GTS'S RAB AND IMPLICATIONS FOR TARIFFS AND INVESTMENT

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1 Introduction and Summary

The Dutch Ministry of Economic Affairs (the *Ministerie van Economische Zaken* or EZ) will shortly issue a consultation on a new regulatory framework for Gas Transport Services (GTS). The consultation will seek views on, among other things, the value of GTS's initial Regulated Asset Base or RAB, from which DTe could derive tariffs. In her letter to the Dutch parliament, the Minister of Economic Affairs has already put forward a suggested RAB of €6.4 billion.[1] We have been retained by BP to estimate a reasonable range of RABs, and determine if the Minister's suggested RAB falls within this range. We also discuss the effect that alternative estimates of the RAB could have on GTS's revenue and ability to invest, and whether inefficiencies could arise.

It is important to note at the outset that, for a state-owned firm, there is no one 'correct' value of the initial RAB, but rather a range of reasonable values that could reflect different policy goals and considerations of 'fairness'. We assess the reasonableness of alternative initial RABs using the criteria of efficiency, equity and government policy:

- Efficiency: tariffs should promote efficient use of the network;
- Equity: consumers should not be charged 'too much'; network owners should earn a fair return on their investment;
- Government policy: the government may want to set the RAB and tariffs to attract larger transit volumes (the "gas roundabout" concept).

Alternative RABs

We have considered several alternative approaches to setting GTS's RAB:

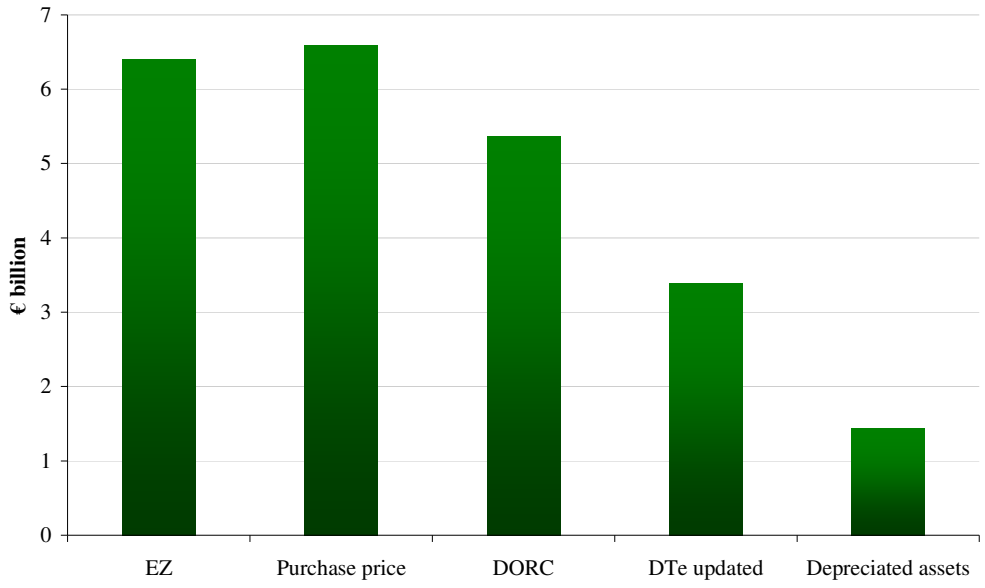
- Apply the 'NPV test'. The NPV test refers to the idea that the regulator should set tariffs so that the present value of capital charges (depreciation and allowed return on capital) associated with a pipeline should not exceed the present value of the capital cost of the pipeline. In essence it is simply a requirement that price equal average cost. Setting the RAB by reference to the NPV test would require the authorities to consider the revenue GTS has earned to date, and the remaining revenue required for GTS to recover the value of its investments.
- Base the RAB on GTS's depreciated book value (prior to revaluation); If Gasunie had set notional gas transport tariffs equal to depreciation plus a reasonable return on capital (how tariffs are set under many regulatory regimes) the depreciated book value of Gasunie's assets would be the amount of the original investment left to recover.
- We have updated DTe's 2001 estimate of GTS's RAB by accounting for investment and inflation since that date.

[1] 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.

- Use Depreciated Optimized Replacement Cost; The DORC methodology sets an upper bound for the RAB, since it is designed to set tariffs that will just dissuade inefficient new pipelines and by pass of the existing network.
- Base the RAB on the 2004 price paid for 50% of Gasunie by the Ministry of Finance.

Figure 1 summarises the results of the approaches we have considered, and compares this to the Minister's proposed RAB.

Figure 1: Summary of alternative RAB estimates



The RAB and tariffs

The Minister has stated that she may raise tariffs above cost-reflective levels, if such tariffs are so low as to risk 'flooding' the Netherlands with gas and threatening the ability to transport gas for Dutch consumers (the so-called 'Jepma effect'). This statement implies that EZ might apply a high RAB to avoid low tariffs and problems with transit gas. We note that recent increases in transit volumes have not threatened security of supply, but have simply prompted GTS to build more capacity via its open season process. The concerns related to the Jepma effect have not materialised in practice.

Moreover, the effect of the initial RAB on tariffs is mitigated by the effect of new investments (which will likely attract higher capital charges and hence have a disproportionate effect on allowed revenue) and GTS's relatively high operating costs. For example, we estimate that choosing an initial RAB about 80% lower than the Minister's suggested RAB would result in average tariffs that are only 33% lower by 2012.

Tariffs and investment

We estimate that, even with a relatively low initial RAB of €1.4 billion, GTS would still be able to fund its planned 'open season' investments without reaching an excessive level of gearing

relative to the other European network businesses. The need for investment does not seem to justify a higher RAB.

Conclusions

- Efficiency considerations imply that the RAB should not in general exceed the DORC. *Our estimate of DORC is €5.4 billion.* Although we have had to rely on limited data, our estimation methodology is conservative (i.e., likely to be an over-estimate), and the figure is therefore likely to be generous upper bound to the RAB unless there are specific efficiency or equity reasons to choose a higher number.

- *There are no compelling efficiency arguments to choose a RAB higher than the DORC*. If efficiency requires higher tariffs for new capacity then it would appear more equitable (while equally efficient) to set higher charges for new capacity, as is done in the UK, without increasing the overall RAB (i.e., charges for existing capacity could go down to compensate).

- *There is no presumption that the RAB should be based on the price paid by the Ministry of Finance to Exxon and Shell when it bought out their share of GTS*. It is quite normal for regulated assets to trade above their RAB, so revaluing the RAB to the market value risks "double counting". Moreover, the high price paid may well have been justified in the context of the transaction, but there are legitimate arguments for expecting at least part of the "market premium" to be borne by taxation rather than charged to system users.

- The RAB of €6.4 billion suggested in the Minister's letter to Parliament is *beyond the upper bound of reasonableness*, which we estimate at €5.4 billion. It is also significantly above the regulator's (adjusted) estimate of €3.4 billion.

- *There are equity arguments to choose a RAB that is significantly lower than implied by the DORC*. Our analysis indicates that Dutch gas users have already paid for much or all of the costs of the network, and the original shareholders had likely already recovered the value of their investment. A significantly lower initial RAB would therefore be more equitable. It need not compromise GTS's ability to invest, or result in a flood of transit flows or problems with security of supply.

2 Issues in setting the RAB

There is no single "correct" methodology for determining the Regulated Asset Base (RAB). Rather there is a range of reasonable values, reflecting a range of relevant criteria such as efficiency, equity, simplicity and transparency. Here we provide a brief discussion of these criteria, and their implications for alternative methodologies.[2] The next section applies these methodologies to produce a range of estimates for the GTS RAB.

