57 | 1 year |
| **10** | 50.000.000 | 17.000 | 0,34 | 1 year |

| profile | price, entry, EUR | price, exit, EUR | total price, capacity, EUR | price, volume, EUR |
|---|---|---|---|---|
| **1** | 4.940.000 | 21.255.000 | 26.195.000 | 2.312.044 |
| **2** | 6.080.000 | 26.160.000 | 32.240.000 | 2.312.044 |
| **3** | 7.600.000 | 32.700.000 | 40.300.000 | 2.312.044 |
| **4** | 494.000 | 2.125.500 | 2.619.500 | 231.204 |
| **5** | 608.000 | 2.616.000 | 3.224.000 | 231.204 |
| **6** | 760.000 | 3.270.000 | 4.030.000 | 231.204 |
| **7** | 1.292.000 | 5.559.000 | 6.851.000 | 231.204 |
| **8** | 60.800 | 261.600 | 322.400 | 23.120 |
| **9** | 76.000 | 327.000 | 403.000 | 23.120 |
| **10** | 129.200 | 555.900 | 685.100 | 23.120 |

| profile | total price, EUR | tariff per 1000 m³, EUR |
|---|---|---|
| **1** | 28.507.044 | 5,70 |
| **2** | 34.552.044 | 6,91 |
| **3** | 42.612.044 | 8,52 |
| **4** | 2.850.704 | 5,70 |
| **5** | 3.455.204 | 6,91 |
| **6** | 4.261.204 | 8,52 |
| **7** | 7.082.204 | 14,16 |
| **8** | 345.520 | 6,91 |
| **9** | 426.120 | 8,52 |
| **10** | 708.220 | 14,16 |

## 2) Description of the Danish transmission tariff system

*The cost of transportation*

On the open gas market consumers pay partly for the natural gas and security of supply and partly for having the gas transported through the Danish pipeline network.

The transmission transport price consists of:

- A capacity component depending on the booked capacity in the transmission system (75%).
- A volume component depending on the volume of gas transported (25 %).

The capacity component accounts for approximately 75 % of the total revenues on transmission transports. The volume component accounts for the remaining 25 %. When the capacity component is higher than the volume component it is caused by the fact that building the network and by this establishing transportation capacity is by far the biggest cost. Thus, the tarification reflects the costs of the TSO.

*Calculation of tariffs*

The tariff system in the Danish transmission system is based on an entry-exit system with three entry points and one national exit zone, but tariffs are uniform for all entry and exit points (postage stamp).

Current tariffs are (as of October 2005):

| Capacity | Tariffs DKK | Tariffs EUR |
|---|---|---|
| -entry | 15,55 DKK/kWh/hour/year | 2,09 EUR/kWh/hour/year |
| -exit | 15,55 DKK/kWh/hour/year | 2,09 EUR/kWh/hour/year |
| Volume | 0,00193 DKK/kWh | 0,000259 DKK/kWh |

- In the Danish transmission system there is no distinction between main network and regional network.
- Danish shippers pay for an emergency supply (either firm or interruptible). The payments for emergency supplies are not included in the tariff calculations.
- Discounts are available for interruptible capacity.
- The Danish TSO offers GTF (Gas Transfer Facility), CTF (Capacity Transfer Facility) and BTF (Balance Transfer Facility).

*Table 20: Calculation of the Danish transportation tariffs.*
*(Entry/exit tariffs are constant).*

**IMPORTANT:** Tariffs of Energinet.dk have been changed after the completion of the tariff comparison. Capacity charges have fallen by 9,87 % and commodity charges have fallen by 23,11 %.

| **Energinet.dk** | | unit |
|---|---|---|
| rate of exchange | 7,4416 | DKK/Euro |
| entry/exit tariff | 15,55 | DKK/kWh/hour/year |
| volume tariff | 0,00193 | DKK/kWh |
| Lower calorific value, DK | 11,01 | kWh/m³ |

**Standard profiles**

| profile | volume, m³ | max hourly capacity, m³ | load factor | duration |
|---|---|---|---|---|
| **1** | 5.000.000.000 | 650.000 | 0,88 | 1 year |
| **2** | 5.000.000.000 | 800.000 | 0,71 | 1 year |
| **3** | 5.000.000.000 | 1.000.000 | 0,57 | 1 year |
| **4** | 500.000.000 | 65.000 | 0,88 | 1 year |
| **5** | 500.000.000 | 80.000 | 0,71 | 1 year |
| **6** | 500.000.000 | 100.000 | 0,57 | 1 year |
| **7** | 500.000.000 | 170.000 | 0,34 | 1 year |
| **8** | 50.000.000 | 8.000 | 0,71 | 1 year |
| **9** | 50.000.000 | 10.000 | 0,57 | 1 year |
| **10** | 50.000.000 | 17.000 | 0,34 | 1 year |

| profile | volume, kWh | max hourly capacity, kWh | price, entry, EUR | price, exit, EUR |
|---|---|---|---|---|
| **1** | 55.050.000.000 | 7.156.500 | 14.954.254 | 14.954.254 |
| **2** | 55.050.000.000 | 8.808.000 | 18.405.235 | 18.405.235 |
| **3** | 55.050.000.000 | 11.010.000 | 23.006.544 | 23.006.544 |
| **4** | 5.505.000.000 | 715.650 | 1.495.425 | 1.495.425 |
| **5** | 5.505.000.000 | 880.800 | 1.840.524 | 1.840.524 |
| **6** | 5.505.000.000 | 1.101.000 | 2.300.654 | 2.300.654 |
| **7** | 5.505.000.000 | 1.871.700 | 3.911.113 | 3.911.113 |
| **8** | 550.500.000 | 88.080 | 184.052 | 184.052 |
| **9** | 550.500.000 | 110.100 | 230.065 | 230.065 |
| **10** | 550.500.000 | 187.170 | 391.111 | 391.111 |

| profile | total price, capacity, EUR | price, volume, EUR | total price, EUR | tariff per 1000 m³, EUR |
|---|---|---|---|---|
| **1** | 29.908.508 | 14.277.373 | 44.185.881 | 8,84 |
| **2** | 36.810.471 | 14.277.373 | 51.087.844 | 10,22 |
| **3** | 46.013.089 | 14.277.373 | 60.290.462 | 12,06 |
| **4** | 2.990.851 | 1.427.737 | 4.418.588 | 8,84 |
| **5** | 3.681.047 | 1.427.737 | 5.108.784 | 10,22 |
| **6** | 4.601.309 | 1.427.737 | 6.029.046 | 12,06 |
| **7** | 7.822.225 | 1.427.737 | 9.249.962 | 18,50 |
| **8** | 368.105 | 142.774 | 510.878 | 10,22 |
| **9** | 460.131 | 142.774 | 602.905 | 12,06 |
| **10** | 782.223 | 142.774 | 924.996 | 18,50 |

