Final

Investigation into the allocation of damping

Submitted to:

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Submitted by:

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Final

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1. INTRODUCTION

GTS via the Gebruikersplatform elektriciteits en gasnetten (GEN) has sent a proposal to the Nederlandse Mededingingsauthoriteit (NMa) detailing amendments to the gas codes which are required to implement the new market model and the balancing system. The NMa has the obligation to approve or disapprove the GEN proposal.

Damping is an important element of the proposal. Damping can be allocated to the entry program, the exit program or divided between the programs. GTS has chosen to allocate damping to the exit program for reasons of transportation security, transparency and efficiency.

Nogepa and Gasterra, who mainly have entry programs, have indicated in their written views and during the hearing that they would consider it discriminatory if damping is allocated to the exit program. They claim that damping bestows commercial advantage, since if exit parties are allocated damping they will contract less transport capacity and flexibility. Nogepa and Gasterra propose 50% of damping should be allocated to the entry program and 50% to the exit program.

Damping is a complex subject and the NMa wishes to have a second opinion before it makes a decision. This is the purpose of this assignment.

Specifically, the Consultant is asked to address the questions:

- Do entry program responsible parties and exit programme responsible parties compete with each other and to what extent does the allocation of damping affect their competitive positions?

- Which of the three options (entry, exit, or 50/50) for allocating damping is most beneficial for the gas market in terms of improving gas market competition, transparency, transport security and lowering trade barriers?

2. WHAT IS DAMPING?

The GTS transmission network is designed and operated for the Groningen gas field to maintain the network balance in real time. The flow of gas entering the network is automatically adjusted to maintain the pressure downstream of the Groningen valve at a constant level. However, when the new balancing regime is implemented Groningen will no longer balance the network and responsibility for residual balancing[1] will pass to GTS who will use the bid price ladder for this purpose.

The physics of gas transmission mean that changes in the quantities of gas exiting the GTS network do not exactly equal the corresponding changes in the quantities of gas entering the network within the same hour[2]. GTS refers to this difference as “damping”.

In the absence of Groningen balancing, if a user supplying small scale consumers delivered the same quantity at entry as is offtaken at exit each hour, ignoring damping, this would impose additional requirements on the network. As a consequence GTS might need to invest in additional entry capacity and storage. To avoid this GTS has incorporated the effect of damping into the new energy balancing calculation along with various rules and processes for users to make adjustments for damping. This approach helps to replace the Groningen balancing role and enables GTS to continue operating the network as efficiently as possible.

Damping is only applicable to consumers whose usage of gas varies during the gas day, commonly referred to as “diurnal” variation, the demand pattern exhibited by small scale consumers, mainly households and smaller industrial and commercial consumers. By contrast, a process load consuming gas at a constant hourly rate will not exhibit “damping” and, assuming Groningen balancing, the flow at entry will be equal to the flow at exit in each hour.

The effect of damping is that the physical profile of gas entering the network is smoother than the corresponding physical profile of gas at exit. In addition, there is a time lag in the entry response.

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[1] Residual balancing refers to any remaining balancing which the TSO undertakes to adjust for imbalances across all user energy balances in aggregate

[2] Assuming the overall balance of the network is controlled by Groningen pressure regulation