Efficiency

Efficiency implies that tariffs should reflect the long run marginal cost of new capacity. Tariffs above long run marginal cost could motivate construction of private pipelines by third-parties even if this was inefficient (either because it would create socially wasteful 'redundant' pipeline capacity, or because third-parties had higher construction costs or were not able to integrate their pipeline into the GTS network and so missed out on potential "economies of scope"). They could also result in inefficiently low levels of demand for transportation.

For new capacity, tariffs below the long run marginal cost of new capacity could lead to inefficiently high demand for new capacity. They could also be too low to allow for or incentivise efficient levels of investment in new pipeline construction.

A further consideration is that where pipe-to-pipe competition exists, the value of the RAB (and therefore resulting level of tariffs) will influence this competition. Setting the RAB too low or too high can distort competition, in the sense that flows may not go via the efficient route.

Since tariffs derive from the RAB, there are at least two implications for RAB valuation. First, in general the RAB should not exceed the Depreciated Optimised Replacement Cost (DORC). The DORC methodology is designed to produce tariffs that correspond to long run marginal cost.[3] It does so by valuing assets on the basis of what it would cost to efficiently replace them with assets of the same service life.

The second implication involves avoiding tariffs for new capacity that are too low. This can be achieved either by setting tariffs for new capacity on the basis of long run marginal cost. However efficiency does not necessarily require the same approach for existing assets. The RAB as a whole can be *less than* implied by DORC. For example, in the UK new entry capacity is charged at cost via the long-term entry capacity auction methodology, but valuation of existing assets for the purpose of determining the RAB is not based on a replacement cost methodology.

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[2] See also our 2000 report for the European Commission, 'Methodologies for Establishing National and Cross-Border Systems of Pricing of Access to the Gas System in Europe', discussion on pp. 54-55, which addresses many of the same issues. Available at http://ec.europa.eu/energy/gas/madrid/doc-2/methodologies.pdf (as of 31/8/07).

[3] See section 3.4 for details.

Equity

It is generally accepted that on grounds of equity/fairness, the revenues for a regulated monopoly asset should be enough to recover costs, including a fair return on the capital employed, but no higher. Charging below this level implies a partial expropriation of assets.[4] Charging above this level provides an unjustified monopoly rent.

The general implication for RAB valuation methodology is that the RAB should reflect the so-called "NPV test". In essence the NPV test is simply a requirement that the price of gas transportation equals the average cost of providing the service, thus ensuring that the pipeline owner will earn a fair return on its investment. More specifically, the regulator should set tariffs so that the present value of capital charges (depreciation and allowed return on capital) associated with a pipeline should not exceed the present value of the capital cost of the pipeline.[5] Capital charges that are consistent with the NPV test allow the pipeline owner to expect a "fair" return on investment.

The question of fairness can be made more complicated by two factors. First, if the owner of a regulated asset bought it from the original investor at a price different from its original cost, then there is a question of which is more relevant: the historic cost of construction, or the "firm acquisition cost" (i.e., the price paid by the new owner). This is particularly difficult as there is a circularity: the price that the new owner paid will have depended on how it thought that the regulator would react to the purchase.

The implications for RAB valuation are complex, precisely because of this circularity. However, there should not be a generic rule that the RAB should reflect "firm acquisition cost", for a number of reasons.

a. The new owner may be able to earn a higher return from the network than is implied by the RAB, so setting the RAB below firm acquisition cost does not imply that the owner will operate at a loss. Regulated companies in many countries typically trade at a significant premium to their RAB, suggesting that they have a value to investors that is greater than the RAB. Possible explanations include that regulators may set tariffs that provide more than a fair return based on the RAB (e.g., they may over-estimate the cost of capital or the level of taxes paid by the company); that incentive regulation ("RPI – X") allows companies to earn above their cost of capital; or that owning regulated assets has option value or provides some kind of synergistic benefits with other assets. In any case, the implication is that if someone buys a regulated company for more than the RAB, they will not necessarily have lost value. Revaluing the RAB to reflect their purchase price may therefore do no more than provide a "windfall profit" to the purchaser, unless their purchase price was based on a firm and legitimate expectation that the revaluation would occur. There is no automatic case for basing the RAB on the purchase price.

[4] There is also an issue of "dynamic efficiency" here—future investment will suffer if government lowers tariffs once an investor has sunk its capital into a regulated asset.

[5] For a more detailed description of the NPV test and related matters see our 200 report (cited at footnote 2 above), especially p.52 and Appendix 6.

b. In a market economy, there is no compelling reason for government to guarantee cost recovery for someone purchasing a network firm, except in cases where it has created a legitimate expectation to that effect in advance of the sale. This is quite different from a firm that built a regulated monopoly network. In that case the guarantee of cost recovery is a promise from government not to engage in "hold up", partly expropriating assets once they are sunk. It is also an equitable part of the arrangement whereby regulation will prevent revenues exceeding costs.

c. Resetting the RAB equal to firm acquisition cost creates perverse incentives for someone considering buying a network. To give an extreme example, if the regulator had a rule that whenever a regulated asset is sold, the RAB should be re-valued to equal the sale price then a purchaser could justify paying any price on the grounds that it will be allowed to recover its costs through the tariffs arising from this revaluation.

Second, state ownership introduces new complications because of the overlap between the interests of customers and taxpayers. If the RAB is set above cost but the resulting profits are used to lower taxes then on average customers will be approximately indifferent. Similarly if the RAB is set below cost and taxes are higher as a result. The implication is simply that for a state-owned company considerations of equity have less effect in terms of restricting the choice of methodology.

Simplicity and Transparency

In practice it is also important that the valuation methodology used should be simple and transparent, so as to allow all market parties to understand and react to proposals, and to ensure that the methodology is applied in practice in a correct and neutral fashion. In terms of valuation methodology, simplicity and transparency are the main arguments that would favour the use of historic cost book value in setting the RAB (i.e., valuing assets at historic cost and applying standard depreciation rules, preferably those the company has used historically).

Additional Policy Considerations

For the Netherlands there are at least two specific additional considerations of public policy. First, the government's desire to attract large transit volumes to the Netherlands so as to benefit from economies of scale in network expansion (the "gas roundabout" concept) could argue in favour of a lower RAB[6] than would otherwise be the case, since lower tariffs will create the necessary level of demand to allow for large scale construction (and the resulting economies of scale will give the network lower unit costs, thus allowing them to recover costs from a relatively lower RAB). Second, the claim that excessively low tariffs could lead to such high volumes of transit on the GTS network that supplies to customers are threatened could argue in favour of a higher RAB than would otherwise be the case. We discuss this second issue (the "Jepma effect") in more detail later in section 4.2.

[6] I.e., a RAB that might be higher in absolute terms, but is lower proportionate to the size of the network, e.g. has a lower value for RAB/(throughput capacity).

3 Alternative estimates of the RAB

As the above discussion shows, different relevant criteria provide some degree of support for a number of different valuation techniques for GTS's RAB, including book value, the "NPV test", DORC and valuation based on the purchase price paid by the Dutch government in buying out the 50% Exxon and Shell shareholding in 2005. Here we apply each of these techniques to get values for the GTS RAB.[7] Given the limitations of time and data availability, the estimates we produce should be viewed as approximate and indicative only. In particular, full application of the DORC methodology would require a detailed engineering assessment of the GTS network. Applying the NPV test in full would also require a "backcasting" exercise to produce hypothetical separate accounts for GTS many years back into the past (when essentially the only available accounts until 1/1/2005 are for the vertically integrated Gasunie company).

As background to this exercise, we provide in section 3.1 a brief overview of recent determinations of the GTS RAB and related figures. We also provide in section 3.6 an update of the RAB value arising from DTE's 2001 determination.