## 3) Description of the Dutch transmission tariff system

*Table 21: Calculation of the Dutch transportation tariffs.*
*(Entry/exit tariffs vary between entry/exit points).*

| | | | | |
|---|---|---|---|---|
| | **GTS** | | unit | |
| | entry tariff | Groningenveld | 13,45 | EUR/m³/hour/year |
| | exit tariff | Hoogeveen (ca 60 km) | 9,53 | EUR/m³/hour/year |
| | | Deventer (ca 110 km) | 11,32 | EUR/m³/hour/year |
| | | Gouda (ca 260 km) | 21,69 | EUR/m³/hour/year |
| | | Botlek (ca 350) | 13,54 | EUR/m³/hour/year |
| | | Goes (ca 350) | 38,88 | EUR/m³/hour/year |
| | Connection fee | Hoogeveen (ca 60 km) | 1,84 | EUR/m³/hour/year |
| | | Deventer (ca 110 km) | 0,77 | EUR/m³/hour/year |
| | | Gouda (ca 260 km) | 0,37 | EUR/m³/hour/year |
| | | Botlek (ca 350) | 11,31 | EUR/m³/hour/year |
| | | Goes (ca 350) | 0,96 | EUR/m³/hour/year |
| | volume tariff | | n.v.t. | |
| **Standard profiles** | | | | |
| profile | volume, m³ | max hourly capacity, m³ | load factor | duration |
| **1** | 5.000.000.000 | 650.000 | 0,88 | 1 year |
| **2** | 5.000.000.000 | 800.000 | 0,71 | 1 year |
| **3** | 5.000.000.000 | 1.000.000 | 0,57 | 1 year |
| **4** | 500.000.000 | 65.000 | 0,88 | 1 year |
| **5** | 500.000.000 | 80.000 | 0,71 | 1 year |
| **6** | 500.000.000 | 100.000 | 0,57 | 1 year |
| **7** | 500.000.000 | 170.000 | 0,34 | 1 year |
| **8** | 50.000.000 | 8.000 | 0,71 | 1 year |
| **9** | 50.000.000 | 10.000 | 0,57 | 1 year |
| **10** | 50.000.000 | 17.000 | 0,34 | 1 year |

| | Distance 60 km | | | |
|---|---|---|---|---|
| profile | price, entry, EUR | price, exit, EUR | price connection fee EUR | total price, capacity, EUR |
| **1** | 8.742.500 | 6.194.500 | 1.196.000 | 16.133.000 |
| **2** | 10.760.000 | 7.624.000 | 1.472.000 | 19.856.000 |
| **3** | 13.450.000 | 9.530.000 | 1.840.000 | 24.820.000 |
| **4** | 874.250 | 619.450 | 119.600 | 1.613.300 |
| **5** | 1.076.000 | 762.400 | 147.200 | 1.985.600 |
| **6** | 1.345.000 | 953.000 | 184.000 | 2.482.000 |
| **7** | 2.286.500 | 1.620.100 | 312.800 | 4.219.400 |
| **8** | 107.600 | 76.240 | 14.720 | 198.560 |
| **9** | 134.500 | 95.300 | 18.400 | 248.200 |
| **10** | 228.650 | 162.010 | 31.280 | 421.940 |
| profile | price, volume, EUR | total price, EUR | tariff per 1000 m³, EUR | |
| **1** | 0 | 16.133.000 | **3,23** | |
| **2** | 0 | 19.856.000 | **3,97** | |
| **3** | 0 | 24.820.000 | **4,96** | |
| **4** | 0 | 1.613.300 | **3,23** | |
| **5** | 0 | 1.985.600 | **3,97** | |
| **6** | 0 | 2.482.000 | **4,96** | |
| **7** | 0 | 4.219.400 | **8,44** | |
| **8** | 0 | 198.560 | **3,97** | |
| **9** | 0 | 248.200 | **4,96** | |
| **10** | 0 | 421.940 | **8,44** | |

| | Distance 110 km | | | |
|---|---|---|---|---|
| profile | price, entry, EUR | price, exit, EUR | price connection fee EUR | total price, capacity, EUR |
| **1** | 8.742.500 | 7.358.000 | 500.500 | 16.601.000 |
| **2** | 10.760.000 | 9.056.000 | 616.000 | 20.432.000 |
| **3** | 13.450.000 | 11.320.000 | 770.000 | 25.540.000 |
| **4** | 874.250 | 735.800 | 50.050 | 1.660.100 |
| **5** | 1.076.000 | 905.600 | 61.600 | 2.043.200 |
| **6** | 1.345.000 | 1.132.000 | 77.000 | 2.554.000 |
| **7** | 2.286.500 | 1.924.400 | 130.900 | 4.341.800 |
| **8** | 107.600 | 90.560 | 6.160 | 204.320 |
| **9** | 134.500 | 113.200 | 7.700 | 255.400 |
| **10** | 228.650 | 192.440 | 13.090 | 434.180 |
| profile | price, volume, EUR | total price, EUR | tariff per 1000 m³, EUR | |
| **1** | 0 | 16.601.000 | **3,32** | |
| **2** | 0 | 20.432.000 | **4,09** | |
| **3** | 0 | 25.540.000 | **5,11** | |
| **4** | 0 | 1.660.100 | **3,32** | |
| **5** | 0 | 2.043.200 | **4,09** | |

| | | | | |
|---|---|---|---|---|
| **6** | 0 | 2.554.000 | **5,11** | |
| **7** | 0 | 4.341.800 | **8,68** | |
| **8** | 0 | 204.320 | **4,09** | |
| **9** | 0 | 255.400 | **5,11** | |
| **10** | 0 | 434.180 | **8,68** | |

