ASSESSING PIPE-TO-PIPE COMPETITION:

THEORETICAL FRAMEWORK AND APPLICATION TO GTS

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1. Introduction and Executive Summary

The DTe has commissioned *The Brattle Group* to investigate the status of pipe-to-pipe (P2P) competition between Gas Transport Services (GTS) and other gas transporters. The purpose of this report is therefore to address questions about the use of tariff benchmarking as envisaged by European Regulation 1775/2005, which we interpret to relate mainly to the existence and extent of P2P competition facing GTS. Therefore our report focuses on the following question: *does the level of P2P competition facing GTS constitute "effective competition"*?[1] We develop a specific interpretation of "effective competition" in the sense of the Regulation. In our view P2P competition is effective if it means that *in the absence of cost-based tariff regulation GTS would be constrained by competitive forces from raising prices "significantly" above current levels*. The "significance" of a level of price increase is inevitably a matter of judgement. We suggest—by analogy with the SSNIP test used in market definition for competition proceedings—that 10% is a reasonable criterion (however our empirical findings are not very sensitive to this choice of parameter value).

We analyse only GTS's basic transport service (that is, capacity booked over a whole year rather than shorter periods). Apart from transportation, we also consider the potential for competition in the provision of gas Quality Conversion (QC) services. Finally, we propose a framework for future assessments of these questions by DTe (potentially in cooperation with other regulatory bodies).

1.1. Assessment of competition in transportation

To assess the extent of competition in transporting gas we have adopted a methodology used by the Federal Energy Regulatory Commission (FERC) in the United States, distinguishing between three types of "product markets": "destination markets", "origin markets", and "parallel path" or "transit markets". Note that there are many markets of each type, differentiated by location.

Destination markets

For a given exit point served by GTS we define the *"destination market"* to comprise all pipelines (actual or potential) that could compete with GTS in bringing gas to that point. In concrete terms this has quite different implications depending on the nature of the exit point. For a Dutch consumer located near the German border, competition to GTS might come from a German network that could build a direct line over the border to the consumer. For a French consumer of gas that is exported from the Netherlands (and therefore "served by GTS" along part of the transportation route), competition might come from any pipeline able to bring competitive gas to the same consumer. In each case it is necessary to assess as far as possible whether other sources of gas are sufficiently competitive to place a material constraint on transportation pricing.

In destination markets the main competitive constraint on GTS's pricing is the potential for customers to bypass the GTS network by building their own pipeline. For example, if GTS attempted to raise the price of exit capacity at Maastricht, customers could in theory connect to the

[1] See Recital 7, which should be read in conjunction with Article 3.

Fluxys network and avoid GTS's tariffs. We have estimated the costs of building a 'bypass' pipeline for two groups of industrial consumers relatively close to the border.

We conclude that building a private pipeline to 'jump' from one GTS entry point to another is unlikely to be cost-effective, since the GTS tariffs are relatively 'flat'. For example, in 2007 entry tariffs for gas production points in the Netherlands varied from €1.377/kW/year to €2.33/kW/year, a difference of €0.953/kW/year. This price difference would only be enough to justify a pipeline of not more than about 20 km, even for a relatively large user. Therefore, building an independent pipeline is only worthwhile if the user bypasses the GTS network completely.

We calculate that with GTS's current tariffs if the Maastricht customers we analysed were just over 30 km from the Fluxys network, it would no longer be cost effective for them to bypass the GTS network. If they were 50 km away, GTS would be able to raise their tariffs by over 50% above current levels before building a bypass pipeline became economic. We also identify several reasons why, even if it was cost-effective to build a bypass pipeline, it would be difficult to build one in practise. These reasons include the difficultly in co-ordinating a group of customers to create a demand large enough to make the pipeline cost-effective, and difficulties in gaining permits and rights-of-way.

Conversely, the cost of new capacity for third-parties is likely to be significantly higher than GTS's Long-Run Marginal Costs (LRMC), due to advantages GTS has in using existing rights-of-way, gaining access to new rights-of-way, and GTS's economies of scale and scope. Therefore, the ability of third-parties to build their own new capacity is a weak constraint on GTS's pricing of either new or existing capacity. We conclude that that there is no effective competition in the destination markets for most if not all consumers in the Netherlands: in the absence of tariff regulation GTS could raise its prices significantly without losing significant volumes.

For consumers out side the Netherlands the issue is more difficult to analyse quantitatively. However, we note that the majority of gas exported from the Netherlands to a specific destination is either L-gas and/or sold under long term contractual agreements. Therefore it would not be possible for the customer to choose an alternative source of gas from outside the Netherlands, if border exit prices were to increase. It therefore seems likely that GTS would be able to increase the price of border exit capacity without reducing export flows.

Origin markets

Analogously, for a given entry point served by GTS we define an *"origin market"* to comprise all pipelines (actual or potential) that could compete with GTS in taking gas from that point. For example, a Dutch gas field that injects gas into the GTS network could in principle choose instead to build its own pipeline to serve consumers or interconnect with other networks.

We find that it would be prohibitively expensive for gas produced offshore of the Netherlands and arriving at Den Helder to build a bypass pipeline to either Fluxys or one of the German networks. Den Helder is 160 km from the Belgian border and (overland) more than 190 km from the German border. A pipe to the German border, even for a relatively large gas user, would cost the equivalent of over €8/kW/year (an estimate which excludes the cost of compression), well in excess of the avoided GTS tariff (€3.26/kW/year). We conclude that GTS would be able to raise the price of entry capacity at domestic origin points significantly.

We conclude that GTS would also be able to raise the price of border entry capacity. Demand for capacity at border entry points would not be sensitive to an increase in the price of capacity. Gas importers are the marginal (price-setting) source of gas, and since all importers would experience the price increase, shippers could pass on price increases to their customers.

Transit markets

Finally, a *"parallel path market"* involves competition to take gas between two fixed points or areas. The key issue with regard to GTS is the existence of competition for gas transiting across the Netherlands, and we focus on these "*transit markets*" (a subset of the parallel path markets). For example, competition in taking gas from Emden to Belgium might come from E.On, RWE or Wingas.[2]

We look at competition for transit between origin A and destination B by looking at transit capacity that goes from A to B on the GTS route, and seeing whether there is available capacity on an alternative route at a tariff competitive with GTS's tariff. If there was, then transit capacity on the GTS route could switch to an alternative route in response to a price rise by GTS. GTS would be unable to raise its prices significantly. Table 1 shows our findings for a selection of routes analysed.

Table 1: Summary of transit route analysis

From	To	Conclusions
Emden	Belgium	Only E.on has spare capacity available (183 MW), at a price 40% higher than the price of the GTS transit route. GTS could profitably raise prices on this route by at least 40%.
North Germany	South Germany	GTS route is already more expensive than the E.on route. Therefore there would be no gas on the GTS route to switch to the E.on route.
Emden	France	No available capacity on alternative routes.

In the markets for transit services – where gas flows through the Netherlands but starts and ends outside it – we find that the price of alternative capacity is more than 110% of the current price of

[2] GTS has an entry-exit tariff system so does not explicitly sell "transit" or have a "transit" tariff (see section 6.1 for more discussion). However, speaking purely mechanically (i.e., without asking whether this would be legal), GTS could charge more to shippers using its system for transit while keeping tariffs constant for other system users. For example, it could raise all entry charges at cross-border entry points, and lower all exit charges at exit points within the Netherlands by an amount equal to the increase in entry charges. See the discussion in Appendix II for more details.

GTS transit. We also find that there is little spare capacity on alternative routes, and this will remain the case until at least the end of 2010. For example, one of the main transit routes across the Netherlands is from Emden (a gas 'hub' in the north-east) to the south of the Netherlands. We calculate that because of a lack of capacity on alternative routes, in the absence of tariff regulation it would be profitable for GTS to raise prices for this transit route by at least 40%, even if all the transit capacity which could switched to the alternative route.

For reasons discussed above, GTS could set prices in excess of its long-run marginal costs without attracting entry. We conclude that there is no effective competition in the transit markets.

We find that our conclusion that there is not effective competition in either the destination, origin or transit markets does not change if GTS's tariffs were to increase to 25% above today's levels. GTS would still be able to profitably increase its tariffs from a level 25% above current tariffs.

Contestability of large new projects

Large international projects, such as the export of gas from a large offshore field or an LNG terminal, have some choice where they land gas, and are therefore in a strong position to negotiate tariffs with GTS, *if multi-year tariffs were allowed*. The ability of large projects to bargain could limit GTS's ability to raise prices at a given entry point and exit point. This ability is not simply theoretical. We understand that GTS had been negotiating with a Norwegian consortium to land gas in the Netherlands. It is plausible that this producer could have had significant leverage with GTS in negotiating tariffs.

However, two factors reduce the potential of large projects to control GTS's tariffs. First, large international projects are relatively rare. The current LNG terminal projects are committed to their given location and hence have no bargaining power, and it is difficult to imagine further LNG terminals in the Netherlands in the foreseeable future. Second, tariffs are only one element in deciding where a project lands gas. Other factors such as an attractive and well-run gas market could offset a relatively high price for entry capacity. Therefore, we remain sceptical about the ability of large international projects to discipline GTS's tariffs.

1.2. Asset stranding and the Jepma effect

As noted above, we have also considered two arguments for tariff benchmarking that form part of the Dutch debate, related to the risk of asset stranding and to the "Jepma" effect. First, is there a material risk that new infrastructure that GTS may build in the coming years will be subject to stranding as a result of future competition that will enter the picture once the infrastructure is in place? Second, could switching of transit flows from other pipelines to the GTS system lead to congestion in the Dutch network, threatening security of supply (the "Jepma effect")?

With regard to asset stranding, there is a theoretical possibility that if GTS builds new infrastructure now in response to demand from shippers looking to transit gas across the Netherlands, then in the future competition from other pipelines (particularly in Germany) could leave that infrastructure under-utilised. We note however that at least two policy measures could substantially mitigate the risk of stranded assets, without requiring a move away from cost-based tariffs:

- A requirement that major new infrastructure be backed up by shippers signing long-term transportation contracts via the 'open season' process
- Allowing or requiring GTS to charge the long-run marginal cost of new infrastructure.

Secondly, the "Jepma" effect is a concern that low GTS tariffs might lead shippers to transit gas through the GTS network, creating congestion and leaving inadequate capacity to serve Dutch consumers. We do not address the Jepma effect, since Regulation 1775 does not appear to envisage tariff benchmarking to avoid the security of supply issues that the Jepma effect is concerned with. We note that any such concerns can be dealt with by policies that do not involve changes in tariff methodology. In this case one could require priority access for shippers serving customers on the low pressure grid.

1.3. Quality conversion

We examine the market for quality conversion (QC) services, which is GTS's main regulated business other than gas transportation. Competition could come from GRT Gaz in France, RWE in Germany and Fluxys in Belgium, all of which provide QC services. Table 2 summarises our results.

Table 2: Summary of price and availability of QC services

QC provider	GRT Gaz	GTS	RWE	Fluxys
€ to convert 1 MW/year at a 50% load factor	2,141	791	6,320	10,360
Capacity available?	Yes	n/a	less than 1%	No

We conclude that there is not effective competition in the QC services market, since GTS could profitably raise the price of QC services by up to 400%. Although there are three other providers of QC service in neighbouring countries, only GRT Gaz has QC capacity available, and this is at a price more than three times the price of GTS's service. For most types of customers this means that the GRT Gaz service is not a reasonable substitute for GTS's QC service.

The market for QC services is not contestable; it would not be possible for a third-party to build a new QC facility at a cost less than the current priced charged by GTS. However, third-parties may build QC facilities to overcome a lack of QC capacity. We recognise that GTS's current QC prices do not reflect the full cost of providing the service, since the Dutch authorities have made a policy decision to partially subsidise the cost of QC. Therefore, it is perhaps not surprising that other QC services are significantly more expensive than GTS's.

1.4. Assessing P2P Competition in future

DTe should continue to monitor developments such as the price of GTS's transit products, the price of alternative products and the cost of building bypass pipelines. DTe should also monitor the

availability of alternative products and the ability of new infrastructure to negotiate tariffs with GTS, once it has the ability to set multi-year tariffs.

In this report we have identified several problems with the assessment of P2P competition which result from the inability of DTe to obtain detailed information regarding pipelines outside its jurisdiction. The Agency for the Cooperation of Energy Regulators recently proposed in the European Commission's "Third Package" offers an ideal vehicle to overcome such problems, assuming that the final legislation provides the necessary powers and competences.

2. Purpose of report and outline of structure

The purpose of the report is to address key questions about the existence and extent of P2P competition facing GTS, primarily to help DTe in understanding the appropriate application of Regulation 1775 and the use of tariff benchmarking. Specifically, we address the question: does the level of P2P competition facing GTS constitute "effective competition", in the sense that in the absence of cost-based tariff regulation GTS would be constrained by competitive forces from raising prices "significantly" above current levels?

In the Dutch debate parties have also advanced arguments that GTS tariffs are very low relative to neighbouring countries, and that therefore prices should be benchmarked to avoid two potential problems:

- Stranding of assets—there could be high demand for new infrastructure, GTS could invest and then later find that some of this infrastructure is "stranded" because potentially competing networks (i.e., primarily German ones) lower their prices in future (voluntarily or as a result of regulatory action).
- Security of supply – reports from Professor Jepma and from the ECN claim that if GTS's tariffs are too far below neighbouring tariffs then they will attract volumes of transit that could threaten the ability to carry domestic gas supplies (the "Jepma effect").[3,4]

We conclude that the first issue ('stranded assets') is relevant to Regulation 1775, but that the Jepma effect is not, and is therefore not discussed beyond this section of the report. We discuss these findings below.

2.1. Regulation 1775/2005 and "effective competition"

Article 3 of Regulation 1775/2005 states that tariffs shall be transparent, take into account the need for system integrity and its improvement and 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.

We have focused on the question of whether in the absence of regulation, the extent of P2P competition would be sufficient to provide a significant constraint on GTS's ability to raise prices on its various services. We believe that this interpretation is consistent with the relevant European legislation (Regulation 1775/2005). For example, the recital 7 of Regulation 1775/2005 states that:

> *In calculating tariffs for access to networks it is important to take account of actual costs incurred, insofar as such costs correspond to those of an efficient*

[3] '*Hydra Aantasting van leveringszekerheid*', C.J. Jepma, with M. Broekhof and W.P. van der Gaast, September 2004.

[4] '*Druk in de gasleiding Verband tussen tarieven voor gastransport, omleidingsstromen en congestie in Nederland*', W. Lise, J. de Joode, M.G. Boots ECN-C--05-098 November 2005.

and structurally comparable network operator and are transparent, as well as of the need to provide appropriate return on investments and incentives to construct new infrastructure. In this respect, and in particular if effective pipeline-to-pipeline competition exists, the benchmarking of tariffs by the regulatory authorities will be a relevant consideration.

If competition does provide a significant constraint on GTS's ability to raise prices, then benchmarking will be relevant because the benchmarking exercise will reveal the level of competitive prices, and fundamental tenets of economic theory imply that competitive prices will reflect efficient costs[5] and provide appropriate returns on investment (including incentives for new investment). Conversely, if relaxing cost-based regulation allowed GTS to effect significant price increases because there was little or no competition (as measured by benchmarked tariffs), then its tariffs would not reflect actual costs and returns on capital would be excessive.

This interpretation is consistent with the views expressed by the European Regulators Group for Electricity and Gas (ERGEG), in a recent consultation document: "if effective competition between TSOs exists, tariffs will always reflect incurred costs, making a cost-based tariff setting regime unnecessary".[6]

The definition of "significant constraint" is clearly a matter of judgement, with no guidance provided by the Regulation or other sources. We suggest that—by analogy with the SSNIP test used in market definition for competition proceedings—a reasonable test for materiality is whether a price increase of more than 10% is feasible, but clearly other figures could be used and some might consider 10% to be insufficiently stringent as a standard for safeguarding consumer welfare.

2.2. Stranded assets

The stranded asset issue is arguably covered by Preamble 7 of the Regulation. The goal of avoiding stranded assets can be construed as falling under the rubric of "the need to provide appropriate return on investments and incentives to construct new infrastructure". If the concern about stranded assets is a real one (which has to be examined empirically), then the high demand for transit arising from current level of GTS tariffs might lead to incentives to invest that are inappropriate because they could result in inefficiently high level of demand. Specifically, the value of the capacity which shippers demand could be less than the cost of providing it. Therefore, we address the stranded asset issue in this report, because it is relevant to tariff benchmarking as described in Regulation 1775.

2.3. The Jepma Effect

We do not believe that the Jepma effect is covered by Article 3 of the Regulation. We understand that benchmarking was included in the text of Regulation 1775 to recognise that some legislators perceived that there was competition between pipelines in Germany, and that

[5] Note that Article 3 of the Regulation specifies cost-reflectivity as the basic principle of tariff-setting.

[6] ERGEG, 'Principles on Calculating Tariffs for Access to Gas Transmission Networks - An ERGEG Public Consultation' Paper Ref: E07-CBT-01-03, 22-November-2007 p.12.

benchmarking could therefore act as an alternative to cost-based regulation. Hence the intent of the Regulation seems to be the link between competition and the use of benchmarking. Regulation 1775 does not envisage using benchmarking to address the security of supply concerns raised by the Jepma effect. Therefore, we do not address the Jepma effect further in this report, since it does not seem to be a reason for benchmarking envisaged by 1775.

That is not to deny that there is a link between the existence of P2P competition and the use of higher tariffs to avoid the alleged Jepma effect on security of supply. Raising transit tariffs to choke off demand for transit is more likely to have the desired effect if there are competing networks that have/can provide additional capacity. However, this link is not enough to ensure that the Regulation would allow for higher tariffs to choke off demand. The text of the Regulation suggests rather clearly that benchmarking is relevant to ensure that tariffs reflect efficient costs and provide appropriate returns and incentives for investment.

Moreover, there is at least one solution to the security of supply concerns other than a general increase in tariffs. That solution would be to ensure that sufficient capacity is reserved for domestic gas transport.

For quality conversion, there is little danger of a Jepma effect, because the physical supply of natural L-gas is able to meet the needs of all Dutch L-gas consumers, if this were required because of a shortage of quality conversion capacity. Hence the presence of relatively cheap QC services in the Netherlands does not introduce any short-term security of supply issues in the Netherlands.

2.4. Structure of the report

The remainder of the report is structured as follows. In Chapter 3 we describe methodologies that have been used for assessing P2P competition in Australia and the USA, and explain that our methodology is based on that used by the US Federal energy regulator (the Federal Energy Regulatory Commission or FERC). Appendix I gives details of other approaches to P2P competition which we investigated but ultimately did not use in our own methodology. We explain how the nature of the gas industry supports the use of three different product markets which the FERC adopts, and we go on to analyse these product markets in the following sections.

Section 4 discusses competition in the destination market, which is the market for moving gas to a certain point in the network, and section 5 discusses competition in the origin market, which is the market for moving gas from a particular in the network. Section 6 analyses the market for transit, which is the market for moving gas from one specific point to another specific point. The Minister for Economic Affairs has indicated that GTS's tariffs may increase in future. Accordingly, in section 7 we briefly analyse if our conclusions for the preceding sections would still be valid if GTS's tariffs were to increase by about 25%. Section 8 analyses the effect on P2P competition if GTS were able to offer multi-year tariffs – that is tariffs for which a formula is established for several years in advance. Section 9 examines competition in gas Quality Conversion services – which is GTS's other main regulated business apart from gas transport. Section 10 discusses the stranded assets issue. Finally, section 11 discusses the aspects which DTe should continue to monitor to assess P2P competition in future, and the potential for the creation of a European energy regulatory agency to help in gathering information to assess P2P competition more effectively.

