

23 December 2005

Gas Balancing Rules In Europe

A Report for CREG

Prepared by NERA and TPA Solutions

NERA
Economic Consulting



Project Team

David Hough (NERA)

Sean Gammons (NERA)

Brian Whithington (TPA Solutions)

NERA Economic Consulting
15 Stratford Place
London W1C 1BE
United Kingdom
Tel: +44 20 7659 8500
Fax: +44 20 7659 8501
www.nera.com

TPA Solutions Ltd
84 Whitemoor Drive
Solihull, B90 4UL
Tel: +44 (0) 121 745 8731
Fax: + 44 (0) 121 745 8731
www.tpasolutions.co.uk

Contents

ASSUMPTIONS & LIMITING CONDITIONS	i
Executive Summary	ii
1. Introduction	1
2. Background	2
2.1. Development of the CEER's Balancing Principles	2
2.2. Balancing Rules in Context	2
2.3. Conclusion	4
3. Review of Existing Gas Balancing Principles	5
3.1. Scope of the Existing Balancing Principles	5
3.2. Standards for the Design of an Efficient Balancing Regime	6
3.3. Appraisal of the Existing Balancing Principles	8
3.4. Conclusion	10
4. Evaluation of Existing Balancing Regimes	11
4.1. Overview of the Existing Balancing Regimes	11
4.2. Inter-System Issues	12
4.3. Imbalance Cash Out prices	13
4.4. Multiple Imbalance Zones	14
4.5. Balancing Period	15
4.6. Information Flows	15
4.7. TSO as Residual Balancer	16
4.8. Promotion of Traded Markets	16
4.9. Access to Flexibility	16
4.10. Treatment of Transit	17
4.11. Conclusion	17
5. Conclusions	19
5.1. Transparency and Due Process	19
5.2. Cost reflective Cash-Out Prices	19
5.3. Balancing Cost-Reflectivity with Promoting Competition	20
5.4. Non-discrimination	20
5.5. Information flows	20
5.6. Conclusion	21
Appendix A. Belgium	22
Appendix B. Cross-Border Arbitrage of Imbalances	29

Appendix C. The Netherlands	34
Appendix D. France	41
Appendix E. Great Britain	47
Appendix F. Spain and Italy	52

p:\projects\energy\creg balancing ldn (h438)\sent to client\050128 final report on gas balancing for the ceer.doc

ASSUMPTIONS & LIMITING CONDITIONS

This report is for the exclusive use of our client to whom it is addressed and its professional advisers. It does not represent investment advice or provide an opinion regarding the fairness of any transaction to any and all parties. There are no third party beneficiaries with respect to this report, and we accept no liability to any third party. The opinions expressed herein are valid only for the purpose stated herein and as of the date of this report.

This report sets forth the information required by the terms of the assignment and is prepared in the form expressly required thereby. This report is intended to be read and used as a whole and not in parts. Separation or alteration of any section or page from the main body of this report is expressly forbidden and invalidates this report.

This report is not intended for general circulation or publication, nor is it to be used, reproduced or distributed for any purpose other than those that may be set forth herein or in any written agreement between us and our client without the prior written permission of NERA UK Limited (“NERA”). Neither all nor any part of the contents of this report, any opinions expressed herein, or the firm with which this report is connected, shall be disseminated to the public through advertising media, public relations, news media, sales media, mail, direct transmittal, or any other public means of communications, without the prior written consent of NERA.

Information furnished by others, upon which all or portions of this report are based, is believed to be reliable but has not been verified. No warranty is given as to the accuracy of such information. Public information and industry and statistical data, including without limitation information and data with respect to gas balancing, are from sources we deem to be reliable; however, we make no representation as to the accuracy or completeness of such information and have accepted the information without further verification.

In rendering this report, we have also relied upon and assumed the accuracy of information gained from market participants in the gas industry in Europe.

No responsibility is taken for changes in market conditions or laws or regulations and no obligation is assumed to revise this report to reflect changes, events or conditions, which occur subsequent to the date hereof.

Future services regarding the subject matter of this report, including, but not limited to, testimony or attendance in court, shall not be required of NERA, unless previous arrangements have been made thereof in writing.

Executive Summary

Introduction

NERA and TPA Solutions Limited have been asked to prepare a report of gas balancing in Europe for the Council of European Energy Regulators (CEER), under funding provided by the Belgian energy regulator, CREG.

The purpose of our study has been to review the “Principles for balancing rules” (the “Balancing Principles”), published by CEER, and to assess the need for further harmonisation across the EU by evaluating the operation of the existing balancing regimes in Member States.

We conducted our review in two parts. In the first part, we evaluate the existing Balancing Principles against a set of standards, in order to identify possible gaps or weaknesses and the need for any changes to the existing principles.

In the second part, we evaluate how well existing balancing regimes are functioning in practice, using a case study approach. We have concentrated on the Netherlands, Belgium and France as these have well developed regimes and can illustrate issues concerning cross border trade and the need to further encourage competition within individual markets, which may also be apparent in other markets. The selection of these three markets should not be seen as implying any particular criticism of their regimes compared with others. We selected them because they offered the best and most topical opportunity for learning in a relatively short study period.

We have held discussions with network users (both incumbent and new entrants) as well as TSOs and regulators in these markets to identify problems and possible solutions. We have also briefly reviewed the balancing regimes in Great Britain, Spain and Italy, based mainly on our own knowledge and analysis.

Our review has, by its nature, been limited, both by the available time and resources. We have sought however to cover as many of the issues as possible and proposed what we feel are practical changes to the Balancing Principles as well as suggesting more detailed solutions to a wide range of issues raised by the discussants we contacted. This study has deliberately focussed on exploring potential issues and concerns with existing balancing arrangements. It cannot claim to be a comprehensive and even-handed assessment of all aspects of those regimes, and it has not been possible to corroborate and cross check all of the content.

We understand and trust that there will be further opportunities to expand the coverage of the report and in particular to test the findings and proposed solutions through a process of consultation with representative bodies, before finally agreeing what amendments need to be made to the Balancing Principles.

Background

The separation of gas trading from gas transportation activities across the different gas markets in Europe has put the need for market rules for gas balancing at the centre of the operation of the gas market.

Balancing is a pivotal activity in any transportation regime. From the perspective of the TSO it is vital that there is the facility to ensure the safe operation of the network by maintaining pressures within acceptable limits. This requirement for system balancing in a liberalised market is achieved through the interplay of shippers and the TSO, the latter adopting a *residual balancing* function whilst the former have the primary responsibility for ensuring adequate gas supplies.

Well designed balancing rules should encourage each shipper to balance its own individual portfolio of supply and demand, thereby limiting the need for intervention by the TSO. The incentivisation of shippers to balance is primarily financial, and it is their job to find the most economic combination of sources and uses of gas.

The design of the gas balancing regime rules is critical. If shippers do not face sufficient incentives to balance, or the contractual regime is a poor model of the physical network, then it is likely that the TSO will need to make more frequent and costly interventions. To the extent that these costs are not fully targeted upon those causing them, there will be a general shipper burden that will ultimately drive up the costs of gas service to the final customer.

Alternatively, if the incentives on shippers to balance are too extreme, or the regime is excessively complicated, this will either deter market entry (limiting competition) or result in high shipper costs of insurance provision or transactions. In other words, designing a regime that seeks to eliminate the residual balancing role of the TSO can be as problematic as a regime that generates too much intervention by the TSO.

Against this background, we have reviewed the “Principles for Balancing Rules” published by the Council of European Energy Regulators (“CEER”).¹ These were designed to establish a robust set of principles in relation to the roles and responsibilities for the industry as it restructures to meet the requirements of the Gas Directive.²

Review of Existing Gas Balancing Principles

The Balancing Principles circulated by the CEER are intended to promote competition and liquidity in the European gas market by defining *guidelines of good practice* for gas balancing rules in each member state. The CEER set out seven Balancing Principles and these are set out in the report.

We have reviewed the Balancing Principles against what we consider to be appropriate standards for the design of an efficient gas balancing regime.

¹ CEER “Principles for Balancing Rules” September 2003 <http://www.ceer-eu.org>

² Directive 2003/55/EC concerning the common rules for the internal market in natural gas and electricity of 26 June 2003

Standards for the Design of an Efficient Balancing Regime

There are two areas of standards for the design of an efficient gas balancing regime: process standards and content standards.

The *process* of designing a balancing regime is an exercise in regulatory rule making, whether it be under the direct control of a regulatory body, or via regulatory approval of decisions delegated to a TSO. As with all such processes, there are generic standards of “due process” that should be adhered to in order to foster stability and predictability, thus promoting efficient decision-making both by regulated companies and their customers.

The *content* of the balancing rules should also meet certain standards, suggested by economic theory,³ in order to promote efficient use of the transportation system and ensure a level-playing field for competition in the gas market.

Appraisal of the Existing Balancing Principles

To address the concerns over *process* standards detailed in the report, the Balancing Principles could usefully be amended to stipulate that balancing rules should be defined using a transparent process, which requires the regulator and/or TSO to demonstrate that the rules are objective and non-discriminatory by reference to objective data and assumptions, including the preferences of shippers and end-users expressed through public consultation. In addition there should be a requirement on regulators to ensure that this process is adopted and followed.

As regards the *content* standards, the existing Balancing Principles should be amended to make it an obligation on TSOs and regulators to ensure:

- effective monitoring and enforcement of the non-discriminatory application of the balancing rules;
- an efficient trade-off between (the sometimes conflicting) aims of *promoting competition* and *ensuring cost reflectivity*, taking account of the degree of competition already present in the market and the specific physical characteristics and costs of each system.

Evaluation of Existing Balancing Regimes

In our evaluation, we concentrated primarily on three countries – Belgium, Netherlands and France. In each case, we had detailed discussions with and contributions from regulators, shippers and gas transporters on gas balancing.

Our case studies have highlighted aspects of the existing balancing regimes that seem to be frustrating the development of competition and liquidity in the markets we have studied⁴. In

³ E.g., on the definition of imbalance cash-out prices

part these problems could be addressed by amending the existing Balancing Principles in the ways we suggest above.