**Distance 260 km**

| profile | price, entry, EUR | price, exit, EUR | price connection fee EUR | total price, capacity, EUR |
|---|---|---|---|---|
| **1** | 8.742.500 | 14.098.500 | 240.500 | 23.081.500 |
| **2** | 10.760.000 | 17.352.000 | 296.000 | 28.408.000 |
| **3** | 13.450.000 | 21.690.000 | 370.000 | 35.510.000 |
| **4** | 874.250 | 1.409.850 | 24.050 | 2.308.150 |
| **5** | 1.076.000 | 1.735.200 | 29.600 | 2.840.800 |
| **6** | 1.345.000 | 2.169.000 | 37.000 | 3.551.000 |
| **7** | 2.286.500 | 3.687.300 | 62.900 | 6.036.700 |
| **8** | 107.600 | 173.520 | 2.960 | 284.080 |
| **9** | 134.500 | 216.900 | 3.700 | 355.100 |
| **10** | 228.650 | 368.730 | 6.290 | 603.670 |

| profile | price, volume, EUR | total price, EUR | tariff per 1000 m³, EUR |
|---|---|---|---|
| **1** | 0 | 23.081.500 | **4,62** |
| **2** | 0 | 28.408.000 | **5,68** |
| **3** | 0 | 35.510.000 | **7,10** |
| **4** | 0 | 2.308.150 | **4,62** |
| **5** | 0 | 2.840.800 | **5,68** |
| **6** | 0 | 3.551.000 | **7,10** |
| **7** | 0 | 6.036.700 | **12,07** |
| **8** | 0 | 284.080 | **5,68** |
| **9** | 0 | 355.100 | **7,10** |
| **10** | 0 | 603.670 | **12,07** |

**Distance 350 km (1) South west Netherlands**

| profile | price, entry, EUR | price, exit, EUR | price connection fee EUR | total price, capacity, EUR |
|---|---|---|---|---|
| **1** | 8.742.500 | 25.272.000 | 624.000 | 34.638.500 |
| **2** | 10.760.000 | 31.104.000 | 768.000 | 42.632.000 |
| **3** | 13.450.000 | 38.880.000 | 960.000 | 53.290.000 |
| **4** | 874.250 | 2.527.200 | 62.400 | 3.463.850 |
| **5** | 1.076.000 | 3.110.400 | 76.800 | 4.263.200 |
| **6** | 1.345.000 | 3.888.000 | 96.000 | 5.329.000 |
| **7** | 2.286.500 | 6.609.600 | 163.200 | 9.059.300 |
| **8** | 107.600 | 311.040 | 7.680 | 426.320 |
| **9** | 134.500 | 388.800 | 9.600 | 532.900 |
| **10** | 228.650 | 660.960 | 16.320 | 905.930 |

| profile | price, volume, EUR | total price, EUR | tariff per 1000 m³, EUR |
|---|---|---|---|
| **1** | 0 | 34.638.500 | **6,93** |
| **2** | 0 | 42.632.000 | **8,53** |
| **3** | 0 | 53.290.000 | **10,66** |
| **4** | 0 | 3.463.850 | **6,93** |
| **5** | 0 | 4.263.200 | **8,53** |

| | | | | |
|---|---|---|---|---|
| **6** | 0 | 5.329.000 | **10,66** | |
| **7** | 0 | 9.059.300 | **18,12** | |
| **8** | 0 | 426.320 | **8,53** | |
| **9** | 0 | 532.900 | **10,66** | |
| **10** | 0 | 905.930 | **18,12** | |
| **Distance 350 km (2) South east Netherlands** | | | | |
| profile | price, entry, EUR | price, exit, EUR | price connection fee EUR | total price, capacity, EUR |
| **1** | 8.742.500 | 8.801.000 | 7.351.500 | 24.895.000 |
| **2** | 10.760.000 | 10.832.000 | 9.048.000 | 30.640.000 |
| **3** | 13.450.000 | 13.540.000 | 11.310.000 | 38.300.000 |
| **4** | 874.250 | 880.100 | 735.150 | 2.489.500 |
| **5** | 1.076.000 | 1.083.200 | 904.800 | 3.064.000 |
| **6** | 1.345.000 | 1.354.000 | 1.131.000 | 3.830.000 |
| **7** | 2.286.500 | 2.301.800 | 1.922.700 | 6.511.000 |
| **8** | 107.600 | 108.320 | 90.480 | 306.400 |
| **9** | 134.500 | 135.400 | 113.100 | 383.000 |
| **10** | 228.650 | 230.180 | 192.270 | 651.100 |
| profile | price, volume, EUR | total price, EUR | tariff per 1000 m³, EUR | |
| **1** | 0 | 24.895.000 | **4,98** | |
| **2** | 0 | 30.640.000 | **6,13** | |
| **3** | 0 | 38.300.000 | **7,66** | |
| **4** | 0 | 2.489.500 | **4,98** | |
| **5** | 0 | 3.064.000 | **6,13** | |
| **6** | 0 | 3.830.000 | **7,66** | |
| **7** | 0 | 6.511.000 | **13,02** | |
| **8** | 0 | 306.400 | **6,13** | |
| **9** | 0 | 383.000 | **7,66** | |
| **10** | 0 | 651.100 | **13,02** | |

## 4) Description of the French transmission tariff system

New transmission tariffs and balancing rules/penalties entered into force on 1st of January 2007 both on GRTgaz and Tigf transmission systems. The data in this report include these new tariffs.

*Table 22: Calculation of the French transportation tariffs (GRT gaz)*
*(Entry/Exit tariffs vary between balancing zones (Entry/Exit tariff system). GRTgaz has 4 balancing zones to be reduced to only 2 balancing zones by 2009.*

| | **GRTgaz** | | Unit | |
|---|---|---|---|---|
| | regional payment | 45 | EUR/MWh/day/year | |
| | fixed charge per time unit | 3.600 | EUR/year/off take station | |
| | capacity charge | 20 | EUR/MWh/day/year | |
| | lower calorific value | 11,5 | kWh/m$^3$ | |
| | regional payment | 45 | EUR/MWh/day/year | |
| **Standard profiles** | | | | |

| profile | volume, m³ | max hourly capacity, m³ | load factor | duration |
|---|---|---|---|---|
| **1** | 5.000.000.000 | 650.000 | 0,88 | 1 year |
| **2** | 5.000.000.000 | 800.000 | 0,71 | 1 year |
| **3** | 5.000.000.000 | 1.000.000 | 0,57 | 1 year |
| **4** | 500.000.000 | 65.000 | 0,88 | 1 year |
| **5** | 500.000.000 | 80.000 | 0,71 | 1 year |
| **6** | 500.000.000 | 100.000 | 0,57 | 1 year |
| **7** | 500.000.000 | 170.000 | 0,34 | 1 year |
| **8** | 50.000.000 | 8.000 | 0,71 | 1 year |
| **9** | 50.000.000 | 10.000 | 0,57 | 1 year |
| **10** | 50.000.000 | 17.000 | 0,34 | 1 year |