3. International assessments of P2P Competition

We have surveyed international practice and methodologies for establishing the presence or absence of P2P competition. Of the material surveyed, only the jurisdictions of Australia and the US offer a well developed, explicit methodology for assessing the presence or absence of P2P competition. We conclude that the methodologies presented by the FERC and the Australian authorities provide the best basis from which to develop a methodology for analysing competition between GTS and other networks.

The examples from Australia and the US are particularly relevant, because the methodologies test to see if the gas pipeline might be freed from regulation (either from cost-based tariffs or from a requirement to offer third party access), and they do so in a legal setting that is subject to challenge. They apply the fundamentals of competition economics by defining markets, and assessing competitive conditions in these markets to make a judgement as to whether or not the pipeline applying for exemption has market power or not. Both methodologies have been applied several times in competition and regulatory proceedings which are subject to intense scrutiny and the possibility of appeal. The methodologies are therefore robust, at least within the legal context of the US and Australia. Therefore we have decided to base our methodology on that employed in Australia and the USA. Since the two methods are in fact very similar, but there is more detail available from the FERC, we focus in particular on that methodology. We present both the FERC methodology and the one applied in Australia below.

The debate in the Netherlands on GTS' exposure to competition has mainly focused on the Jepma effect *i.e.* the prospect of relatively low gas transportation tariffs in the Netherlands causing gas to divert to the Netherlands, with potential implications for security of supply. These issues have some relevance to competition, in that they address the response of gas flows to changes in prices. However, our concern in this exercise is rather the opposite – whether gas flows could move *away* from the Netherlands if GTS raised tariffs. The work we have seen does not investigate whether GTS has market power, and is therefore of limited use in contributing toward a methodology for determining the presence of absence of P2P competition.

Germany has several independently owned gas transportation pipelines which could potentially compete. Accordingly the subject of P2P competition has been the focus of particular attention in Germany. The German debate confirms the importance of assessing if customers or their suppliers would be able to build their own pipelines to an alternative network. However, the studies we have seen which assert the presence of P2P competition in Germany fail to address several important elements: they do not investigate the cost or feasibility of customers connecting to alternative pipelines; they do not investigate whether spare capacity is available in an alternative pipeline; and they assume that two pipelines would be sufficient to provide adequate competition. In our view the German studies do not provide a good basis for developing a methodology for establishing the presence or absence of competition. We present more details of examples from the Netherlands and Germany in Appendix I.

3.1. Coverage Decisions in Australia

Australia has a rapidly expanding gas network, bringing gas from production (often onshore) to consumption. The "network topology" is rather different from the typical European network: the

network tends to involve pipes bringing gas from production basins over long distances to centres of consumption that are concentrated in a few mainly coastal areas (reflecting Australian geography).

Unlike in Europe, there is not an absolute requirement for Third Party Access (TPA) in Australia. The relevant authority must decide whether or not TPA should be required (in Australian terms, whether or not a pipeline should be "covered"). Coverage is required (subject to final decision by the Relevant Minister) if and only if the pipeline meets all four of the following conditions:[7]

> *(a) that access (or increased access) to Services provided by means of the Pipeline would promote competition in at least one market (whether or not in Australia), other than the market for the Services provided by means of the Pipeline;*
>
> *(b) that it would be uneconomic for anyone to develop another Pipeline to provide the Services provided by means of the Pipeline;*
>
> *(c) that access (or increased access) to the Services provided by means of the Pipeline can be provided without undue risk to human health or safety; and*
>
> *(d) that access (or increased access) to the Services provided by means of the Pipeline would not be contrary to the public interest.*

The assessment of these conditions is made by the National Competition Council (NCC), who then makes a recommendation to the Final Minister. For the purposes of this study, the most relevant of these is condition (a), because it involves an assessment by the NCC of competition that often includes competition between pipelines serving the same area.[8]

The Moomba to Adelaide Pipeline System (MAPS)

A useful example is the NCC's 2005 recommendation to remove a previous requirement that the MAPS be subject to TPA, following the commissioning in 2004 of a new pipeline, the South East Australia (SEA) Gas Pipeline that links Victoria to Adelaide and therefore provides potential competition to the MAPS in serving the Adelaide area.

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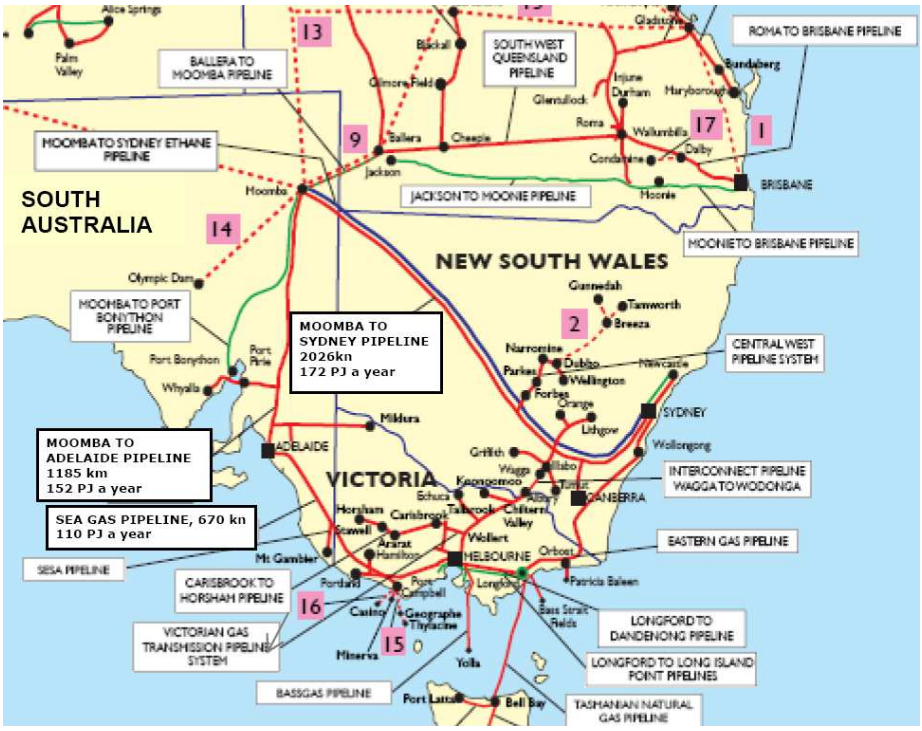
[7] From Section 1.9 of the National Third Party Access Code for Natural Gas Pipelines, Australia, available at http://www.coderegistrar.sa.gov.au/ as of Sept 2007.

[8] Condition (b) is interpreted to mean that it would be socially inefficient to duplicate the existing infrastructure, and is therefore not about pipe-to-pipe competition *per se*, but about whether the pipeline in question has natural monopoly characteristics in the correct sense of the term (see footnote 63).

Figure 1: MAPS, SEA and Neighbouring Pipelines



The NCC recommendation involved an assessment of competition in three areas:

1. The Adelaide area (where the MAPS ends).
2. The Cooper Basin, which is the production area around Moomba (where the MAPS begins).
3. Locations between the two.

Pipe-to-pipe competition was central to the first two of these.

P2P Competition in the Adelaide Area

For the Adelaide area, the NCC's main finding was that the SEA provides effective competition to the MAPS.[9] It can bring gas to the Adelaide area, and has spare capacity, including both spare capacity contracted to the three existing capacity holders and unused capacity that could be used by new entrants.

The NCC appears to have put significant weight on the fact that three parties hold long-term capacity on the SEA:[10]

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[9] National Competition Council (NCC), *Application for revocation of coverage of the Moomba to Adelaide Pipeline System under the National Gas Access Regime: Final recommendation*, 14 December 2005, paras 6.68-89. Available from www.ncc.gov.au as of Sept 2007.

[10] NCC, *Loc. Cit.*, para 6.87.

In effect there are four competing pipeline operators. The presence of spare contracted capacity would appear to provide an incentive for the SEA Gas foundation shippers to compete with one another to provide services. Also, unused capacity may provide opportunities for new entrants. Thus competition to the MAPS, provided by the SEA Gas pipeline, will likely limit the opportunity for Epic Energy to exploit market power in the Adelaide market.

P2P Competition in the Cooper Basin

For the Cooper Basin, the NCC's findings can be summarised as follows:[11]

- The Moomba to Sydney Pipeline (MSP) has sufficient spare capacity to take significant amounts of gas produced in the Cooper Basin to New South Wales instead of South Australia. It therefore competes with the MAPS. Producers could do this and still meet their contractual obligations for deliveries in Adelaide by "swaps" involving the SEA .
- Although it may be physically possible to redirect gas to Queensland by reconfiguring and reversing flow on the Ballera to Moomba pipeline, cost considerations would make it commercially unattractive for Cooper Basin producers, and this pipeline therefore does not compete with the MAPS.
- The Cooper Basin producers have significant bargaining power with the MAPS.[12]

The NCC concluded that:

It would appear that competition in the gas production and sales market is effective. There appears to be sufficient actual or developable capacity on the MSP now and into the short to medium term to enable the Cooper Basin producers to divert gas sales into markets other than South Australia. Demand forecasts suggest that New South Wales would be able to absorb any gas sales diverted from South Australia. Gas swaps also potentially provide a mechanism to facilitate the diversion of gas sales. Moreover, because gas swaps alter only the source of supply not the quantity of gas delivered, swaps would appear to mitigate the impact of diversions on the wellhead price of gas. The joint production and marketing arrangements of the South Australian Cooper Basin producers are also likely to provide producers with substantial bargaining power when negotiating with Epic Energy

The NCC also noted a medium-to-long term concern that if in the future Moomba were connected to a northern source of gas then this could lead to increased flows on the MSP, reducing the level of available capacity and so undermining its ability to compete with the MAPS. However it argued that this concern was uncertain and far in the future.

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[11] NCC, *Loc. Cit.*, paras 6.42-67.

[12] Note that although this is relevant to the assessment of condition (a), it does not appear that it would be relevant to an assessment of of P2P competition under the European Gas Regulation (Regualtion (EC) No 1775/2005). .

The Moomba to Sydney Pipeline (MSP)

Another recent coverage decision, concerning the MSP (also shown in Figure 1) provides an even clearer set of criteria for a finding of P2P competition. The Productivity Commission of the Australian Government summarised the decision as follows:[13]

> *Building on the framework developed by the [National Competition] Council, certain minimum requirements are necessary both to limit the ability of gas transmission pipeline owners and operators to exert market power in dependent markets and to constrain the ability of either upstream or downstream participants to exercise power in that market by the way they contract for these pipeline services, namely that:*
>
> > *(a) at least three independent (either competitive or regulated) pipelines can offer, or are capable of offering, transmission services in each dependent market*
> >
> > *(b) competitive market factors, as identified by the [Australian Competition] Tribunal, either should be or are likely to be sufficiently evident in each dependent market, including the absence of price collusion or coordination*
> >
> > *(c) provision of gas pipeline services in an upstream or downstream market should not be qualified to a significant degree by vertical integration or horizontal consolidation*
> >
> > *(d) consideration may be given to individual circumstances on a case-by-case basis, such as the specific requirements for regional areas. (Macfarlane 2003a, para. 110)*

Observations

We make a number of observations/interpretations concerning the Australian assessment of P2P competition:

- To find that competition is effective, there appears in general to be a requirement for at least three competing transmission providers, as per the MSP decision cited above. This requirement is modified when there is "countervailing market power", i.e., when the buyers of transmission are sufficiently large to have bargaining power of their own, as in the NCC analysis of the Cooper Basin for the MAPS decision.
- It is recognised that holding long-term capacity in a pipeline enables a party to provide transmission services. In the case of Adelaide the NCC identified four providers (as well as potential for entry), even though there are only two physical pipes, because one of those has three distinct capacity holders. It is therefore possible for a single pipe to be considered equivalent to more than one "virtual pipelines".

[13] Productivity Commission 2004, Review of the Gas Access Regime, Report no. 31, Canberra, p.204.

- However, for a pipeline or long-term capacity holder to be viewed as a competitor it must have spare capacity: the NCC is clear that a pipeline without spare capacity cannot provide a competitive constraint (see for example its concern cited above that if the MSP attracts additional volumes then in the future it might not have enough spare capacity to act as an effective constraint on the MAPS).

- Finally, both the Ministerial Decision on the MSP and the NCC MAPS recommendation address the issue of potential collusion, implicit or explicit. As cited above, the Minister regarded "the absence of price collusion or coordination" as a necessary condition for a finding of sufficient competition. The MAPS recommendation included a substantive discussion under the heading "explicit or implicit price collusion"[14] The NCC noted that "[t]he [National Competition] Council accepts that the possibility of parallel behaviour tends to be greater where, as here, a small number of pipelines (in this case two) serve the markets in question". It relied on a specific analysis of competitive conditions to conclude that collusion was unlikely to be a problem in this case (for example, it noted that shippers on the MAPS and SEA pipelines favour long term, high volume contracts, thus intensifying P2P competition, and also that the service providers can price in a non-public fashion, making it difficult for colluding parties to monitor each others' behaviour).

3.2. FERC Approach to Applications for "Market Based Rates"

The US has a system of both intrastate gas pipelines (those which operate within a single State) and interstate pipelines (which cross State boundaries). The Federal Energy Regulatory Commission (the FERC) regulates the latter group, whereas state regulators regulate the former. In common with Australia, interstate pipelines are point-to-point transmission lines, i.e., most of the gas in an interstate pipeline is going from the same origin to the same destination, with some gas taken off at lateral 'spur' lines. This is in contrast to the highly interconnected system in north-western Europe.

By default, the FERC mandates that pipelines must charge cost-based rates, which are arrived at via regulatory proceedings. However, in 1996 the FERC ruled that pipelines can enjoy the right to charge "market-based rates" (MBR), if they can show to the FERC's satisfaction they lack significant market power (defined as the ability of a pipeline to profitably maintain prices above competitive levels for a significant period of time). An MBR means that the pipeline can set its own tariff, without further approval from the FERC and without the usual regulatory proceedings.

In this section we describe the criteria that the FERC developed for accepting MBR, and describe how these guidelines have been applied in practice. It is interesting to note that to date no pipeline in the US has been granted the right to charge market-based rates. In part this reflects the fact that the burden of proof lies with the pipeline applying for MBRs, which is particularly challenging given that the applicant has no right to require other parties to provide relevant information.

[14] NCC, *Loc. Cit.*, paras 6.31-35.

FERC criteria for the application for MBR

In its 1996 decision[15] the FERC described how it would apply basic market power analysis for evaluating applications for MBR. It would:

- Define relevant markets (both product and geographic);
- Measure firm's market share/concentration;
- Consider other relevant factors.

Product definition

The FERC considered an alternative pipeline service was a good alternative to the applicant's pipeline service if the alternative was available, at a sufficiently low price and the service was of a similar quality to permit substitution.

- Timeliness and availability – the FERC noted that alternative capacity would need to be available at the same time as the applicant's pipeline. While the FERC recognised that an applicant can cite the availability of planned capacity as an alternative, it noted that if the applicant is relying on future services, customers must be able to switch to this product when it is available (i.e. the applicant cannot bind customers into long-term contracts before the capacity is built).
- Price – the alternative pipeline route must be no more than 10% more expensive than the pipeline's cost-based (regulated) rates (reminiscent of the SSNIP test), and the use of alternative services should not significantly affect customers' profits.
- Quality – alternative services must be comparable, for example in terms of 'firmness' of service and the amount of notice required for nominations. Interruptible capacity could be an alternative, if applicants could demonstrate an absence of congestion in peak hours. But the FERC did not lay out detailed rules, since these depend on the specific product.

Geographic market definition

The FERC recognised three 'geographic' markets, being the market for moving gas from:

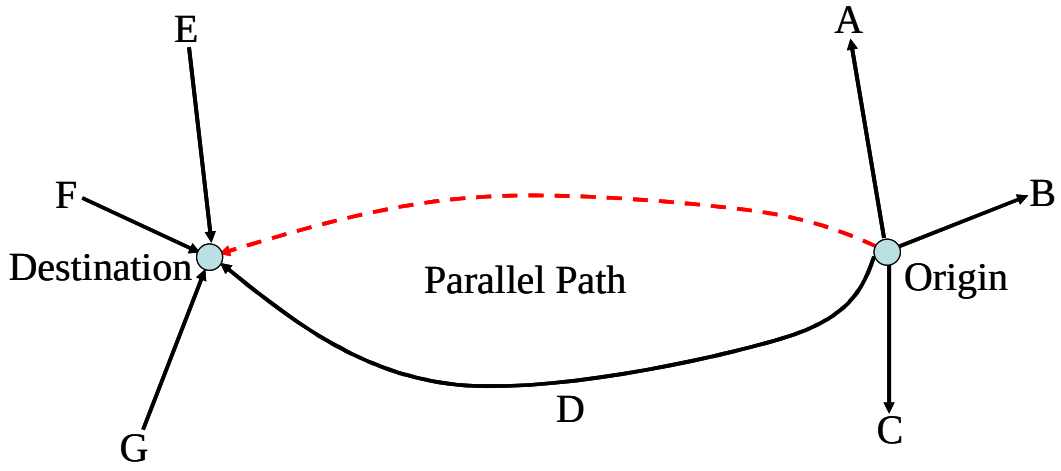
1. The applicant's pipeline's origin to its destination – the 'parallel-path' market.
2. The applicant's pipeline's origin (often a gas production basin) to an alternative destination – the origin market.
3. An alternative origin to the applicant's pipeline's destination – the destination market.

We illustrate the FERC's market definition in Figure 2. If FERC was analysing the pipeline represented by the broken red line (the 'applicant' pipeline), it would say that in the origin market

[15] The description in this section is derived from FERC Order: Alternatives to traditional cost-of service ratemaking for Natural Gas pipelines, Statement of Policy and request for comments 74 FERC ¶61,076 (January 31 1996) pp.20-39.

the applicant faced potential competition from pipelines A, B, and C; in the parallel-path market the applicant faced potential competition from pipeline D; and in the destination market the applicant faced potential competition from pipelines E, F and G. Whether the applicant actually faces competition from the other pipelines depends on the rates those pipelines charge, and if customers are connected to the lines or could connect at a low cost – we discuss these issues in more detail below. Note that the pipeline will be active in all three geographic markets, but generally faces a different set of competitors in each.

Figure 2: Illustration of FERC market definitions



The FERC noted that "the applicant must show that customers could purchase the relevant service from the alternative supplier. Such a demonstration will likely include showing that capacity would be available on the alternative". While the FERC's policy statement was not as explicit as it might have been on the subject, in a later application of the policy (discussed below) the FERC clarified that applicants must demonstrate that capacity is unsubscribed, rather than simply installed.

The FERC noted that prices at the destinations/origins must be similar; specifically, for a pipeline to be in the same origin/destination market (markets 2 and 3 above), the FERC states that a shipper would have to receive the same netback[16] using the alternative service as it would using the applicant's service. For example, suppose there was a second pipeline that went from the same origin to an alternative destination market – the applicant could include the second pipeline in its market analysis, even if the second pipeline's transportation rates were higher, if the gas price at the alternative destination was high enough to compensate. The FERC stated that the user would not necessarily have to be physically connected to the alternative pipeline service (in its later applications of the policy, discussed below, the FERC clarified that applicants must demonstrate that to include unconnected services as alternatives, the applicant must demonstrate that making the connection would preserve the customer's netback). The FERC also considered that LNG and LPG

[16] The netback is the price that the shipper receives for its gas at the destination, after paying for transport; it is a measure of the profit that the shipper can make from gas at a point in the network.

could be considered as alternative sources of gas for a destination market, as long as the delivered price of gas was the same or less than using the applicant's pipeline with regulated rates.