In addition, our case studies have identified a number of other issues that suggest a need for further amendments to the Balancing Principles.

First there are problems of information flows which could be addressed in the Balancing Principles with the addition of a requirement that TSOs, as far as possible, use provisional allocations in the calculation of imbalance charges. Clearly, however, the problems caused by poor quality information flows will only be fully resolved when a number of other measures are implemented, including:

- § improved accountability and standards for information flows, especially for offtake allocations in relation to end users who reside in a connected distribution zone;
- § increased use of well-designed OBAs to resolve uncertainties in relation to input allocations, particularly for cross-border flows; and
- § new investment in metering and information systems, and the adoption of well designed demand profile algorithms for those customers for whom more frequent measurement is uneconomic.

Second, many shippers have complained about inadequate access to sources of flexibility (e.g., the Zeebrugge Hub, storage, liquid traded markets, etc.), particularly in regimes with hourly balancing disciplines such as Belgium and the Netherlands. We suggest four amendments to the Balancing Principles that would help address the shippers' concerns about inadequate flexibility, namely:

- § require TSOs to maximise the linepack they make available to shippers, subject to maintaining system security;
- § where flexibility is in short supply, TSOs should adopt the presumption that allocating tolerances and/or flexibility services on the basis of market value is preferable to bundling automatically with capacity;⁵
- § require TSOs to facilitate secondary trading of linepack (e.g., trading of free tolerances), as well as any additional flexibility services provided by TSOs; and
- § allow ex post trading of daily imbalances in systems that have implemented cost reflective cash-out prices, at least as a transitional measure.

⁴ For example, multiple balancing zones and hourly constraints that deter new entry and frustrate the development of liquid traded markets and arbitrary differences in administered cash-out prices that distort intra-market decision-making as well as cross-border trade.

⁵ Revenues in excess of reasonable cost could be redistributed to shippers via balancing neutrality provisions

Third, our case studies have also revealed that the treatment of transit is a potential cause of distortions, which is not addressed by the existing Balancing Principles. The Balancing Principles should be amended to require that the same transparent, non-discriminatory and objective procedures and rules be consistently applied to transit pipelines as to the ordinary transportation system.

Conclusion

It is a fundamental requirement for establishing a well functioning balancing regime that the TSO's ability to maintain a safe and efficient transportation network is retained. However, the means of achieving this needs to alter with the move from monopoly to competition. The TSO must shed its *command and control* philosophy of the past and adopt a *service oriented* role.

In its new role, the TSO needs to actively facilitate supply competition in both the design and operation of the transportation regime. It needs to both encourage and respond to the signals and needs of the users of the network. The TSO should ensure that the transportation cost signals confronting network users are as reasonable and as efficient as possible. This requires a critical trade off between underlying cost reflectivity and transactional complexity. However well intentioned, there is no point in replicating the physical regime with a commercial model of such complexity that it generates excessive cost to users or frustrates their ability to serve customers and compete effectively with one another.

It is for this reason that we advocate important additions to the CEER balancing principles with an emphasis on the need to promote cost reflective signals whilst making reasoned and transparent trade-offs with the wider benefits of promoting competition in gas supply.

1. Introduction

This is the Final Report of our study of gas balancing in Europe for the Council of European Energy Regulators (CEER), under funding provided by the Belgian energy regulator, CREG. The purpose of our study has been to review the “Principles for balancing rules” (the “Balancing Principles”), published by CEER, and assess the need for further harmonisation across the EU by evaluating the operation of the existing balancing regimes in Member States.

We have adopted a case study approach to evaluate existing balancing regimes. We have concentrated on the Netherlands, Belgium and France as these have well developed regimes and can illustrate issues concerning cross border trade and the need to encourage competition within individual markets. We have held discussions with network users (both incumbent and new entrants) as well as TSOs and regulators in these markets to identify problems and possible solutions. We have also reviewed the balancing regimes in Great Britain, Spain and Italy, based mainly on our own knowledge and analysis.

The review has, by its nature, been limited, both by the available time and resources. We have sought however to cover as many of the issues as possible and proposed what we feel are practical changes to the Balancing Principles as well as suggesting more detailed solutions to a wide range of issues raised by the discussants we contacted. This study has deliberately focussed on exploring potential issues and concerns with existing balancing arrangements. It cannot claim to be a comprehensive and even-handed assessment of all aspects of those regimes, and it has not been possible to corroborate and cross check all of the content.

We understand and trust that there will be further opportunities to expand the coverage of the report and in particular to test the findings and proposed solutions through a process of consultation with representative bodies, before finally agreeing what amendments need to be made to the Balancing Principles.

The rest of this report is organised as follows:

- § Chapter 2 gives some background on the development of the CEER’s Balancing Principles and a description of the decisions involved in gas balancing;
- § Chapter 3 summarises our theoretical review of the existing CEER Balancing Principles;
- § Chapter 4 discusses our evaluation of the existing balancing regime and summarise our recommendations on how the Balancing Principles should be amended to better promote competition and liquidity in the EU gas market; and
- § Chapter 5 concludes with a summary of the main lessons and themes that have emerged from our study.

Our detailed analysis of the existing balancing regimes in selected EU countries is contained in the appendices to this report.

2. Background

2.1. Development of the CEER's Balancing Principles

The separation of gas trading from gas transportation activities across the different gas markets in Europe has put the need for market rules for gas balancing at the centre of the operation of the gas market.

The importance of gas balancing rules was recognised in 2002 in the strategy paper “A long term vision of a fully operational single market for gas in Europe.”⁶ What is more it recognised that for the creation of a single market in Europe there has to be a mechanism for achieving suitable harmonisation between different gas markets and TSOs. For shippers wishing to convey gas across more than one system, it is important that this can be done as seamlessly as possible and at a minimum cost to TSOs and to shippers.

Since then the Council of European Energy Regulators (“CEER”) has published a set of “Principles for Balancing Rules”.⁷ These were designed to establish a robust set of principles in relation to the roles and responsibilities for the industry as it restructures to meet the requirements of the Gas Directive.⁸

2.2. Balancing Rules in Context

Balancing is a pivotal activity in any transportation regime. From the perspective of the TSO it is vital that there is the facility to ensure the safe operation of the network by maintaining pressures within acceptable limits. This requirement for system balancing in a liberalised market is achieved through the interplay of shippers and the TSO, the latter adopting a *residual balancing* function whilst the former have the primary responsibility for ensuring adequate gas supplies.

Well designed balancing rules should encourage each shipper to balance its own individual portfolio of supply and demand, thereby limiting the need for intervention by the TSO. The incentivisation of shippers to balance is primarily financial, and it is their job to find the most economic combination of sources and uses of gas. These may include:

- § Production sources, perhaps with the ability to vary rates of flow;
- § Access to gas storage facilities that can inject and withdraw gas as required;
- § Services from the TSO (or incumbent supplier) that can mimic gas storage;
- § Trading with other parties; and
- § Demand side management such as interruptible customers

⁶ Joint Working Group of the European Gas Regulatory Forum (“the Madrid Forum”) published in 2002 <http://europa.eu.int/comm/energy/gas/Madrid>

⁷ CEER “Principles for Balancing Rules” September 2003 <http://www.ceer-eu.org>

⁸ Directive 2003/55/EC concerning the common rules for the internal market in natural gas and electricity of 26 June 2003

The shipper may need to reflect both anticipated and unanticipated levels of demand, and adjust supplies (or other demands) accordingly.⁹ This poses both a seasonal and day-to-day challenge. The former is primarily concerned with securing adequate maximum capability, including reservation of sufficient transportation capacity, as economically as possible. A key issue here is the estimation of maximum demand. The day-to-day challenge is more concerned with optimisation within the constraints of maximum reserved capability, particularly forecasting daily and within day demand and then responding quickly to any variations.

In essence the TSO manages the physical system whilst the shipper is primarily concerned with the virtual or contractual model. Inevitably the contractual model and physical system will not be perfectly matched. And shippers will not always be able to ensure their own balance, especially when demands (or supplies) change unexpectedly. It follows that the TSO requires its own sources of flexibility or *residual balancing tools* in order to maintain the integrity of the network on a day-to-day basis. The first line of defence is normally the use of linepack within the transportation system. Other tools may include direct or indirect access to storage, and services from shippers, producers or end customers to vary inputs or offtakes as and when required.

The TSO may also have a seasonal role in gas balancing, depending upon the security of supply arrangements in place. For example, the TSO may have licence obligations that require it to make some provision for securing supplies of gas at times of peak demands or emergency conditions. This is an important topic but is not within the scope of this report, which instead concentrates on the day-to-day gas balancing regime.

The significance of balancing for end customers is typically derived from the contractual regime facing their shipper. The shipper may seek rights to information¹⁰ from the end customer in order to better manage its forecasting and the matching of supply and demand. There may be specific financial provisions in the supply contract in order to mitigate the shipper's balancing risk, particularly for larger customers. If there are no explicit balancing provisions, the shipper will need to reflect its balancing risk in the price it charges for its services. Larger end customers might even be allowed or required to offer flexibility directly to the TSO.

It can be seen that the design of the gas balancing regime rules is critical. If shippers do not face sufficient incentives to balance, or the contractual regime is a poor model of the physical network, then it is likely that the TSO will need to make more frequent and costly interventions. To the extent that these costs are not fully targeted upon those causing them, this will encourage gaming by shippers and there will be a general shipper burden that will ultimately drive up the costs of gas service to the final customer.

⁹ Some regimes may feature a gate closure arrangement, by which shippers are not expected to make further adjustments in response to variations after a given deadline.

¹⁰ Historic, forecast and/or actual (near) real time offtake quantities.

Alternatively, if the incentives on shippers to balance are too extreme, or the regime is excessively complicated, this will either deter market entry (limiting competition) or result in high shipper costs of insurance provision or transactions. In other words, designing a regime that seeks to eliminate the residual balancing role of the TSO can be as problematic as a regime that generates too much intervention by the TSO.

2.3. Conclusion

In this chapter, we have explained the origins of the CEER's Balancing Principles document, and described the actors, responsibilities and decisions involved in gas balancing in the context of competitive gas markets. In the next chapter, we begin our evaluation of the Balancing Principles.