**Distance 60 km**

| profile | price, entry, EUR | price, exit, EUR | Regional network payment, EUR | Fixed charge, EUR |
|---|---|---|---|---|
| **1** | 10.918.234 | 2.580.370 | 6.727.500 | 3.600 |
| **2** | 13.437.827 | 3.175.840 | 8.280.000 | 3.600 |
| **3** | 16.797.283 | 3.969.800 | 10.350.000 | 3.600 |
| **4** | 1.091.823 | 258.037 | 672.750 | 3.600 |
| **5** | 1.343.783 | 317.584 | 828.000 | 3.600 |
| **6** | 1.679.728 | 396.980 | 1.035.000 | 3.600 |
| **7** | 2.855.538 | 674.866 | 1.759.500 | 3.600 |
| **8** | 134.378 | 31.758 | 82.800 | 3.600 |
| **9** | 167.973 | 39.698 | 103.500 | 3.600 |
| **10** | 285.554 | 67.487 | 175.950 | 3.600 |

| profile | Capacity charge, EUR | price, volume, EUR | total price, EUR | tariff per 1000 m³, EUR |
|---|---|---|---|---|
| **1** | 2.990.000 | 0 | 23.219.704 | **4,64** |
| **2** | 3.680.000 | 0 | 28.577.267 | **5,72** |
| **3** | 4.600.000 | 0 | 35.720.683 | **7,14** |
| **4** | 299.000 | 0 | 2.325.210 | **4,65** |
| **5** | 368.000 | 0 | 2.860.967 | **5,72** |
| **6** | 460.000 | 0 | 3.575.308 | **7,15** |
| **7** | 782.000 | 0 | 6.075.504 | **12,15** |
| **8** | 36.800 | 0 | 289.337 | **5,79** |
| **9** | 46.000 | 0 | 360.771 | **7,22** |
| **10** | 78.200 | 0 | 610.790 | **12,22** |

**Distance 110 km**

| profile | price, entry, EUR | price, exit, EUR | Regional network payment, EUR | Fixed charge, EUR |
|---|---|---|---|---|
| **1** | 10.918.234 | 4.408.132 | 6.727.500 | 3.600 |
| **2** | 13.437.827 | 5.425.393 | 8.280.000 | 3.600 |
| **3** | 16.797.283 | 6.781.742 | 10.350.000 | 3.600 |
| **4** | 1.091.823 | 440.813 | 672.750 | 3.600 |
| **5** | 1.343.783 | 542.539 | 828.000 | 3.600 |

| | | | | |
|---|---|---|---|---|
| **6** | 1.679.728 | 678.174 | 1.035.000 | 3.600 |
| **7** | 2.855.538 | 1.152.896 | 1.759.500 | 3.600 |
| **8** | 134.378 | 54.254 | 82.800 | 3.600 |
| **9** | 167.973 | 67.817 | 103.500 | 3.600 |
| **10** | 285.554 | 115.290 | 175.950 | 3.600 |
| profile | Capacity charge, EUR | price, volume, EUR | total price, EUR | tariff per 1000 m³, EUR |
| **1** | 2.990.000 | 0 | 25.047.466 | **5,01** |
| **2** | 3.680.000 | 0 | 30.826.820 | **6,17** |
| **3** | 4.600.000 | 0 | 38.532.625 | **7,71** |
| **4** | 299.000 | 0 | 2.507.987 | **5,02** |
| **5** | 368.000 | 0 | 3.085.922 | **6,17** |
| **6** | 460.000 | 0 | 3.856.503 | **7,71** |
| **7** | 782.000 | 0 | 6.553.534 | **13,11** |
| **8** | 36.800 | 0 | 311.832 | **6,24** |
| **9** | 46.000 | 0 | 388.890 | **7,78** |
| **10** | 78.200 | 0 | 658.593 | **13,17** |
| **Distance 260 km** | | | | |
| profile | price, entry, EUR | price, exit, EUR | Regional network payment, EUR | Fixed charge, EUR |
| **1** | 10.918.234 | 5.160.740 | 6.727.500 | 3.600 |
| **2** | 13.437.827 | 6.351.680 | 8.280.000 | 3.600 |
| **3** | 16.797.283 | 7.939.600 | 10.350.000 | 3.600 |
| **4** | 1.091.823 | 516.074 | 672.750 | 3.600 |
| **5** | 1.343.783 | 635.168 | 828.000 | 3.600 |
| **6** | 1.679.728 | 793.960 | 1.035.000 | 3.600 |
| **7** | 2.855.538 | 1.349.732 | 1.759.500 | 3.600 |
| **8** | 134.378 | 63.517 | 82.800 | 3.600 |
| **9** | 167.973 | 79.396 | 103.500 | 3.600 |
| **10** | 285.554 | 134.973 | 175.950 | 3.600 |
| profile | Capacity charge, EUR | price, volume, EUR | total price, EUR | tariff per 1000 m³, EUR |
| **1** | 2.990.000 | 0 | 25.800.074 | **5,16** |
| **2** | 3.680.000 | 0 | 31.753.107 | **6,35** |
| **3** | 4.600.000 | 0 | 39.690.483 | **7,94** |
| **4** | 299.000 | 0 | 2.583.247 | **5,17** |
| **5** | 368.000 | 0 | 3.178.551 | **6,36** |
| **6** | 460.000 | 0 | 3.972.288 | **7,94** |
| **7** | 782.000 | 0 | 6.750.370 | **13,50** |
| **8** | 36.800 | 0 | 321.095 | **6,42** |
| **9** | 46.000 | 0 | 400.469 | **8,01** |
| **10** | 78.200 | 0 | 678.277 | **13,57** |