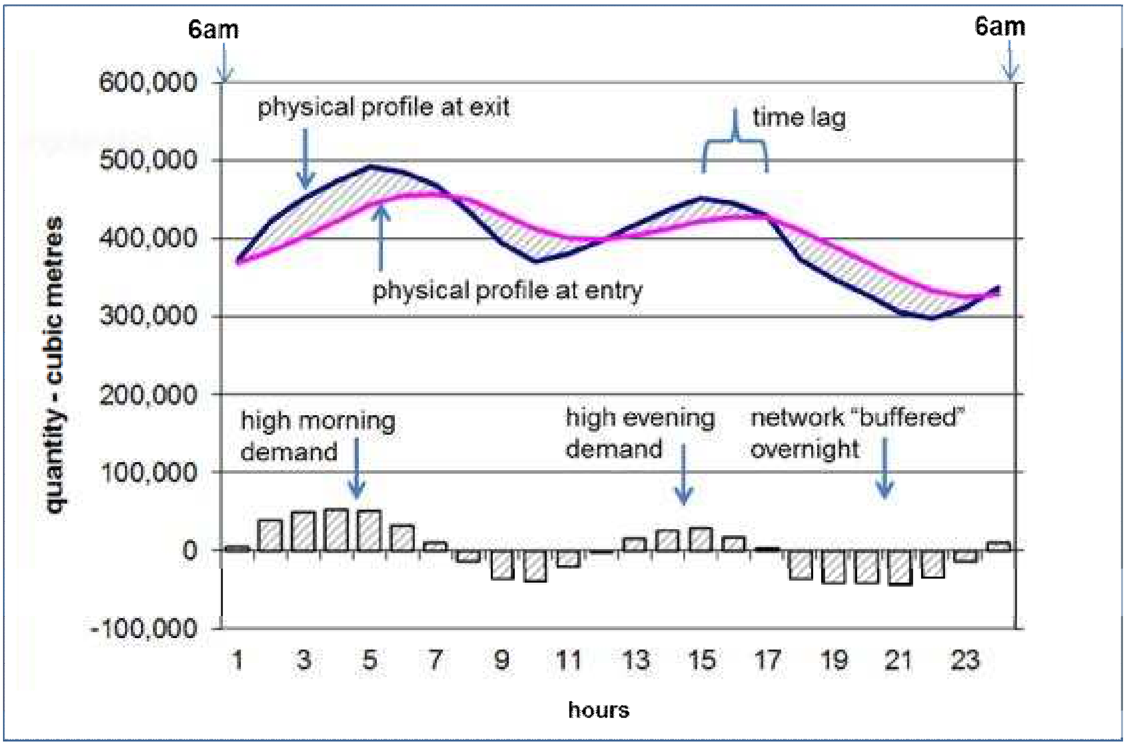


Figure 1: The impact of damping on physical gas flows at entry and exit

These characteristics of damping are illustrated by the diagram in Figure 1, representing a profile which is typical of small scale consumer demand. During the night when demand is low, the quantity of gas entering the network exceeds consumption and this excess gas is stored (or "buffered") in the network and depleted during the morning peak demand period. In the middle of the day, when demand also tends to be rather low, this process is repeated with gas going into store to help supply evening peak demand.

From the user perspective, the benefit of damping is its effect to smooth the profile of small scale consumer demand. This amounts to a "free" storage service. Without damping the supply chain would require more diurnal flexibility and more entry capacity although, as we shall discuss later, the benefits of damping are most significant in off peak periods.

3. COMMERCIAL RULES PROPOSED BY GTS

The amount of damping available varies considerably from day to day and GTS has provided a damping formula, in the form of a spreadsheet, which is available from the GTS web site. Users are asked to use the spreadsheet to calculate their required entry based on their predicted exit. The damping formula is a function of two parameters, α and β, which are determined by GTS and published on the GTS web site by 0900 each day, for users to use in their calculation of the following day's supply requirement.

The amount of damping determined by the damping formula is based on the user's forecast profile of exit flows and is not adjusted for the actual demand profile which occurs during the following day. This means it is theoretically possible for a user to overestimate its forecast profile so as to be allocated more damping, reducing the user's need to use its own flexibility. If GTS observe this practice it may be necessary to devise some kind of countermeasure.

The damping formula is only applicable to physical exits and use of the formula is obligatory for exit programs which include LDC exits. The application of damping to large loads directly connected to the GTS network and to export (transit) flows is optional. Users are not allowed to have damped and undamped loads within the same exit program and balancing is not aggregated across more than one exit program. Nonetheless, it is possible to link portfolios with a balancing agreement so that imbalances are crystallised in a single portfolio.

The amount of damping is a function of the linepack in the transmission network. Linepack refers to the quantity of gas in the pipeline network which also determines the pipeline pressure. When gas consumption is high (in the winter time) linepack (and pressure) has to be maintained within a narrow range to transport the high volumes of gas required. As transport volumes reduce the network can be operated safely over an increasingly wider range of linepack (and pressure). The storage capacity of the network depends on how wide the linepack range is, so storage capacity is higher in the summer when consumption is lower. These variations are modeled by the damping formula parameters, α and β which have opposing effects:

- The α parameter index is between 0.3 in summer up to 0.6 in winter. As α **increases**, the level of smoothing **decreases**, reflecting that less linepack is available at higher demand.
- The β parameter is between between 0 in winter up to 1.0 in summer. As β **increases** the level of smoothing **increases**, reflecting that additional linepack is available in low demand periods.

The α parameter acts to protect the network balance and the linepack required by the Green Zone, whereas the β parameter makes additional damping available during the summer. The β parameter is therefore discretionary in nature as there are different uses for spare linepack, for example, widening the Green Zone or providing user specific balancing tolerances.