3. Review of Existing Gas Balancing Principles

3.1. Scope of the Existing Balancing Principles

The Balancing Principles put forward by the CEER are intended to promote competition and liquidity in the European gas market by defining *guidelines of good practice* for gas balancing rules in each member state. They were tabled by the CEER at the 7th meeting of the Madrid Forum in September 2003, as a proposed amendment to the existing *Guidelines for Good TPA Practice (GGP)*.¹¹ The 7th meeting, of the Madrid Forum decided not to incorporate the principles the CEER put forward because further consideration was required. After discussion at the 7th meeting, the Madrid Forum adopted a revised version of the GGP.

The Balancing Principles developed by the CEER comprise the following seven principles:

- § **Principle 1 Balancing responsibilities** There needs to be appropriate rules and incentives to ensure shippers have *strong commercial incentives* to balance inputs and withdrawals of gas. The TSOs have a duty to ensure the safe, reliable and efficient operation of the network and should have a residual role to maintain a physical balance in the system.
- § **Principle 2 General requirements for balancing rules** Balancing rules should be transparent and non-discriminatory and based on objective criteria. These rules need to take account of the particular operational characteristics of the network while continuing to facilitate competition in the market;
- § **Principle 3 Frequency of balance** There needs to be a choice of an appropriate balancing period based on an assessment of a set of objective criteria;
- § **Principle 4a Balancing Costs** There needs to be incentives on the TSO to ensure that balancing costs are efficiently incurred and that the TSO is ‘revenue-neutral’ as regards balancing actions it takes;
- § **Principle 4b Charges for imbalances** Charges should aim not to distort competition and should incentivise shippers to balance inputs and withdrawals from the network;
- § **Principle 4c Trading of Imbalance positions** the balancing rules should allow shippers to trade their imbalance positions over a reasonable period thereby minimising the incidence of imbalance actions;
- § **Principle 5 Tolerance services** Tolerance services are a useful tool to facilitate competition and a practical means for handling certain of the uncertainties surrounding balancing;
- § **Principle 6 Information and transparency.** Market participants shall be provided with sufficient timely and reliable information about their balancing status and imbalance charges;
- § **Principle 7 Harmonisation of balancing rules** TSOs should ensure compatibility of different TSO systems in order to facilitate gas trade across the borders of different TSO systems.

¹¹ *The Guidelines for Good TPA Practice, Revised Version, 7th Meeting of the Madrid Forum, September 2003.*

3.2. Standards for the Design of an Efficient Balancing Regime

The design of a balancing regime is an exercise in regulatory rule making, whether it be under the direct control of a regulatory body, or via regulatory approval of decisions delegated to a TSO. As with all such processes, there are generic standards of “due process” that should be adhered to in order to foster stability and predictability, thus promoting efficient decision-making both by regulated companies and their customers. In the terms of the EU gas and electricity directives, these standards of due process are encapsulated in the phrase “transparent, objective and non-discriminatory”. They apply to gas balancing rules, just as much as to other areas of regulatory rule making such as tariffs, storage access, public service obligations, etc.

Economic theory suggests that the *content* of the balancing rules should also meet certain standards (e.g., on the definition of imbalance cash-out prices), in order to promote efficient use of the transportation system and ensure a level-playing field for competition in the gas market.

We briefly discuss each of these two sets of standards in turn below, before evaluating the extent to which the existing Balancing Principles promote adherence to these standards.

3.2.1. Process Standards

The design of balancing rules inevitably calls for TSOs to make trade-offs between different objectives. For example, a trade-off might exist between the amount of transportation capacity a TSO offers to the market and the transactions costs and risks imposed on shippers by complex hourly or zonal systems. Or a trade-off might have to be made between the length of the balancing period, or frequency of balancing, and the amount of residual balancing the TSO has to perform. In most cases, these trade-offs are about balancing the need to reflect physical constraints and system costs with the need to limit the transactions costs and risks imposed on shippers, in order to promote new entry and competition in gas supply. That is, they are about balancing the pursuit of *cost reflectivity* with the wider goal of the *promotion of competition*.

As in other areas of regulatory rule-making, regulators and/or TSOs should use cost-benefit analysis (to the extent that costs and benefits can be identified and quantified – although any decisions should be based on some objective assessment) to compare alternative balancing rules, and hence identify the optimal trade-off, or at least rule out sub-optimal proposals. In that context, “due process” requires the regulator and/or TSO to carry out this cost-benefit analysis using a transparent procedure, during which they demonstrate that the rules are objective and non-discriminatory by reference to objective data and assumptions, including the preferences of shippers and end-users expressed through a public consultation process.

3.2.2. Content Standards

However efficiently shippers purchase gas under contracts and are able to trade gas in advance, imbalances will arise in real-time. The over-riding aim of the balancing regime should be to provide efficient incentives for shippers themselves to restore their individual

balances, and for the TSO to correct safely any remaining physical imbalances.¹² To achieve that aim the balancing regime should adhere to the following content standards:

1. a requirement for the TSO to use transparent and non-discriminatory market-based procedures to procure the gas it uses for system balancing,¹³ backed-up by a mechanism to incentivise the TSO to minimise the costs it incurs in carrying out its balancing function;
2. cost-reflective imbalance cash-out prices, i.e., prices that reflect the costs to the TSO of correcting negative and positive shipper imbalances, with these costs defined objectively by reference to the costs incurred by the TSO through the above-mentioned market-based procedures;
3. a balancing period, or frequency of balancing, that ensures that shippers are generally held responsible for the costs they impose on the system, and avoids unnecessary balancing actions by shippers (e.g., requiring shippers to balance hourly when there is enough linepack in the system to handle diurnal variation most of the time);
4. timely and accurate provision of information to shippers on their imbalance quantities, so they can respond efficiently to the cost signals provided by imbalance cash-out prices;¹⁴
5. targeted recovery of the net costs incurred by the TSO in carrying out its residual balancing function, i.e., recovery of these costs from shippers who are out of balance;
6. revenue neutrality of the TSO's balancing operations, to ensure the TSO's commercial incentives are aligned with its public service duty to ensure a safe and reliable system;
7. effective monitoring and enforcement of the non-discriminatory application of the rules by the TSO (i.e., a mechanism for ensuring that all shippers, whether affiliated to the TSO or not, are treated fairly and transparently);
8. the available linepack in the system, above the amount needed by the TSO for system security purposes, should be made available to shippers on a non-discriminatory basis through tolerances, additional flexibility services, or "linepack inventory accounts", in order to make efficient use of the available physical flexibility in the system;
9. shippers should be allowed to trade any tolerances they are allocated and the TSO should have systems in place to facilitate such trade;
10. provided cash-out prices are cost-based, and at least as an interim measure pending the development of liquid traded within-day markets, shippers should be allowed to trade their imbalances ex-post prior to settling any residual physical imbalances, and the TSO should have systems in place to facilitate such trade; and

¹² There may sometimes be a case for adopting a system of "gate closure", by which shippers are discouraged from making adjustments after a certain deadline, and it is left to the TSO to solve the imbalance on its own. In practice, gate closure tends to be applied more in electricity than gas regimes.

¹³ This is a requirement of the second Gas Directive.

¹⁴ What qualifies as timely will depend on the specifics of the balancing rules (i.e., whether balancing is hourly or daily, and whether ex-post imbalance trading is allowed or not).

11. the balancing regime should be structured in a way that the incentives for shippers to balance do not create opportunities for abuse of the regime e.g. creating an imbalance and then benefiting financially from that action.

The first two requirements are stipulated in the second Gas Directive. They are particularly important since, taken together, they should ensure that there is a “feed-back loop” between the residual balancing costs incurred by the TSO and the cost signals given to shippers through the imbalance cash-out mechanism. These cost signals ensure shippers have the right incentives to make appropriately flexible forward purchase and sale arrangements and/or trade between themselves to minimise imbalances. They also foster the efficient development of flexible traded markets and other sources of flexible gas, to allow shippers, and the TSO, to manage their imbalance positions efficiently.

In practice, as we have already noted, TSOs will need to make trade-offs between *cost reflectivity* and *promoting competition* in the design of each aspect of the balancing regime. The optimal trade-off will depend on the specific circumstances of each system. For example, in markets where effective competition is absent or weak it may be optimal to give more weight to the aim of promoting competition, since the efficiency gains from greater competition may outweigh those that would result from more cost reflective rules. Whereas in markets where there is already effective competition, it may be optimal to give more weight to cost reflectivity.

It should be noted that defining *cost reflectivity* may not always be straightforward. For example, a TSO may not always incur immediate or directly attributable costs, even though some individual shippers are out of balance.¹⁵ Whether, when and how the out of balance shippers should face financial consequences in such circumstances requires careful consideration of the implications for efficient behaviour.¹⁶ However, the general principle that *cost reflectivity* is preferable to arbitrary incentives holds good.

3.3. Appraisal of the Existing Balancing Principles

3.3.1. Process Standards

The Balancing Principles enumerated by the CEER give guidelines on the *content* of the balancing rules in each EU member state, but give little guidance on the *process* by which they should be fixed or revised. For example, Principle 2 says:

“balancing rules should be reflective of the actual flexibility and tools available to shippers to balance the system while ensuring there are sufficient commercial incentives on shippers to balance.”

This principle recognises that a trade-off must be made between two conflicting objectives (i.e., shippers’ access to flexible gas versus system security), but provides no guidance on the process for deciding the right trade-off. The same comment could be made about many of the other principles enumerated by the CEER. The most stark example is Principle 7, which

¹⁵ Shipper positions may cancel one another out by good fortune.

¹⁶ Perhaps including some probabilistic assessment of the potential consequences of persistent shipper behaviour.

concerns the trade-off between the need to reflect the specificity of the gas system in each member state (to promote efficient intra-market trade) and harmonisation of rules across member states (to promote efficient cross-border trade). Here again, the Balancing Principles recognise there is a trade-off without giving any guidance on the process by which it should be made. The only exception is Principle 3, which says the length of the balancing period, or frequency of balance, should be decided using a cost-benefit analysis, taking into account a number of factors (operational capabilities of the system, availability of information, etc). However, even here the Balancing Principles give no guidance on the process for conducting the cost-benefit analysis.