3.1 Recent Determinations of GTS Asset Value

Below we summarise recent determinations of GTS asset value:

- Nederlandse Gasunie N.V. (Gasunie) reported tangible fixed assets for 31/12/01 of €0.99 billion in its 2002 Annual Report, based on historic cost valuation and a depreciation period for pipelines of 20 years.[8]
- In 2001 DTe published a determination setting GTS's RAB as of 1/1/2002 at €2.4 billion.[9] The determination was based on historic cost valuation and a depreciation period for pipelines of 50 years.[10]
- In November 2004 Ministry of Finance agreed to pay €2.78 billion for Shell and Exxon's 50% share of Gasunie, excluding the gas supply business.[11] The gas supply business was split off as Gasunie Trade & Supply, effective as of 1/1/2005.
- In its 2004 Annual Report Gasunie reported tangible fixed assets for 31/12/04 of €0.94 billion.[12]

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[7] In terms of timing, the initial RAB decided by EZ would apply to the new tariff methodology, which we assume would begin in 2008. Hence, the relevant initial RAB is as of 1/1/2008. From the Minister's March 2007 letter it is not clear if the proposed RAB is as of this date, or is a 2007 RAB that would be adjusted for any investments by GTS in 2007. We assume the former in this report. In our assessment below we estimate all RABs as of 1/1/2008.

[8] Nederlandse Gasunie N.V. 2002 Annual Report p.28. Depreciation period from 2004 Annual Report p.51.

[9] DTe *Besluit* 100554/15, 20th December 2001.

[10] The information on how DTe arrived at their RAB estimate is from 'Regulation of European gas transmission system operators', Frontier Economics, January 2005.

[11] Ministry of Economic Affairs Press Release 1/11/2004.

- Following the purchase by the state, Gasunie's tangible fixed assets (in effect GTS's gas transport network and ancillary services assets) were re-valued by Gasunie at €5.1 billion as of 31/12/2005.[13]

3.2 The NPV test

The NPV test requires that the pipeline recover its costs over its useful life. Accordingly, when setting the RAB at some point when the pipeline has been in service for some years, the regulator must consider the revenues earned by the pipeline before this point, to determine how much revenues are required in future for the pipe to recover its costs. For example, suppose a pipeline half way through its useful life had recovered 70% of its costs, then it only requires 30% of its costs over the remaining half of its life.

Ideally one would therefore "reconstruct" hypothetical regulatory accounts for GTS, using data on investments, annual revenues and operating costs to estimate how the ratebase should have grown over time. The difference between annual revenues and operating costs would be viewed as the return on capital (i.e., depreciation plus "allowed return"[14] on the ratebase). In years when the overall return exceeded the allowed return on the ratebase, the difference would be counted as depreciation and next year's ratebase would fall accordingly. In years when the overall return was less than the allowed return, there could be negative depreciation (i.e., the firm would be viewed as having under-recovered in that year and a kind of "IOU" would be added to the ratebase in the form of negative depreciation).

In practice we do not have the data to carry out this exercise. However, publicly available data provides some indication of the network's level of capital recovery over time, and suggests that GTS historically has earned more than its cost of capital on its assets.

First, in its 2004 Annual Report Gasunie provided separate figures for the network business. Based on that data we estimate that in 2003 and 2004 GTS made a return of nearly 100% on its assets (see Table 1). This is an extraordinarily high return, nearly 20 times the return of 5.5% proposed by EZ. Even if the RAB were as high as the €6.4 billion suggested by the Minister, the figures shown in Table 1 would represent a very high level of return (approx. 15%). Note that our calculation underestimates GTS's return, since we use deprecation and operating costs for the whole of Gasunie's business, not just GTS (separate depreciation and operating costs for GTS are not available). Since the costs for Gasunie as a whole are higher than the costs for GTS alone, our methodology will underestimate GTS's pre-tax profit.

Gasunie does not report separate revenue for its pipeline business in other years, so it is not possible to calculate historic returns for many of the previous years. But there is no good reason to believe that Gasunie would have earned very low returns in previous years.

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[12] Nederlandse Gasunie N.V. 2004 Annual Report p.48.

[13] Nederlandse Gasunie N.V. 2005 Annual Report p.74.

[14] Based on an estimate of the appropriate cost of capital, using standard financial techniques such as the Capital Asset Pricing Model (CAPM).

Table 1: Estimated return on GTS's assets for 2003 and 2004

			2004	2003
GTS Revenue	[1]	GU 2004 Annual Report p.58	1,400	1,400
Depreciation	[2]	GU 2004 Annual Report p.48	118	121
Operating costs	[3]	GU 2004 Annual Report p.48	384	366
Pre-tax profit	[4]	[1]-[2]-[3]	898	913
Tangible assets	[5]	GU 2004 Annual Report p.48	944	920
Pre-tax return on tangible assets	[5]	[4]/[5]	95%	99%

Notes:

Depreciation and operating costs are for all of Gasunie's businesses, including Trade & Supply. Therefore our calculation will underestimate GTS's profits, since we allocate to it some costs from other Gasunie businesses.

Second, we know that historically N.V. Nederlandse Gasunie reported profits every year, of around NLG 80 million (about €35 million), until the *Gasgebouw* was restructured in 2004. Since profit is reported *after* depreciation is accounted for, this implies at a minimum that the gas transport business had historically recovered its (accounting) depreciation costs.[15]

Clearly to have an overall after-tax profit of some €30 million with a pre-tax profit of over €350 million on its network, Gasunie must have operated the non-network part of its business at a significant loss. It could be argued therefore that the high returns for the gas transport business seen in Table 1 do not reflect large profits for Gasunie as a whole, because the high returns in gas transport were in some sense cross-subsidising the gas supply business. However this conclusion is misleading, because losses in gas supply by Gasunie reflect an artificially high price paid to purchase gas from NAM, which was also part of the *Gasgebouw*. Without greater transparency about the historical arrangements it is difficult to draw firm conclusions, other than that Gasunie's own accounts report extraordinarily high returns to the network.

Based on the available evidence we therefore conclude that it is likely that GTS has historically recovered its depreciation costs in nominal terms and has earned a return well in excess of its cost of capital. This would imply that the remaining costs to recover are very low. The level of excess returns shown above would imply that according to the principles of the NPV test the RAB could even be zero, as the excess returns may have already paid for the remaining un-depreciated assets. In other words, users of the Dutch gas transport network have already paid for its costs, and probably more. We conclude that, based on the idea of the NPV test, GTS's financial history provides good arguments for a rather low value of the RAB.

[15] Gasunie was originally established to market gas from the Groningen field. Gasunie's cost of gas purchases (i.e. the money it paid to NAM, the upstream producer) were calculated to leave it with a profit of around NLG 70 million per year – that is, the cost of gas was an output of the accounts, and the profit an input. This structure ensured that the profits from Groningen gas sales were taxed upstream, and was a feature of the Dutch Gasgebouw.

3.3 Depreciated historic cost

Nederlanse Gasunie N.V. reports tangible fixed assets for 31/12/04 of €0.94 billion, based on depreciated historic cost. We note that the €0.94 billion of assets includes assets of non-regulated businesses, such as the gas supply business and Gasunie's engineering business. However, we expect that the fixed assets of these businesses are relatively small compared to GTS, although we note that using €0.94 billion is an overestimate of GTS's remaining fixed assets.

We have taken the assets at end 2004[16] and inflated this to reach a RAB for 1/1/2008.[17] We do not deduct further depreciation from the assets, which will also slightly over-estimate the RAB. We have also added on investments made or planned for the period 2005 to 2007 inclusive. This results in an estimate of the initial RAB of €1.4 billion.