To give users an example of how the damping formula might be applied, GTS has published the values of α and β which would have applied in 2008. These are plotted in Figure 2 below, showing that β in particular is a highly volatile parameter.

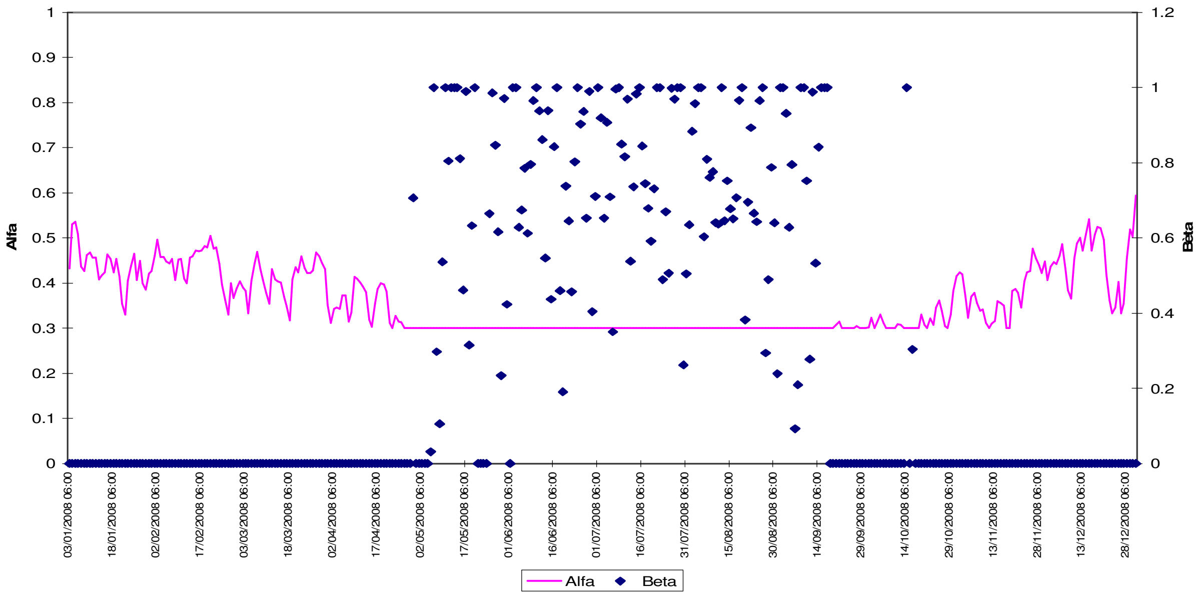


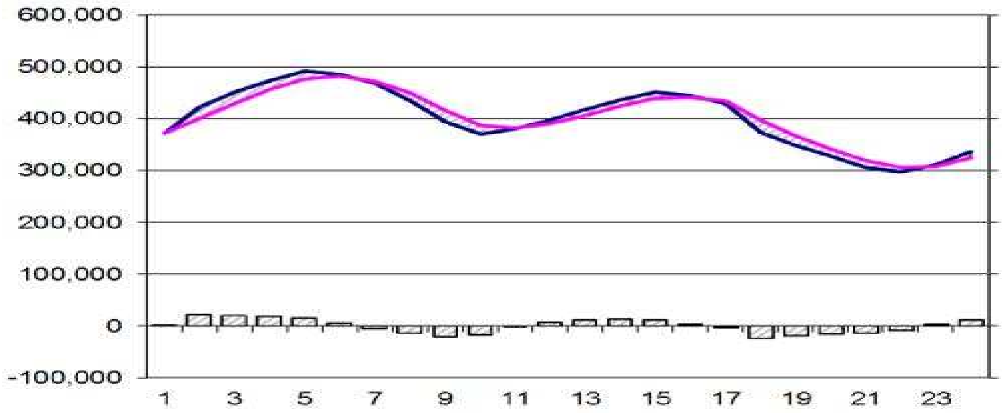
Figure 2: Values of α and β as they would have been for 2008[3]

Examples of the application of different values of α and β to the same exit profile[4] are shown in figure 3 on the next page. Example 1 represents a peak winter demand day with α = 0.6 and β = 0, and it can be seen that the smoothing effect is quite limited. This means that damping has only a limited impact to reduce network investment and the peak supply requirement. Examples 2 and 3 represent summer days with α = 0.3 and β = 0 and 1 respectively. Here the effect of damping is much greater. With β = 1 the exit profile is completed flattened meaning that small scale consumers could be supplied with flat (baseload) gas. Based on the 2008 experience, there are potentially many days during the summer when β = 1.