| Distance 350 km | | | | |
|---|---|---|---|---|
| profile | price, entry, EUR | price, exit, EUR | Regional network payment, EUR | Fixed charge, EUR |
| **1** | 10.918.234 | 7.939.600 | 6.727.500 | 3.600 |
| **2** | 13.437.827 | 9.771.815 | 8.280.000 | 3.600 |
| **3** | 16.797.283 | 12.214.769 | 10.350.000 | 3.600 |
| **4** | 1.091.823 | 793.960 | 672.750 | 3.600 |
| **5** | 1.343.783 | 977.182 | 828.000 | 3.600 |
| **6** | 1.679.728 | 1.221.477 | 1.035.000 | 3.600 |
| **7** | 2.855.538 | 2.076.511 | 1.759.500 | 3.600 |
| **8** | 134.378 | 97.718 | 82.800 | 3.600 |
| **9** | 167.973 | 122.148 | 103.500 | 3.600 |
| **10** | 285.554 | 207.651 | 175.950 | 3.600 |
| profile | Capacity charge, EUR | price, volume, EUR | total price, EUR | tariff per 1000 m³, EUR |
| **1** | 2.990.000 | 0 | 28.578.934 | **5,72** |
| **2** | 3.680.000 | 0 | 35.173.242 | **7,03** |
| **3** | 4.600.000 | 0 | 43.965.653 | **8,79** |
| **4** | 299.000 | 0 | 2.861.133 | **5,72** |
| **5** | 368.000 | 0 | 3.520.564 | **7,04** |
| **6** | 460.000 | 0 | 4.399.805 | **8,80** |
| **7** | 782.000 | 0 | 7.477.149 | **14,95** |
| **8** | 36.800 | 0 | 355.296 | **7,11** |
| **9** | 46.000 | 0 | 443.221 | **8,86** |
| **10** | 78.200 | 0 | 750.955 | **15,02** |

*Table 23: Calculation of the French transportation tariffs (TIGF).*
*(Entry/exit tariffs vary between balancing zones. TIGF has 1 balancing zone.*

| | TIGF | | |
|---|---|---|---|
| | regional payment | 43 | EUR/MWh/day/year |
| | fixed charge per time unit | 1.800 | EUR/year/off take station |
| | capacity charge | 11 | EUR/MWh/day/year |
| | lower calorific value | 11,5 | kWh/m$^3$ |
| | **Distance 60 km** | | |
| profile | volume, m³ | max hourly capacity, m³ | load factor | duration |
| **1** | 5.000.000.000 | 650.000 | 0,88 | 1 year |
| **2** | 5.000.000.000 | 800.000 | 0,71 | 1 year |
| **3** | 5.000.000.000 | 1.000.000 | 0,57 | 1 year |
| **4** | 500.000.000 | 65.000 | 0,88 | 1 year |
| **5** | 500.000.000 | 80.000 | 0,71 | 1 year |
| **6** | 500.000.000 | 100.000 | 0,57 | 1 year |
| **7** | 500.000.000 | 170.000 | 0,34 | 1 year |
| **8** | 50.000.000 | 8.000 | 0,71 | 1 year |
| **9** | 50.000.000 | 10.000 | 0,57 | 1 year |
| **10** | 50.000.000 | 17.000 | 0,34 | 1 year |

| profile | price, entry, EUR | price, exit, EUR | Regional network payment, EUR | Fixed charge, EUR |
|---|---|---|---|---|
| **1** | 3.313.917 | 9.630.292 | 6.428.500 | 1.800 |
| **2** | 4.078.667 | 11.852.667 | 7.912.000 | 1.800 |
| **3** | 5.098.333 | 14.815.833 | 9.890.000 | 1.800 |
| **4** | 331.392 | 963.029 | 642.850 | 1.800 |
| **5** | 407.867 | 1.185.267 | 791.200 | 1.800 |
| **6** | 509.833 | 1.481.583 | 989.000 | 1.800 |
| **7** | 866.717 | 2.518.692 | 1.681.300 | 1.800 |
| **8** | 40.787 | 118.527 | 79.120 | 1.800 |
| **9** | 50.983 | 148.158 | 98.900 | 1.800 |
| **10** | 86.672 | 251.869 | 168.130 | 1.800 |

| profile | Capacity charge, EUR | price, volume, EUR | total price, EUR | tariff per 1000 m³, EUR |
|---|---|---|---|---|
| **1** | 1.644.500 | 0 | 21.019.008 | **4,20** |
| **2** | 2.024.000 | 0 | 25.869.133 | **5,17** |
| **3** | 2.530.000 | 0 | 32.335.967 | **6,47** |
| **4** | 164.450 | 0 | 2.103.521 | **4,21** |
| **5** | 202.400 | 0 | 2.588.533 | **5,18** |
| **6** | 253.000 | 0 | 3.235.217 | **6,47** |
| **7** | 430.100 | 0 | 5.498.608 | **11,00** |
| **8** | 20.240 | 0 | 260.473 | **5,21** |
| **9** | 25.300 | 0 | 325.142 | **6,50** |
| **10** | 43.010 | 0 | 551.481 | **11,03** |

**Distance 110 km**

| profile | price, entry, EUR | price, exit, EUR | Regional network payment, EUR | Fixed charge, EUR |
|---|---|---|---|---|
| **1** | 3.313.917 | 9.664.107 | 6.428.500 | 1.800 |
| **2** | 4.078.667 | 11.894.286 | 7.912.000 | 1.800 |
| **3** | 5.098.333 | 14.867.857 | 9.890.000 | 1.800 |
| **4** | 331.392 | 966.411 | 642.850 | 1.800 |
| **5** | 407.867 | 1.189.429 | 791.200 | 1.800 |
| **6** | 509.833 | 1.486.786 | 989.000 | 1.800 |
| **7** | 866.717 | 2.527.536 | 1.681.300 | 1.800 |
| **8** | 40.787 | 118.943 | 79.120 | 1.800 |
| **9** | 50.983 | 148.679 | 98.900 | 1.800 |
| **10** | 86.672 | 252.754 | 168.130 | 1.800 |

| profile | Capacity charge, EUR | price, volume, EUR | total price, EUR | tariff per 1000 m³, EUR |
|---|---|---|---|---|
| **1** | 1.644.500 | 0 | 21.052.824 | **4,21** |
| **2** | 2.024.000 | 0 | 25.910.752 | **5,18** |
| **3** | 2.530.000 | 0 | 32.387.990 | **6,48** |
| **4** | 164.450 | 0 | 2.106.902 | **4,21** |
| **5** | 202.400 | 0 | 2.592.695 | **5,19** |
| **6** | 253.000 | 0 | 3.240.419 | **6,48** |
| **7** | 430.100 | 0 | 5.507.452 | **11,01** |
| **8** | 20.240 | 0 | 260.890 | **5,22** |
| **9** | 25.300 | 0 | 325.662 | **6,51** |
| **10** | 43.010 | 0 | 552.365 | **11,05** |