The FERC recognised that even though origin and destination markets may be competitive (in that producers have alternative destinations which give at least as high a netback and shippers alternative and equally profitable sources of supply), the applicant could still have market power if a shipper had a long-term contract to take gas from the applicant's pipeline's origin and sell it at the destination (i.e. the shipper is unable to switch supplier). If such shippers existed the FERC would require evidence of parallel-route competition to allow market-based rates. The FERC expressed doubts that the ability of the shipper to swap gas at its origin in exchange for gas at the destination would be a viable substitute.

Note that these definitions are similar to those implied by the MAPS pipeline case cited above. In that case, the NCC recognised that the origin and destination markets were competitive (producers and consumers had viable alternatives).

Firm size and market concentration

The MBR applicant must calculate its market share in the relevant markets, and the FERC would also calculate separate HHIs for the destination market, the origin market and the parallel-path market. The FERC avoided a 'bright-line' threshold for the HHI, above or below which an application for MBR would be rejected; but the FERC did state that it would apply closer scrutiny to applications with an HHI above 1,800 (an HHI consistent with about six similarly sized firms in the market). The FERC implies that it will consider holders of long-term capacity as capacity suppliers (so-called pipe-in-pipe competition).

The FERC implicitly recognised the limits of this use of the HHI – namely that it does not consider if there is any spare capacity or not – by evaluating if the applicants customers would be able to move a "significant proportion" of their throughput to an alternative service, so that an attempt by the applicant to raise its prices would be unprofitable.

Other relevant factors

In contrast with the view of some of the economists who have analysed the German market, the FERC expressed doubts about the contestability of the interstate pipeline market, noting that the need to acquire environmental permits would add to the time taken to enter, and the large sunk costs of pipelines would also act as a barrier to entry. In contrast to Australia, the FERC expressed scepticism that 'buyer power' (for example a single buyer at the destination market) could help to offset the market power of the applicant. The FERC noted that it would be prepared to consider a mixture of MBR and cost-based rates on a pipeline, for example granting MBR for a lateral or spur line from the main pipeline, as long as the applicant made undertakings to allocate costs between the regulated and unregulated lines fairly. Note that mixing MBR and cost-based rates in US pipelines is much simpler than for a European style entry-exit tariff system, since in the US the line is offering a point-to-point service, using distance-based tariffs.

Application of the policy: the Koch case

After the FERC issued an initial consultation on its basis for granting MBR, but before the final policy statement was issued, Koch Gateway Pipeline Company (Koch) applied for MBR. The application was ultimately rejected by the FERC after objections from interveners.[17] FERC's rejection reflects the difficulty of attempting to gain MBR for a gas pipeline network, as opposed to a point-to-point service. The Koch pipeline system was a network, serving many customers (i.e. similar in topography to the GTS network). According to the FERC's methodology, each exit point for serving one or more customers is a destination market which must be analysed. Therefore, Koch would have had to conduct analysis on 1,588 markets, producing 1,588 HHIs and analysing the availability and price of alternatives in 1,588 markets.

Perhaps unsurprisingly, Koch failed to do this, instead arguing for a market defined by its entire multi-State service area. This argument was rejected by the FERC. The case also illustrated the practical difficultly of obtaining some of the required information, such as the capacity available on alternative pipelines.

One of the main reasons why the FERC has not yet granted any inter-State US pipeline MBR is that it is difficult to prove that the pipeline lacks market power over every single relevant market. The obvious solution would be to apply for MBR on a part of the network, for which the applicant could demonstrate relatively easily that it lacks market power (for example a simple point-to-point service). However, in practice pipelines are reluctant to do this, since applying for MBR on part of their network will likely result in a new rate-case proceeding for the remainder of the network subject to cost-based regulation. This is an outcome most pipelines want to avoid, since there is always the risk that a proceeding could result in lower tariffs. Hence, pipelines tend to pursue an 'all or nothing' MBR application which, given the difficulties discussed above, seems likely to fail.

Discounting

US pipelines often offer discounts over their cost-based rates to customers that are able to switch to an alternative service. Despite evidence of discounting – which Koch also applied to some customers and products – the FERC has not accepted that this is sufficient evidence of competition to allow MBR.

Observations

- The FERC's standard of proof for the absence of market power, while not necessarily unreasonable, appears to be relatively high and difficult for pipelines to meet, at least for complex networks. Not least, applicants must demonstrate they do not have market power in all three geographic markets identified. It would seem most practical for US pipelines to apply for MBR only over pipelines that conform to a point-to-point topology.
- The FERC notes that, to be a realistic alternative to the applicant's service, other pipelines must offer a service that is available soon enough, has a price that is low enough and has a quality high enough to permit customers to substitute the alternative

[17] Order Reversing Initial Decision, 85 FERC ¶61,013 (October 2nd 1998).

for the applicant's service. Specifically, higher prices (up to 10%) for alternatives are allowed as long as they are offset by higher gas prices at the destination market.

- In common with Australia, the FERC recognises that long-term capacity holders (rather than just pipeline owners) are potential suppliers of gas transport; that these suppliers must have spare capacity for it to be an effective restraint on the applicant's pricing; and that the relevant markets should not be concentrated. While not explicit, we note that the MSP criteria of at least three pipelines would qualify for 'closer scrutiny' according to the FERC's guidelines, implying that the FERC's criteria for what constitutes a competitive market is perhaps higher than in Australia.
- The FERC expresses greater scepticism than the Australian authorities on the role of 'buyer power' in mitigating the applicant's market power.

3.3. Choice of product markets

Based on the FERC methodology described above, we analyse three types of gas-transport product-markets:

1. Destination markets;
2. Origin markets;
3. Parallel-path markets.

It is worth briefly exploring how the structure of the gas supply industry, and the types of consumers this creates, drives this choice of product market definition.

The gas supply industry is characterised by the use of long-term contracts (by which we mean periods of at least five years, and often 20 or 30 years) and/or large investments in gas production facilities or facilities which use gas. The destination market is concerned with the analysis of shippers that must transport gas *to* a particular point on the network, probably because they have signed a contract to supply gas at that point or have a facility which needs gas at that point. A power station without a long-term supply agreement would be an example of this type of customer – because the plant does not have a long-term contract, it is free to buy gas from any number of points in Europe, but must always transport gas to the power station. The competitive concern is that such customers should have an adequate choice of independent competing pipelines on which to transport gas to their specific point on the network. For example, if a customer could transport gas from points A or B to point C, (and gas was priced similarly at points A and B) then a merger of the owners of the A to C and B to C routes would be a concern for these customers, because the merged company could increase the price of transport over both routes.

The origin market is concerned with the analysis of shippers that must transport gas *from* a particular point on the network, probably because they have signed a contract to buy gas at that point, or have invested in gas production there. A gas producer who has not signed a long-term gas contract (and can therefore sell on a number of 'spot' markets) is an example of this type of customer. These customers are concerned with having a choice of evacuation routes to points on the network where gas fetches a similar price. For example, if the customers could transport gas from C to points A or B (and gas was priced similarly at points A and B) then a merger of the

owners of the C to A and C to B routes would be a concern to these customers, because the merged entity could increase the price of gas transport on both routes.

Finally the parallel-path market is concerned with the analysis of shippers that must transport gas *from* a particular point on the network *to* a particular point on the network, because they have signed a contract to buy gas at the origin (or have invested in production facilities at the origin point) and sell it at the destination. An example would be a gas producer who has agreed to sell gas to a specific power station. These customers are concerned with having a choice of routes from point A to point B. A merger of two separately owned pipelines that went from A to B would be of concern to these customers.

4. Destination markets

As described in the previous section, customers in a destination market are shippers that must transport gas *to* a particular point on the network. We analyse exit points within the Netherlands ('domestic exit points') and exit points on the border separately, as they present slightly different issues.

Figure 3: GTE map of gas pipelines in and around the Netherlands

We conclude that GTS has a very high share of the destination market, and that the main restraint to GTS pricing in this market is the ability of third-parties to build pipes which bypass the GTS network and connect directly with a neighbouring network. Hence, the majority of our analysis focuses on the cost and non-cost issues of building new bypass pipelines. We conclude that for the majority of customers the cost of building their own pipeline far exceeds the current GTS tariffs, so that, for most customers, GTS could raise tariffs significantly without losing customers. We also identify non-cost issues which make building bypass pipelines difficult.

Some of the discussion in this and the following sections involve analysis of specific points in the gas transmission network. For convenience, in Figure 3 we include a Gas Transmission Europe (GTE) map, which shows the main places in the gas network relevant to this analysis.

4.1. Methodology

Domestic Exit points

There are no existing pipeline alternatives to GTS for most Dutch consumers; GTS supplies nearly all of the domestic exit points (the notable exception is the Zebra pipeline, which we discuss on page 27). However, it may be that GTS may not be able to raise prices significantly, if a customer could build a new pipeline to an alternative network, such as the Zebra pipeline, the Fluxys network or one of the German networks, at a reasonable cost. (Alternatively a different pipeline operator could sign up one or more customers on long-term transport contracts, and build a pipeline for them).

The European Commission's market definition guidelines would, in most cases not include pipelines which have not been built yet. According to European Commission's guidelines on market definition, the competitive constraints arising from supply side substitutability are in general less immediate and in any case require an analysis of additional factors. As a result such constraints are taken into account at the assessment stage of competition analysis.[18] Specifically, the Commission Notice says that "[s]upply-side substitutability may also be taken into account when defining markets in those situations in which its effects are equivalent to those of demand substitution in terms of effectiveness and immediacy". Since building an alternative pipeline takes several years, it is not as effective and immediate as a consumer switching to an existing pipeline. Therefore, bypass lines would not be included in the product market definition. Accordingly, GTS has a market share close to 100% at most domestic exit points.

However, evidence from other gas markets such as the UK suggests that building bypass lines can be cost-effective for a sub-set of customers that are located relatively near to an alternative network, and can therefore bypass the incumbent. For example, in the UK Transco responded to the efforts of some customers to build bypass lines by introducing a 'short-haul tariff' – a lower tariff for relatively short distance gas transport. Therefore, the issue of bypass lines is relevant to a

[18] *Commission Notice on the definition of the relevant market for the purposes of Community competition law*, OJ C 372 on 9/12/1997.

competitive assessment of GTS's position in the destination market, and our methodology focuses on the ability of customers to constrain GTS price increases by building their own pipeline.

Border Exit points

If parallel-path (transit) flows had reasonable alternative routes (discussed in more detail below) then GTS may worry that increasing border exit charges would cause transit flows to divert to an alternative pipeline. But in Appendix II we explain that competition in the parallel path market cannot prevent price increases at border exit points, if GTS can price-discriminate between border exit points and nearby domestic exit points. For example, GTS could raise border exit charges, but reduce border entry charges by an amount which ensures transit flows pay the same amount. Therefore GTS could raise border exit charges, without risk of losing transit flows to competing pipelines.

Therefore competition in the transit markets (were it to exist) could not restrain GTS's pricing for border exit points. In common with domestic exit points, only the ability of customers to build a bypass pipeline could restrain GTS's pricing at border exit points.

4.2. Domestic Exit points

The cost of building an alternative line

In this section we estimate the cost to 'bypass' the GTS network in response to tariff increases and connect to an alternative network.

Realistically, only industrial customers or a power station could build their own pipeline, or have one built for them. This is because constructing an alternative pipeline either requires a long-term contract (if a third-party builds a pipeline) or, if the customers build it, the project is equivalent to a long-term contract because the customers have taken on the long-term commitment of paying for the line. It would be much more difficult to sign up many household customers for such a long-term transportation contract. For example, suppose Nuon decided to build its own pipeline from one of its distribution grids to Belgium so that it could bypass the GTS grid. There is a risk that customers could switch to an alternative supplier that did use the GTS grid, and Nuon would be left with an empty pipeline. Since a short pipeline will be cheaper, customers are also more likely to build a pipeline if they are close to an alternative network – which in practice means near to the Dutch border or to the Zebra pipe.

Accordingly, we focus our analysis on two groups of industrial customers who are relatively near the Dutch border (Maastricht and Delfzijl), and are therefore most likely to build a 'bypass' pipeline. Note that there is nothing particular about these customer groups, other than that they are a group of industrial customers relatively near to the Dutch border, and so it is most likely that building a bypass line would be economic. If building a bypass line was not cost-effective[19] for these customers, it would probably not be cost-effective for any group of customers.

[19] By cost-effective, we mean that cost of building the pipeline is less than the present value of future payments to GTS. In practise, we compare the annualised cost of a pipeline with the GTS tariffs, because we do not know how GTS tariffs will developed in future and therefore cannot calculate their present value.

DTe has provided us with data regarding the capacity of each of the industrial customers. We have aggregated their capacity needs, and estimate that the group of customers in Delfzijl would require a relatively large pipeline of nominal diameter 300mm (approximately 12 inches) and the customers in Maastricht would need a pipeline with nominal diameter of 150 mm (approximately 6 inches).

We take the case that the pipeline from Delfzijl would connect to the Gassco pipeline at Emden, bypassing the GTS network. We assume that the exit costs from the Gassco system would remain the same; the shipper would simply enter the new third-party pipeline rather than the GTS network (although the customers would need to pay for the creation of a new tie-in point to the Gassco pipeline). Therefore, the customers save the GTS entry costs at Emden, plus the exit costs at their respective delivery points. We estimate the approximate length of a pipeline from Delfzijl to Emden at around 10 km – though we should stress that we do not have pipeline maps and so cannot make a detailed estimate of the exact distances required.

The pipeline from Maastricht would connect to the Fluxys network; again we do not have a map of the Fluxys pipeline grid, but we take the case that a 20 km pipeline should be sufficient to reach the nearest tie-in point to the Fluxys network. In the case of a Maastricht pipeline, we assume that prior to building their pipeline, the Maastricht shippers were importing gas from Belgium to the Netherlands. In common with the Delfzijl case, the shippers would save the entry costs (in this case we assume the entry point is Zelzate, since this is the only non-backhaul H-gas entry point from Belgium) and the exit costs at their respective exit points.

We have estimated costs based on information from National Grid, the owner and operator of the pipeline system in Great Britain. National Grid publishes a document which describes the methodology that it uses to charge for use of the Gas Transmission System in Great Britain, and part of this methodology uses the estimated cost of a new pipeline. We use the National Grid numbers because they are public, subject to regulatory and public scrutiny and therefore likely to be a good measure of actual costs. The National Grid cost estimates are valid for tariffs from April 2007, and so should give a good estimate of current costs. However, to the extent that steel prices have risen recently, the National Grid estimates are likely to underestimate the current cost of a pipeline, and hence underestimate the degree to which GTS could raise prices before customers build their own bypass pipeline.

Table 3 illustrates the results for the two pipelines. The estimated pipeline cost per km from this methodology is between 0.71 and 0.84 million Euros per km, for a 150 mm and a 300 mm diameter pipe respectively. Parties that have investigated building their own pipeline in the Netherlands have estimated costs for a 24 inch pipe (approximately 600mm) at about €1 million/km. Using the National Grid methodology to estimate the cost of a 24 inch (600 mm) pipe yields a cost of 0.99 million Euros per km, nearly identical to the estimate provided by the third-party in the Netherlands. This close agreement supports the use of the National Grid cost estimating formula in the Netherlands.

Table 3: Estimated pipeline costs

			Maastricht	Delfzijl
Diameter, mm	[1]	Brattle	150	300
Cost, mln £/km	[2]	See note	0.40	0.44
£/€	[3]	Yahoo 13/11/07	0.70	0.70
Line pipe cost, mln €/km	[4]	[2]/[3]	0.56	0.63
Length, km	[5]	Brattle	20	10
Tie-in costs, € mln	[6]	Brattle	1	1
Material Cost, € mln	[7]	([4]x[5])+[6]	12.29	7.31
Non-material costs, € mln	[8]	See note	1.84	1.10
Total cost, € mln	[9]	[6]+[7]	14.13	8.40
Total cost per km, € mln	[10]	[9]/[5]	0.71	0.84

Notes:
[2]: 0.0003115 x [1] +0.3505652. Source: National Grid, The Statement of the Gas Transmission Transportation Charging Methodology Effective from 1 April 2007,
[8]: Other costs are 15% of meterial costs; *Ibid*, section 2.1.1.3.

If customers are connected to the GTS network, in addition to entry and exit charges they pay a connection fee. According to GTS, the connection fee covers the costs of a pressure reduction station (*gasontvangststation* or GOS), which is required to make the gas available at the connection in a safe and controlled way. If customers bypassed the GTS network, they would need to build their own pressure reduction station. Since we do not have costs for a pressure reduction station, we assume its costs are equal to the connection tariff that the customers currently pay to GTS (i.e. that the GTS connection fee is cost reflective). Assuming the customers save the connection fee, while not adding the costs of a pressure reduction station, would overestimate the cost savings from bypassing GTS. Hence, our calculation takes the case that the customers make no saving on the connection cost, but only on the entry and exit charges.

In Table 4 we convert the capital costs to an equivalent annual tariff, and compare this to the costs saved from bypassing the GTS network. We adopt National Grid's assumption of a 20 year pay-back period for the project. Our calculations indicate that customers at Delfzijl could apparently save over 80% of their current gas transportation costs by building their own pipeline, and the group of customers at Maastricht could save one-third of their gas transport costs.

Table 4: Savings from building a bypass pipeline

			Maastricht	Delfzijl
Discount rate	[1]	See note	7.0%	7.0%
Costs				
Capital cost, € mln	[2]	Table 1	14.13	8.40
Annual tariff, € mln	[3]	See note	1.33	0.79
Capacity, kW	[4]	GTS	402,309	1,998,844
Tariff, €/kW/year	[5]	[3] x 1 million/[4]	3.31	0.397
GTS tariffs				
Relevant GTS entry tariff, €/kW/year	[6]	See note	2.123	1.377
Relevant GTS exit tariff, €/kW/year	[7]	See note	2.926	0.868
Total GTS costs saved, €/kW/year	[8]	[6]+[7]	5.049	2.245
Savings				
Net saving, €/kW/year	[9]	[8]-[5]	1.734	1.849
Net saving, %	[10]	[9]/[8]	34%	82%

Notes:

[1]: We use the 7% pre-tax real return proposed by the Minister of Economic Affairs for the return on new GTS investments.
[3]: Annual tariff (in real 2007 money) that has a present value equal to the initial cost when paid every year for 20 years, using the discount rate shown.

[6]: Relevant entry tariff is at Zelzate for Maastricht customers and at Emden for Delfzijl customers.
[7]: Relevant exit tariffs is the average exit for all the customers considered. In practise all customers have very similar exit tariffs.

For customers further from an alternative network the ability to build a bypass pipeline rapidly becomes a weak constraint on GTS's pricing. For example, we calculate that if the Maastricht customers were just over 30 km from the Fluxys network, it would no longer be cost effective for them to bypass the GTS network. If they were 50 km away, GTS would be able to raise their tariffs by over 50% above current levels before building a bypass pipeline became economic.

Practical difficulties in building a pipeline

Our analysis indicates that, even though GTS's tariffs are relatively low, for customers sufficiently close to alternative networks it may be cheaper to build their own pipeline and bypass the GTS network. This conclusion raises a question: if it is cheaper for some industrial customers to build their own pipeline than use the GTS system, why have they not already done so? One possibility is that we have significantly underestimated the cost of building a new pipeline. However, we think this is unlikely, since we have confirmed our estimates with third-parties. However, even if it was cheaper for customers to build their own line than pay GTS's tariffs, in practise, it could be very difficult for someone other than GTS to build a pipeline across the Netherlands. Accordingly, GTS may be able to charge more than the material and project

management costs of building a bypass pipeline, because there are other practical difficulties involved.