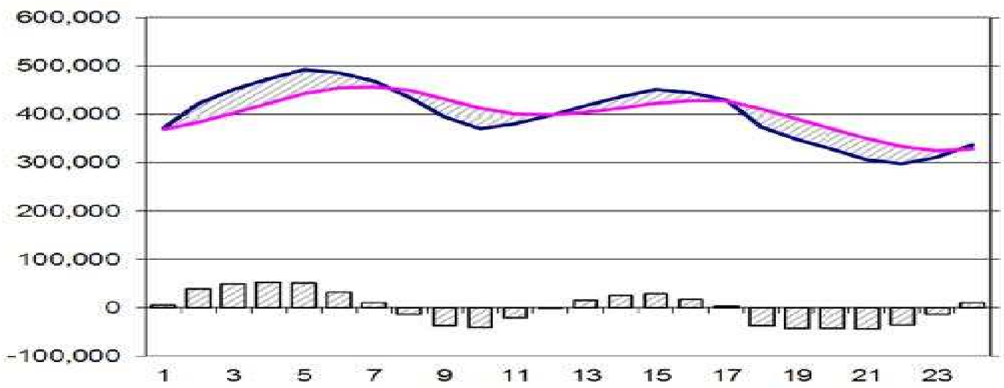
[3] Source GTS web site, damping proposals

[4] In practice the exit profile in winter will be much steeper than during the summer

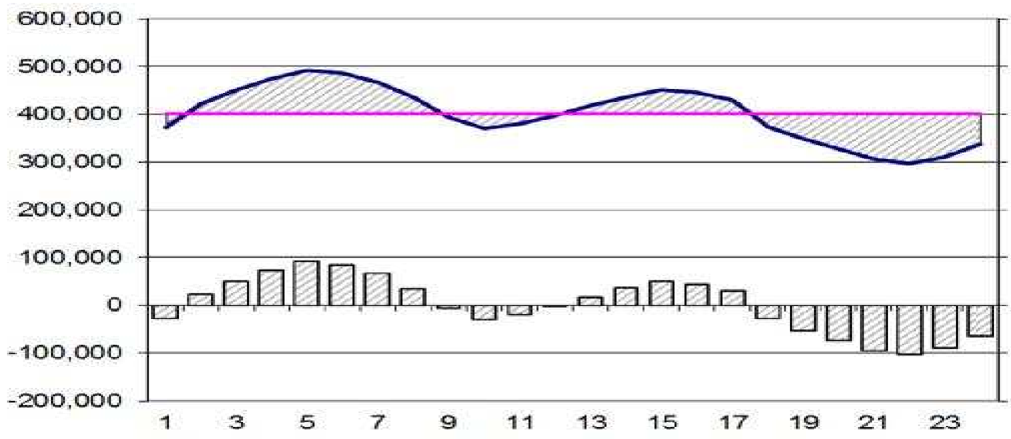
Example 1: high winter demand: α = 0.6, β = 0



Example 2: summer demand: α = 0.3, β = 0



Example 3: summer demand α = 0.3, β = 1



physical entry   physical exit   Note: the exit profile is the same for all the examples

Figure 3 Examples showing the application of α and β

4. ALLOCATION OF DAMPING

The purpose of this investigation is to consider whether the benefit of damping should be allocated to the entry program, the exit program or shared between the two. These different methods of allocating damping do not change the amount of damping or the flows of gas supplied at the physical entry and then delivered at the physical exit.

The tables below show the impact of the alternative allocation methodologies on the maximum and minimum capacity required by Party A with an Entry Program supplying Party B with an Exit Program.

In summary, if damping is allocated to the exit program, this reduces the amount of flexibility Party B needs to purchase from Party A because the damped volume is added onto what is purchased. On the other hand, if damping is allocated to the entry program the amount of flexibility purchased by Party B does not reduce, instead the damped volume is added to the volume physically supplied by the Entry PV.