A number of shippers have commented to us that the balancing rules often seem to be decided by TSOs and regulators and then presented to shippers as a *fait accompli*. These shippers would like to see a more transparent process for fixing the rules, in which regulators and TSOs consult shippers before taking decisions and give objective justification for the choices they make, supported by published evidence and reasoning. Regulators will in many instances have the final say in any rule changes, so they need to be part of the same process, and where they disagree with the wishes of shippers and/or the TSO should give reasons for those decisions.

Without a more transparent process, shippers argue, there is no guarantee the trade-offs inherent in the balancing rules (e.g., hourly instead of daily balancing) are indeed objective and non-discriminatory, and not designed for example to keep new entrants out, to the benefit of the incumbent supplier, who in many instances is still under the same ownership as the TSO. Consequently, new entrant shippers lack the confidence to participate in certain markets, or adopt a more cautious approach, avoiding committing themselves to large-scale entry. As a result the degree of competition is, or may be, reduced, resulting in less choice and potentially higher prices and/or lower quality of service for end-users.

To address the above concerns, the Balancing Principles could usefully be amended to stipulate that balancing rules should be defined using a transparent process, which requires the regulator and/or TSO to demonstrate that the rules are objective and non-discriminatory by reference to objective data and assumptions, including the preferences of shippers and end-users expressed through public consultation. In addition there should be a requirement on regulators to ensure that this process is adopted and followed.

This clarification of the Balancing Principles would bring them more into line with the GGP provisions on “Tariff Structure and Derivation”, which require that TSOs publish detailed information on the methodology they use to derive their tariffs.¹⁷ It would also help to clarify what is meant by the requirement at Section 2.1.5 of the revised GGP, which reads:

“The development of network codes and standard contracts must be done by proper consultation [our underlining] with users and overseen by the regulatory authorities at the national level.”

¹⁷ First bullet point, Section 6.2, Page 16, GGP (Revised Edition, September 2003).

3.3.2. Content Standards

Our comparison of the existing Balancing Principles against the standards we have set out above suggests the most critical gaps in the existing Balancing Principles are that:

- § they do not require TSOs to use market-based procedures to procure the gas they use for system balancing;
- § they do not require imbalance cash-out prices to be cost-reflective.

Correcting these flaws would help to rectify some of the other weaknesses of the existing Balancing Principles. For example, if imbalance cash-out prices are cost reflective, there would be no reason to place restrictions on the requirement to allow ex-post imbalance trading, in the way the existing Balancing Principles do. Allowing ex-post imbalance trading may weaken the incentives on shippers to balance, transferring more risk to the TSO and possibly increasing the cost of residual balancing, but if imbalance prices are cost-reflective that would be an efficient outcome.

Our review also suggests that the existing Balancing Principles should be amended to make it an obligation on TSOs and regulators to ensure:

- § effective monitoring and enforcement of the non-discriminatory application of the rules, to reinforce the principle of non-discrimination enunciated by the existing Balancing Principles;
- § an efficient trade-off between the sometimes conflicting aims of *promoting competition* and *ensuring cost reflectivity*, taking account of the degree of competition already present in the market and the specific physical characteristics and costs of each system.

3.4. Conclusion

Our review of the existing Balancing Principles has suggested a number of possible amendments, which we have listed above. In the next chapter, we examine the existing balancing regimes in a selection of EU markets, to assess:

- § whether there are any aspects of the existing regimes that are distorting or frustrating competition and liquidity;
- § whether the problems we identify could be addressed through more consistent application of the existing Balancing Principles; or
- § whether amendments to the Balancing Principles are needed in order to better promote competition and liquidity in these markets and elsewhere in the EU.

4. Evaluation of Existing Balancing Regimes

In our evaluation, we have concentrated primarily on three countries – Belgium, Netherlands and France. In each case, we had detailed discussions with and contributions from regulators, shippers and gas transporters on gas balancing. We selected these three countries for several reasons:

- § Market opening is happening and arousing interest in the balancing regime in each of these countries;
- § They are in close geographic proximity and offer the potential for examining boundary issues; and
- § Industry participants have also identified these countries as being of greatest interest from a balancing perspective at present.

The selection of these three markets should not be seen as implying any particular criticism of their regimes compared with others. We selected them because they offered the best and most topical opportunity for learning in a relatively short study period.

We also briefly reviewed the balancing regimes in the UK, Italy and Spain, based largely on our own experience rather than enquiry amongst industry players.

This chapter summarises the possible inefficiencies and distortions caused by the balancing regimes in these markets, and considers how these might be addressed in the light of views from market participants. The detailed case studies of each market, on which this chapter is based, are described more fully in the Appendices.

We would not claim that our analysis represents a comprehensive and even handed assessment even of the regimes that we have concentrated on. Nor has it always been possible to corroborate our findings with the original contributors or other interested parties. Our purpose in this short study has been to identify issues and concerns primarily from the perspective of market participants, and we hope and anticipate that others will have the opportunity to offer alternative perspectives in due course.

4.1. Overview of the Existing Balancing Regimes

4.1.1. Belgium, the Netherlands and France

Although all three systems exhibit some features of daily and hourly rules, most shippers we spoke to characterised Belgium and the Netherlands as hourly balancing regimes, and France as daily.

All three have multiple balancing zones, reflecting the response of TSOs to a combination of gas quality and network size and congestion considerations. In the case of France, the system is further fragmented by diversity of system ownership.

Shipper imbalance pricing varies between systems, but shares a common trait of administered incentives, generally referred to by shippers as “penalties”, rather than being derived from more cost reflective principles. In the Netherlands, measures are in train to move to a system

of cost-reflective cash-out prices during 2005, based on market prices in a new on-the-day commodity market.

None of the TSOs yet has direct access to a short term source of market priced flexibility, but instead make do with a combination of reliance on linepack, storage, annual flexibility contracts and the services of the incumbent supplier (enshrined in the concept of the “balancing shipper” in the case of the Netherlands).

4.1.2. GB, Italy and Spain

GB, Italy and Spain all operate a system of daily balancing within a single balancing zone.

In GB, imbalance cash-out prices are based on system-sell and system-buy prices in the on-the-day commodity market (OCM). Currently, Italy and Spain both rely on administered cash-out prices, but there are developments in train in both markets aimed at introducing more cost reflective cash-out prices in the near future.

4.2. Inter-System Issues

4.2.1. Arbitrage of Cash Out Prices

The majority of issues we have identified relate to the balancing activities within each system rather than between neighbouring regimes. The main exception concerns the interaction between Belgium and the Netherlands, where a number of parties have told us that differences in imbalance cash out prices have resulted in arbitrage of imbalances between the Netherlands and Belgium (cf. Appendix A). We have carried out our own analysis to examine the extent to which differences in administered cash-out prices can be arbitrated profitably across the Dutch-Belgian border, which is summarised in Appendix B. Our own analysis seems to confirm what we have been told by some of the parties we have spoken to. We have not been told about any similar problems at the Belgian-French border.

The parties we spoke to agreed that the ability of players to arbitrage between systems is not necessarily a bad thing, and is a welcome phenomenon where it is occurring in response to different underlying cost signals between neighbouring systems. However, in the case in question parties were concerned that it is more likely to be arising due to the adoption of inappropriate administrative cash out arrangements that are distorting trade, and our own analysis confirms that.

4.2.2. TSO Pricing of Additional Flexibility

We have been told that flexibility in Belgium is in relatively tight supply and yet Fluxys’ charges for additional flexibility services are low (due to the application of regulated cost-plus rules) compared to the Netherlands and France, which enjoy more plentiful flexibility (particularly from the Groningen field and storage respectively). Fluxys has told us that they do not define the Zeebrugge Hub as an exit point from the Belgium system, partly in order to prevent shippers exporting cheap additional flexibility from Belgium to neighbouring systems. So if a shipper is long in the Belgian system, he cannot exit his gas to the Hub.

Currently, the only way excess gas destined for a Belgian customer can be taken off is via renomination on entry points, or cash-out of end-of-day imbalances by Fluxys.¹⁸

It appears, therefore, that the measures adopted by Fluxys to correct for the under-pricing of additional flexibility services in Belgium are resulting in knock-on distortions to the access arrangements, which restrict shippers' ability to manage their imbalances efficiently.

4.2.3. Information Flows at Cross-Border Interfaces

Shippers have also expressed some informational concerns regarding cross border trade, particularly where a daily regime meets an hourly one, but the consensus view suggests that these are manageable provided neighbouring TSOs co-operate in extending the application of well designed Operational Balancing Agreements (OBAs).

4.3. Imbalance Cash Out prices

A common concern among shippers in Belgium, France and the Netherlands is the nature of imbalance cash out pricing. In the absence of market based mechanisms for pricing flexibility, each regime has adopted a variety of reference prices with multipliers and discounts applied to over and under deliveries respectively. For example, the Netherlands references quarterly oil indexed prices, whilst in France cash out in all zones is based on Zeebrugge spot prices. In both markets, as well as Belgium, imbalance prices outside specified tolerances are calculated by applying non-cost-based multipliers or discounts to these reference prices. Shippers complain that these schemes amount to penalty regimes rather than balancing regimes, creating unnecessary risks and hence unnecessary costs. Because incumbents with large diversified portfolios are less exposed to these risks than new entrants, these schemes also exacerbate entry barriers, thus deterring entry and distorting competition.

The TSOs we spoke to all argued that they needed to wait for liquid and competitive short-term markets to develop within their systems as a means of procuring residual balancing flexibility and providing the basis for moving to more cost reflective cash-out prices. However, even before such markets develop, it is possible for TSOs to procure flexibility and design cash-out prices that better reflect the underlying economics of balancing the system.