For example, under Dutch law GTS has special 'eminent domain' powers to gain right-of-way for pipelines, an advantage not enjoyed by an independent pipeline developer.[20] Moreover, there would be no reason for GTS to offer the developer access to its pipeline right-of way, so the new pipeline developer would have to gain permission for a new pipeline corridor to lay a pipeline across the Netherlands. This would involve gaining permission and permits from multiple municipalities, local authorities, and private land owners, as well as liaising with Non-Governmental Organisations and local interest groups.

Our calculations above confirm that there are significant economies of a scale in building a pipeline, and that only a pipeline with a relatively large capacity will be economic. Therefore, either a few very large customers would group together to build a pipeline, or a larger number of smaller customers would have to get together. But economists have recognised that it is often difficult for large numbers of companies to join together and sign long-term contracts, as they would need to do to build a pipeline.[21] Not all consumers would be willing to share the risk of incurring long-term investments in pipeline infrastructure. In our experience, consumers prefer short-term contracts in liberalised energy markets.

The builder of the new pipeline would also have to negotiate a connection with the neighbouring pipeline network (e.g. Fluxys), which would involve the construction of a new connection or tie-in point, as well as a new exit charge. As such agreements are uncommon, it may take some time to negotiate.

Given the practical difficulties in building a new transit pipeline across the Netherlands, we conclude that GTS could charge significantly above the cost of building a bypass pipeline without significant risk of losing customers.

Note that the difficulties cited above may also explain why customers in Germany have not bypassed the more expensive German gas transport networks by building their own pipelines to the GTS network. As far as we are aware, there are two gas storages in Germany which have built their own pipelines to the GTS system, but these are the only examples of bypass. It seems likely that the factors listed above limit the ability of third-parties to build their own pipeline (also in Germany).

The Zebra pipe

The Zebra pipeline, which runs approximately 60 km from the Dutch-Belgium border near Zelzate into the province of Zealand is the only significant non-GTS gas pipeline in the Netherlands. It is instructive to review the circumstances surrounding the construction of the Zebra pipeline, to see if they are consistent with the difficulties we have identified above.

One of the difficulties that we outlined above was obtaining permits and rights-of way. But for the Zebra pipeline, because we understand that other pipes already passed through the land it was

[20] Several of these issues have emerged from discussions with a large gas supplier in the Netherlands who had considered building its own pipeline.

[21] Coase, RH, *The Firm, The Market, and The Law* (The University of Chicago Press)(1988), pp. 38-9.

already authorised for pipeline use. Therefore the Zebra project avoided some of the permitting issues that other pipeline projects would face.

We also noted that economies of scale played an important role, and that for a pipeline to be economic the owners must be large gas users. The Zebra pipeline was constructed to serve a large power plant that provided steam and electricity to three large customers: Dow, Delta, and Essent.[22] We estimate that the demand when the Zebra pipe was first operational was approximately 900 million cubic metres per year.[23] Assuming a load factor of 70%, this equates to a peak capacity of about 1,400 MW, similar to the Delfzijl users which we used in our case study above. This confirms that Delta's customers were using a significant volume of gas.

Another unusual factor which led to the development of the Zebra project was the large difference between UK gas prices and prices in the Netherlands. The principal attraction of the pipeline was as a method to obtain cheap gas from the United Kingdom. In the absence of capacity constraints, the difference in Dutch-UK gas prices should not have changed the economics of building a pipeline: the only relevant factor would be the cost of the alternative i.e. the GTS tariffs. However, if the GTS network was congested, then this would significantly increase the attractiveness of building more capacity to import cheap gas from the UK. More recently, price differences between the UK and the Netherlands have narrowed considerably, reducing the incentive of any other industrial group to finance a new pipeline.

Finally, we stated that co-ordination is problematic, and that customers may be unwilling to sign long-term contracts (or equivalently fund a pipeline project). The Zebra pipeline involved just three parties, which used large amounts of gas, so co-ordination was relatively easy. We also note that large new gas-fired power plants present a notable exception to the reluctance to sign long-term gas transport contracts, as investors often want to be sure that the owners have access to long-term gas supplies before they will loan money to construct a new plant. The Zebra pipeline was actually built to coincide with the completion of Elsta's 400 MW gas-fired power plant, which is the largest user of the pipeline.[24] The plant owners were willing to undertake long-term commitments to persuade bankers that the project had secured its supplies.

The construction of the Zebra pipeline suggests that to build an independent 'bypass line' a project requires a few large users which are relatively near to the border, and that permitting and gaining rights of way remain a crucial factor. The circumstances which led to the construction of the Zebra pipeline were very unusual. We also understand that the Gate LNG terminal may build a 25 km pipeline from the terminal to a GTS quality conversion station at Pernis. However, this too fits with the requirements to build a pipeline which we list above; the pipeline is built by a single

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[22] The original investors now have several customers each. Essent has informed us that it has five customers, and that Delta has three or four customers. The total number of customers is therefore approximately 10 or 11.

[23] A 1998 document available on PNEM/MEGA's website on 15th November 2000 indicated that PNEM/MEGA, now part of Essent, had contracted 600 million cubic metres of gas supplies per year, and equated this amount to a 2/3rd share of the Zebra venture. This implies a total use of 900 million cubic metres per year.

[24] A Centrica news release of 15th July 1997 reported that delivery of gas to be used by the Elsta plant would start in October 1998. The Zebra pipe actually began operation in September 1998 as described in a 1998 document available on PNEM/MEGA's website on 15th November 2000.

very large user, and permitting may be helped by the laying of the pipeline in an area where there is already significant industrial activity. The Gate terminal is also partly owned by Gasunie, the parent company of GTS. This may aid the transfer of the required skills to build the pipeline.

4.3. Border Exit Points

Some shippers have to export gas from the Netherlands, and must therefore use an exit point at the border. GTS currently has a monopoly over these shippers, since they have no choice but to use a GTS exit point. More generally, GTS has a monopoly over parties producing gas in the Netherlands, since the gas must either be sold to a domestic customer via a domestic GTS exit point (discussed above) or exported via a GTS border exit point.

Only the ability of parties to build their own pipeline can constrain GTS's pricing over border exit points. As we have discussed, this is a constraint that could apply only to a small number of large customers who are physically close to an alternative network.

A related issue is the reaction of shippers that buy gas in the Netherlands and use a border exit point to export the gas to a market outside the Netherlands. GasTerra is the only major example of this kind of shipper that we are aware of. GasTerra exports gas to France, Belgium, Italy and Switzerland for example, and these are all examples of destination markets.

One possibility is that increases in the price of border exit capacity could make the gas sufficiently expensive that the buyer switches to an alternative source of gas from outside of the Netherlands – for example the customer in France buys gas from the UK instead (or, if the shipper bears the increased costs of gas transport, then it may no longer want to sell the gas if it is not making a profit). In this case GTS would lose custom as it attempted to raise prices – so demand elasticity would constrain GTS's ability to raise prices at border exit points.

A quantitative analysis of this issue is beyond the scope of this engagement, since for each of the major destination markets we would need to analyse the price and availability of alternative sources of gas. However, there are a number of qualitative factors which indicate that in reality GTS would not lose significant volumes if it raised border exit prices.

First, GasTerra sells gas under binding long-term contracts, so that it could not simply stop shipping gas in response to an increase in the price of transportation. As a minimum, GTS would not lose any capacity bookings until the long-term contracts expired. Second, much of these export volumes are for L-gas, which no shipper other than GasTerra can provide without using expensive QC services (discussed in section 9). Customers buying L-gas from GasTerra could not easily or cheaply switch to another source. Neither is the ability of customers to convert to H-gas likely to be an effective constraint on the ability of GTS to the price of (L-gas) border exit capacity. Third, the cost of gas transport is usually a relatively small part of the overall cost of gas. If Dutch gas is relatively cheap before an increase in the price of GTS's capacity (and the fact that customers are buying the gas in preference to others sources suggest that this is the case), then customers or GasTerra may be willing to tolerate significant increases in the price of GTS capacity before they switch to another supply/stop selling the gas. Finally, some of the border exit capacity will be used by transit flows, rather than GasTerra exporting gas from the Netherlands. As we conclude in section 6 that there is not effective competition in the transit market, GTS could be willing to raise

the price of border exit capacity, since the loss of some export flows would be offset by the increased profits on the remaining transit flows.

The above factors suggest that the theoretical ability of customers outside of the Netherlands to switch to another source of gas would not be an effective constraint of the price of border exit capacity.

4.4. Conclusions on destination markets

1. The only constraint on GTS's ability to raise prices is the potential for customers to bypass the GTS network with their own pipeline.

Our calculations show that bypass is not cost effective for most Dutch exit points, though for exit points within 20-30km of border, bypass could be cost-effective.

2. However, other factors, such as the ability to gain rights-of-way and permits, and gathering together a large enough group of customers to make the pipeline cost-effective present additional obstacles to building a bypass pipeline.

3. We conclude that in the absence of regulation, GTS could raise prices at most domestic exit points in the Netherlands. At most GTS faces effective competition at exit points within 20km of a neighbouring pipeline network.

4. We conclude that GTS could also raise the price of border exit points, since it would not be cost effective for shippers exporting gas from the Netherlands to bypass the GTS network, and it seems unlikely that customers outside of the Netherlands would stop buying Dutch gas in response to an increase in the cost of border exit capacity.

5. Origin markets

Customers in an origin market are shippers that must transport gas *from* a particular point on the network, probably because they have signed a contract to buy gas at that point, or have invested in gas production there. Origin markets are domestic entry points taking Dutch gas production; and border entry points that send gas to a point inside the Dutch network.

5.1. Domestic entry points for Dutch gas production

In common with domestic exit points, domestic entry points taking Dutch gas production (be it from a gas field or a gas storage facility) have no alternative but to use the GTS network, unless they build their own pipelines to a neighbouring network., the only competition is from the threat of customers or suppliers building new pipes from their production facility to a neighbouring network. In our discussion of domestic exit points, we concluded that only large users near the Dutch border might be able to economically build their own pipeline and bypass the GTS network. In the case of origin markets, there are relatively few gas production locations which could economically connect to a neighbouring network. We suspect that the Annerveen field and some others in the Schonebeek

area could connect to a German network at relatively low cost, but these fields are relatively small and nearing the end of their life.[25]

It would be prohibitively expensive for gas produced offshore of the Netherlands and arriving at Den Helder to build a bypass pipeline to either Fluxys or a German network. Den Helder is 160 km from the Belgian border and (overland) more than 190 km from the German border. A pipe to the German border, even for a relatively large gas user, would cost the equivalent of over €8/kW/year (an estimate which excludes the cost of compression), well in excess of the avoided GTS tariff (€3.26/kW/year).[26]

Moreover, much of the gas is destined for sale in the Dutch market, and so it is likely that producers would have to connect to the GTS network at some point. Building a private pipeline to 'jump' from one GTS entry point to another is unlikely to be cost-effective, since the GTS tariffs are relatively 'flat'. For example, in 2007 entry tariffs for gas production points in the Netherlands varied from €1.377/kW/year to €2.33/kW/year, a difference of €0.953/kW/year. This price difference would only be enough to justify a pipeline of not more than about 20 km, even for a relatively large user.

5.2. Border entry points

In this section, we discuss border entry points used by shippers that deliver gas to a customer within the Netherlands (we analyse shippers using a border entry point and delivering gas to a customer outside of the Netherlands in the next section). Clearly, shippers have to use the border entry point (and the domestic exit point) if they want to supply gas to a customer in the Netherlands. The risk to GTS is that as it raised prices, these shippers could divert their gas to another market; GTS would lose transport volumes, and the price rise could be unprofitable. Therefore, the question is whether in practice shippers would divert their gas flows to another market in response to a price rise by GTS.

Shippers would only divert their flows if they were contractually able to do so and if the rise in the price of gas transport reduced their profits. For example, if a shipper was contractually committed to delivering gas to a certain point in the Netherlands, then the shipper would have no choice but to use one of the entry points on the GTS network. Alternatively, if the shipper had a contract whereby the cost of gas transport was an add-on which was passed through to the customer, and the customer was compelled to continue taking the gas, an increase in gas transport costs would not affect demand for gas transport.

Similarly, if customers had no choice but to buy gas from outside the Netherlands, then they would have to pay the increased border entry charges. In the Netherlands, it seems likely that imports are the 'marginal' source of gas, since Dutch gas is already being produced at its physical or contractual limits. Therefore, a customer would not be able to switch to a domestic source of gas to avoid the increase in border entry charges. Therefore shippers could pass on the cost increase

[25] These fields are operated by NAM, who sells the gas to GasTerra at the edge of the production facility. Hence it could be GasTerra which built a pipe to Germany in this example.

[26] Sum of the H-gas entry tariff for the NOGAT pipeline at Den Helder and the H-gas exit tariff at Oude Statenzijl on the German border.

without experiencing a loss in gas sales. There would be no reduction in profitability, at least in the short-to-medium term given the very low elasticity of demand for natural gas (and the small proportion of the final price that transport charges comprise). Therefore, if GTS raised prices at all border entry points, shippers could pass on these costs to customers, who would have no choice but to pay them. Hence there would be little if any incentive for shippers to divert their gas to another market or to stop using GTS's gas transport services.[27]

Therefore, GTS could raise the price of border entry capacity, since by doing so it would not lose customers who are transporting gas to a point within the Netherlands. As we discuss above and in Appendix II, GTS could raise border entry charges without diverting transit flows away from the GTS system.

5.3. New entry points

New entry capacity – such as GTS plans to construct for the open season – is in theory subject to greater competition, since customers potentially have a choice of building an alternative route. However, as we discuss on page 26 in more detail, in practice we suspect customers would find great practical difficulty in trying to build a new pipeline from their entry point to a customer. GTS would not have to grant access to their existing pipeline right-of-way, so the new pipeline would have to seek new permits and attempt to buy or rent land for the pipeline. In a country as densely populated as the Netherlands this would be extremely difficult. In contrast, GTS can expand its pipeline capacity using existing rights of way, at a lower cost. Therefore, in the absence of regulation GTS could charge above its own LRMC, since this would still be lower than a third party's LRMC.

5.4. Conclusions for origin markets

In common with the destination market, few domestic entry points could build a pipeline to a neighbouring network at a cost similar to the current GTS tariffs. Demand for capacity at border entry points would not be sensitive to an increase in the price of capacity, since shippers could pass on price increases to their customers. The cost of new capacity for third-parties is likely to be significantly higher than GTS's LRMC, due to advantages GTS has in using existing rights-of-way and gaining access to new rights-of-way. Therefore, the ability of third-parties to build their own new capacity is a weak constraint on GTS's pricing of new capacity; GTS could set prices in excess of its costs. We conclude that GTS could profitably raise prices at domestic and border entry points for both new and existing capacity.

6. Transit markets

The product in this case is the transit of gas from an origin point A to a destination point B. By transit, we mean a gas flow which goes through the Netherlands but starts and ends outside it. In

[27] Note that the situation described above is in contrast to shipper in a parallel path (transit) market (discussed below), where a shipper is sending gas via the Netherlands to e.g. Belgium. Because the Belgium market is receiving gas from several sources in addition to the gas transiting through the Netherlands, the shipper could not pass on any increase in transport costs charged by GTS; if it tried to do so, customers in Belgium might switch to one of the other sources of gas.

common with cases in the aviation industry, it does not make sense to differentiate the product market from the geographic market, since the product involves moving something from one point to another. In the language of the FERC methodology the transit markets are a subset of the parallel-path markets. We do not include parallel-path routes that begin and end in the Netherlands, since GTS is the only provider of such services within the Netherlands, so that the only competition is from the building of independent pipelines, an issue we analysed in section 4.

In this section, we identify several transit products (defined by a start point and an end point) which GTS offers, and identify several alternative products which could occupy the same product market. If alternative products are available, we carry out two tests:

1. **SSNIP test-based competitive assessment**. A market definition exercise, asking if the alternative products are not more than 110% of the price of the GTS product, and are therefore (according to the SSNIP test) reasonable substitutes from the point of view of the consumer.

2. **Broader competitive assessment**. A competitive assessment, analysing by how much GTS could profitably raise the price of its transit product given the pricing and available capacity on other routes. Note that in this competitive assessment we include all alternative products, even if market definition exercise concluded that they were not reasonable substitutes—we therefore refer to this as the "broader competitive assessment".

We describe our methodology in more detail below.

6.1. Description of methodology

We understand that GTS – and most European TSOs – do not sell "transit capacity" as such. Rather they sell capacity separately at entry and exit points. Consumers create their own transit capacity by buying capacity at a border entry point and a corresponding capacity at a border exit point. In the absence of any legal constraints however, GTS can/could raise the price of transit independently of the price of other transportation services (imports, exports, within-country transportation), by raising border entry and/or exit tariffs, as explain in Appendix II.

There may be several different routes or paths from A to B, and the objective of our analysis is to determine if alternative routes can discipline the price charged for GTS's transit product. In essence, the basic question we investigate is: could GTS profitably and sustainably increase the price of gas transit for a particular transit product or route? The questions to answer are then twofold: does an alternative route identified occupy the same product market as the GTS transit product? That is, is the alternative route a 'reasonable' substitute for the GTS transit product? And if it is, is there enough of the alternative product available to discipline GTS's prices?

With regard to the first question we would not consider an alternative route a good substitute for the GTS transit product, if the price of the alternative route was more than about 110% of the GTS product; in this case GTS could raise the price of its route by more than 10% without losing any custom. It is common practice in analysing the competition 'product A' faces to define which

other products compete with it (or occupy the same market).[28] Such products should be 'reasonable substitutes' from the point of view of the consumer. Typically if a potential substitute 'product B' is more than about 10% more expensive than 'product A', then product B is not regarded as a reasonable substitute. The number of 10% finds support in the Small Sustainable Non-transient Increase in Price (SSNIP) test, which defines markets by reference to a 5-10% price increase (and which we discuss in more detail below), and the FERC methodology described in section 3.2.

With regard to the second question (the availability of capacity), there may be spare capacity at a price less than 110% of the GTS route, but the amount of capacity available may be small, relative to the amount of capacity customers are using on the GTS route. In this case GTS could profitably raise prices, because it would only lose a relatively small volume of its customers. For example, suppose transit flow on a GTS route was 6,000 MW, and there was 100 MW available on an alternative route which charged just 1% more than GTS; GTS could profitably increase its prices by *e.g.* 15% and earn a higher profit on the remaining 5,900 MW of flow that could not switch to the alternative network.

Put simply, if there is plentiful capacity available on alternative routes at a similar price to the GTS route then the market for GTS's transit product may be competitive, depending on the form that competition takes. If the number of alternative routes is small and competition is intense ("Bertrand competition") then GTS could not profitably raise its tariffs for this route; if it did, customers would switch to the alternative route, and GTS would lose revenue and profits. The alternative route or routes cap GTS's tariffs for this particular combination of entry and exit points. However, before drawing this conclusion one would need to carry out further analysis, since competition is often not intense when the number of competing firms is small.

Note that by "available capacity", we mean capacity which is available for customers that were using the GTS route to buy. Capacity which has been bought by a shipper using e.g. the German network but is not being used and is not for sale is not "available". Capacity available to buy can be either primary or secondary capacity.[29] As we describe below, we have investigated the available capacity by asking the relevant TSOs and checking 'bulletin boards' used for offering secondary capacity.