Table 2: RAB estimate based on GTS's depreciated asset value

				Money of the day	01/01/2008 money
Gasunie tangible fixed assets end 2004, € mln		[1]	See note	944	
Inflation		[2]	Assumed	2%	
N.V. Nederlanse Gasunie assets end 2004, 2008 value, € mln		[3]	See note		1,002
GTS Investments, € mln					
	2005	[4]	See note	87	91
	2006	[5]	See note	242	250
	2007	[6]	See note	90	91
RAB 1st Jan 2008, € mln		[7]	See note		1,434

Notes:
[1]: N.V. Nederlandse Gasunie 2004 Annual Report
[3]: [1] inflated at 2% per year for three years.
[4]-[6]: From Gasunie N.V 2006 Annual Report p.27. 2008 values derived by inflating values using rate in [2]. For 2006 (Row [5]) GTS state that two-thirds of €367 million was invested in the pipeline network and accompanying installations - we assume that this excludes the BBL pipeline.
[6]: Estimate based on historic levels of investment.
[12]: Sum [3]-[6]

3.4 Depreciated Optimized Replacement Cost

In the absence of detailed engineering studies we cannot determine how a "replacement" network could be optimised relative to the existing GTS network. Our methodology therefore involves in effect valuing the existing network at depreciated replacement cost, and will give a figure that by definition is more than or equal to the true DORC (since optimising the network would give lower costs). Hence our calculation will tend to overestimate the RAB: it would be more correct to say that we have calculated the Depreciated (Unoptimized) Replacement Cost.

[16] Using the fixed assets at the end of 2004 is appropriate because after this date the assets were re-valued due to the Dutch State's purchase of the pipeline business (discussed in more detail below).

[17] Since we subsequently apply a real rate of return, we need a RAB in real terms, hence we need to inflate the historic value of the RAB.

GTS state that the current value of the investments made in the pipeline network between 1963 and 2004 is €11.8 billion.[18] To estimate the DORC, we need to know when the investments were made, so that we can properly depreciate the assets. In the absence of detailed information we have made some simplifying assumptions that are described in Appendix III (and which will tend to further over-estimate the DORC). We assume a depreciation period of 55 years, as proposed by the Minister in her letter to Parliament. Note that this is a conservative assumption, in the sense that long depreciation period will give a higher value for the DORC. Our calculation yields a RAB of €5.4 billion. Appendix III shows the details of our calculations.

3.5 Purchase price of GTS

The price that the Dutch State paid for Gasunie (in effect GTS) could provide a basis for the RAB. The purchase price of €2.78 billion implies a value for Gasunie's equity of €5.56 billion at the time of the purchase. Gasunie has around €0.2 billion in long-term liabilities (debt), implying a total enterprise value of around €5.8 billion as of 01/01/2005. This sum is another possible basis for the RAB. In Table 3 we add on estimated investments made after 01/01/2005 to reach an estimated RAB of €6.6 billion as of 01/01/2008.

Table 3: RAB based on 2005 purchase value

				Money of the day	01/01/2008 money
Gasunie enterprise value 01/01/2005, € mln		[1]	See note	5,800	
Inflation		[2]	Assumed	2%	
N.V. Nederlanse Gasunie assets 01/01/2005, 2008 value, € mln		[3]	See note		6,155
GTS Investments, € mln					
	2005	[4]	See note	87	91
	2006	[5]	See note	242	250
	2007	[6]	See note	90	91
RAB 1st Jan 2008, € mln		[7]	See note		6,587

Notes:
[1]: N.V. Nederlandse Gasunie 2004 Annual Report
[3]: [1] inflated at 2% per year for three years.
[4]-[6]: From Gasunie N.V 2006 Annual Report p.27. 2008 values derived by inflating values using rate in [2]. For 2006 (Row [5]) GTS state that two-thirds of €367 million was invested in the pipeline network and accompanying installations - we assume that this excludes the BBL pipeline.
[6]: Estimate based on historic levels of investment.
[12]: Sum [3]-[6]

3.6 Updated DTe estimate

In December 2001 DTe estimated GTS's RAB as of 1/1/2002 at NLG 5.35 billion, equivalent to €2.43 billion.[19] DTe arrived at this estimate by using the historic book value of the assets (i.e. not

[18] N.V. Nederlandse Gasunie 2004 Annual Report p.53.

[19] DTe *Besluit* 100554/15, 20th December 2001.

adjusted for inflation) and applying a depreciation term of 50 years.[20] Hence, the DTe estimate of the RAB is higher than the depreciated book value above, since Nederlandse Gasunie N.V. used a shorter depreciation term of only 20 years. Since Nederlandse Gasunie N.V. recovered all its depreciation costs, the DTe's estimate is likely to overestimate the RAB with respect to the NPV test. In other words, the DTe's estimate will assume some capital costs have not yet been recovered, when in practise they have been.

In Table 4 we have updated DTe's 2001 RAB estimate, to account for inflation and investments made since the DTe's estimate. This results in a RAB of €3.4 billion for 1/1/2008.

Table 4: Update of DTe's 2001 GTS RAB estimate

			Money of the day	01/01/2008 money
DTe RAB, 1st Jan. 2002, NLG mln	[1]	See note	5,350	
NLG/€ exchange rate	[2]	ECB	2.2	
DTe RAB, 1st Jan. 2002, € mln	[3]	[1]/[2]	2,432	
Inflation	[4]	Assumed	2%	
DTe RAB, 1st Jan. 2002, 2008 value € mln	[5]	See note		2,739
GTS Investments, € mln				
2002	[6]	See note	70	78
2003	[7]	See note	90	98
2004	[8]	See note	35	38
2005	[9]	See note	87	91
2006	[10]	See note	242	250
2007	[11]	See note	90	91
RAB 1st Jan 2008, € mln	[12]	See note		3,384

Notes:
[1]: DTe Besluit 100554/15
[5]: [3] inflated at 2% per year for six years.
[6]-[11]: From Gasunie N.V 2006 Annual Report p.27. 2008 values derived by inflating values using rate in [4]. For 2006 (Row [10]) GTS state that two-thirds of €367 million was invested in the pipeline network and accompanying installations - we assume that this excludes the BBL pipeline.
[11]: Estimate based on historic levels of investment.
[12]: Sum [5]-[11]

3.7 Maintaining the Dutch Investment Environment

Our analysis above suggests that at most, the Dutch pipeline network would have about €1.4 billion of costs to recover. But the price paid by the Dutch state implied a value of €5.8 billion. This is not to say that the Ministry of Finance overpaid for GTS. Rather the Dutch State faced a choice. Either it could buy GTS at the price implied by its recent tariffs and revenues. Or it could apply the logic of the NPV test, claim that the shareholders had recovered most of their costs, cut tariffs and buy the business at a price closer to the depreciated book value.

[20] The information on how DTe arrived at their RAB estimate is from 'Regulation of European gas transmission system operators', Frontier Economics, January 2005.

If the Netherlands had followed the latter choice, this could have looked like the government was expropriating the private shareholders' assets. Instead, by paying the value implied by the pre-liberalisation tariff regime, the government respected the expectations of the private shareholders, and helped to maintain an attractive investment environment in the Netherlands. The amount paid for GTS above the depreciated book value can be thought of as the price of maintaining the Netherlands reputation for respecting investors' expectations, as it restructures the gas industry for market liberalisation. In a sense, the issue is similar to the issue of 'stranded costs' that occur in many transitions to a liberalised market.

The relevant question then is – who should pay for maintaining the investment environment in the Netherlands? If GTS's RAB is set at less than €5.8 billion, the Dutch government must write off the difference between the RAB and the purchase price. The cost of the write off would be met through general taxation – *i.e.* most people in the Netherlands. Alternatively, the government could set GTS's RAB at €5.8 billion (or higher) and avoid a write off. This would mean that users of the Dutch gas network would bear the costs of maintaining the investment environment.

There is an argument that the cost of the write-off should be recovered through general taxation: since everyone in the Netherlands benefited from maintaining the investment environment, it seems fair that everyone should pay for it. Recovering the cost from network users might be construed as inequitable, since the costs are concentrated on a smaller group while the benefits are more widespread. Therefore, there is an equity argument for setting a RAB close to €1.4 billion (the RAB based on depreciated assets), since this means the beneficiaries of the policy of maintaining the Dutch investment environment bear its costs.