For example, the costs TSOs incur in procuring flexibility through annual contracts could be reflected in cash-out prices, by profiling these costs to reflect the opportunity cost of calling gas at short-notice on each day, rather than using an external reference price with arbitrary multipliers and discounts. (The annual flexibility contract may itself cross reference some external market, as is the case in Northern Ireland, where the TSO procures annual flexibility through a tender in which providers are required to bid a price that is referenced to the neighbouring GB on-the-day commodity market price.)

Furthermore, the TSO could complement its annual contract(s) by seeking to procure flexibility on a shorter term basis, perhaps from multiple sources including shippers and

¹⁸ Fluxys is investigating if they can allow shippers to export imbalance gas to the Hub and/or offer limited parking services to small shippers starting up in Belgium.

demand side, without waiting for the emergence of independently operated traded markets. For example, the TSO could create interim market mechanisms as occurred in GB, where Transco operated a bid-based “flexibility mechanism” prior to the emergence of the OCM.¹⁹ These TSO mechanisms can then be subsumed as and when independently operated markets emerge.

4.4. Multiple Imbalance Zones

The existence of more than one balancing zone, particularly in a relatively modest sized area or gas market, can seriously limit market liquidity and hamper the development of competition by increasing transaction costs and risks for shippers. Those interviewed were particularly critical of the design of the regime in France, and felt that TSO concerns over network congestion were at best overstated, or at worst irrelevant, to the decision on the number of balancing zones. One observed that theoretical occasional problems were being unnecessarily “hard-wired” into the design of the day to day regime, to the serious detriment of the prospects for competition and gas trading.

Belgium and France partially address these concerns by aggregating, or netting off, shipper imbalances across zones in most circumstances.

The Netherlands, Belgium and France all have separate high and low calorific value (CV) zones at present. Some shippers advocated that conversion infrastructure costs be “socialised” by the TSO (as has been considered in the Netherlands), so that the shipper is not faced with different balancing zones for high and low CV gas. Some shippers suggested that without such an approach the prospects for genuine supply competition in low CV areas would be seriously hampered.²⁰

Merging high and low CV zones is potentially problematic, because it may require investment in conversion facilities and/or changes to consumption technologies, or at least the development of new (locational) commercial tools to enable the TSO to overcome potential constraints that might emerge if shippers did not have to distinguish between zones. For example, shippers may all be nominating balanced inputs and offtakes in aggregate, but it may not be possible for the TSO to achieve the needs of one or more zones without some form of locational intervention. Such an intervention would be designed to increase flow from some source and perhaps reduce flow elsewhere, and may of course introduce costs that probably could not, or would not, be targeted in a simpler combined zone regime.²¹

In essence a cost benefit trade-off is required to establish whether the promotion of greater competition via a more user friendly regime for shippers can justify the likely resulting increase in costs of operation (or loss of cost reflective targeting of such costs).

¹⁹ Because of concerns about the dominance of the incumbent supplier in GB, Ofgem initially required the dominant supplier to bid into Transco’s flexibility mechanism within a restricted bid-offer spread.

²⁰ Due to the relative lack of competition in production sources because of the ownership structure of Groningen and the traditional supply relationships that govern the way in which Groningen supplies are marketed.

²¹ Or a demand side intervention might be taken if an end customer were prepared to reduce (or increase) demand more cheaply than the alternative.

4.5. Balancing Period

Several participants expressed the view that they had not seen compelling evidence of the case for hourly balancing in either Belgium or the Netherlands. Shippers thought unnecessarily short balancing periods were placing additional strain on information processes, increasing transaction costs and shipper risks, and reducing market liquidity.

The TSOs in Belgium and the Netherlands both stated that hourly constraints were necessary in order to ensure system integrity, citing the design principles and capabilities of their respective networks.

Although, it is not within the scope of this report to judge the merits of these different points of view, we believe that in arriving at a judgement it is important to consider a number of factors, including:

- § The sourcing of diurnal fluctuation which may be upstream (e.g. production), midstream (e.g. storage) or downstream (e.g. local distribution);
- § The availability and economics of flexibility for both the TSO and shippers; and
- § The size and design of the network operated by the TSO

Whether or not shorter balancing periods are fully justified by considerations such as network design and operational characteristics, this issue highlights the importance of greater transparency and debate in the development of regime rules.

4.6. Information Flows

Nearly all shippers, TSOs and regulators consulted cited information flows as a source of concern, especially in the hourly regime of the Netherlands. Concerns about poor quality information and long delays in the final allocation process were especially prevalent in relation to offtake allocations, particularly where end customers resided in a connected distribution zone.

Input allocations can also be problematic in the case of shared entry points and in the absence of effective OBAs. The problem can be compounded by the frequency of the balancing period, and when final allocations are used in establishing imbalance charges, rather than provisional allocations. Examples were cited (in the Netherlands) of allocations and charges still being outstanding over a year after the event. This clearly has the potential to undermine shipper confidence and increase the costs and risks of doing business, hence unnecessarily raising prices to end-users.

In Belgium, parties also acknowledged there are problems with the accuracy and timeliness of information flows, but stated they have little impact on the risks borne by shippers in balancing their portfolio, because imbalance charges depend on provisional allocations notified close to real-time. In the Belgian system, therefore, the costs of dealing with hourly or daily imbalances that are caused by inaccurate provisional allocations fall on the TSO or the distribution companies, rather than the shippers. This system of cost allocation ensures that the parties who are responsible for metering, customer profiling and the maintenance of

robust information systems, namely the TSO and distribution companies, are properly incentivised to manage the costs of any inaccuracies in provisional allocations.

4.7. TSO as Residual Balancer

Whilst we do not claim to have closely studied TSO activities, and shippers have not directly made the point, we have some concern about the adequacy of resources directly available to TSOs in order to balance the system.

In Belgium, Fluxys interprets Article 2 of the Belgian Code of Conduct to mean that it cannot buy or sell gas to balance the system, and hence cannot directly use the increasingly liquid hub at Zeebrugge for system balancing.²² Whatever the merits of Fluxys' legal interpretation, it seems further legal clarification may be required in order to ensure that Fluxys can carry out its balancing function efficiently.

In the Netherlands, GTS relies upon the dominant incumbent supplier, GUTS, to act as a special “balancing shipper”, and we understand that in France that if GDF Negoce took advantage of the tolerances that are offered, the system could have difficulties accommodating such action by a major supplier. In each case these suggest the need to put the TSO's residual balancing capability on a proper footing – with appropriately designed incentives -, so that regimes can operate efficiently and without the need for “grace and favour” understandings between the TSO and incumbent suppliers or storage operators. Only then can credible non-discriminatory arrangements be established that foster confidence among potential new entrants and hence increase competition and liquidity.

4.8. Promotion of Traded Markets

Whilst not the only determinant of the success of establishing and encouraging traded markets, many shippers recognised that gas balancing rules have a pivotal role to play in this regard. As already discussed, the emergence of healthy and liquid traded markets can be hampered by multiple balancing zones, short balancing periods and the adoption of “punitive” administered imbalance cash out prices. Whilst the TTF is a welcome development in the Netherlands, participants have expressed concerns about the surrounding balancing regime (e.g., inadequate information, hourly constraints, etc.). In France, shippers have commented that the multiplicity of balancing zones is hampering attempts to stimulate a traded market. In Belgium, shippers see the successful Zeebrugge hub as primarily serving the transit market rather than facilitating competition and supply within Belgium.

4.9. Access to Flexibility

In the absence of active and liquid within day markets, several shippers complained that they cannot access sufficient *ex ante* flexibility on reasonable terms. Shippers noted that storage is either in short supply or reserved for strategic seasonal purposes. Beyond available “free” tolerances, shippers stated that additional flexibility services were in short supply, or sometimes had to be bought expensively from the incumbent supplier, a rival. Shippers also

²² Arrêté royal relatif au code de bonne conduite en matière d'accès aux réseaux de transport pour le gaz naturel, 4 avril 2003, [F. – 2003 – 1708].

complained that they are denied the opportunity to trade imbalances *ex post*, even as a transitional measure pending the emergence of active within day markets.

4.10. Treatment of Transit

A particular concern shippers identified in the case of Belgium, which we believe may also be relevant in other EU jurisdictions that we have not surveyed (e.g., Austria), is the separate treatment of transit. In the case of Belgium this appears to be particularly acute, since transit capacity is owned mainly by Distrigas, and the rules of balancing are quite different from those applying to “internal” transportation.

Whether it is efficient to have separate balancing rules for transit in Belgium could only be decided through objective cost-benefit analysis, which is beyond the scope of our study. In particular, shippers are concerned about the risk that Distrigas could use its dominant position on the market for transit capacity to protect its position on the Belgian TPA market (e.g., by using flexibility in the transit system to balance its position on the TPA system, or restricting access to the hub for deliveries to the Belgian market). The issues around transit in Belgium are much wider than gas balancing, and we have not been able to verify whether the concerns shippers have expressed to us are justified. However, the lack of transparency concerning the balancing rules governing transit pipelines and the possible interactions with the balancing rules on the TPA system clearly creates uncertainty that acts as a deterrent to new entrants and the development of competition.

4.11. Conclusion

Our case studies have highlighted aspects of the existing balancing regimes that seem to be frustrating the development of competition and liquidity in the markets we have studied. For example, multiple balancing zones and hourly constraints that deter new entry and frustrate the development of liquid traded markets. And arbitrary differences in administered cash-out prices that distort intra-market decision-making as well as cross-border trade.

These problems could be addressed partly by amending the existing Balancing Principles in the ways we suggested in Chapter 3, i.e. :

- § a more transparent process for decision-making, to ensure that balancing rules are objective and reflect an efficient trade-off between cost reflectivity and promoting competition, particularly in relation to the number of balancing zones and the use of hourly constraints;
- § cost-reflective imbalance cash-out prices;
- § effective monitoring and enforcement of arms-length and transparent dealings between the TSO and affiliated incumbent shippers, in particular where affiliated shippers play a special role in balancing the system (e.g., as a “balancing shipper”); and
- § requiring TSOs to make an efficient trade-off between ensuring cost reflectivity and the wider objective of promoting competition.