In sum, a necessary condition for effective competition on a given GTS route is that there is at least one alternative route which has adequate spare capacity. If the price of this route is more than 10% more than the price of the GTS route then according to standard tests (the SSNIP test, which we discuss below in more detail) then it is not an effective substitute for the GTS route, and GTS can be considered to hold a monopoly.

Below we identify plausible transit products for GTS, and feasible alternative routes on the networks of one or more TSOs. For each transit product, we describe the current flow over the GTS

[28] For example, the ERGEG document states that "NRAs [National Regulatory Authorities] shall assess whether the relevant pipelines can be considered a relevant market, e.g. by executing the so-called Small but Significant Non-transitory Increase in Price (SSNIP) test. If relevant pipelines are not within the same market, they are not in competition with each other." *Loc. cit.* footnote 6 p.12.

[29] By Primary capacity, we mean capacity bought directly from the pipeline owner. Secondary capacity is capacity bought from another shipper – essentially 'second-hand' primary capacity.

network, which alternative routes the gas could switch to if GTS raised its prices. We then analyse the availability and price of the alternative routes. To be sure that we have not missed some element of competition through too narrow a focus, we look at competition even from pipes that according to the SSNIP test are not adequate substitutes for the GTS route.

Caveats

There is a possibility that shippers on the alternative route have bought capacity but are not using it, and would therefore be willing to sell it if asked. In this case our approach of looking at primary capacity available and secondary capacity advertised on bulletin boards would underestimate the amount of the alternative product on offer. However it would be odd if shippers have not offered unused capacity for sale already, since absent market power they have good incentives to do so. Accordingly, we assume that if shippers on the alternative route have not offered unused capacity for sale before GTS raises its prices they will not do so after. On a practical level, we cannot know whether there is unused capacity available but for some reason not advertised, and so there would be no way of dealing with this in our analysis. However, we judge the risk that this is the case to be very small.

Similarly, there is a possibility that an attempt by GTS to raise prices, and the subsequent requests by shippers for capacity on the alternative route, could increase the supply of capacity that shippers are using. In other words, that the supply of available capacity is 'elastic'. However, we do not include this possibility in our analysis for two reasons, the first theoretical and the other practical. First, shippers selling capacity would have to stop supplying gas on that particular route – it would not be profitable to sell capacity to a third-party and then have to buy the capacity back at a higher price. We work on the presumption that most shippers have gas supply contracts to honour, and could not simply stop supplying gas; therefore they cannot sell the capacity they are using. Again, on a practical level we would have no way of estimating the amount of capacity that is being used but that might become available, though there are good reasons to believe that the amount of such capacity will be very small.

There is also the theoretical possibility that demand is sufficiently elastic to limit GTS's price increases – in other words, if GTS raised prices shippers would simply stop shipping gas from the origin to the destination market. If this were true then even absent alternative transit products or routes, GTS would not be able to significantly raise prices. However, for the reasons discussed above we do not consider this possibility realistic, since in reality shippers are compelled by contracts to continue using the transit route even if the price of transit rises. Moreover, if the gas on this transit route did not set the price at the destination, then the buyer or seller could still profitably transport gas on this route; though their profits would reduce by the amount of the increase in GTS's transit tariffs.

The SSNIP test

In applying the SSNIP test in this context, our aim is to determine if an alternative transit product offered by *e.g.* E.On occupies the same market as the GTS transit product – are these two products reasonable substitutes from the view point of consumers? Specifically, in defining the relevant transit market, we have investigated whether GTS could raise its prices (by 5 to 10%) above *current* levels.

Whether one uses current or competitive levels depends on the purpose for which the SSNIP test is being applied. For example, in an Article 82 case (abuse of a dominant position) and Article 81 case (cartels) the market definition practice is to investigate if the party could raise prices above *competitive* levels. In merger analysis one would investigate if the party could raise prices above *current* levels.[30]

This study is neither a merger analysis, nor an Article 81/82 case. Also, the issue of which prices to use is material, since current GTS prices are in some cases not competitive, the clearest case being quality conversion where prices are below the full cost of providing the service.

In our view it is appropriate in the context of Regulation 1775/2005 to investigate price rises above *current* levels. In many cases, investigating price rises above competitive levels would result in an inappropriately broad definition of the market, which could lead to erroneous conclusions regarding the level of competition and ultimately higher tariffs. We do not believe that allowing large price increases is the intention of Regulation 1775/2005.

However, we would also stress that our conclusions do not depend on the use of current or competitive prices, since we carry out a competitive assessment of GTS against all alternative routes, even when the SSNIP test (based on current prices) implies that these alternative routes do not occupy the same product market as the GTS route.

Market definition would also, in most cases not include pipelines which have not been built yet. According to European Commission's guidelines on market definition, the competitive constraints arising from supply side substitutability are in general less immediate and in any case require an analysis of additional factors. As a result such constraints are taken into account at the assessment stage of competition analysis.[31] Specifically, the Commission Notice says that "[s]upply-side substitutability may also be taken into account when defining markets in those situations in which its effects are equivalent to those of demand substitution in terms of effectiveness and immediacy". Since building an alternative pipeline takes several years, it is not as effective and immediate as a consumer switching to an existing pipeline.

One possible exception to this arises when the GTS infrastructure itself is not yet built, i.e. an Open Season context (or more properly, a post-Open Season context where GTS would be trying to sign shippers up to LT contracts at an agreed long-term tariff). In this case, it would be feasible for an alternative pipeline project to compete with the GTS project; this competition could limit the ability of GTS to raise prices in the absence of regulation. We will discuss this issue in section 6.6.

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[30] The difference is logical, because in merger control the point is to check that competition after the merger is no less than before, so the current level of prices is the right starting point, while in an Article 81/82 proceeding the point is to see whether specific illegal behaviour is raising prices above the competitive level and competitive prices are therefore relevant. Using current prices in an Article 81/82 context risks committing the "cellophane fallacy". For a detailed discussion of the cellophane fallacy see section 2.3 of our report *Factors affecting geographic market definition and merger control for the Dutch electricity sector*, June 2006, The Brattle Group, available from the NMA website.

[31] *Commission Notice on the definition of the relevant market for the purposes of Community competition law*, OJ C 372 on 9/12/1997.

6.2. Transit market 1: Emden to Belgium (H-gas)

Relevant transit: The relevant transit is the movement of H-gas from Emden to Belgium.

Scenario: Norwegian H-gas flowing through from Emden to Belgium diverts to a German network.

Current flow through the GTS network: we assume that the gas currently flows via the GTS network, entering at Emden (points 15A-E in Figure 3) and leaving to enter the Fluxys system at either s'Gravenvoeren, Obbicht, Zandvliet or Zelzate (points 6, 5, 3A-B, 2A-B). Our analysis uses Zandvliet tariffs since they are the highest, and hence customers using this exit point would be first to switch to the alternative route.

Feasibility: Belgium imports about 6 bcm of Norwegian gas, so the transaction is realistic. However, we do not know if the delivery point of these volumes is fixed (i.e. may not be able to switch to delivery via Germany), though even if they are, a change of route that was beneficial to both the buyer and seller might be achievable through renegotiation.

Potential alternatives: we consider all routes from Emden into Belgium through existing pipelines that do not use the GTS system, as listed below.

Available primary capacity on alternative routes

1. **E.On Transport**. Gas could flow via the E.On Transport (E.On) system, entering at Emden NPT and exiting at Eynatten. E.On has 183 MWh/h of firm capacity available at the Emden NPT entry point from 01/10/2008 to 01/10/2010, and at least 320 MWh/h of firm exit capacity at Eynatten. From 01/10/2008 Fluxys has at least 930 MWh/h of firm entry capacity available at Eynatten. Hence 183 MWh/h could switch from the GTS route onto the E.On route from 01/10/2008. There was no additional capacity advertised via the 'bulletin board' on E.On's website on this route for the relevant period. Also there was no firm entry capacity available at Dornum (which is close to Emden and could serve as a substitute for it).

2. **Wingas** has built entry and exit capacity at Emden (Bunde) and Eynatten respectively. However, Wingas only has firm entry at Emden available intermittently– specifically 605 MWh/h of capacity from 01/06/08 to 31/08/08 and from 01/12/2008 to 28/02/09 every year until 31/08/2010. Wingas does not publish available firm exit capacity at Eynatten[32] – but it states that exit capacity utilisation is greater than 99% until end-2010. We could find no secondary capacity advertised for the Wingas network. Hence Wingas cannot provide a competing route to the GTS system, since there does not appear to be available exit capacity.

3. **BEB:** GTS recently announced that it will buy BEB.[33] Hence BEB will no longer provide a source of competition for GTS. We note that BEB has no available entry

[32] In general, TSOs do not publish information on available capacity at an entry or exit point if there are less than three customers using the point, since to do so could jeopardise commercial confidentiality.

[33] Gasunie press release 23rd November 2007.

capacity at Emden until at least 01/10/2010, and does not have an exit to Belgium, and so could not have provided competition for the GTS system on this route even absent a merger until at least 01/10/2010.

4. **RWE** has less than 1% of its entry capacity available at Emden until August 2010, and so we discount the RWE route as a potential competitor to GTS. There is no secondary capacity advertised for the RWE network or indeed any German pipeline network for the relevant periods.

SSNIP test-based competitive assessment

Table 5 illustrates the difference in tariffs between the two routes. Note that Fluxys charges a uniform entry tariff at all entry points, and that even though the two routes would deliver gas into different balancing zones in the Fluxys system, there is no charge for transporting gas between balancing zones. Hence the two routes deliver gas into an economically equivalent area. Table 5 illustrates that the E.On tariffs are about 1.6 €/kWh/h/year higher than the tariff on the GTS route, or 135% of the price of the GTS route. According to the SSNIP test methodology, the E.On route is not a reasonable substitute for the GTS route and does not occupy the same product market. Even if there are differences in the services provided (for example *force majeure* clauses etc.),[34] it seems implausible that GTS could not raise its tariffs on this route by more than 10%. Absent any significant differences of this kind, GTS could apparently raise its tariffs on this route by about 35% without losing any customers.

We conclude that on the basis of the SSNIP test GTS enjoys a monopoly on this transit route, and therefore does not face effective competition.

[34] *Force majeure* clauses excuse a party from liability if some unforseen event beyond the control of that party prevents it from performing its obligations under the contract. Typically, force majeure clauses cover natural disasters or other "Acts of God", war, or the failure of third parties--such as suppliers and subcontractors--to perform their obligations to the contracting party. In gas pipeline contracts there can be differences between TSOs as to the circumstances covered by *force majeure.*

Table 5: Tariff comparison Emden to Belgium based on 2007 tariffs

Route			Tariff €/kWh/h/year
E.on route			
Emden (entry)	[1]	E.on Gastransport	3.3
Eynatten (exit)	[2]	E.on Gastransport	2.2
Eynatten (entry)	[3]	Fluxys	0.711
Total	[4]	Sum, [1],[2],[3]	6.211
GTS route			
Emden (entry)	[5]	GTS	1.377
Zandvleit (exit)	[6]	GTS	2.511
Zandvleit (entry)	[7]	Fluxys	0.711
Total	[8]	Sum, [5],[6],[7]	4.599
Difference	[9]	[4]-[8]	1.612

Broader competitive assessment

For the broader assessment we include the E.On route in our analysis. As Table 6 illustrates, we find that in 2007 it would be more profitable for GTS to raise the price of its transit product to at least the level of E.On's price and lose 183 MW of custom (which is all the capacity that could switch to the E.On network), than it is for GTS to set a price below E.On's. At most only 1% of transit capacity on the GTS network could switch to an alternative route (see Appendix III). *Hence, we conclude that there is no effective competition on this transit route.* Of course, there would be no reason for GTS to just charge a bit more than E.On. GTS could charge significantly more than the E.On price without losing customers. The volumes of transit gas are expected to increase dramatically from 2012 so that, barring any additional capacity becoming available on German networks, GTS would continue to find it profitable to raise its prices on this route in the future, in the absence of tariff regulation.

Table 6: Increase in GTS's profits if it increases its Emden-Belgium price to just above E.On's 2007 price[35]

Original revenue			
Transit tariff, €/kW/year	[1]	GTS	4.599
Capacity, MW	[2]	GTS	35,775
Revenue, € million	[3]	[1]x[2]/1000	164.53
GTS revenue charging E.on tariff			
Transit tariff, €/kW/year	[4]	E.on	6.211
Capacity, MW	[5]	[2]-183	35,592
Revenue, € million	[6]	[4]x[5]/1000	221.06
Increase in profits, € million	[7]	[6]-[3]	56.53

Note that our calculation in Table 6 may underestimate the profitability of GTS's price increase, since in reality GTS would also reduce its costs by transporting less gas. However, since we do not have reliable data on GTS's variable costs we ignore this factor, while noting that GTS's increase in profits would be higher than Table 6 suggests. Below we explain in detail how we arrive at our conclusions.

6.3. Transit Product 2: North Germany to South Germany (H-Gas)

Relevant transit: The relevant transit is the movement of H-gas from North Germany to South Germany.

Scenario: Gas flowing from Emden through the GTS network diverts to the E.On network.

Current flow: we assume that gas currently flows from Emden, through the GTS network, then exits the GTS system at Boscholtz to enter the E.On network (Boscholtz is the only H-gas exit from the GTS network into the E.On network).

Feasibility: Germany imports over 30 bcm of Norwegian gas, so the transaction is realistic. However, we note that E.On Ruhrgas is the main buyer, and would presumably use its own network rather than the GTS network. VNG and Deutsche Shell buy about 4 bcm/year each, and may be more open to using the GTS network.

Potential alternatives: The gas flows directly onto the E.On network at Emden. Note that we choose the E.On network for this analysis, since it is the only network with available entry capacity at Emden.

Tariff comparison

Table 2 illustrates that the GTS route is already 2.3 €/kWh/h/year more expensive than the E.On route. Hence flows would presumably already be using the E.On route, unless there was some non-price reason not to. GTS raising tariffs should not cause any flows to divert to the E.On route.

[35] See Appendix III for supporting calculations.

Note that E.On's tariffs decreased from October 2007. This explains why a recent study GTS commissioned (which used the pre-October 2007 E.On tariffs) found that this route was cheaper on the GTS network, but we find that the E.On route is cheaper.[36]

Table 7: Tariff comparison Emden to E.On system

Route			Tariff €/kWh/h/year
GTS route			
Emden (entry)	[1]	GTS	1.377
Bocholtz (exit)	[2]	GTS	1.86
Bocholtz (entry)	[3]	E.on Gastransport	2.4
Total	[4]	[1]+[2]+[3]	5.637
Eon route			
Emden (entry)	[5]	E.on Gastransport	3.3
Difference	[6]	[4]-[5]	2.337

We conclude that the GTS and E.On routes are probably poor substitutes, implying that GTS has a monopoly in this market.

6.4. Transit Product 3: Emden to France (H-gas)

Relevant transit: The relevant transit is the movement of H-gas from Emden to France.

Scenario: Gas flowing from Emden through the GTS network diverts to the E.On network.

Current route: we assume gas flows into the GTS system at Emden, then exits the GTS system and enters the Fluxys system at s'Gravenvoeren, Obbicht or Zelzate. The gas exits the Fluxys system and enters the GRT Gaz system at Quévy, Blaregnies or Taieniéres.

Feasibility: GdF imports about 20 bcm/year from Norway, so this scenario is realistic, and a proportion of this gas may already go through the GTS network. Note that no pipeline network other than E.On has an exit point into France.

Potential alternative: Gas could flow into the E.On system at Emden, and exit at Medelsheim/Obergailbach into the GRT Gaz system. Alternatively, gas could exit the E.On system and enter the Swizzgas system at Wallbach, then exit the Swizzgas system and enter the GRT Gaz system at Oltingue (note that if gas flowed to France via Belgium this would result in the same analysis and conclusions as for transit route 1).

Available primary capacity on alternative routes

E.On has no firm exit capacity at either Medelsheim/Obergailbach or Wallbach until at least 01/10/2010. Hence it would not be possible for customers to sending gas from Emden to France to divert gas onto the E.On network in response to a price increase from GTS.

[36] Arthur D Little; Transit Route Tariff Comparisons; April 2006.

We conclude that there is no effective competition on this route because E.On cannot provide a competitive restraint to GTS.

6.5. Other possible transit markets

We considered additional transit routes to see whether there was any potential for competition, but in each case decided there is not:

1. L-gas transit. As far as we are aware there is no L-gas transit, since L-gas is only exported from the Netherlands, and very little L-gas is imported. Hence GTS could not lose transit flows of L-gas by raising prices.

2. South-west Germany to Zeebrugge. A possible scenario is that gas flowing from East of Belgium to Zeebrugge via the GTS network diverts to the Fluxys network. However, to flow gas to Zeebrugge via GTS would require entering the GTS network at Bocholtz. The entry capacity at Bolscholtz would be a backhaul, since the physical flow of gas is leaving the Netherlands. Hence the product would be non-firm. It seems unlikely that the assumed current route is feasible.

3. GasTerra is importing about 3 bcm/year Russian of gas to use for its contract with Centrica.[37] But GasTerra has long-term capacity on the BBL; to switch routes it would have to buy secondary capacity on ICUK, which would likely be prohibitively expensive. Hence it seems very unlikely that an increase in tariffs of 10% or less would cause flows to switch from the BBL to ICUK, though lack of information on the cost of secondary capacity for ICUK makes this impossible to confirm. Similar arguments would apply to Russian gas sold to the UK via the Baltic pipeline.

4. GDF imports about 10 bcm of Russian gas – some deliveries at Baumgarten, some at Waidhaus: it seems unlikely that it would be economic to divert via GTS/Fluxys networks, as the flow would still have to transit via German gas networks.

6.6. Contestability of transit markets

In the section above we noted that, absent regulation, GTS could raise its prices significantly above that of its rivals. However, in theory there is a limit to what GTS could charge; the LRMC of a new pipeline should constrain both the price of GTS's new capacity (in the open season) and its existing capacity; if GTS attempted to charge much more than the LRMC for transit capacity, customers could build there own pipeline. The contestability of transit capacity is an important point, as if transit was clearly contestable this would set a clear limit on GTS's prices.

We note a number of reasons why it would be more expensive for a third-party to build a pipeline across the Netherlands that it would be for GTS to do it. GTS has significant economies of scope and scale. For example GTS could add capacity by modifying an existing compressor, or adding more compression. This is an operation which involves modifying only one piece of

[37] GasTerra supplies about 8 bcm/year of gas to Centrica in the UK via the BBL pipeline (Centrica Press Release, 25/6/02). We also understand that Gazprom and GasTerra have negotiated a swap agreement that would involve Gazprom shipping gas to the Netherlands via NEGP and GasTerra shipping the same volume of gas to the UK via BBL. The volume may be 3 bcm ('Gazprom Is in Search for Own Route to U.K.', The Kommersant, Tuesday, April 18, 2006. Hence in effect GasTerra transports about 3 bcm/year of Russian gas to the UK.

equipment. In contrast, a third-party would need to build an entire new pipeline of potentially several hundred kilometres.

If GTS needed to, it could also add new pipelines more easily than a third-party, since it has existing rights-of-way in which to lay the pipe. If required GTS has special 'eminent domain' powers to acquire new rights-of-way (as we discuss on page 26). In contrast a third-party would have to acquire new rights-of-way with no eminent domain powers, which could be expensive and very time consuming.