**Distance 260 km**

| profile | price, entry, EUR | price, exit, EUR | Regional network payment, EUR | Fixed charge, EUR |
|---|---|---|---|---|
| **1** | 3.313.917 | 10.778.238 | 6.428.500 | 1.800 |
| **2** | 4.078.667 | 13.265.524 | 7.912.000 | 1.800 |
| **3** | 5.098.333 | 16.581.905 | 9.890.000 | 1.800 |
| **4** | 331.392 | 1.077.824 | 642.850 | 1.800 |
| **5** | 407.867 | 1.326.552 | 791.200 | 1.800 |
| **6** | 509.833 | 1.658.190 | 989.000 | 1.800 |
| **7** | 866.717 | 2.818.924 | 1.681.300 | 1.800 |
| **8** | 40.787 | 132.655 | 79.120 | 1.800 |
| **9** | 50.983 | 165.819 | 98.900 | 1.800 |
| **10** | 86.672 | 281.892 | 168.130 | 1.800 |

| profile | Capacity charge, EUR | price, volume, EUR | total price, EUR | tariff per 1000 m³, EUR |
|---|---|---|---|---|
| **1** | 1.644.500 | 0 | 22.166.955 | **4,43** |
| **2** | 2.024.000 | 0 | 27.281.990 | **5,46** |
| **3** | 2.530.000 | 0 | 34.102.038 | **6,82** |
| **4** | 164.450 | 0 | 2.218.315 | **4,44** |
| **5** | 202.400 | 0 | 2.729.819 | **5,46** |
| **6** | 253.000 | 0 | 3.411.824 | **6,82** |
| **7** | 430.100 | 0 | 5.798.840 | **11,60** |
| **8** | 20.240 | 0 | 274.602 | **5,49** |
| **9** | 25.300 | 0 | 342.802 | **6,86** |
| **10** | 43.010 | 0 | 581.504 | **11,63** |

**Distance 350 km**

| profile | price, entry, EUR | price, exit, EUR | Regional network payment, EUR | Fixed charge, EUR |
|---|---|---|---|---|
| **1** | 3.313.917 | 10.793.900 | 6.428.500 | 1.800 |
| **2** | 4.078.667 | 13.284.800 | 7.912.000 | 1.800 |
| **3** | 5.098.333 | 16.606.000 | 9.890.000 | 1.800 |
| **4** | 331.392 | 1.079.390 | 642.850 | 1.800 |
| **5** | 407.867 | 1.328.480 | 791.200 | 1.800 |
| **6** | 509.833 | 1.660.600 | 989.000 | 1.800 |
| **7** | 866.717 | 2.823.020 | 1.681.300 | 1.800 |
| **8** | 40.787 | 132.848 | 79.120 | 1.800 |
| **9** | 50.983 | 166.060 | 98.900 | 1.800 |
| **10** | 86.672 | 282.302 | 168.130 | 1.800 |

| Profile | Capacity charge, EUR | price, volume, EUR | total price, EUR | tariff per 1000 m³, EUR |
|---|---|---|---|---|
| **1** | 1.644.500 | 0 | 22.182.617 | **4,44** |
| **2** | 2.024.000 | 0 | 27.301.267 | **5,46** |
| **3** | 2.530.000 | 0 | 34.126.133 | **6,83** |
| **4** | 164.450 | 0 | 2.219.882 | **4,44** |
| **5** | 202.400 | 0 | 2.731.747 | **5,46** |
| **6** | 253.000 | 0 | 3.414.233 | **6,83** |
| **7** | 430.100 | 0 | 5.802.937 | **11,61** |
| **8** | 20.240 | 0 | 274.795 | **5,50** |
| **9** | 25.300 | 0 | 343.043 | **6,86** |

| | | | | |
|---|---|---|---|---|
| **10** | 43.010 | 0 | 581.914 | **11,64** |

## 5) Description of the Hungarian transmission tariff system

*Table 24: Calculation of the Hungarian transportation tariffs.*
*Entry/exit tariffs are constant.*

| **MOL** | | unit |
|---|---|---|
| rate of exchange | 251 | HUF/Euro |
| entry tariff | 7555 | HUF/m³/hour/year |
| exit tariff | 2291 | HUF/m³/hour/year |
| volume tariff | 0,812 | HUF/m³ |

**Standard profiles**

| profile | volume, m³ | max hourly capacity, m³ | load factor | duration |
|---|---|---|---|---|
| **1** | 5.000.000.000 | 650.000 | 0,88 | 1 year |
| **2** | 5.000.000.000 | 800.000 | 0,71 | 1 year |
| **3** | 5.000.000.000 | 1.000.000 | 0,57 | 1 year |
| **4** | 500.000.000 | 65.000 | 0,88 | 1 year |
| **5** | 500.000.000 | 80.000 | 0,71 | 1 year |
| **6** | 500.000.000 | 100.000 | 0,57 | 1 year |
| **7** | 500.000.000 | 170.000 | 0,34 | 1 year |
| **8** | 50.000.000 | 8.000 | 0,71 | 1 year |
| **9** | 50.000.000 | 10.000 | 0,57 | 1 year |
| **10** | 50.000.000 | 17.000 | 0,34 | 1 year |

| profile | price, entry, EUR | price, exit, EUR | total price, capacity, EUR | price, volume, EUR |
|---|---|---|---|---|
| **1** | 19.565.000 | 5.932.550 | 25.497.550 | 16.175.000 |
| **2** | 24.080.000 | 7.301.600 | 31.381.600 | 16.175.000 |
| **3** | 30.100.000 | 9.127.000 | 39.227.000 | 16.175.000 |
| **4** | 1.956.500 | 593.255 | 2.549.755 | 1.617.500 |
| **5** | 2.408.000 | 730.160 | 3.138.160 | 1.617.500 |
| **6** | 3.010.000 | 912.700 | 3.922.700 | 1.617.500 |
| **7** | 5.117.000 | 1.551.590 | 6.668.590 | 1.617.500 |
| **8** | 240.800 | 73.016 | 313.816 | 161.750 |
| **9** | 301.000 | 91.270 | 392.270 | 161.750 |
| **10** | 511.700 | 155.159 | 666.859 | 161.750 |

| profile | total price, EUR | tariff per 1000 m³, EUR |
|---|---|---|
| **1** | 41.672.550 | **8,33** |
| **2** | 47.556.600 | **9,51** |
| **3** | 55.402.000 | **11,08** |
| **4** | 4.167.255 | **8,33** |
| **5** | 4.755.660 | **9,51** |
| **6** | 5.540.200 | **11,08** |
| **7** | 8.286.090 | **16,57** |
| **8** | 475.566 | **9,51** |
| **9** | 554.020 | **11,08** |
| **10** | 828.609 | **16,57** |