On this basis, setting GTS's RAB above €5.8 billion would appear even less fair. Gas users would pay not only the cost of maintaining the Dutch investment environment, but an additional cost for a network they have largely already paid for. This argument therefore implies that on an equity basis €5.8 billion would be the upper limit of reasonableness for GTS's RAB, and setting a significantly lower RAB, closer to €1.4 billion, would be more equitable. We would recognise however in assessing this argument that it is for government to decide on the appropriate levels and structure of taxation, which involve many complex economic and political issues.

3.8 Summary of alternative RAB estimates

We summarize the different RAB estimates in Table 5 below.

Table 5: Alternative GTS RAB estimates

Method	01/01/2008 RAB, € mln
DORC	5,367
Depreciated assets	1,434
EZ	6,400
DTe updated	3,384
Purchase price	6,587

4 Implications of alternative RABs for tariffs and investment

In this section we analyze the effect that alternative revenues could have on GTS's allowed revenues, and hence by extension the effect on tariffs and GTS's ability to fund new investment.

4.1 Model of required future revenues

We have constructed a simple financial model that calculates GTS's allowed revenues for a given RAB (as of 1/1/2008), taking into account GTS's investment plans and the depreciation and allowed rates of return mentioned in the Minister's letter. Table 6 illustrates the allowed revenues for the lowest initial RAB we have calculated (column [A]), and for the Minister's proposed RAB of €6.4 billion (column [B]). Appendix I shows our more detailed calculations.

Our calculations illustrate that allowed revenues (and hence tariffs) do not fall dramatically, even with a much lower RAB. For example, if we set a RAB based on Gasunie's depreciated assets, it would be 22% of the RAB proposed by EZ. But by 2012 allowed revenue (and hence tariffs) would be 67% of the revenue if the RAB had been set at the level proposed by EZ level (Table 6 explains how the 67% is derived). This implies that even using a relatively low RAB need not dramatically lower tariffs.

Allowed revenues for most regulated pipelines consists of money for covering operating costs, deprecation and a return on capital. Accordingly, in the case of Gasunie there are two factors which reduce the effect of the initial RAB on tariffs in 2012 (and future years). First, Gasunie has relatively high operating costs (columns [A] and [D] in Table 6). Most likely these reflect large transit volumes, and the demand for high cost of gas-quality conversion (an energy intensive process which involves the separation of nitrogen from air). These costs must be recovered and are added to the allowed revenues. Hence high operating costs form a large part of the allowed revenue, and these do not vary with the choice of initial RAB.

Second, Gasunie is planning to invest €1.3 billion in new pipelines between 2009 and 2012 (the so-called open season). According to the Minister's proposal, these new investments will be allowed higher capital charges, and hence have a disproportionate effect on allowed revenues. Therefore, regardless of the RAB at the beginning of 2008, the return on capital on open season investments add significantly to Gasunie's required revenue.

Table 6: Estimated allowed revenues (nominal, € mln) under different initial RAB assumptions

	Allowed revenue, € mln						Ratio
	Basis for RAB: Depreciated assets (€1.4 bln)			Basis for RAB: EZ (€6.4 bln)			
Year	Operating costs [A] Table 8	Capital allowances [B] Table 8	Total [C] Table 8	Operating costs [D] Table 9	Capital allowances [E] Table 9	Total [G] Table 9	[H] [C]/[G]
2012	478	285	763	478	661	1,139	67%

4.2 The Jepma effect

In her letter, the Minister stated that she would consider raising tariffs above a cost-based rate, if cost-based tariffs were so low that the demand for transit flows could increase to a degree which threatens domestic Dutch gas supplies.[21] The Minister specifically cites the 'Jepma effect', after a report by Professor C.J. Jepma[22] which originally developed the theory that low transit tariffs could flood the Dutch market and threaten security of supply. Specifically, the concern is that the demand for transit capacity could leave insufficient capacity for Dutch gas users.

However, developments in the gas market over the last few years have shown that the theoretical concerns expressed in the Jepma report appear to be unfounded in reality. Gas flows on the GTS system to other countries have increased from 44.5 bcm in 2003 to 51.8 bcm in 2006. Since there are restrictions on Dutch gas exports, the majority of this 7.3 bcm/year increase is presumably transit flows. Yet there have been no reported issues with gas transport to domestic Dutch customers.

The GTS network has become increasingly congested. But rather than threaten domestic supply, GTS has responded by holding an open season, and now plans to increase capacity, specifically for transit gas. The response to increased transit has been a move to increase capacity, rather than domestic gas supply disruption. Although it will take some years for the open season to produce new capacity, to our knowledge there is no objective evidence of a 'Jepma' problem in the immediate future.

We also note that, even if the Minister were concerned with a 'Jepma effect', there are regulatory solutions that do not depend on increasing tariffs. First, GTS could simply reserve the necessary amount of transport capacity to ensure security of supply for domestic Dutch customers. This would appear to serve a legitimate public interest and we doubt that it should be construed as discriminatory—it seems analogous to the rule in Belgium that reserves the limited Belgian storage capacity to ensure security of supply for domestic Belgian customers. We understand that DTe has proposed such a solution.

4.3 Tariffs and investment

GTS plans to invest €1.3 billion between 2009 and 2012 as part of the 'open season' process to increase transit capacity. This amounts to an average investment of about €325 million per year. We have calculated GTS's ratio of debt/to RAB, if it had an initial RAB of €1.4 billion (based on the depreciated assets). Our calculations illustrate that GTS could fund its investments by borrowing without a dangerously high level of gearing. Column [H] of Table 7 illustrates that the resulting debt/RAB ratio would be at most 34%. A recent paper by the UK's energy and water regulators recently concluded that the average gearing for network companies in the UK was 60%, with several firms having a gearing of greater than 75%.[23] GTS's gearing would be well below this

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[21] *Loc. cit.* footnote 1. Translation from Dutch to English provided by BP.

[22] Prof. Dr mr C.J. Jepma, *Gaslevering onder druk: invloed van de Richtlijnen van de DTe op de Nederlandse gasstromen* (April 2001).

[23] 'Financing Networks: A discussion paper' Ofwat and Ofgem, February 2006 ¶20 p.12.

average level, even with a relative low initial RAB. UK firms provide a good benchmark for what is an efficient or acceptable level of gearing, as the network firms are privatised and are therefore well-incentivised to finance themselves efficiently.

Table 7: Estimate of Debt/RAB

Year	Total allowed revenues [A] Table 8	Operating expenses [B] Table 8	Cash left for investment [C] [A]-[B]	Investments [D] Table 8	Borrowing requirement [E] [D]-[C]	Cumulative debt [F] [E] + [F]y-1	RAB [G] See note	Debt/RAB [H] [F]/[G]
2009	608	478	130	500	370	370	1,736	21%
2010	669	478	191	500	309	679	2,018	34%
2011	725	478	247	325	78	758	2,412	31%
2012	763	478	285	325	40	798	2,791	29%

Notes:
[D]: For 2008 we assume investment of €90 million based on GTS's past investment record. Annual investment between 2009 and 2012 inclusive is €1.3 billion (the 'open season' investments) divided by 4 plus, plus 50% of €350 million per year in 2009 and 2010 to allow for investment in gas storage.
[G]: Average of SOY and EOY RAB from Table 8, inflated to money of the day (middle of year) at 2% per year.

We note that Gasunie issued €1 billion of debt in 2006, but will have no other outstanding debt at the end of 2007.[24] However, we do not include the €1 billion of debt in our calculation above. Either the money has been borrowed to fund non-regulated investment (in which case it would not appear in GTS's regulatory accounts) or, if it was borrowed partially to fund regulated investments, the regulator would only allow the amount required to appear on the regulatory accounts at the time that it is needed (as in Table 7). Our case is conservative, in that we assume Gasunie's planned gas storage investment will be regulated, and hence appear in the regulatory accounts.