As we discuss elsewhere, pipelines have significant economies of scale; to reduce the €/kW price of shipping gas to a cost-effective level new project would need to transport significant amounts of gas. A sufficiently large project – for example an LNG terminal shipping gas across the Netherlands – could achieve this. However, given the issues cited above it seems likely that the costs for a third-party would exceed GTS's LRMC. Therefore, GTS could charge more than its own LRMC for new capacity. The exact amount it could charge would vary by the precise route, and would require an engineering study to determine the difference between the costs for GTS of adding capacity and the costs for a third-party.

6.7. Conclusions on the current state of competition for transit products

Our analysis indicates that for transit from Emden to either Belgium or France the capacity that is available on alternative networks is more expensive than the price of the GTS route, and would fail to prevent a price rise of more than 10% in the absence of regulated prices. Moreover, the available capacity on the alternative route is small relative to the capacity of transit we estimate for the GTS route. Accordingly, even if the price on the alternative route was less than 110% of the price of the GTS route, GTS would find it profitable to raise prices by more than 10% and sell a smaller amount of transit capacity. For the other route investigated (North Germany to South Germany) the GTS route is more expensive, and hence shippers would already be using the German route if they could.

A recent study commissioned by GTS supports our findings. The study found that a "route which transits the Netherlands always results in the cheapest tariffs." [38] This implies that other transit routes are more expensive, and are generally poor substitutes for the GTS transit route.

7. The effect of future gas tariff increases

GTS's regulatory regime is currently under discussion. While the level of future tariff is not yet known, the Minister of Economic Affairs has indicated that tariffs are likely to increase.[39] The aim of this report is to investigate if GTS could significantly and profitably raise prices in the absence of tariff regulation. If regulated tariffs increased sufficiently, then GTS would not be able to profitably increase tariffs above the (new) regulated level, since either competition from other networks or the threat of customers building their own pipelines would prevent them from doing so.

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[38] *Loc. cit* footnote 36. ;;

[39] Letter from the Minister of Economic Affairs to the Lower House of Parliament (the *Tweede Kamer*) March 29th 2007, '*Voorzienings- en leveringszekerheid energie*' 29 023 No.37.

Accordingly, an increase in GTS's tariffs could affect the conclusions of this study. In this section we briefly re-visit our main conclusions on P2P competition, and conclude that GTS would still be able to significantly increase its tariffs, even from a starting tariff 25% above today's level.

7.1. Origin and Destination markets

For the origin and destination markets, we concluded that only a relatively narrow fringe of customers would be able to prevent significant increases in the price of gas transport, by building their own pipeline. We calculated that a typical group of industrial customers would need to be closer than 30 km to an alternative network for them to bypass GTS.

An increase in GTS's tariffs would increase the attractiveness of building a bypass pipeline but the effect is relatively modest. Since the cost of a pipeline is roughly proportional to its length, if GTS raised its prices by 25% then the minimum 'break even' distance for a bypass pipeline would increase by about 25%, from 30 km to about 38 km. Hence, the group of customers that could potentially bypass GTS would increase, but not significantly. Hence, with a 25% increase in regulated tariffs, our conclusions for the origin and destination markets remain unchanged; for a large majority of customers it would not be cost-effective for them to bypass GTS.

7.2. Transit market

We concluded that there was little spare capacity on alternative transit routes, and that GTS could increase the price of transit by at least 40% above existing tariff levels. Therefore, if GTS's tariffs increased by 25%, GTS could still increase prices by at least 15% above the new tariff levels. Hence, if tariffs were increased but then tariff regulation was subsequently abandoned, GTS could still raise prices further above the new regulated levels. We have not estimated the long-run marginal cost of building an alternative transit pipeline, but for the reasons discussed elsewhere in this report we do not think that the threat of a new third-party transit line would be sufficient to stop prices increases of more than 25% above current levels.

Similarly, on the other transit routes examined there was no available capacity on alternative routes, and so GTS would continue to be able to increase the price of transit capacity to at least 25% higher than current levels.

8. The effect of multi-year tariffs

At present, shippers can only buy capacity at a fixed price for up to one year. However, there may soon be changes in the Dutch Gas Act which allow GTS to sell capacity where the price (or the formula for the price) is agreed for contract periods of longer than one year, and potentially 10 or 20 years. This would have two effects with respect to P2P competition. First, it would allow competition from secondary trading to develop on transit routes. Second, it would allow large international projects to negotiate tariffs with GTS, which could potentially benefit other gas system users. We discuss both these possibilities below.

8.1. Competition between capacity holders

On some networks – for example in the case in Australia considered in section 3.1 – holders of long-term capacity can provide competition to the pipeline owner. For example, suppose a pipeline

had sold equal amounts of capacity under a 10-year contract to five different shippers. If the pipeline subsequently tried to charge a new sixth shipper much more than the original five, and some of the five shippers had spare capacity, then the shippers could undercut the pipeline's offer and sell capacity to the new shipper at a lower price; competition from existing capacity holders would restrain the pipeline's pricing.

At present, such competition is not possible in the Netherlands, because shippers can only buy capacity at a fixed price for up to one year. Therefore, the shippers would at most be able to undercut GTS's price for one year, before GTS could raise the price for all shippers. Moreover, having a shorter contract makes it less likely that shippers will have spare capacity to sell, since they can estimate the capacity they need relatively well over a one year period.[40]

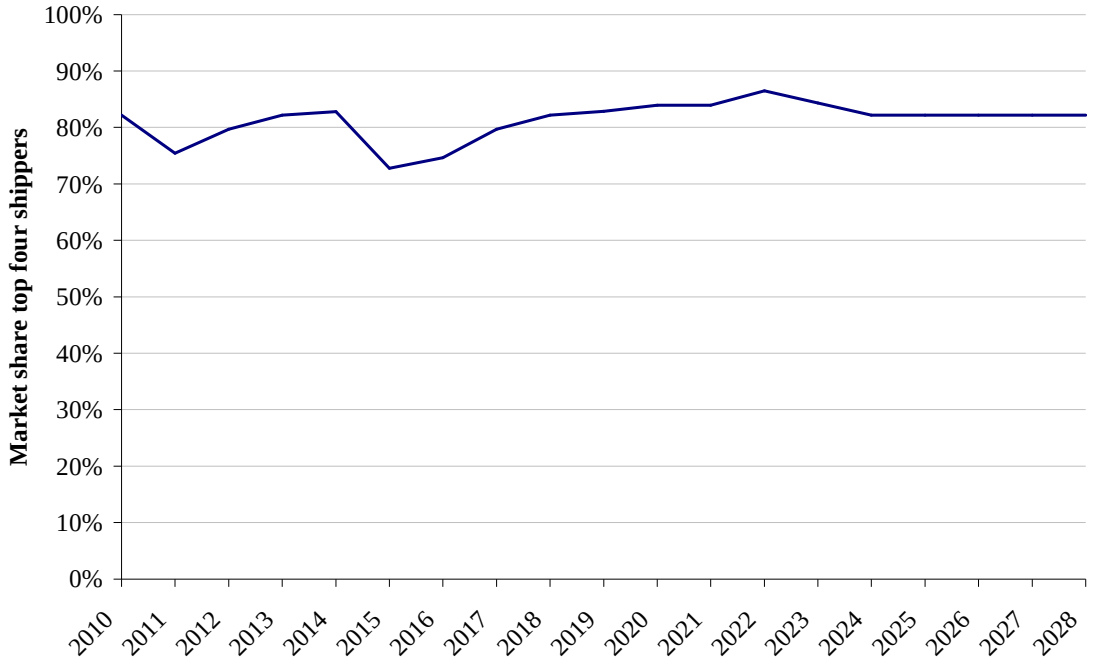
The prospect of long-term capacity holders, who have bought capacity at a fixed price, could restrict the ability of GTS to raise prices in all three of the gas transport product markets we have examined: origin markets, destination markets and the parallel path market.

Recently GTS undertook an 'open season' process to establish interest from the market in new entry and exit capacity. Over 20 shippers have shown a strong interest in new capacity, and made provisional bookings. Based on data provided by DTe, we have estimated the transit capacity held by each shipper for a route from the north-east of the Netherlands (Emden, Oude Statenzijl) to the south (Zelzate, s'Gravenvoeren and Boscholtz).

We find that the distribution of capacity holding is only moderately well diversified; on average three shippers hold 55% of the capacity, and four shippers hold over 80% of capacity (the 'C4' concentration, illustrated in Figure 4). Therefore while long-term contracts offer the prospect of increased competition it is not clear at this stage whether there would be effective competition between shippers in selling secondary capacity. It is also important to note that open season capacity has not been sold at a pre-agreed price; GTS can raise the price of capacity in future. Therefore while long-term contracts offer the prospect of increased competition, this could not happen until capacity is sold under long-term pricing agreements. Moreover, we have looked at total capacity booked, where as the relevant factor for restraining GTS prices is the holding of unused or 'spare' capacity. We would expect shippers to be using most of their capacity at the beginning of the contract periods, and it may take some time for capacity to become available for secondary trading.

[40] In contrast, a gas producer that signed a long-term contract 10 years ago could well have spare capacity, if the gas field can no longer produce at its maximum rate.

Figure 4: Estimated market shares in long-term transit capacity from the north-east to the south of the Netherlands for the largest four capacity holders



8.2. Large international projects

There is a second form of restraint on GTS's transit pricing; some large international projects have a choice as to which gas network they connect to. Therefore, they can negotiate tariffs by forcing TSOs to compete with one another on tariffs. For example, we understand that the Norwegians were considering whether to land gas in the Netherlands or another country, and would therefore have been in a strong position to negotiate tariffs with GTS. LNG projects would have a similar leverage, as they can, to a degree, chose in which country to build an LNG terminal. However, such negotiations would only be possible with multi-year tariffs; otherwise, GTS can guarantee the offered price for at most one year.

Where international projects could moderate the ability of GTS to increase its tariffs (in the absence of regulation), the outcome would at least to some extent replicate the effect of a fair regulatory regime. Presumably, GTS would like to raise the price above the cost-based tariff at the entry point where the project is requesting capacity. However, if a large project were negotiating between two or three TSOs, the customer might be able to push the tariff offered by each TSO down to the LRMC of providing the requested capacity (bearing in mind however that the number of competing TSOs is rather small). The TSOs should not set a tariff on a new entry point that is below the LRMC of the new entry point. To do so would be inefficient. Hence, negotiations with a large international project should result in the same tariffs as cost-based tariffs.

However, we note that in practise there are two main limits to the ability of international projects to moderate GTS's tariffs. First, there are simply not many large projects available, and hence not many entry and exit tariffs which could be controlled by them. For a project to successfully negotiate tariffs with GTS it must be very large (i.e. shipping large volumes of gas); if

GTS has to reduce tariffs for the customer, it would have to reduce tariffs for all other customers using that entry point, and quite possibly for the surrounding entry points (an issue discussed further below). Hence there would need to be a large increase in gas volumes shipped by GTS to compensate for the lower per-unit revenue. In reality, there are not many projects of this nature. GTS may prefer simply to lose the new customer, and maintain higher tariffs (this discussion assumes an absence of regulated tariffs, so that GTS has the ability to raise tariffs above the current level. We recognise that GTS's current tariffs are relatively low, and hence would be attractive to large international projects).

For example, and as we discussed in section 6.6 on page 42, the three LNG terminals planned for the Netherlands arguably have no leverage with GTS to negotiate future long-term tariffs, since these projects are committed to their current location. They could not credibly threaten to move to another country.

Second, the cost of gas transport in the Netherlands would generally make up a relatively small element of a large international project. Other factors will likely play a more important role in deciding where a project lands its gas. These include gas prices, the quality of law and regulation and the cost of transporting gas to an alternative destination market. For example, the UK gas market has witnessed several large investments in LNG terminals; we believe that key factors for these investments are the liquidity and competitiveness of the GB gas market – which reduces volume risk – and the transparent, stable and market-oriented regulatory regime. We have not heard market players mention lower entry charges as a decisive factor. Therefore GTS could charge higher prices than an alternative network and still win the new customer.

9. Quality conversion

Quality Conversion (QC) is a product where gas with a 'high' calorific value (H-gas) is converted to gas with a 'low' calorific value (L-gas).[41] The methodology for the analysis of QC market is similar to that described above for the parallel-path market. That is, is there sufficient available QC capacity at a price not more than 110% of the GTS price? Below we describe which networks offer QC capacity, and its pricing and availability. We then describe the alternative types of QC transaction which may currently be taking place, and the relevance of gas transport costs to each case.

9.1. Alternatives to GTS's QC service

Within Europe, the use of L-gas is limited the Netherlands and regions of Germany, France and Belgium. Within these countries, the following networks operators (other than GTS) offer QC services:

- GRT Gaz
- Fluxys

[41] On the GTS network, H-gas typically has a Wobbe number of 51.6 MJ/Nm^3; L-gas for use within the Netherlands has a Wobbe of around 44 MJ/Nm^3. Quality conversion from L-gas to H-gas is both impractical and a service that few shippers would need, since H-gas is more plentiful than L-gas.

- RWE

Delta (a gas supplier) also has a QC facility, but we understand that Delta does not offer access to third-parties.

Price of alternative services

Table 8 illustrates the prices charged by the three operators listed above for a representative transaction converting 1 MWh/h from H-gas to L-gas for a period of one year. Table 8 illustrates that the GTS price is les than 40% of the price of the next cheapest service, which is offered by GRT Gaz. That GTS's QC service is relatively cheap is perhaps not surprising, as some of the cost of the service is 'socialised' and included in other gas transport tariffs.

Availability of alternative services

Of the three alternative QC service providers, only GRT Gaz advertises that it has capacity available – specifically it has 1,400 MWh/day of QC capacity available until March 2008, and thereafter 57,000 MWh/day of capacity up to and including February 2009 (no capacity information is available beyond this date). This capacity is sufficient to produce just over 2 bcm/year of L-gas, if used at a 100% load factor.

Fluxys informed us that they give priority for use of their QC service to the public distribution grids in cold weather (for peak consumption), and that the QC service is only available from November 15th of one year up to the end of March of the next year; there is no available capacity for winter 2007/08. The Fluxys QC service is not intended for the supply of 'baseload' QC services for shippers supplying L-gas to other countries, and it would not be possible to book it for this service.

RWE does not publish detailed information on the quantity of QC services it has available, but their website stated that their QC service had less than 1% of its existing capacity available.

Table 8: Price of alternative QC services

Capacity, MWh/h/year	[1]	Assumed	1
Load Factor	[2]	Assumed	0.5
kWh/MJ	[3]	IEA	0.27778
Gas Volume, MWh/year	[4]	[1]x[2]x8760	4380
Starting Wobbe, MJ/m3	[5]	See note	51.6
Ending Wobbe, MJ/m3	[6]	See note	44.4
L-gas Gross Heating Value (GHV), MJ/m3	[7]	GTS	35
L-gas kWh/m3	[8]	[7]x[3]	9.8
L-gas Volume, m3/year	[9]	[4]x1000/[8]	448,333
Fluxys H-gas GHV	[10]	Fluxys	41.87
Fluxys H-gas kWh/m3	[11]	[10]x[3]	11.6
Cost of using Fluxys conversion			
Capacity Fee, €/m3/h	[12]	Fluxys	13.6
Capacity Fee, €/kWh/h	[13]	[12]/[11]	1.17
Commodity fee, €/'000 m3 L-gas	[14]	Fluxys	20.5
Capacity cost, €	[15]	1000x[13]x[1]	1,169
Commodity cost, €	[16]	[14]x[9]/1000	9,191
Total Fluxys cost, €	[17]	[15]+[16]	**10,360**
Cost of using GTS conversion			
Capacity fee, €/m3/hour/year/MJ/m3	[18]	GTS	1.073
Wobbe change, MJ/m3	[19]	[5]-[6]	7.2
Capacity, m3 (35.17)/h/year	[20]	[1]x1000/[8]	102
Total GTS cost, €	[21]	[18]x[19]x[20]	**791**
Cost of using GRT Gaz conversion			
Capacity fee, €/MWh/d/year	[22]	See note	60
Commodity fee, €/MWh	[23]	GRT Gaz	0.16
Capacity cost, €	[24]	[1]x24x[22]	1,440
Commidity cost, €	[25]	[4]x[23]	701
Total cost, €	[26]	[24]+[25]	**2,141**
Cost of using RWE conversion			
Capacity fee, €/kWh/h/year	[27]	RWE	6.32
Capacity cost, €	[28]	[1]x1000x[27]	**6,320**

Notes
[5], [6]: GTS lists the Wobbe of H-gas entry points as 51.6 MJ/m3 and for most domestic exit points it is 44.4 MJ/m3.
[22]: Based on GRT Gaz 'base service' - this is cheaper than the peak service

9.2. Types of QC transactions

When considering non-GTS QC services, we not only have to think about the cost of the alternative service but also differences in the cost of gas transport when using the alternative service. It is feasible that differences in transport costs could offset differences in the prices charged for QC services. If a shipper actually reduces its costs of gas transport by switching from GTS to another QC service provider, then GTS would not have to raise the price of its QC service to the price of the next-cheapest QC service before it starting losing customers. For example, suppose a shipper saved €3 in gas transport costs by switching to GRT Gaz's QC service, GRT Gaz charged

€10 for QC and GTS charged €5. GTS could not raise its price to more than €7 before the customer switched; it is the price of gas transport and the QC service which is relevant.

In Table 9 we list the different types of QC transaction which could be taking place before GTS raised the prices for QC; Table 9 then comments on what would happen if GTS raised the prices for QC services, so that a shipper switched to using the QC services of another TSO.

Table 9: Types of QC transaction summary

Transaction:	Pre-price rise transaction		Implications of using non-GTS QC services
	Buy H-gas:	Sell L-gas:	
1	Inside NL	Outside NL	Switch from exporting L-gas from NL to exporting H-gas; transport costs may go up or down.
2	Inside NL	Inside NL	Now need to export H-gas, and import L-gas (as backhaul), as well as paying the original entry/exit fees; transport costs would increase.
3	Outside NL	Inside NL	Switch to importing L-gas (as backhaul) instead of H-gas.
4	Outside NL	Outside NL	No need to import H-gas to NL and export L-gas; transport costs would reduce by switching to another QC service provider.

- For transaction type 1 in Table 9 transport costs may go up or down by switching to the alternative service; however, there is not sufficient difference between GTS's L-gas and H-gas exit tariffs that they could compensate for the large difference in the price of QC services illustrated in Table 8. Note that we have seen press reports that some traders in Germany are buying H-gas in the Netherlands, converting it to L-gas and then exporting it to Germany, so this kind of transaction is realistic.[42]

- For transaction type 2 transport costs would increase; hence differences in transport costs would not offset higher QC charges by another operator. We note that there is also a variant of transaction type 2, where instead of converting H-gas to L-gas a shipper blends a gas which is too low in Wobbe number to enter most parts of the GTS pipeline system with H-gas, to make an L-gas which meets the gas quality specifications required for gas transport. We understand that GasTerra blends gas produced from the Groningen field in this way. However, GasTerra could not react to an increase in the cost of QC services by using QC in another country, because the gas is not of a quality

[42] European Spot Gas Markets reported that Enercity, the energy trading arm of German utility Stadwerke Hanover, was buying H-gas in the Netherlands, converting it to L-gas then exporting the gas to Germany. See ESGM 13th April 2005.

that can be transported. Therefore, GasTerra is a captive customer of GTS. Its only alternative would be to build its own QC facility, an issue we discuss below.