Method 1 – Damping 100% in the exit programme					
	Entry Programme (Party A)		VPPV	Exit Programme (Party B)	
	Physical Entry	Exit		Entry	Physical Exit
Max Capacity	110	110		110	120
Min Capacity	90	90		90	80

The key features of Method 1 are:

- The maximum capacity Party B purchases from Party A is reduced from 120 to 110
- The lower levels of flexibility which Party B needs to purchase could possibly increase the number of potential suppliers, thereby extending competition. On many summer days, subject to existing contractual obligations, Party B may be able to source flat gas[5]
- Furthermore, the benefit of damping may encourage Party B retain responsibility for its own exit program rather than transfer the exit program, together with “free” damping, to a supplier
- Party B would be free to buy its gas from any source, including purchases of traded gas from the TTF, and could enter into purchase commitments whenever it chooses to do so
- GTS can monitor the actual exit profile compared to forecast exit profile to check if Party B is overestimating its profile in order to obtain more damping[6]

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[5] See Figure 3, example 3 on page 7

[6] See also Section 3, paragraph 2 on page 5

Method 2 – Damping 100% in the entry program					
	Entry Program (Party A)		VPPV	Exit Program (Party B)	
	Physical Entry	Exit		Entry	Physical Exit
Max Capacity	110	120		120	120
Min Capacity	90	80		80	80

The key features of Method 2 are:

- Damping is allocated to Party A, who sells it on to Party B
- Damping is "free", but if competitive forces are weak, Party A could charge Party B for damping volumes
- Although available equally to all suppliers, the majority of damping volumes would accrue to incumbent suppliers in the short and medium term
- Unless there is a link between entry and exit, there is no assurance that damping volumes will be passed onto LDC exits as intended
- Alternatively, if a linkage between entry and exit is introduced this could act to restrict Party B's sourcing of supply as commitments to purchase damped supply would have to be made at the day ahead stage[7].

Method 3 – Damping 50-50% split over entry and exit programs					
	Entry Program (Party A)		VPPV	Exit Program (Party B)	
	Physical Entry	Exit		Entry	Physical Exit
Max Capacity	110	115		115	120
Min Capacity	90	85		85	80

The key features of Method 3 are:

- Damping volumes are shared equally between Party A and Party B[8]
- The allocation of damping volumes to entry programs faces the same difficulties as explained in method 2 above
- There is the added complexity of administering damping in both entry and exit programs.

[7] If Method 2 was implemented without a link between entry and exit programs, GTS would probably need to forecast damping volumes for themselves and allocate these volumes amongst the entry programs which decided to ask for damping.

[8] Nogepa and Gasterra propose that this is the most equitable solution

5. SPECIFIC QUESTIONS ADDRESSED

Question 1: Do entry program responsible parties and exit programme responsible parties compete with each other and to what extent does the allocation of damping affect their competitive positions?

A key objective of any entry-exit regime is to facilitate supply competition. Regime design should support market parties participating in whatever way suits their particular interests, whether they be producers, suppliers, storage operators or active across all these activities. Nevertheless, it is expected that production and storage interests will be most represented in entry programs with supply interests most represented in exit programs. At present supply, especially flexibility, is a concentrated market in the Netherlands. Although the allocation of damping volumes to entry programs potentially benefits anybody with an entry program, we would expect most volumes to be allocated to incumbents in the short to medium term. For this reason, allocation of damping to entry programs would tend to increase flexibility market concentration, in which case the competitive position of exit programs might be adversely affected.

The methods for the allocation of damping apply to all parties equally. Therefore the allocation method which is chosen does not discriminate between sellers or between buyers, but it may impact the relative competitive position of buyers and sellers.

Question 2: Which of the three options (entry, exit, or 50/50) for allocating damping is most beneficial for the gas market in terms of improving gas market competition, transparency, transport security and lowering trade barriers?

Improving competition: We expect allocation of damping to exit programs may have a limited positive impact on the prospects for competitive supply for small scale consumers, with the beneficial effects most evident during summer.

	Entry	Exit	50-50
Improving competition	–	+	_
Transparency	_	O	_
Transport security	O	O	O
Trade barriers	_	+	_

Figure 4: Expected effect of damping allocation alternatives

Transparency: If allocated to exit programs damping is a relatively straightforward mechanism to allocate linepack flexibility to suppliers serving small scale consumers. The two alternative allocation mechanisms are less transparent, perhaps requiring linkage between entry and exit programs. The 50-50 mechanism would be most complex to administer.

Transport security: The alternative allocation mechanisms are not expected to have a material impact on transport security as in all cases users will have an incentive to balance in accordance with the POS which takes damping volumes into account.

Trade barriers: The allocation of damping to entry programs could be a barrier to trade if as a result exit programs are discouraged or prevented from sourcing supply from entry programs which are not damped or sourcing directly from the TTF. In addition it is possible that damping volumes may not benefit suppliers to small scale consumers as intended.