In addition, our case studies have identified a number of other issues that suggest a need for further amendments to the Balancing Principles. First, the contrasting experience of Belgium

and the Netherlands in terms of information flows suggests the Balancing Principles should be amended to require TSOs, as far as possible, to use provisional allocations in the calculation of imbalance charges. That would reduce imbalance risks for shippers, and help ensure the TSO and distribution companies are properly incentivised to invest in the metering and information systems needed to ensure accurate provisional allocations. Clearly, however, the problems caused by poor quality information flows will only be fully resolved when a number of other measures are implemented, including:

- § improved accountability and standards for information flows, especially for offtake allocations in relation to end users who reside in a connected distribution zone;
- § increased use of well-designed OBAs to resolve uncertainties in relation to input allocations, particularly for cross-border flows; and
- § new investment in metering and information systems.

Second, many shippers have complained about inadequate access to sources of flexibility (e.g., the Zeebrugge Hub, storage, liquid traded markets, etc.). To address this problem a number of measures are needed, including for example changes to capacity allocation rules, many of which are outside the scope of the Balancing Principles. Nevertheless, four amendments to the Balancing Principles would help address the shippers' concerns about inadequate flexibility, namely:

- § require TSOs to maximise the linepack they make available to shippers, subject to maintaining system security;
- § where flexibility is in short supply, TSOs should adopt the presumption that allocating tolerances and/or flexibility services on the basis of market value is preferable to bundling automatically with capacity;²³
- § require TSOs to facilitate secondary trading of linepack (e.g., trading of free tolerances), as well as any additional flexibility services provided by TSOs; and
- § allow ex post trading of daily imbalances in systems that have implemented cost reflective cash-out prices.

Third, our case studies have also revealed that the treatment of transit is a potential cause of distortions, which is not addressed by the existing Balancing Principles. The Balancing Principles should be amended to require the same transparent, non-discriminatory and objective procedures and rules to be applied to transit pipelines as to the ordinary transportation system.

²³ Revenues in excess of reasonable cost could be redistributed to shippers via balancing neutrality provisions

5. Conclusions

In this report we have reviewed the CEER Balancing Principles from a theoretical perspective and considered practical issues identified by industry participants in several important EU markets. Based on our findings, we have made a series of recommendations for amending the existing Balancing Principles, which are summarised in the conclusion of the preceding chapter.

In the short-term, amending the Balancing Principles in the ways we have recommended, and incorporating this new set of principles into the GGP, would provide improved guidance to national regulators and TSOs on the design of an efficient balancing regime. In the longer term, measures to reduce the number of balancing zones, both within and across member states, reduce the complexity of gas balancing for shippers (e.g., removing hourly constraints), and increase access to flexibility (e.g., through the development of traded markets), would all help to promote competition and liquidity in the EU gas market. However, these measures may require new investment (e.g., to remove physical network constraints, merge low cal and high cal zones, develop the information systems needed to support traded markets, etc.), which will take time to complete. In addition, all such investment will need to be appraised in the specific context of the gas market of each member state, to establish whether the benefits outweigh the costs.

Our recommendations are based on analysis of a selected group of markets and focus on the perspective of new entrant shippers, so it is important that they are tested thoroughly through consultation with all relevant players, both in the markets we have studied and in other markets, before they are used as a basis for decision-making. In the remainder of this chapter, we conclude with a summary of the main lessons and themes that have emerged from our study.

5.1. Transparency and Due Process

The Balancing Principles need to spell out that balancing rules should be decided upon using a transparent process, which requires the TSO to demonstrate that the rules are objective and non-discriminatory by reference to objective data and assumptions, including the preferences of shippers and end-users expressed through public consultation.

There should also be a requirement on regulators to ensure that a transparent and objective process is adopted and followed.

5.2. Cost reflective Cash-Out Prices

The Balancing Principles need to emphasise that imbalance cash out prices should be set on a cost reflective basis. In order to facilitate this objective, TSOs should be required to obtain residual system balancing flexibility through market-based procedures.

This may dictate consideration by the regulator of the extent of underlying competition in flexibility to ensure efficient purchase by the TSO. It may also require the TSO to use innovative methods to translate contract prices into cost-reflective daily cash-out prices, in systems where the TSO relies on contract tenders to procure the flexibility it needs to carry out its residual balancing function.

5.3. Balancing Cost-Reflectivity with Promoting Competition

In applying the principle of cost reflectivity, TSOs must take proper account of the trade off with the promotion of competition. The efficient trade-off will depend on the degree of competition already present in each market and the specific physical characteristics and costs of the system. However, TSOs should generally give greater weight to promoting competition in markets where competition is currently weak. This could be achieved, for example, by regulators and TSOs adopting the presumption that fewer balancing zones and daily, not hourly, balancing periods are intrinsically preferable, seeking to overcome TSO concerns about physical system integrity by other means.²⁴

A vital facet of the promotion of competition is the facilitation of trade. The TSO should not be compelled to operate markets, but it should operate balancing rules in a manner conducive to the establishment of liquid traded markets, both within and ahead of day (e.g., by minimising the number of balancing zones). Regulators and TSOs should take account of the impact of their decisions on the development of traded markets when deciding the appropriate trade-off between cost reflectivity and promoting competition in the design of gas balancing rules. In addition, regulators should consider fostering the development of traded markets by incentivising dominant, incumbent suppliers to participate in nascent markets. Similarly, TSOs should foster the development of traded markets by using them as a residual balancing tool as soon as that becomes feasible.

5.4. Non-discrimination

Particular emphasis should be placed on the need to ensure effective monitoring and enforcement of the non-discriminatory application of balancing rules. One of the surest signs of a weakness in the underlying transportation rules is if they cannot be applied consistently to all users of the network.

Where interim arrangements involving the incumbent supplier are necessary, these should be established transparently and preferably outside, rather than embedded within, the transportation rules. For example, a public undertaking by an incumbent to participate in the flexibility market on a certain basis is to be preferred over special dispensations within the TSO's balancing rules (or private understandings).

5.5. Information flows

It is evident that there is a widespread concern regarding the quality and timeliness of information flows to support balancing regimes. To minimise these problems, TSOs should, as far as possible, use provisional allocations to calculate imbalance charges. In addition, regulators should be required to establish clear accountabilities and standards for information flow such as input and offtake allocations, and to promote the adoption of well designed OBAs between neighbouring systems. Regulators will also need to ensure TSOs and other network operators have adequate resources to put in place the metering and information systems needed to improve the quality of available information.

²⁴ For example, these means could include more innovative capacity design and allocation procedures, and additional commercial system management tools.

5.6. Conclusion

It is a fundamental requirement for establishing a well functioning balancing regime that the TSO's ability to maintain a safe and efficient transportation network is retained. However, the means of achieving this needs to alter with the move from monopoly to competition. The TSO must shed its *command and control* philosophy of the past and adopt a *service oriented* role.

In its new role, the TSO needs to actively facilitate competition in both the design and operation of the transportation regime. It needs to encourage and respond to the signals and needs of the users of the network. The TSO should ensure that the transportation cost signals confronting network users are as reasonable and as efficient as possible. This requires a critical trade off between underlying cost reflectivity and transactional complexity. There is no point in replicating the physical regime with a commercial model of such complexity that it generates excessive cost to users or frustrates their ability to do business and compete effectively with one another.

It is for this reason that we advocate important additions to the CEER balancing principles with an emphasis on the need to promote cost reflective signals whilst making reasoned and transparent trade-offs with the wider benefits of promoting competition in gas supply.

Appendix A. Belgium

A.1. Background

In Belgium, there are two commercially distinct transmission systems: the third party access (TPA) system, which is subject to regulated third party access by CREG; and the transit system, which currently escapes from economic regulation by CREG²⁵. Capacity in the TPA system is allocated by Fluxys on a “first-to-commit” basis, under standard transportation contracts. The majority of the capacity in the transit system is allocated to Distrigas & Co. and ETAC, both subsidiaries of the incumbent gas trading company Distrigas, under long-term (up to 20 years or more) contracts. Fluxys operates both systems, and is also the operator of the Zeebrugge trading hub through its subsidiary Huberator.

Separate gas balancing rules are used on the TPA and transit systems. Our discussion of the balancing regime in Belgium concentrates on the TPA system. However, where the operation of the transit system may affect gas balancing on the TPA system, we discuss the issues that arise from this possible interaction.

A.2. Overview of the Existing Balancing Regime

On the TPA system, Fluxys operates a system of daily balancing with hourly constraints. There are three types of imbalance tolerances – hourly (HIT), cumulative (CIT) and daily (DIT) – with corresponding imbalance prices.

Fluxys operates a system of 4 balancing zones (three high cal and one low cal). Shipper imbalances are aggregated across these zones except when there is congestion on the interconnections between these zones (currently applying only a few times a year) in which case shippers get “pushed back” to their contractual route. The push-back principle is apparently applied only when Fluxys is confronted with more extreme situations which have not been simulated.. When push back applies the shipper needs to be in balance in the specific balancing zone connecting his entry zone with his exit points.

At present, Fluxys relies on linepack, together with small quantities of gas stored in the LNG and gas storage facilities, to meet its residual gas balancing needs. Apparently system balancing depends upon rapidly available capacity from storage and LNG send-out, but relatively small aggregate volumes. Linepack and send-out capacities on the LNG-terminal

²⁵ The process involved in the publication of the main conditions of access to the FLUXYS SA/NV transmission network began with the publication, on 2 May 2003, of the Royal Decree on the **code of conduct** as regards access to the natural gas transmission network (‘the code of conduct’), proposed by the CREG. The Belgian code of conduct was one of the sources of inspiration for the drafting of the ‘**Guidelines of Good Practice**’ for which a broad consensus was achieved within the Madrid Forum. The CREG regrets that FLUXYS SA/NV has been unable to draw up any main conditions for its transit activity, further to judgement No 126.817 pronounced by the Council of State on 5 January 2004 in the case of DISTRIGAS SA/NV and DISTRIGAS & Co S.C.A./C.V.A. against the Belgian State (the Council of State reached this decision on the basis of a procedural error, without pronouncing judgement on the merits of the case). Consequently there are not yet any approved, transparent and non-discriminatory rules of access for transit through Belgium, although this is clearly important, given that the capacity reserved for transit accounts for two-thirds of the total useable capacity at entry points on the Belgian transmission network.

and the storage facilities at Loenhout are also used for flexibility services offered to the shipper (CIT/DIT) and not limited to residual balancing needs. The Fluxys transmission system provides most of the diurnal flexibility required by the Belgian gas industry, with free flow into the (more than 30) local distribution systems. Fluxys currently procures operational reserve to cover emergencies through an annual tender process.