- For transaction type 3 there could be a saving from importing L-gas using backhaul capacity rather than importing H-gas via either firm or backhaul capacity. For example, the average GTS L-gas backhaul import tariff is €1.365/kW/year, compared to €1.668/kW/year for backhaul H-gas, a difference of €0.303/kW/year. For the sample transaction capacity of 1 MW/year illustrated in Table 8, this translates into a transport difference of €303. However, this only reduces the relevant comparison cost of QC from €2,561 to €2,258, compared to GTS's QC costs of €791. This still leaves significant scope for GTS to raise the price of its QC service without losing customers.

- For transaction type 4 the shipper would actually save on gas transport costs by using QC services in their own county. They would not have to import H-gas to and export L-gas from the Netherlands. For example, a German shipper importing H-gas into the Netherlands at Vleighuis for €2.144/kW/year and exporting L-gas at Haanrade for €2.888/kW/year, a total saving of €5.032/kW/year or €5,032/year for our sample transaction in Table 8. However, this still would not be sufficient to motivate a German shipper to use RWE's more expensive QC service, even if any capacity were available.

We conclude that only GRT Gaz has QC capacity available, and this is at a price significantly above the price of GTS's service. For customers who are importing H-gas into the Netherlands, converting it and then exporting it as L-gas, the price of QC services offered by GRT Gaz are attractive relative to the price of GTS QC services. However, such customers would need to make up a large proportion of the total if they were to restrain the price that GTS could charge for QC. In reality there is no evidence that there are any customers of this type. For all other transaction types, there would be little or no saving in transport. Hence we conclude that there is insufficient competition in QC services to prevent GTS raising prices by more than 10% in the absence of regulated prices.

9.3. Contestability

Technically, it would be feasible for a shipper to build there own QC facility (as Delta has done). There are no particular economies of scale with QC facilities, which can be made up of modular units, and there are several large manufacturers which offer nitrogen production facilities required to convert H-gas to L-gas. Owning a QC facility would allow a shipper more control over how to source the L-gas for their portfolio; they could for example to buy baseload L-gas from GasTerra, and then convert H-gas to L-gas as required to meet peak demand.

However, conversations with market parties active in the Netherlands indicate that the price of GTS's quality conversion service is well below (perhaps less than 10% of) the full (capital and operating) cost of a new QC facility. Again, given that the price of GTS charged for QC does not reflect the full costs of the service this is not surprising.

Moreover, there are technical issues in building a QC facility – it must be built at a convenient location which is close to both the L-gas and H-gas networks, and the numbers of such locations are likely to be limited. Also, the shipper would have to pay an exit charge to leave the H-gas system, and an L-gas charge to enter the L-gas system (once the gas has passed through the QC

facility). This represents additional costs, since GTS's QC service happens 'inside' the network, with no need to pay additional exit and entry charges.

Proposals have also been discussed to make QC entirely free, with the costs socialised and collected from all gas users via transportation tariffs. If GTS's QC service was free, this could strand the QC facilities of third parties (though demand for them GTS QC would still exceed supply, so third-parties may want to build their own QC facilities to ensure access).

We conclude that it seems unlikely that the ability of shippers to build their own QC service could not prevent a significant price rise by GTS in the absence of regulation.

10. Stranded assets

Before applying tariff benchmarking to avoid the stranded asset problem, DTe should first be satisfied that the problem has a reasonable chance of occurring. We begin by noting that long-term contracts can eliminate or substantially reduce the risk of stranded assets. Customers would only be able to move to another network once these contracts have expired. If GTS only builds new transit capacity when customers have signed relatively long-term contracts of e.g. 15 years for the majority of the capacity,[43] then this would defer the risk of asset stranding, which could only occur once the 'open season' contracts have expired.

The question is then whether competition would lead to the assets being stranded, once the 'open season' contracts have expired. Clearly it is impossible to say now whether competition would emerge at that time, but it is by no means obvious that competition between a very few (probably two) firms would result in very intense competition. Hence the risk of stranded assets seems rather small. Moreover, the relative insensitivity of demand for gas transport to its price also increases the ability to profitably raise prices. We conclude that the risk of stranded assets is relatively small. Provided there is an option to use suitable long-term contracts, it would be unnecessary and disproportionate to use tariff benchmarking (and abandon cost-based regulation) to avoid stranding risk.

10.1. The risk of stranded QC assets

The relatively low price of GTS's QC service could also increase demand for the service, to more than it would be if GTS charged the full LRMC of QC. Currently, there is an excess of demand over for supply for QC services. This could lead GTS to build more QC capacity. Subsequently, if other TSOs cut the price of their QC services, so that shippers abandoned the GTS QC service, the GTS QC assets would be left stranded.

However, the risk of this scenario seems remote, since the price of alternative services are so far above the price of GTS services, it would require a dramatic cut in the price of alternative services to strand GTS's QC assets. For example, GRT Gaz, the next cheapest QC service provider, would need to cut tariffs by about 70% to strand GTS's assets.

[43] It may be wise for GTS to build some incremental capacity which has not been contracted, since the marginal cost of capacity is likely to be relatively low and could be used to serve future demand.

Nevertheless, while the policy of subsidising QC service may have merits (such as decreasing the price of L-gas), it does carry a risk of inefficient allocation of QC capacity (as QC capacity is allocated on a first-come-first-served basis) or creating an inefficiently high level of demand for the service. That is, shippers may demand the service even if they would not be willing to pay its full LRMC. This could increase the risk of stranded assets. However, the pricing of QC services involves complex trade-offs which are beyond the scope of this paper.

11. Assessing P2P competition in the future

In this report we have made an assessment of the current state of the P2P competition which GTS faces, and likely changes in P2P competition given expected developments such as the open season. However, DTe will need to assess P2P competition on a regular and ongoing basis, and so in this section we describe the market elements which DTe should monitor, likely future changes and the way in which the monitoring of P2P competition could change in future with the creation of a European energy regulatory body (the Agency for the Cooperation of Energy Regulators, ACER, as proposed by the European Commission).

11.1. Monitoring

Price changes

Changes in both GTS tariffs and the tariffs of alternative routes will affect the group of products which occupy the same market as GTS's products. We have already addressed the effect of a hypothetical 25% increase in GTS's tariffs, but the exact price rise that will take place is not yet known. In addition, we understand that the BNA is still reviewing its tariff regulation methodology, and it is possible that German gas transport tariffs could reduce when the methodology is implemented. DTe should continue to monitor the prices of the transit products which we have identified in this report.

So as to avoid our conclusions being overly reliant on market definition, we have included all alternative products in our competitive assessment, regardless of the price of the alternative product. In future, and especially if a consensus emerges on which starting price to use in the SSNIP test, DTe may wish to exclude some products from the competitive analysis which are more than 110% of the price.

The cost of building a bypass pipeline will also change over time, as the price of line pipe changes over time, and the possibility exists for alternative and cheaper materials to become available. If the cost of building a bypass pipeline reduced, this would widen the fringe of customers that could in theory react to a small GTS price rise by connecting directly to a neighbouring network. However, we do not expect changes in the price of pipelines to have a dramatic effect on our conclusion that there is no effective competition for the majority of customers in the origin and destination markets. For example, even if the price of building a pipeline were to reduce by 50% (which would require more than a 50% fall in the price of steel, since some of the costs of a pipeline are not dependent on price of steel) the 'radius' of customers that could save money by bypassing GTS would increase from 20 km to about 40km. But the ability to build a bypass pipeline would still not protect the majority of customers from price

increases, and the other difficulties which we identified for third-parties trying to build a pipeline would still persist.

Capacity on alternative routes and new infrastructure

The conclusions in our report depend strongly on the capacity available on alternative routes. While the alternative routes generally publish a forecast of available capacity until about 2010, it is possible that these numbers could change either because of the construction of new capacity or (more likely) because existing capacity comes up for sale. The German pipelines now publish relatively accessible data on the availability of secondary capacity, which can be accessed by non-traders after registration with the system.

In future, holders of long-term contracts with multi-year tariffs would also be able to compete with GTS on some routes. DTe should monitor the availability of 'spare' capacity that could moderate GTS's prices, and include this in the competitive assessment.

New transit markets

We have identified markets for moving gas from one point to another, based mainly on existing gas sales agreements and the existence of gas trading hubs such as Emden. In future, new gas trading hubs could emerge, new gas contracts will be signed and this will create new transit products. DTe should monitor market developments in terms of gas contracts signed or announced, and capacity bookings which indicate a new transit route. For example, several shippers booking border entry and exit capacity at points which they previously had no bookings would indicate a new transit market. DTe could then identify alternatives to GTS's transit product and carry out a competitive assessment.

Effects of Gasunie's takeover of BEB

Gasunie's acquisition of BEB clearly removes a potential competitor from the market (though according to our analysis the effect of this on competition in the next few years is muted, since BEB had little spare capacity to offer shippers and could not therefore compete with GTS). In addition, it is possible that a combined GTS/BEB network could change its tariff structure, for example by creating a combined GTS/BEB entry-exit system, where customers enter in Germany and exit in the Netherlands. This would change the competitive landscape in terms of prices and possibly also capacity, since the re-configured/ combined network may be able to create new capacity. DTe should monitor changes in capacity and prices which result from the Gasunie's purchase of BEB (assuming the transaction is approved).

New infrastructure

Perhaps the most plausible case for P2P competition is when new gas projects are being developed, that have the ability to choose which country they send their gas to. As we have discussed in this report, such projects may have the ability, to some degree, to negotiate tariffs with gas transporters.

As we also note in section 8.2, the ability of large projects to negotiate with the TSO depends on the TSO's ability to commit to multi-year tariffs for a significant portion of the projects lifetime. Therefore the monitoring of large projects will only become relevant once GTS is allowed by law to set multiyear tariffs. If and when this occurs, DTe should monitor large projects to see if they are

able to negotiate lower tariffs with GTS in practise, and how many other entry and exit points such negotiations affect.

11.2. Changes in the Regulatory Framework

At present the assessment of P2P competition by national regulators suffers from a lack of legal powers to require information provision by pipelines that are potential competitors. For example, in our assessment we were unable to get information on who held capacity in German pipelines, and the difference between the capacity parties had bought and what they intended to actually use.

It is also clear that the assessment of P2P competition is a natural area for co-operation between national energy regulators: for example at present DTe will have to assess whether E.On competes with GTS, while the BNA may perform a separate assessment of whether GTS competes with E.On. We are aware that DTe and the BNA are already co-operating on the issue of P2P competition, and have exchanged information with each other on their methodologies. But more formal requirements for the sharing of information may improve the regulatory process, and help overcome confidentiality issues.

The difficultly of obtaining required information for neighbouring Member States is an example of the "regulatory gap" identified by ERGEG. To address this, the new package of proposed legislation which the European Commission has introduced (the "Third Package") includes a proposal for a body that would complement at a European level the work of the national regulatory authorities. This body ('the Agency') would among other things "lay down procedures for cooperation between national regulators, in particular as regards the exchange of information and the apportionment of competence where more than one Member State is involved."[44] This is exactly the type of measure that is required to enable the effective assessment of P2P competition.

We recommend that DTe monitor the development of the Regulation establishing the Agency. From the point of assessing P2P competition it would be desirable that the Agency is able to require gas transporters anywhere in Europe to provide the data necessary for the assessment of P2P competition (either directly or via the national regulators). The Agency would help national regulators to share information and analysis in this area, and might perhaps have a role in conducting or overseeing joint assessments.

The Third Package could also empower national regulators to obtain and share necessary information from the developers of large new gas projects, to the extent that such a requirement was proportionate and justified. One practical way to do this would be to require developers seeking TPA exemptions (under Article 22 of the current Gas Directive) to provide information to the Agency about negotiations with gas transporters. We recommend that DTe participate through appropriate channels in the current debate of the Third Package, to help ensure that the required elements for the effective monitoring of P2P competition are included.

[44] European Commission, Explanatory Memorandum on the third package proposals, §3.2 p.11.

Appendix I : Other international assessments of P2P competition

I.1. The Netherlands

Two published reports are potentially relevant to establishing P2P competition in the Netherlands. Both reports were prepared at the request of GTS as part of previous tariff setting processes, and are mainly concerned with investigating the effect of low tariffs on gas flow and security of supply – specifically whether relatively low GTS tariffs would cause gas flows to divert to the GTS network, threatening security of supply.

However, our interest in further stages of this study will be the 'opposite' problem; whether raising tariffs on the GTS network could prompt gas flows to switch away from GTS to another network. Moreover, the two studies are not trying to establish the presence or absence of P2P competition, or whether GTS has market power or not – they are concerned with security of supply issues, and hence do not define markets or attempt to calculate market shares. Therefore while the studies are of some interest – in that they deal with the issue of how gas flows would respond to changing tariffs – they do not offer a methodology that we could use to establish the presence of absence of P2P competition.

The Second Jepma report

At the request of GTS, Professor Jepma of Groningen University has written a report which describes the factors that could affect security of supply (the second Jepma report).[45] These factors include the possibility that transit flows could be diverted through the Netherlands at the expense of pipeline capacity for domestic gas. In assessing the possibility of transit flows diverting to the Netherlands, Professor Jepma's study is potentially relevant to the analysis P2P competition *i.e.* the ability of GTS to attract flows from another pipeline as it lowers tariffs. Professor Jepma specifically focuses on the potential for gas currently flowing through German pipelines to divert to the GTS network; he identifies five factors/questions that would affect the chance of diversions of gas from German pipelines to the GTS network (in other words, P2P competition, at least in one direction).

- Is there spare capacity in the German networks?
- Is there likely to be an increase in the demand for gas transport?
- Are the German networks investing in extra capacity?
- Is the transport tariff in the Netherlands substantially lower than for the German networks?
- Is there available capacity on the GTS network (to which the gas would be diverted)?

Professor Jepma then constructs the various permutations of the 'yes or no' answers to these questions, with more 'yes' answers leading to a greater chance of gas being diverted to the GTS

[45] '*Hydra Aantasting van leveringszekerheid*', C.J. Jepma, with M. Broekhof and W.P. van der Gaast, September 2004. Hereafter referred to as the second Jepma report.

network. He then argues that the current situation in the Netherlands has a high chance of gas being diverted to the GTS network, which could threaten security of supply.

Professor Jepma's study makes use of GTS's computer model of the European gas pipeline system (the Albatross model), which calculates how gas flows would change given demand at various points in the network, pipeline capacity and tariffs.

The Jepma report does identify sources of transit flows that could pass through the Netherlands, and calculates various tariffs for alternative and potentially competing routes. These transit routes could be informative for our analysis.

The ECN study

GTS commissioned the Energy Research Centre of the Netherlands (ECN) to perform a study of the effect of tariffs on gas flows using their in-house model (the Gas Market System for Trade Analysis in a Liberalizing Europe or GASTALE).[46] ECN found that lowering Dutch tariffs induced a re-routing of flows from the German network to the Dutch network. In common with the second Jepma report discussed above, the aim of the report is to investigate the effect of tariffs on security of supply, rather than establish the presence of absence of P2P competition.

The model understandably simplifies the Netherlands and Germany into three zones, and aggregates entry and exit capacity. Rather than using existing tariffs, the model seems to base transport prices on the LRMC, assuming a given cost-per-km.

The model focuses on physical congestion, rather than contractual congestion, whereas the latter is more relevant for our analysis. For example, if a shipper could not book firm capacity on an alternative route, even if physical capacity was available, then the shipper would not be able to switch his gas to the alternative route. Pragmatically, it should be possible to get information on contractual congestion –even on German and Belgian pipelines – whereas we anticipate it will be very difficult or impossible to get information on physical congestion for specific routes.

In essence, the ECN model follows a fairly simple methodology, asking if gas would go via a cheaper route if there was spare capacity available. However, and in common with the study of Professor Jepma, the ECN study does not offer a methodology that we could use to establish the presence of absence of P2P competition.

I.2. Germany

Germany has several independently owned pipeline networks which operate at the gas transmission (as opposed to distribution) level. Accordingly, the subject of P2P competition has been the source of considerable debate in Germany. On the one side are parties which claim that these pipelines compete with one another to offer national transportation service, and on the other those that claim these pipelines do not compete, either because their service areas do not overlap sufficiently, or because the number of alternative pipelines available to customers do not provide for sufficient competition. In this section we assess the main documents produced on the subject of P2P competition in Germany.

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[46] '*Druk in de gasleiding Verband tussen tarieven voor gastransport, omleidingsstromen en congestie in Nederland*', W. Lise, J. de Joode, M.G. Boots ECN-C--05-098 November 2005.

Exxon/Mobil merger

In the European Commission's decision on the Exxon/Mobil merger,[47] it examined arguments by the parties that competition was possible in Germany through the construction of pipelines that would compete with the incumbents' networks. The Commission adopted a "hybrid" product market definition suitable to the vertically integrated nature of the merging firms. It defined an activity of "long-distance wholesale transmission", which comprises importing gas from foreign producers, transporting it over long distances, and selling it to short distance wholesale companies, distributors and large end users (see paras 67, 71, 111).

The parties argued (implicitly) that this is a contestable market: "everybody can import gas" (para 73). The Commission rejected this view on the basis of evidence from its market investigation. In particular it concluded (paras 97-101) that "access to the infrastructure or duplication are no options. Duplication of infrastructure would involve excessive sunk costs".

In coming to this conclusion, the Commission considered carefully the example of Wingas. Wingas did indeed enter the German market through the construction of competing pipelines. The Commission concluded that the large sunk costs involved in building duplicate pipelines and the economies of scale enjoyed by a existing pipelines were significant barriers to entry, and that "[i]t is, therefore, not expected that a newcomer to the market will start constructing a new, major high-pressure pipeline network in Germany. In other words, the 'Wingas experience' is not likely to be repeated. Wingas is a sort of a 'lucky combination' between a very big (probably even the largest) German industrial gas consumer that was not happy with the prevailing prices and a very big Russian producer that had a conflict of interest with the incumbents." (para 100).[48]

In conclusion, the merger does not provide a generic methodology for assessing P2P competition. However, it does support the significance of sunk costs and economies of scale. It also suggests that there is evidence that the example of Wingas should not be generalized, although it appears that this evidence is confidential and therefore not presented in the public/non-confidential version.

The BNA

The German energy regulator (the *BundesNetzAgentur* or BNA) is the European energy regulator for which the issue of P2P competition is most central, since there are several separately-owned pipelines networks in Germany that arguably could compete with one another, and the German gas industry has argued that this obviates the need for tariff regulation. The BNA kindly spoke to for the purposes of this report us about its own ongoing analysis of the P2P competition issue.

The BNA has not yet decided on the presence, absence or extent of P2P competition in Germany. However it has commissioned an export report on the subject, which proposes an economics-based framework for assessing P2P competition, based on standard competition

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[47] Case No IV/M.1383, Exxon/Mobil, 29/09/1999.

[48] It is not clear (at least from the non-confidential version) what the reference to a "conflict of interest" is about.

economics analysis including the definition of markets and market shares, and the use of the Herfindahl-Hirschman Index (HHI). The document is not public, and the BNA could not make it available to us. The BNA told us that it will base its methodology on the expert report, subject to possible adjustments to reflect certain features of the gas pipeline industry. It has already asked market participants to provide them with the data (capacities, sales etc) required to calculate market shares and HHIs and apply the methodology.