## 6) Description of the Austrian transmission tariff system

*Table 25: Calculation of the Austrian tariffs (TAG).*
*Tariffs are related to distance.*

| Trans Austria Gasleitung GmbH (TAG) | | unit |
|---|---|---|
| distance - based tariff component | 0,1236 | €/(Cm³/h*km) per year |
| tariff component independent from distance | 1,9436 | €/(Cm³/h) per year |

**Standard profiles**

| profile | volume, m³ | max hourly capacity, m³ | load factor | duration |
|---|---|---|---|---|
| **1** | 5.000.000.000 | 650.000 | 0,88 | 1 year |
| **2** | 5.000.000.000 | 800.000 | 0,71 | 1 year |
| **3** | 5.000.000.000 | 1.000.000 | 0,57 | 1 year |
| **4** | 500.000.000 | 65.000 | 0,88 | 1 year |
| **5** | 500.000.000 | 80.000 | 0,71 | 1 year |
| **6** | 500.000.000 | 100.000 | 0,57 | 1 year |
| **7** | 500.000.000 | 170.000 | 0,34 | 1 year |
| **8** | 50.000.000 | 8.000 | 0,71 | 1 year |
| **9** | 50.000.000 | 10.000 | 0,57 | 1 year |
| **10** | 50.000.000 | 17.000 | 0,34 | 1 year |

**Distance 60 km**

| profile | tariff component independent from distance | distance - based tariff component | total price, EUR | tariff per 1000 m³, EUR |
|---|---|---|---|---|
| **1** | 1.263.340 | 4.820.400 | 6.083.740 | **1,22** |
| **2** | 1.554.880 | 5.932.800 | 7.487.680 | **1,50** |
| **3** | 1.943.600 | 7.416.000 | 9.359.600 | **1,87** |
| **4** | 126.334 | 482.040 | 608.374 | **1,22** |
| **5** | 155.488 | 593.280 | 748.768 | **1,50** |
| **6** | 194.360 | 741.600 | 935.960 | **1,87** |
| **7** | 330.412 | 1.260.720 | 1.591.132 | **3,18** |
| **8** | 15.549 | 59.328 | 74.877 | **1,50** |
| **9** | 19.436 | 74.160 | 93.596 | **1,87** |
| **10** | 33.041 | 126.072 | 159.113 | **3,18** |

**Distance 110 km**

| profile | tariff component independent from distance | distance - based tariff component | total price, EUR | tariff per 1000 m³, EUR |
|---|---|---|---|---|
| **1** | 1.263.340 | 8.837.400 | 10.100.740 | **2,02** |
| **2** | 1.554.880 | 10.876.800 | 12.431.680 | **2,49** |
| **3** | 1.943.600 | 13.596.000 | 15.539.600 | **3,11** |
| **4** | 126.334 | 883.740 | 1.010.074 | **2,02** |
| **5** | 155.488 | 1.087.680 | 1.243.168 | **2,49** |
| **6** | 194.360 | 1.359.600 | 1.553.960 | **3,11** |
| **7** | 330.412 | 2.311.320 | 2.641.732 | **5,28** |
| **8** | 15.549 | 108.768 | 124.317 | **2,49** |
| **9** | 19.436 | 135.960 | 155.396 | **3,11** |
| **10** | 33.041 | 231.132 | 264.173 | **5,28** |

| Distance 260 km | | | | |
|---|---|---|---|---|
| profile | tariff component independent from distance | distance - based tariff component | total price, EUR | tariff per 1000 $m^3$, EUR |
| **1** | 1.263.340 | 20.888.400 | 22.151.740 | **4,43** |
| **2** | 1.554.880 | 25.708.800 | 27.263.680 | **5,45** |
| **3** | 1.943.600 | 32.136.000 | 34.079.600 | **6,82** |
| **4** | 126.334 | 2.088.840 | 2.215.174 | **4,43** |
| **5** | 155.488 | 2.570.880 | 2.726.368 | **5,45** |
| **6** | 194.360 | 3.213.600 | 3.407.960 | **6,82** |
| **7** | 330.412 | 5.463.120 | 5.793.532 | **11,59** |
| **8** | 15.549 | 257.088 | 272.637 | **5,45** |
| **9** | 19.436 | 321.360 | 340.796 | **6,82** |
| **10** | 33.041 | 546.312 | 579.353 | **11,59** |

| Distance 350 km | | | | |
|---|---|---|---|---|
| profile | tariff component independent from distance | distance - based tariff component | total price, EUR | tariff per 1000 $m^3$, EUR |
| **1** | 1.263.340 | 28.119.000 | 29.382.340 | **5,88** |
| **2** | 1.554.880 | 34.608.000 | 36.162.880 | **7,23** |
| **3** | 1.943.600 | 43.260.000 | 45.203.600 | **9,04** |
| **4** | 126.334 | 2.811.900 | 2.938.234 | **5,88** |
| **5** | 155.488 | 3.460.800 | 3.616.288 | **7,23** |
| **6** | 194.360 | 4.326.000 | 4.520.360 | **9,04** |
| **7** | 330.412 | 7.354.200 | 7.684.612 | **15,37** |
| **8** | 15.549 | 346.080 | 361.629 | **7,23** |
| **9** | 19.436 | 432.600 | 452.036 | **9,04** |
| **10** | 33.041 | 735.420 | 768.461 | **15,37** |

| Distance 380,203 km (Austrian - Italian Border) | | | | |
|---|---|---|---|---|
| profile | tariff component independent from distance | distance - based tariff component | total price, EUR | tariff per 1000 $m^3$, EUR |
| **1** | 1.263.340 | 30.545.509 | 31.808.849 | **6,36** |
| **2** | 1.554.880 | 37.594.473 | 39.149.353 | **7,83** |
| **3** | 1.943.600 | 46.993.091 | 48.936.691 | **9,79** |
| **4** | 126.334 | 3.054.551 | 3.180.885 | **6,36** |
| **5** | 155.488 | 3.759.447 | 3.914.935 | **7,83** |
| **6** | 194.360 | 4.699.309 | 4.893.669 | **9,79** |
| **7** | 330.412 | 7.988.825 | 8.319.237 | **16,64** |
| **8** | 15.549 | 375.945 | 391.494 | **7,83** |
| **9** | 19.436 | 469.931 | 489.367 | **9,79** |
| **10** | 33.041 | 798.883 | 831.924 | **16,64** |