Our calculations are necessarily approximate; a much more detailed assessment would be required before setting the final RAB. But our calculations seem to indicate a much lower RAB that that proposed by the Minister is consistent with acceptable levels of gearing.

[24] N.V. Nederlandse Gasunie 2006 Annual Report p.88.

Appendix I : Note on DORC

This note explains the economic logic behind using DORC as an upper bound on the ratebase, including a brief explanation of why it is right to depreciate (i.e., to use "DORC" not "ORC").

If the charge for using an asset is set above its replacement cost then there is a risk of inefficient entry. Consider a hypothetical pipeline that is about to go into operation. Assume for simplicity's sake that the pipeline is the right size to meet all demand. Once the pipeline has been built, it represents a sunk cost. Entry is therefore inefficient however low the entrant's costs: the existing pipeline provides all needed services, and building a second pipeline will therefore simply add cost without producing additional value.

To prevent this inefficient entry it is sufficient to set tariffs such that the maximum revenues an entrant can earn are no more (in NPV terms) than its costs.

Instead of thinking directly about tariffs, it is convenient to think in terms of the Regulatory Asset Base (RAB). Under standard regulatory accounting, tariffs are derived from the RAB in such a way that at any point in time, the NPV of future revenues (net of operating costs) for a given asset, over the remaining life of that asset, is equal to its RAB.

If an asset had an infinite useful life (and therefore no depreciation), preventing inefficient entry could be done simply by ensuring that at any point in time the RAB was no greater than the costs of any entrant.[25] This could be done by periodic revaluation of the RAB. Then the entrant would know that even if it entered and took 100% of business from the existing pipeline by offering tariffs equal to the incumbent's (or the incumbent's minus a very small amount), its revenues could not do more than cover its costs.

In these circumstances (and still assuming infinite length of useful life), a necessary condition for efficiency therefore is that the RAB is never above ORC. We should recognize that this argument involves some simplifying assumptions:

1. It assumes that the market is contestable, in the sense that an entrant could sign up all existing demand on long-term contracts in advance of sinking the cost of its pipeline. In reality this will often be difficult or impossible.[26] As a result, entry is more difficult and even tariffs above the DORC level might not induce entry. Once both pipelines are in the ground, competition between the two for customers who have not signed long-term contracts could cause prices to drop down to short run marginal costs, causing both to lose money.

2. There is a related issue concerning economies of scope. Suppose that a network provides transportation services from points A to B and from points C to D. The joint

[25] Note that requiring the RAB to be no higher than the lowest cost of *any* entrant is the same as requiring it to be no higher than the Optimized Replacement Cost (ORC), since the entrant with lowest costs will by definition build the optimized replacement asset.

[26] Partly because existing customers may already have long-term contracts with the incumbent, partly because of "transactions costs" that make it impractical to sign up every present and future customer.

cost of providing both services will typically be lower than the individual cost of providing either. Suppose that in this case each service has stand-alone total cost of 100, while the combined cost of the two services is 180 (all costs in NPV terms). Then capping the RAB at 180 is necessary if there is a concern that an entrant might replicate the whole network. However, more realistically the concern will be at most that an entrant might replicate one of the services. A RAB of 200 would then be enough to prevent inefficient entry.

These two points both imply that it is probably possible to charge some amount above ORC without in practice incurring a significant risk of inefficient entry. The incumbent could in principle enjoy an "incumbency rent" or return to the "first-mover's advantage".

Nonetheless, ORC remains a useful benchmark for a number of reasons:

- Setting tariffs above ORC leads to unnecessary static inefficiency, i.e., a reduction in demand for transportation services that could be provided at cost less than their value to the user.
- General considerations of equity would argue against allowing the incumbent to earn a rent of this kind (although equity considerations are best seen in relation to the overall profitability of the pipeline).
- Estimating ORC is already in practice quite complex, and attempting to estimate in addition the size of this incumbency rent would add to the difficulty.

Depreciation

Allowing for a finite asset life adds technical complexity, but does not alter the underlying economics. To see the effect of finite asset life it is simplest first to suppose that the discount rate is zero, and also that there are no operating costs: the tariff is therefore just equal to depreciation. Imagine an asset of cost €100, with constant annual volumes and a 20 year lifetime (and assume also straight line depreciation). Suppose the asset is now ten years old, and technological progress means that the replacement cost is now just €80. If we set the RAB of the existing asset at €80 then the tariffs over the remaining ten years of that asset will be €8/yr. However a tariff of €8/yr over 20 years will give €160. An entrant who built a duplicate pipe would therefore earn a 100% profit over the lifetime of its investment. To prevent inefficient duplication, the tariff has to be just €4/yr, which is achieved by applying ten years depreciation and so setting the RAB at €40.

The realistic case involves a positive discount rate, but it is simple to check that the underlying principle remains: applying depreciation gives the right tariff level to prevent inefficient duplication.

Appendix II : Allowed revenue calculations

Table 8: Calculation of GTS's allowed revenues using Depreciated Assets as initial RAB

Inflation	[1]	Assumed	2%
Return, old assets	[2]	EZ	5.5%
Return, new assets	[3]	EZ	7.0%
Depreciation, old assets, years	[4]	EZ	55
Depreciation, new assets, years	[5]	EZ	20

	Old Assets					New Assets							Totals			
Year	RAB SOY [A] See note	Depreciation [B] $[A]_{2008}/[4]$	RAB EOY [C] [A]-[B]	Return on capital [D] [2]x[A]	Capital allowances [E] [D]+[B]	RAB SOY [F] $[J]_{y-1}$	Investments Nominal [G] See note	Investments Real [H] See note	Depreciation [I] See note	RAB EOY [J] [F]+[H]-[I]	Return on capital [K] [3]x[F]	Capital allowances [L] [I]+[K]	Total capital allowances, real [M] [E]+[L]	Total capital allowances, nominal [N] See note	Operating expenses [O] See note	Total allowed revenues, Nominal [P] [N]+[O]
2008	1,434	26	1,408	79	105	-	90	89	2	87	-	2	107	108	478	586
2009	1,408	26	1,381	77	103	87	500	485	17	556	6	23	126	130	478	608
2010	1,381	26	1,355	76	102	556	500	476	41	991	39	80	182	191	478	669
2011	1,355	26	1,329	75	101	991	325	303	60	1,234	69	129	230	247	478	725
2012	1,329	26	1,303	73	99	1,234	325	297	75	1,456	86	161	261	285	478	763

Notes:

All amounts € million; SOY = Start of year; EOY = End of year.

[A]: 2008 Opening RAB from main report. Thereafter $[A]_y = [C]_{y-1}$.

[G]: For 2008 we assume investment of €90 million based on GTS's past investment record. Annual investment between 2009 and 2012 inclusive is €1.3 billion (the 'open season' investments) divided by 4 plus, plus 50% of €350 million per year in 2009 and 2010 to allow for investment in gas storage.

[H]: [G]/{(1+[1])^(year - 2007)}

[I]: For year y, depreciation is the sum of all 50% of investment in year y plus investments in column [H] up to year y, divided by [5].

[N]: [M]x{(1+[1])^(year - 2007-0.5)}

[O]: Based on Gasunie's 2006 operating costs less investment related costs (N.V. Nederlandse Gasunie 2006 Annual Report, p.108). We assume GTS accounts for 99% of Gasunie's operating costs, and that these costs will stay constant in nominal terms (decline in real terms) due to efficiency improvements.