Where they are in place, Operational Balancing Agreements (OBAs) are helpful in keeping input allocations whole (i.e. equal to nominations), increasing shippers comfort and also offering the potential for collaboration between TSOs in order to meet residual balancing needs. Provisional allocations, notified close to real-time, are used for imbalance calculation purposes. Provisional data are reopened (validated) for calculation of the commodity settlement but are not reopened for balancing charges.

There is some scope for interruption by the TSO. The actual procedures have 6 hours pre-notice giving the end-users time to prepare for switching to another fuel source and 4 hours interruption notice. Fluxys would like to have some interruptible contracts with power stations that may be able to offer the speed of response (2 hours or less) typically required to support the network in case of emergency. Most normal interruptible customers need several hours or more notice before they can switch to alternative fuel sources.

A.3. Inefficiencies and Distortions

A.3.1. Arbitrary Imbalance Prices

Imbalance prices in Belgium are not cost reflective because they are based on an administered reference price with multipliers and discounts that bear little or no relation to the costs Fluxys incurs in balancing the system. Although they may provide shippers with strong incentives to balance their positions, because they do not provide accurate cost signals they may distort decision-making about gas purchasing and could cause inefficiency.

Shippers have told us that the differences between the administered imbalance prices in Belgium and those in the Netherlands are resulting in distorted and inefficient cross-border trade (i.e. trade that is not based on differences in costs). We have examined these effects ourselves using recent past data on imbalance prices (c.f. Appendix C). Our analysis confirms that differences in administered imbalance prices are creating opportunities for distorted arbitrage trade across the Belgian-Dutch border.

A.3.2. TSO Procurement of Balancing Gas

There is concern that the current Fluxys tender for operational flexibility is not best designed to encourage competitive provision. We understand that CREG is encouraging Fluxys to carry out a study concerning operational flexibility, procurement of balancing gas and incident management taking into account all possible alternatives (interruptible clients, investment in send-out capacity, emergency contracts with neighbouring operators, flexibility contracts etc) and options for the future.

A.3.3. Under-Pricing of Additional Flexibility Services

Flexibility in Belgium is generally in relatively tight supply and yet somewhat paradoxically the charges for the additional flexibility services provided by Fluxys are low (due to the application of cost-plus rules), in contrast to the Netherlands and France, which in comparison enjoy more plentiful flexibility (from Groningen and storage respectively).

To prevent shippers exporting cheap flexibility available within the Belgium system to neighbouring systems, Fluxys does not allow shippers to re-nominate within-day at exit points from the Belgium system. This is one of the reasons the Zeebrugge Hub is not defined as an exit point from the Belgium system, to prevent shippers exporting cheap flexibility from Belgium to neighbouring systems. So if a shipper is long in the Belgian system, he cannot exit his gas to the Hub. Currently, the only way excess gas destined for a Belgian customer can be taken off is via renomination on entry points or if not cash out end-of-day imbalances by Fluxys.

So the measures adopted by Fluxys to correct for the under-pricing of additional flexibility services in Belgium appear to be resulting in knock-on distortions that restrict shippers' ability to manage their imbalances efficiently.

A.3.4. Flow of Information

There have been difficulties with input allocations although it appears that the situation may be improving. However, output allocations are more problematic, particularly where they require input from distribution companies. Load profiles for smaller end customers (for whom hourly metering is inefficient and/or unavailable) may also be a source of concern.

A.3.5. Multiplicity of Zones

The number of balancing zones would seem excessive for a relatively small country. Although it is possible to combine imbalances on many days, this facility may be withdrawn in some circumstances, including "congestion" situations. It would seem that advance notice of congestion between balancing zones is quite limited and may create difficulties for network users in managing their supply demand portfolio and capacity rights. In these circumstances the "push back" principle requires the shippers to balance their portfolio separately in each of the zones.

A.3.6. Hourly Constraints

The hourly constraints built into the balancing regime in Belgium impose additional costs and risks on shippers, and make it necessary for Fluxys to provide and administer more costly within-day information compared with a purely daily balancing regime. We understand that Fluxys has adopted this system to ensure it is able to maintain system integrity. However, some shippers remain to be persuaded that an hourly balancing scheme is really necessary in Belgium. They doubt whether the balancing of inputs and offtakes on an hour by hour basis is either necessary or even helpful to the system, and therefore see little merit in the imposition of hourly constraints and imbalance incentives.

Although good information is available historically and within-day on performance of large consumers, the narrow tolerance bands mean that frequent renominations are necessary to keep in balance - sometimes up to 5 or 6 renominations per day.

A.3.7. Inadequate Availability of Flexible Gas

§ A Shortage of Within-Day Services

Within-day flexibility is not readily available in Belgium. Distrigas does not offer a service, and Fluxys has only provided limited services (e.g., the narrow tolerance bands), though we understand they may offer a new service from April 2004.

The automatic bundled allocation of tolerances with capacity may be inefficient, since some shippers need far less flexibility than others such as new entrants. For example, major players with high transit flows may be able to respond readily to the requirements of the hourly Belgian balancing requirement by some netting off of transit flows, making compensating adjustments via either upstream storage or the downstream regime (*such as the UK OCM*). This contrasts with the position of those importing gas via the IUK who need all the flexibility they can get.

The lack of a within-day market in Belgium means that any within-day trading must happen elsewhere. It is possible to trade gas at the UK NBP and make changes to IUK nominations, when gas is flowing, but this has not so far led to an active within-day market at Zeebrugge. Although it may be theoretically possible to trade imbalances on the Fluxys system, this doesn't seem to be happening yet as there are no tools like electronic posting and few market players.

§ Difficulties Accessing Flexibility at the Zeebrugge Hub

Although we understand that the Zeebrugge hub is an entry point for the internal Belgian gas market, several shippers have commented that there is an effective “disconnect” between the two. Shippers refer to the difficulty of doing business within Belgium compared to trading at Zeebrugge for onward transit. The capacities going in and out of the Zeebrugge Hub from ZPT, IZT and LNG terminal are transit capacities and those are sold by the primary capacity holder Distrigas & Co, full subsidiary of Distrigas S.A. on the secondary capacity market (entry exit capacity). As Distrigas holds a firm control over the bulk of what comes in and out of the Hub, and as it uses all the entry points, LNG storage and holds storage capacity it is the only company able to offer back up gas or on-the-day flexibility.

Because new entrants necessarily have small portfolios, trades for balancing quantities will necessarily be very small, perhaps too small for the traded market.

Gas is traded in the UK in energy terms, and shipped through IUK, but capacity in the Belgian system is booked as volume (cu m). This can cause confusion and creates additional balancing needs around CV variations. The 1% daily tolerance could theoretically be taken up entirely through CV variations, and this could get worse with LNG at Zeebrugge. Quality issues on some pipelines can also make it difficult to move flexibility between different parts of the system.

Given that CV values at Zeebrugge are only posted for the current day, not the day ahead, and that gas is entered in volume terms but balanced in energy, then the shipper is faced with balancing risk arising from CV variability largely outside its control. However, it can be argued that CV variability is primarily an issue between the shipper and the upstream industry, rather than the responsibility of the TSO.

§ Restricted Availability of Storage Capacity

Storage is only accessible to those shippers serving the residential market. The relatively small amount of storage means that in the case of Belgium, access to storage/flexibility in neighbouring countries could be an important source of flexibility for new entrants. However, access to such flexibility can be limited due to either the ability to obtain storage service elsewhere or the necessary cross border transport capacity. So far this benefit tends to be confined to major incumbent players in neighbouring countries who can net back imbalances to their home country, and/or have better storage and capacity access.

We understand that CREG and Fluxys are currently working on a study of flexibility service provision in Belgium.

§ Limited Ex-Post Flexibility

The balancing rules dictate that a shipper has the opportunity to rectify an imbalance during 12 hours in the following gas day. First, the need to correct an imbalance over 12 hours rather than 24 hours creates a difficult profile which is hard to source without additional within-day flexibility; second, that gas cannot be purchased on the day ahead market e.g. in UK as it will arrive a day late. (For example, if you have an imbalance on D, and buy day-ahead gas on D+1, you'll get it on D+2, but the imbalance must be repaid on D+1. If you want to buy gas on the day ahead market, you must second-guess on day D what your imbalance is going to be.)

A.3.8. Distrigas' Control of Transit Capacity

Distrigas' control of transmission capacity allocated to transit raises obvious potential concerns about equitable competitor access to the Belgian market, although these are not necessarily all within the scope of a review of gas balancing issues. There is a lack of normal transparency and regulatory oversight concerning transit capacity, and this extends to the availability and use of linepack capability to facilitate overall system balancing. There are also unresolved questions about the scope for physical interaction between "transit" and "internal" capacity, and whether this is limited by Distrigas' commercial control rather than Fluxys operational imperatives?

A.4. Possible Solutions

A.4.1. Cost-reflective Imbalance Prices

The use of cost-reflective imbalance prices would correct the distortions and inefficiencies caused by the current administered cash out arrangements. The introduction of cost-based imbalance charging in Belgium alone could exacerbate the risk of distorted arbitrage trade across the Belgium-Netherlands border, so there is a need for a co-ordinated approach. It

should be noted that arbitrage between systems is not of itself necessarily a concern, provided that it is in response to genuine cost reflective signals that differ between markets.

A.4.2. Market Pricing of Regulated Flexibility Services

The price of the additional flexibility services offered by Fluxys should reflect the full opportunity cost of supplying short-notice, flexible gas, to avoid distorting the market for flexible gas in Belgium, and limit the risk of scarce flexibility being exported abroad. Any surplus profits that accrue to Fluxys from supplying a service on these terms should be clawed-back through general transmission tariffs.