*Table 26: Calculation of the Austrian tariffs (BOG).*
*Tariffs are related to distance.*

**Baumgarten-Oberkappel Gasleitungsgesellschaft m.b.H (BOG)**

| | | unit |
|---|---|---|
| distance - based tariff component | 0,2188 | €/(Cm$^3$/h*km) per year |
| tariff component independent from distance | 5,4665 | €/(Cm$^3$/h) per year |

**Standard profiles**

| profile | volume, m³ | max hourly capacity, m³ | load factor | duration |
|---|---|---|---|---|
| **1** | 5.000.000.000 | 650.000 | 0,88 | 1 year |
| **2** | 5.000.000.000 | 800.000 | 0,71 | 1 year |
| **3** | 5.000.000.000 | 1.000.000 | 0,57 | 1 year |
| **4** | 500.000.000 | 65.000 | 0,88 | 1 year |
| **5** | 500.000.000 | 80.000 | 0,71 | 1 year |
| **6** | 500.000.000 | 100.000 | 0,57 | 1 year |
| **7** | 500.000.000 | 170.000 | 0,34 | 1 year |
| **8** | 50.000.000 | 8.000 | 0,71 | 1 year |
| **9** | 50.000.000 | 10.000 | 0,57 | 1 year |
| **10** | 50.000.000 | 17.000 | 0,34 | 1 year |

**Distance 60 km**

| profile | tariff component independent from distance | distance - based tariff component | total price, EUR | tariff per 1000 m$^3$, EUR |
|---|---|---|---|---|
| **1** | 3.553.225 | 8.533.200 | 12.086.425 | **2,42** |
| **2** | 4.373.200 | 10.502.400 | 14.875.600 | **2,98** |
| **3** | 5.466.500 | 13.128.000 | 18.594.500 | **3,72** |
| **4** | 355.323 | 853.320 | 1.208.643 | **2,42** |
| **5** | 437.320 | 1.050.240 | 1.487.560 | **2,98** |
| **6** | 546.650 | 1.312.800 | 1.859.450 | **3,72** |
| **7** | 929.305 | 2.231.760 | 3.161.065 | **6,32** |
| **8** | 43.732 | 105.024 | 148.756 | **2,98** |
| **9** | 54.665 | 131.280 | 185.945 | **3,72** |
| **10** | 92.931 | 223.176 | 316.107 | **6,32** |

**Distance 110 km**

| profile | tariff component independent from distance | distance - based tariff component | total price, EUR | tariff per 1000 m$^3$, EUR |
|---|---|---|---|---|
| **1** | 3.553.225 | 15.644.200 | 19.197.425 | **3,84** |
| **2** | 4.373.200 | 19.254.400 | 23.627.600 | **4,73** |
| **3** | 5.466.500 | 24.068.000 | 29.534.500 | **5,91** |
| **4** | 355.323 | 1.564.420 | 1.919.743 | **3,84** |
| **5** | 437.320 | 1.925.440 | 2.362.760 | **4,73** |
| **6** | 546.650 | 2.406.800 | 2.953.450 | **5,91** |
| **7** | 929.305 | 4.091.560 | 5.020.865 | **10,04** |
| **8** | 43.732 | 192.544 | 236.276 | **4,73** |

| | | | | |
|---|---|---|---|---|
| **9** | 54.665 | 240.680 | 295.345 | **5,91** |
| **10** | 92.931 | 409.156 | 502.087 | **10,04** |

**Distance 245,146 km (Austrian - German Border)**

| profile | tariff component independent from distance | distance - based tariff component | total price, EUR | tariff per 1000 $m^3$, EUR |
|---|---|---|---|---|
| **1** | 3.553.225 | 34.864.664 | 38.417.889 | **7,68** |
| **2** | 4.373.200 | 42.910.356 | 47.283.556 | **9,46** |
| **3** | 5.466.500 | 53.637.945 | 59.104.445 | **11,82** |
| **4** | 355.323 | 3.486.466 | 3.841.789 | **7,68** |
| **5** | 437.320 | 4.291.036 | 4.728.356 | **9,46** |
| **6** | 546.650 | 5.363.794 | 5.910.444 | **11,82** |
| **7** | 929.305 | 9.118.451 | 10.047.756 | **20,10** |
| **8** | 43.732 | 429.104 | 472.836 | **9,46** |
| **9** | 54.665 | 536.379 | 591.044 | **11,82** |
| **10** | 92.931 | 911.845 | 1.004.776 | **20,10** |

**Distance 260 km**

| profile | tariff component independent from distance | distance - based tariff component | total price, EUR | tariff per 1000 $m^3$, EUR |
|---|---|---|---|---|
| **1** | 3.553.225 | 36.977.200 | 40.530.425 | **8,11** |
| **2** | 4.373.200 | 45.510.400 | 49.883.600 | **9,98** |
| **3** | 5.466.500 | 56.888.000 | 62.354.500 | **12,47** |
| **4** | 355.323 | 3.697.720 | 4.053.043 | **8,11** |
| **5** | 437.320 | 4.551.040 | 4.988.360 | **9,98** |
| **6** | 546.650 | 5.688.800 | 6.235.450 | **12,47** |
| **7** | 929.305 | 9.670.960 | 10.600.265 | **21,20** |
| **8** | 43.732 | 455.104 | 498.836 | **9,98** |
| **9** | 54.665 | 568.880 | 623.545 | **12,47** |
| **10** | 92.931 | 967.096 | 1.060.027 | **21,20** |

**Distance 350 km**

| profile | tariff component independent from distance | distance - based tariff component | total price, EUR | tariff per 1000 $m^3$, EUR |
|---|---|---|---|---|
| **1** | 3.553.225 | 49.777.000 | 53.330.225 | **10,67** |
| **2** | 4.373.200 | 61.264.000 | 65.637.200 | **13,13** |
| **3** | 5.466.500 | 76.580.000 | 82.046.500 | **16,41** |
| **4** | 355.323 | 4.977.700 | 5.333.023 | **10,67** |
| **5** | 437.320 | 6.126.400 | 6.563.720 | **13,13** |
| **6** | 546.650 | 7.658.000 | 8.204.650 | **16,41** |
| **7** | 929.305 | 13.018.600 | 13.947.905 | **27,90** |
| **8** | 43.732 | 612.640 | 656.372 | **13,13** |
| **9** | 54.665 | 765.800 | 820.465 | **16,41** |
| **10** | 92.931 | 1.301.860 | 1.394.791 | **27,90** |