Table 9: Calculation of GTS's allowed revenues using EZ's initial RAB proposal

Inflation	[1]	Assumed	2%
Return, old assets	[2]	EZ	5.5%
Return, new assets	[3]	EZ	7.0%
Depreciation, old assets, years	[4]	EZ	55
Depreciation, new assets, years	[5]	EZ	20

	Old Assets					New Assets							Totals			
Year	RAB SOY [A] See note	Depreciation [B] $[A]_{2008}/[4]$	RAB EOY [C] [A]-[B]	Return on capital [D] [2]x[A]	Capital allowances [E] [D]+[B]	RAB SOY [F] $[J]_{y-1}$	Investments Nominal [G] See note	Investments Real [H] See note	Depreciation [I] See note	RAB EOY [J] [F]+[H]-[I]	Return on capital [K] [3]x[F]	Capital allowances [L] [I]+[K]	Total capital allowances, real [M] [E]+[L]	Total capital allowances, nominal [N] See note	Operating expenses [O] See note	Total allowed revenues, Nominal [P] [N]+[O]
2008	6,400	116	6,284	352	468	-	90	89	2	87	-	2	471	475	478	953
2009	6,284	116	6,167	346	462	87	500	485	17	556	6	23	485	499	478	977
2010	6,167	116	6,051	339	456	556	500	476	41	991	39	80	535	562	478	1,040
2011	6,051	116	5,935	333	449	991	325	303	60	1,234	69	129	579	620	478	1,098
2012	5,935	116	5,818	326	443	1,234	325	297	75	1,456	86	161	604	661	478	1,139

Notes:

All amounts € million; SOY = Start of year; EOY = End of year.

[A]: 2008 Opening RAB from main report. Thereafter $[A]_y = [C]_{y-1}$.

[G]: For 2008 we assume investment of €90 million based on GTS's past investment record. Annual investment between 2009 and 2012 inclusive is €1.3 billion (the 'open season' investments) divided by 4 plus, plus 50% of €350 million per year in 2009 and 2010 to allow for investment in gas storage.

[H]: [G]/{(1+[1])^(year - 2007)}

[I]: For year y, depreciation is the sum of all 50% of investment in year y plus investments in column [H] up to year y, divided by [5].

[N]: [M]x{(1+[1])^(year - 2007-0.5)}

[O]: Based on Gasunie's 2006 operating costs less investment related costs (N.V. Nederlandse Gasunie 2006 Annual Report, p.108). We assume GTS accounts for 99% of Gasunie's operating costs, and that these costs will stay constant in nominal terms (decline in real terms) due to efficiency improvements.

Table 10: Calculation of GTS's allowed revenues using initial RAB based on updated DTe estimate

Inflation	[1]	Assumed	2%
Return, old assets	[2]	EZ	5.5%
Return, new assets	[3]	EZ	7.0%
Depreciation, old assets, years	[4]	EZ	55
Depreciation, new assets, years	[5]	EZ	20

	Old Assets					New Assets							Totals			
Year	RAB SOY [A] See note	Depreciation [B] $[A]_{2008}/[4]$	RAB EOY [C] [A]-[B]	Return on capital [D] [2]x[A]	Capital allowances [E] [D]+[B]	RAB SOY [F] $[J]_{y-1}$	Investments Nominal [G] See note	Investments Real [H] See note	Depreciation [I] See note	RAB EOY [J] [F]+[H]-[I]	Return on capital [K] [3]x[F]	Capital allowances [L] [I]+[K]	Total capital allowances, real [M] [E]+[L]	Total capital allowances, nominal [N] See note	Operating expenses [O] See note	Total allowed revenues, Nominal [P] [N]+[O]
2008	3,384	62	3,323	186	248	-	90	89	2	87	-	2	250	252	478	731
2009	3,323	62	3,261	183	244	87	500	485	17	556	6	23	267	275	478	753
2010	3,261	62	3,200	179	241	556	500	476	41	991	39	80	320	337	478	815
2011	3,200	62	3,138	176	238	991	325	303	60	1,234	69	129	367	393	478	871
2012	3,138	62	3,077	173	234	1,234	325	297	75	1,456	86	161	396	433	478	911

Notes:

All amounts € million; SOY = Start of year; EOY = End of year.

[A]: 2008 Opening RAB from main report. Thereafter $[A]_y = [C]_{y-1}$.

[G]: For 2008 we assume investment of €90 million based on GTS's past investment record. Annual investment between 2009 and 2012 inclusive is €1.3 billion (the 'open season' investments) divided by 4 plus, plus 50% of €350 million per year in 2009 and 2010 to allow for investment in gas storage.

[H]: [G]/{(1+[1])^(year - 2007)}

[I]: For year y, depreciation is the sum of all 50% of investment in year y plus investments in column [H] up to year y, divided by [5].

[N]: [M]x{(1+[1])^(year - 2007-0.5)}

[O]: Based on Gasunie's 2006 operating costs less investment related costs (N.V. Nederlandse Gasunie 2006 Annual Report, p.108). We assume GTS accounts for 99% of Gasunie's operating costs, and that these costs will stay constant in nominal terms (decline in real terms) due to efficiency improvements.

Table 11: Calculation of GTS's allowed revenues using initial RAB based on DORC

Inflation	[1]	Assumed	2%
Return, old assets	[2]	EZ	5.5%
Return, new assets	[3]	EZ	7.0%
Depreciation, old assets, years	[4]	EZ	55
Depreciation, new assets, years	[5]	EZ	20

	Old Assets					New Assets							Totals			
Year	RAB SOY [A] See note	Depreciation [B] $[A]_{2008}/[4]$	RAB EOY [C] [A]-[B]	Return on capital [D] [2]x[A]	Capital allowances [E] [D]+[B]	RAB SOY [F] $[J]_{y-1}$	Investments Nominal [G] See note	Investments Real [H] See note	Depreciation [I] See note	RAB EOY [J] [F]+[H]-[I]	Return on capital [K] [3]x[F]	Capital allowances [L] [I]+[K]	Total capital allowances, real [M] [E]+[L]	Total capital allowances, nominal [N] See note	Operating expenses [O] See note	Total allowed revenues, Nominal [P] [N]+[O]
2008	5,367	98	5,270	295	393	-	90	89	2	87	-	2	395	399	478	877
2009	5,270	98	5,172	290	387	87	500	485	17	556	6	23	410	422	478	901
2010	5,172	98	5,074	284	382	556	500	476	41	991	39	80	462	485	478	963
2011	5,074	98	4,977	279	377	991	325	303	60	1,234	69	129	506	542	478	1,021
2012	4,977	98	4,879	274	371	1,234	325	297	75	1,456	86	161	533	582	478	1,061

Notes:
All amounts € million; SOY = Start of year; EOY = End of year.
[A]: 2008 Opening RAB from main report. Thereafter $[A]_y = [C]_{y-1}$.
[G]: For 2008 we assume investment of €90 million based on GTS's past investment record. Annual investment between 2009 and 2012 inclusive is €1.3 billion (the 'open season' investments) divided by 4 plus, plus 50% of €350 million per year in 2009 and 2010 to allow for investment in gas storage.
[H]: [G]/{(1+[1])^(year - 2007)}
[I]: For year y, depreciation is the sum of all 50% of investment in year y plus investments in column [H] up to year y, divided by [5].
[N]: [M]x{(1+[1])^(year - 2007-0.5)}
[O]: Based on Gasunie's 2006 operating costs less investment related costs (N.V. Nederlandse Gasunie 2006 Annual Report, p.108). We assume GTS accounts for 99% of Gasunie's operating costs, and that these costs will stay constant in nominal terms (decline in real terms) due to efficiency improvements.