Academic literature on the German pipeline market

The case for

The BNA has provided DTe with several reports that discuss P2P competition in Germany. In one of these reports, Professor Günter Knieps argues that "market shares do not represent a sufficient criterion as justification for ex-ante regulatory interferences". Professor Knieps seems to base this on the idea that the German pipeline market is contestable – that is pipelines could not charge high tariffs, because of the "possibilities of [customers] building branch lines at relatively small expenditure" which means that "there are options for regional net companies and/or local gas supply enterprises to choose between different operators of long-distance gas transport networks so that the German domestic long-distance gas transport does not represent a monopoly".[49]

Professor Knieps in essence relies on two points. First, customers could build a pipeline to an alternative network at a 'reasonable' cost. If the cost of building the pipeline was prohibitive, then the neighbouring pipeline would not offer effective competition; it would not protect consumers from excessive tariffs. Second, Professor Knieps assumes that 'two is enough' – that two pipelines would compete effectively with one another. Economists would generally regard a market with only two players as concentrated. In most industries with high entry costs, effective competition is thought to require four or five competing firms.[50] There are some cases where an industry with only two players can be competitive – commercial aircraft manufacturing is the most prominent example. However, the commercial aircraft industry has a number of features that encourage competition (notably, very large orders and significant buyer power) which the pipeline industry does not share.

We agree with Professor Knieps that it is important to address the issue of whether customers or suppliers can bypass the incumbent pipeline, and that this could discipline tariffs. However, in our view Professor Knieps' approach misses several important aspects, such as establishing that the cost of bypass is reasonable, that there are no factors preventing the construction of a new pipeline (e.g. environmental permitting), that there is spare capacity in the alternative pipeline, and that competition between the two pipelines would be sufficiently intense, given the potential for unilateral abuse of dominance as well as implicit or explicit collusion.

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[49] *Wettbewerb auf den Ferntransportnetzen der deutschen Gaswirtschaft, Wirtschaftswissenschaftliches Gutachten im Auftrag der Ruhrgas AG*, Prof. Dr. Günter Knieps Freiburg, 26. February 2002.

[50] For example, both EU and US competition authorities use the HHI concentration index, and have an "initial screen" that would regard an HHI value above 2,000 (which corresponds to five equally sized firms) as indicating a high level of market concentration.

In our 2002 report for the Commission[51] (discussed more fully in section I.3), we also addressed Professor Knieps' discussion of the potential for partners in jointly-owned pipelines to provide competition. The report describes the large number of suppliers that are "technically" able to compete with German firms because they own transportation rights on national supraregional transmission pipelines. However, we noted that there are several reasons why holders of long-term capacity may not be able to compete with one another in practise. First, the contractual framework around such joint venture ("project company") pipelines, which might not allow for example SNAM to use the TENP to compete within Germany.[52] For example, we note that recently (July 2007) the European Commission announced it had initiated proceedings against E.On and Gaz de France in relation to a suspected agreement concerning the marketing of supplies of natural gas transported over the MEGAL pipeline, which was designed to restrict competition in their respective home markets.[53] Such agreements – while illegal – would significantly reduce the competition offered by long-term capacity holders.

Second, the volumes transported by *e.g.* SNAM through TENP may be already largely committed in to a destination, and the capacity holder cannot therefore sell the capacity rights to a third-party. Finally, to sell gas to German customers the long-term capacity holder would either require access to the "spur" lines that lead off the pipeline, or would have to build its own spurs. Its joint venture partner might be unable to provide access (lack of capacity), or unwilling (because it naturally does not wish to help a competitor). Professor Knieps' paper does not address these factors.

Several other papers base the idea of pipe-to-pipe competition on the idea that many customers have access to two pipelines. One paper states that 70% of the German demand can be reached by at least two different network operators,[54] while another that "[f]ar more than half of the gas needed in Germany can be reached through competing networks…with respect to pipeline competition in the long haul gas transport sector, regulation is actually redundant."[55]

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[51] The Brattle Group, *Convergence of non-discriminatory tariff and congestion management systems in the European gas sector*, September 2002, available at http://ec.europa.eu/energy/gas/madrid/doc-6/brattlestudy.pdf (as of Sept 2007).

[52] Such contracts may be considered no longer valid under competition law. However, national authorities should be certain that they will no longer be respected.

[53] European Commission Notice 18th July 2007.

[54] Floren, Hans-Peter: *"Permanenter Dialog mit unseren Transportkunden"* in *Energiewirtschaftliche Tagesfragen*, 55. Jg. (2005), Heft 10, S 3, Essen, 2005 cited in 'Analysis of a liberalised German Gas Market A Medium-Term Gas Trading Model based on Entry-Exit Network Access, Philipp Scheib, Dr. Frieder Kalisch, Dr. Bernhard Graeber (all of EnBW Trading, Methodology & Models department), preliminary version for the 5th Conference on Applied Infrastructure Research (INFRADAY), Berlin University of Technology, 6-7 October 2006 (hereafter referred to as the EnBW paper). .

[55] *Gutachten zu Wettbewerbsfragen im Zusammenhang* mit §3, Absatz 2, Satz 1 GasNEV, Im Auftrag von BEB Transport und Speicher Service GmbG, E.ON-Ruhrgas, AG RWE Transportnetz Gas, VNG Verbundnetz Gas AG, Prof. Dr. Wolfgang Pfaffenberger & Prof. Dr. Ulrich Scheele, Bremen, 20/12/05. Translation by *The Brattle Group*.

However, these approaches again confront the difficulties that we mention above; that two pipelines operators may not be sufficient to ensure adequate competition, and that the costs of connecting to an alternative pipeline could be prohibitive. Not withstanding these issues, there remains the problem of how to deal with the remaining 30-50% of customers who do not have access to an alternative network, and could therefore be subject to abuse by a monopoly pipeline in the absence of tariff regulation. In an entry-exit pricing system, it would be relatively easy for a network to charge higher prices to such customers.

The case against significant P2P competition

Schuller argues that there is no P2P competition in Germany, and looks at the specific case of competition between Wingas' network and the ERT network.[56] Schuller notes that the Wingas pipes can reach far fewer customers and exit points than by the ERT network, so that there is insufficient competition.

A 2006 report for the German Federal Ministry of Economics and Technology comes to the conclusion that "the assumption, that there is actual or potential competition in the field of gas transport networks, which would supersede sector specific cost-based regulation, lacks any evidence."[57]

EE² paper

In July 2007, the German section of the European Federation of Energy Traders commissioned a report on the state of P2P competition in Germany.[58] The work was carried out by The Chair of Energy Economics and Public Sector Management at Dresden University of Technology (EE²).

The report noted that the German Regulation on Access Tariffs to Gas Networks [*Gasnetzentgeltverordnung*, GasNEV] of July 25, 2005 states that for there to be P2P competition:

- There should be a majority ("dominance") of exit points with access to multiple network operators;
- it must be potentially viable for a customer to build a new pipeline to access alternative gas networks.

In other words, for competition to exist 'most' customers must have access to a choice of networks, or be able to build a pipeline to an alternative network at a reasonable cost.

The report goes on to discuss the 'natural monopoly' aspects of the gas transport business, noting that there are large economies of scale and scope, and that it is socially inefficient to have multiple companies. The authors argue that 'two is not enough' for pipeline competition, though

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[56] *Infrastrukturwettbewerb im deutschen Gasmarkt, Untersuchung ausgewählter Beispiele*, Benedikt Schuler.

[57] *Monopolkommission: Mehr Wettbewerb auch im Dienstleistungssektor Sechzehntes Hauptgutachten der Monopolkommission gemäß* § 44 Abs. 1 Satz 1 GWB, Bonn, 2006. p.14., cited in the EnBW paper.

[58] Competition in Natural Gas Transportation? Technical and Economic Fundamentals and an Application to Germany, Christian von Hirschhausen, Anne Neumann and Sophia Rüster Reprint from Report for EFET Germany, July 2007.

they offer no evidence of strategic behaviour or further analysis. For example the paper states that "[s]trategic behavior by the network operators also suggests the absence of effective competition"[59] that "[c]ollusion and cooperation appear to be more likely strategies than intensive price competition even where pipeline territories overlap, or there is partial ownership of one pipeline" and "[i]n the case of two existing network operators in a market, it is unlikely that a competitive price emerges because consumers have few options to "switch" between service providers due to technical, locational or institutional factors, or because implicit or explicit collusion between the providers is a more realistic outcome than price competition."

The authors assert that incumbent pipelines could dissuade entry by pricing just below the cost of a new pipeline (limit pricing). This implies that the authors believe the market is contestable, and that the threat of entry could moderate the prices incumbents charge for gas transport. This seems somewhat inconsistent with the authors call for pipeline-tariff regulation. We also note that whether or not contestable markets theory describes other industries, it cannot apply to natural gas transmission, since it relies on the absence of sunk costs.[60] The authors conclude that "it is unlikely that a dominant pipe-to-pipe competition will emerge in Germany."[61]

Beyond noting the requirements of the law for establishing P2P competition, the report does not include a methodology or framework that one could use to establish the presence or absence of competition.

I.3. European Commission investigations and studies

The Energy Sector Inquiry

Other European Commission documents and decisions assert that competition in gas transmission is not economically viable, but without giving detailed evidence or discussion. For example, the Final report of the Energy Sector Inquiry says:

> *Onward transport from the point of import to consumers within the EU takes place by pipeline networks, which gives the gas industry the character of a network industry. The supply of gas to customers in fact depends on the possibilities to use existing pipeline infrastructure. In most cases, the construction of competing parallel gas networks is not economically viable: the network operator on a given transport market can, therefore, often be considered to be in control of a natural monopoly.*[62]

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[59] *Ibid.* p.8.

[60] See for example discussion by Professor R.J. Gilbert in Schmalensee and Willig, eds., Handbook of Industrial Organization (Amsterdam: North Holland) 1989, Vol. I, p. 527).

[61] *Ibid.* p.8.

[62] European Commission, *DG Competition Report on Energy Sector Inquiry*, 10 January 2007, para 31 (p.26).

Similarly, in its decision on the E.On/MOL merger the Commission asserts that "[t]he transmission of gas constitutes a natural monopoly".[63]

The 2002 Brattle Report

In 2002 the European Commission commissioned an independent report from our firm that examined various aspects of the liberalized EU gas market.[64] Our report included a section on pipe-to-pipe competition. The main points were:

- Gas transmission is an industry that faces obvious barriers to the development of competition. Scale economies mean that the efficient scale of entry (i.e., the appropriate size of network/pipeline that an entrant must build) is very large.
- Entry entails large sunk costs that constitute a barrier to entry.
- High barriers to entry mean that competitive discipline on pricing must come from actual rather than potential competition. In the gas industry, proof of competition must entail signs of existing active competition, such as the number of independent players, market shares and concentration indices.
- In most industries with high entry costs, effective competition is thought to require at least four or five competing firms.[65] The presence of just two competing pipelines cannot therefore be considered as evidence of a competitive industry.
- The nature of the gas transport industry makes effective P2P competition difficult.

The report also put forward some suggested tests for establishing the presence of absence of P2P competition which included:

- Whether independent pipelines transport gas from the same location to the same delivery point.
- Concentration of ownership of pipelines.
- Concentration of ownership of capacity.
- The existence of excess capacity.
- Common ownership links among infrastructure owners or capacity holders.

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[63] E.On/MOL, *Case No COMP/M.3696 E.ON/MOL*, 21/12/2005, para 97. Note that strictly speaking (i.e., in economics textbooks) a "natural monopoly" is an industry where economies of scale are such as to make it socially inefficient for competition to occur, even if it is economic for more than one company to enter the market. However the phrase is commonly used to indicate that the market cannot be expected to support more than one company, and that appears to be the meaning intended here and in the previous quotation.

[64] *Loc. cit.* footnote 51.

[65] For example, both EU and US competition authorities use the HHI concentration index. An HHI value above 2,000 (which corresponds to five equally sized firms) is generally regarded as indicating a high level of market concentration.

I.4. Academic Literature, and Trade Associations

Academic Literature

The subject of P2P competition uses several fundamental concepts of economic theory, most notably the concepts of barriers to entry,[66] sunk costs, and contestability[67]. These theories are well covered by the academic literature. However, we found little academic literature dedicated to the subject of P2P competition itself. What we did find principally addresses the possibility of P2P competition in Germany and we have included the material in section I.2 of this paper.

Gas Transmission Europe

As far as we are aware, no trade association in the EU has developed a methodology for establishing the presence of absence of P2P competition. However, GTE has categorised the alternative types of competition that could occur for transit pipelines. GTE has noted that:

> *"Competition [in transit] is present at three levels:*
>
> - *before a transit pipeline is developed, several projects usually compete;*
> - *once the pipeline is in place, it will have to compete with other transit pipelines; in many cases, different companies compete with each other through pipe-to-pipe competition;*
> - *besides pipe-to-pipe competition, LNG routes also offer flexible alternatives to transit through pipelines.*
>
> *This leads to the conclusion that transit is generally a competitive activity in Europe."*[68]

With respect to GTE's first 'level' of competition, it is not clear that this competition is based on the prices charged for gas transport. According to reports in the press, recent competing pipeline projects to bring gas to the EU from Asia seem to have competed largely on the grounds of political support, with lobbying by various governments. This kind of competition is not necessarily relevant for tariffs, since it is not clear that the cheapest pipeline, or the one offering the lowest tariffs, will be built. Nevertheless, GTE's report suggests that GTS could face some competition when setting tariffs for new, open season capacity (if it were allowed to set longer-term tariffs). However, GTE does not describe a method for determining if alternative transit routes are available at a reasonable cost.

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[66] Nobel laureate economist George Stigler defined a barrier to entry as "a cost of producing (at some or every rate of output) which must be borne by a firm which seeks to enter an industry but is not borne by firms already in the industry" (Stigler, G.J., "Barriers to Entry, Economies of Scale, and Firm Size", in G.J. Stigler, *The Organization of Industry*, Irwin, Homewood Il, p.69.

[67] The so-called "contestable markets" theory is difficult to apply to natural gas transmission. The essence of "contestable markets" is that even a monopolist may be constrained to charge competitive prices, because of the risk of "hit-and-run" entry. Pipelines involve large sunk costs and long lead times, making hit-and-run entry very difficult. See for example the discussion by Professor R.J. Gilbert in Schmalensee and Willig, eds., *Handbook of Industrial Organization* (Amsterdam: North Holland) 1989, Vol. I, p. 527.

[68] GTE Transit Report 27th June 2005 Ref. 05TR033, p.5.

GTE's report is primarily concerned with the regulation of transit, rather than establishing the presence or absence of competition between specific transit lines. Therefore the GTS report does not offer an analysis to confirm that competition is present, and for which transit routes. Rather, GTE seems to have identified potential modes of competition for transit pipelines, and then asserts that competition is present.

Appendix II : Entry-exit pricing and tariffs for transit

In an entry and exit system, it is perhaps not immediately obvious how GTS could increase the price of e.g. border entry capacity, while maintaining the price of transit capacity at the same level. If it was true that GTS could not raise the price of e.g. border entry points without also raising the price of transit capacity, then a competitive transit market might discipline the price of border entry capacity. Since GTS charges the same price at an entry point to all users regardless of their destination, it could be that GTS is reluctant to e.g. raise border entry tariffs, for fear of losing transit volumes.

In this section we briefly demonstrate that, leaving aside price discrimination concerns which we discuss later, this is not the case. Looking purely in formal terms, GTS could raise the price for origin and destination markets without affecting the price of transit flows.

Consider the system of price increases illustrated in Figure 5. The price increase for different types of user would be as follows:

- A gas importer: 1+B
- A gas exporter: A-1
- Gas transit: 0
- Gas transport within the Netherlands: A + B.

By applying an offsetting decrease in the price of border exit capacity, GTS could neutralize the effect of the price increase on gas transit, while raising prices to all other types of customers. As long as A > 1 and B > -1, the price increase is profitable for GTS, regardless of the different volume of each type of customer.

Figure 5: Hypothetical price increases, raising border entry tariffs

	Netherlands	Border
Entry	**+A**	**+1**
Exit	**+B**	**-1**

Figure 6 illustrates that GTS could get an identical outcome while *reducing* border entry tariffs. In this case the price increase for different types of user would be as follows:

- A gas importer: -1+B+2 = 1+B
- A gas exporter: A-2+1 = A-1
- Gas transit: 0
- Gas transport within the Netherlands: A-2+B+2 = A + B.

Figure 6: Hypothetical price increases, reducing border entry tariffs

	Netherlands	Border
Entry	**A-2**	**-1**
Exit	**B+2**	**+1**

Accordingly, the competitiveness of transit or parallel path markets would not reduce the risk of market power abuse in the origin and destination markets.

We note that the discussion above assumes that GTS would be able to e.g. reduce the price of a border exit point, while maintaining relatively high prices for nearby domestic exit points; this could raise issues of price discrimination, and could limit the ability of GTS to engage in the kind of pricing we describe above. If this was the case then competition in the parallel path market could provide some protection for users on the origin and destination markets.

This discussion also does not presume that GTS would engage in the behaviour we describe, or that this behaviour is legal. This appendix simply demonstrates that in an entry-exit system it is possible to raise the price of border entry capacity or border exit capacity, without increasing the price of transit, if some price discrimination is possible. Therefore, *competition in the transit market would not necessarily discipline prices for border entry and exit capacity*.

Appendix III : Capacity booked on GTS route that could switch to the alternative route

While raising prices above that of the E.On route would cause GTS to lose some capacity bookings, it would be profitable to do this if the increase in revenue from the remaining capacity (which is unable to switch to E.On) offset the lost revenue from customers that switched to E.On. To make this calculation, we need an estimate of how much transit capacity is currently booked on the route from Emden/Oude Statenzijl area to Belgium.

GTS have provided us with an estimate of all transit capacity across the Netherlands, which is shown in Table 10. Ideally, we would like to have only transit from the Emden/Oude Statenzijl area to Belgium. However, from shipper capacity bookings that DTe have provided to us (discussed in more detail below) we estimate that the majority of transit bookings are from Emden/Oude Statenzijl to Belgium, and hence GTS's estimate of all transit is a good proxy for transit on this route.

However, we make an important adjustment to the GTS transit data, which is to remove the capacity booked under older ('grandfathered') transit contracts for which the price is fixed in a long-term contract which was agreed prior to the Second Gas Directive. Since GTS cannot raise the price of these contracts, they play no part in our calculation of GTS's increased profits from raising prices. Subtracting the fixed price transit contracts gives us the transit capacity for which GTS could raise the price. Note that one of the grandfathered contracts is from the west of the Netherlands to the east (rather than the Emden/Oude Statenzijl area to Belgium transit capacity we are interested in), so by removing this transit capacity we reduce the amount of capacity that is not relevant to this calculation. Table 10 illustrates that the (variable price) transit capacity in 2007 was 1,085 MW.

DTe has also provided us with data indicating the capacity booked by shippers at both entry and exit points during 2006 (on a monthly basis) and for the years 2007 to 2020 inclusive. We attempted to make our own estimate of transit capacity for this specific route, but were unable to reconcile data provided by GTS regarding the grandfathered capacity with the capacity that shippers had claimed to have booked. While we suspect that the inconsistencies may be due to some shippers making errors in the capacity they declare to DTe, DTe was unable to confirm this. Hence, we prefer to rely on the GTS data, even though it is for all transit capacity, not just transit capacity on the route from Emden/Oude Statenzijl area to Belgium.

Table 10: Estimate of capacity bookings for transit flows across the Netherlands 2006-2020

Year	Variable price transit capacity, MW [A] GTS	Capacity available on other routes, MW [B] Brattle	% of variable price transit which could switch [C] [B]/[[A]
2007	35,775	183	1%
2008	38,981	183	0%
2009	38,065	183	0%
2010	52,471	183	0%
2011	77,635	n/a	n/a
2012	136,524	n/a	n/a
2013	138,768	n/a	n/a
2014	140,904	n/a	n/a
2015	140,904	n/a	n/a
2016	140,904	n/a	n/a
2017	140,904	n/a	n/a
2018	140,904	n/a	n/a
2019	140,904	n/a	n/a
2020	140,904	n/a	n/a