Table 12: Summary of GTS's allowed revenues using different initial RABs

Year	Allowed Revenue, € mln				Allowed Revenue, % of EZ proposal		
	DORC	Depreciated assets	Updated DTe	EZ	DORC	Depreciated assets	Updated DTe
2008	877	586	731	953	92%	62%	77%
2009	901	608	753	977	92%	62%	77%
2010	963	669	815	1,040	93%	64%	78%
2011	1,021	725	871	1,098	93%	66%	79%
2012	1,061	763	911	1,139	93%	67%	80%

Appendix III : DORC calculation details

To estimate the timing of Gasunie's investment in the network, we assume that between 1985 and 2004 investments were proportional to the length of the pipeline network. Prior to this date, we assume that investments were made in proportion to demand for gas transport.[27]

Table 13: Calculation of 2006 RAB based on DORC

Year	Transported (bcm) [A] Table 14	Transport index [B] 100x[A]/[A]$_{Max}$	Pipeline length, km [C] EnergieNed	Pipeline index [D] 100x[C]/[AC$_{Max}$	Investment scaling factor [E] See note	Replacement value (current value) (€mn) [F] [E]x[F]$_{Max}$/100	New investments by year (€mn) [G] [F]$_{y}$-[F]$_{y-1}$	Depreciated value in 2006 (€mn) [H] See note
1965	4.2	4.3			4.3	509	509	130
1966	7.7	7.9			7.9	934	424	116
1967	14.2	14.6			14.6	1726	792	230
1968	23.8	24.5			24.5	2886	1160	359
1969	34.8	35.7			35.7	4216	1330	435
1970	49.5	50.8			50.8	5999	1783	616
1971	63.7	65.5			65.5	7725	1726	628
1972	75.1	77.2			77.2	9112	1387	529
1973	83.3	85.6			85.6	10102	990	396
1974	83.3	85.6			85.6	10102	0	0
1975	86.1	88.5			88.5	10442	340	148
1976	85.6	88.0			88.5	10442	0	0
1977	86.6	89.0			89.0	10498	57	27
1978	84.5	86.8			89.0	10498	0	0
1979	85.9	88.2			89.0	10498	0	0
1980	78.4	80.6			89.0	10498	0	0
1981	77.9	80.1			89.0	10498	0	0
1982	78.9	81.1			89.0	10498	0	0
1983	76.5	78.7			89.0	10498	0	0
1984	81.0	83.2			89.0	10498	0	0
1985	84.5	86.8	10926	93.95	93.95	11086	587	363
1986	84.7	87.1	10872	93.48	93.95	11086	0	0
1987	87.0	89.4	10830	93.12	93.95	11086	0	0
1988	79.3	81.5	10919	93.89	93.95	11086	0	0
1989	81.2	83.5	10786	92.74	93.95	11086	0	0
1990	80.3	82.5	10685	91.87	93.95	11086	0	0
1991	88.9	91.4	10730	92.26	93.95	11086	0	0
1992	85.6	88.0	11027	94.82	94.82	11188	102	76
1993	88.4	90.9	11255	96.78	96.78	11420	231	177
1994	86.1	88.5	11487	98.77	98.77	11655	235	184
1995	88.2	90.6	11424	98.23	98.77	11655	0	0
1996	97.3	100.0	11429	98.27	98.77	11655	0	0
1997	91.2	93.8	11389	97.93	98.77	11655	0	0
1998	90.3	92.8	11630	100.00	100.00	11800	145	124
1999	88.4	90.9	11600	99.74	100.00	11800	0	0
2000	91.5	94.0	11600	99.74	100.00	11800	0	0
2001	91.2	93.8	11600	99.74	100.00	11800	0	0
2002	87.0	89.4	11600	99.74	100.00	11800	0	0
2003	87.0	89.4	11600	99.74	100.00	11800	0	0
2004	97.3	100.0	11600	99.74	100.00	11800	0	0
2005	95.2	97.8	11600	99.74	100.00	11800	0	0
2006	96.4	99.1	11600	99.74	100.00	*11800*	0	0
Maximum	97.3		11630			11800		
						Total	*11800*	*4538*

Notes:

[E]: From 1965 to 1984, we scale from column [B], the transported gas, as there is no information on installed pipeline lenght available; in these years the scaling factor is the maximum value in column [B] between 1965 and the year the scaling factor is calculated for. We use a maximum to account for the possibility that transported gaas volumes culd fall from one year to the next, but the investment sclaing factor should not decrease from one year to the next. From 1985 onward, we switch to using the more reliable pipeline index. For these years, the scaling factor is the maximum value in column [D] between 1985 and the year the scaling factor is calculated for.
[H]: Maximum of {0,[G]x55 years - (2006 -year))/55 years}

[27] This assumption will overestimate the DORC; since we assume investments were made 'on demand' as demand for gas transport grew, but in reality investments are lumpy, and hence are made in anticipation of future demand. Earlier investment will mean more depreciation has taken lace, and hence today's DORC will be lower than we estimate.

Table 14: Estimate of transported gas volumes

	Year	Dutch Consumption [A] See note	Total volumes transported [B] See note	Ratio [C] [B]/[A]
[1]	1965	1.8	4.20	
[2]	1966	3.3	7.70	
[3]	1967	6.1	14.23	
[4]	1968	10.2	23.80	
[5]	1969	14.9	34.77	
[6]	1970	21.2	49.47	
[7]	1971	27.3	63.70	
[8]	1972	32.2	75.14	
[9]	1973	35.7	83.30	
[10]	1974	35.7	83.30	
[11]	1975	36.9	86.10	
[12]	1976	36.7	85.64	
[13]	1977	37.1	86.57	
[14]	1978	36.2	84.47	
[15]	1979	36.8	85.87	
[16]	1980	33.6	78.40	
[17]	1981	33.4	77.94	
[18]	1982	33.8	78.87	
[19]	1983	32.8	76.54	
[20]	1984	34.7	80.97	
[21]	1985	36.2	84.47	
[22]	1986	36.3	84.70	
[23]	1987	37.3	87.04	
[24]	1988	34	79.34	
[25]	1989	34.8	81.20	
[26]	1990	34.4	80.27	
[27]	1991	38.1	88.90	
[28]	1992	36.7	85.64	
[29]	1993	37.9	88.44	
[30]	1994	36.9	86.10	
[31]	1995	37.8	88.20	
[32]	1996	41.7	97.30	
[33]	1997	39.1	91.24	
[34]	1998	38.7	90.30	
[35]	1999	37.9	88.44	
[36]	2000	39.2	91.47	
[37]	2001	39.1	91.24	
[38]	2002	39.3	87	2.21
[39]	2003	40.3	87	2.16
[40]	2004	41.1	97.3	2.37
[41]	2005	39.5	95.2	2.41
[42]	2006	38.3	96.4	2.52

Notes:
[A]: BP Statistical Review of World Energy, 2007 and 2003.
[B]: [38]-[42] - Gasunie 2006 Annual Report; [1]-[37] Average of {[C][38]-[42]}x[A]

Table 15: Estimate 2008 RAB from 2006 DORC

			Money of the day	01/01/2008 money
DORC RAB, 1st Jan. 2006, NLG mln	[1]	Table 12	4,538	
Inflation	[2]	Assumed	2%	
DTe RAB, 1st Jan. 2006, 2008 value € mln	[3]	See note		4,721
GTS Investments, € mln				
2002	[4]	See note	70	78
2003	[5]	See note	90	98
2004	[6]	See note	35	38
2005	[7]	See note	87	91
2006	[8]	See note	242	250
2007	[9]	See note	90	91
RAB 1st Jan 2008, € mln	[10]	See note		5,367

Notes:
[3]: [1] inflated at 2% per year for two years.
[4]-[8]: From Gasunie N.V 2006 Annual Report p.27. 2008 values derived by inflating values using rate in [2]. For 2006 (Row [8]) GTS state that two-thirds of €367 million was invested in the pipeline network and accompanying installations - we assume that this excludes the BBL pipeline.
[9]: Estimate based on historic levels of investment.
[10]: Sum [3]-[9]