This change would also enable Fluxys to define Zeebrugge as an exit point, and allow within-day renominations at other exit points from the Belgian system, to facilitate shippers wishing to trade out a long position without having to resort to system cash out. This might reduce the case for a within system hub like the TTF or NBP.

We understand that Fluxys is investigating if they can allow the exporting of imbalance gas to the Zeebrugge hub and/or the possibility of offering limited parking & loaning services to small shippers starting up in Belgium.

A.4.3. Reducing the Number of Zones

CREG is encouraging Fluxys to invest to overcome congestion problems between the high cal balancing zones. However, the problem of combining low and high calorific balancing zones is perceived to be “almost insoluble” for Belgium on its own, and to date discussions with the Dte in the Netherlands have not yielded a solution. CREG has decided not to encourage expensive investment by Fluxys to create quality conversion capability such as nitrogen ballasting. Instead, the plan is to switch industrial customers within the low cal zone to high cal gas, while retaining the low cal gas for the residential markets in Brussels and Antwerp.²⁶ (*Low calorie supplies are actually quite valuable due to their sourcing from the inherently flexible Groningen field*).

A.4.4. Increasing the Availability of Flexible Gas

Tolerance flexibility could be unbundled from the sale of capacity, to give shippers greater choice over the quantity and duration they wish to purchase. We understand that tolerances that vary with prevailing temperature are proposed for implementation in 2005.

The development of a within-day market at Zeebrugge is being actively promoted by the industry as a means of providing additional flexibility – Huberator has signed an agreement with APX to create a cleared exchange at the Hub. A well functioning liquid market could complement administered tolerances and associated services from the transporter, and ultimately might prove a better alternative.

Concerns about the limited “connectedness” between the Zeebrugge hub and the internal Belgian market, including the difficulties associated with Distrigas’ position, have prompted some to advocate the development of a “within system” hub at Ostkerkstraat. However, the

²⁶ Fluxys can maintain safe Wobbe values by adjusting pressures in some circumstances

alternative view is that it would be more effective to work with the existing established Zeebrugge hub but overcome concerns about connectivity and flexibility provision for the internal market.

Underground storage in Belgium is predominantly used for seasonal purposes, but there could be scope for more creative day-to-day management (e.g. contra nominations) to provide more flexibility. It has been suggested that Fluxys are somewhat conservative in their management of storage, and we understand that there is little or no financial incentive under the existing regulatory system for them to adopt a more commercial and innovative approach.

A.4.5. Miscellaneous

Fluxys could alleviate CV fluctuation difficulties by adopting energy terms for capacity booking and gas inputs as well as gas balancing.

Relaxing the 12 hour repayment rule to 24 hours would avoid the need for shippers to source a difficult profile, and the creation of a “park and loan” service that allows repayment on D+2 rather than D+1 would further assist shippers. We understand that Fluxys intend to offer such a service in 2006/7.

We understand that work is in hand to improve informational issues, including better load algorithms, concerning the distribution systems connected to the Fluxys transmission system. This could reduce shipper costs and risks as well as mitigate the potential cross subsidy inherent in the use of inaccurate demand allocation methods.

Appendix B. Cross-Border Arbitrage of Imbalances

In both the Netherlands and Belgium imbalances are cashed out at a reference price within a certain band labelled a “free tolerance”. In the Netherlands the free tolerance band is equal to 2% of inputs to the system and in Belgium it is equal to a proportion of exit capacity. The reference price at which these imbalances are cashed out also varies between the two countries. In the Netherlands the reference price is indexed to oil prices whilst in Belgium the reference price is calculated daily based on the minimum of the day-ahead Zeebrugge and OMC prices.

B.1. Negative Imbalance Prices

Negative imbalances (outside the free tolerance) are cashed out at a proportion of the reference price. There are therefore two factors that affect the relative imbalance prices:

- § the relative volatility of daily vs quarterly prices; and
- § the relative premiums applied to reference prices for negative imbalances.

**Figure B.1
Negative Imbalance Prices Belgium & the Netherlands (Cents/kWh)**

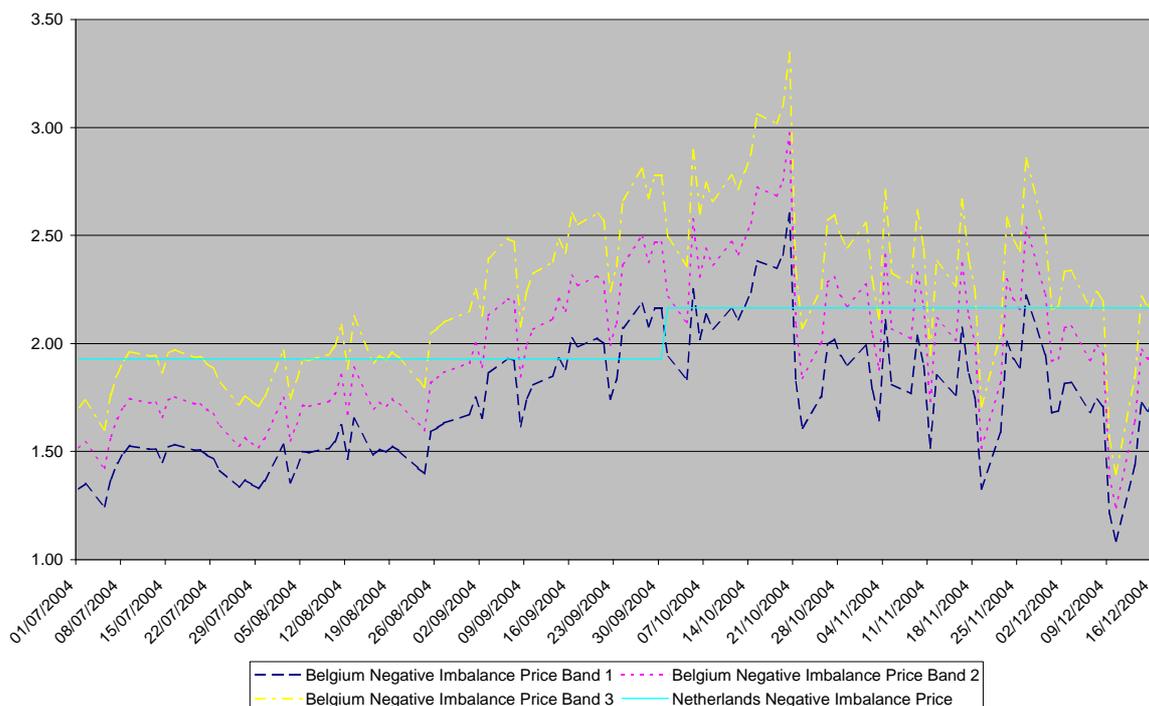


Figure B.1 shows imbalance prices for negative imbalances outside the free tolerance band for the Netherlands and Belgium.

The figure illustrates the opportunity for shippers to arbitrage between imbalance prices between the Netherlands and Belgium, taking advantage of relatively low prices in either jurisdiction.

Arbitrage occurs where a shipper has a negative imbalance (such that the imbalance price applies) in Belgium and in the Netherlands and it is profitable to transfer some or all of the imbalance between the two jurisdictions. For example, a shipper with a negative imbalance in the Netherlands can transfer a proportion of that imbalance to Belgium profitably on 84% of days in our sample.²⁷

The example set out in 1 illustrates this type of arbitrage in more detail.

In addition to the arbitrage scenario described above shippers may also move gas between jurisdictions in order to take advantage of “free tolerances”. In this case a shipper with an imbalance in Belgium and a balance in the Netherlands may transfer a set amount of gas in order to use up his “free tolerance” in the Netherlands. The “free tolerance is the amount of imbalance at which the reference price applies rather than the imbalance price. We can make two general statements about this type of imbalance transfer based on Box C.1:

- § for a shipper currently in balance in Belgium but with a negative imbalance in the Netherlands (such that an imbalance price applies) it is always profitable to transfer imbalance to Belgium up to the “free tolerance” limit.
- § for the opposite case, where a shipper is currently in balance in the Netherlands but has a negative imbalance in Belgium (such that an imbalance price applies) it is almost always, but not in every case, profitable to transfer that imbalance to the Netherlands up to the “free tolerance limit”.

²⁷ In order for this arbitrage to be profitable in each case the amount of capacity transferred must not exceed double the free tolerance as this implies an increase in imbalance costs in Belgium.

Box B.1 Negative Imbalance Transfer Example

Shipper A has a negative imbalance in the Netherlands amounting to exactly 2% of total inputs such that the imbalance price applies. Shipper A also has a negative imbalance in Belgium amounting to exactly the exit free tolerance limit such that the imbalance price also applies.

If shipper A transfers an imbalance equal to the free tolerance currently held in the Belgium system to Belgium the imbalance price applied will be 140% of the reference price.² In the Netherlands the imbalance price would be 170% of the reference price.³ Were the reference prices equal it would therefore be profitable for Shipper A to import some gas from Belgium to the Netherlands improving balance in the Netherlands but increasing the imbalance in Belgium.

However, reference prices are not the same and in some cases it is not profitable to transfer an imbalance due to the volatility of the Belgium reference price. Despite this it is still profitable for Shipper A to import gas from Belgium to the Netherlands in 84% of cases.

Assuming that Shipper A does in fact arbitrage imbalance costs by importing gas from Belgium to the Netherlands the maximum profit he could have made was 1.08 cents/kWh on 10th December 2004 (the average profit over the period is 0.37 cents). Table C.1 illustrates the total profit in Euros Shipper A could have made on 10th December 2004 based on varying assumptions on market share and daily imbalance as a proportion of total volumes consumed.

The table also illustrates the maximum profit Shipper A could have made from importing gas from the Netherlands to Belgium; this is actually slightly higher in this case.⁴

**Table B.1
Maximum Potential Daily Profits – Imbalance Arbitrage**

	Daily Consumption (kWh)	Shipper A Assumed Market Share (kWh)	Shipper A Assumed Daily Imbalance (kWh)	Maximum Arbitrage Profit - Transfer to Belgium	Maximum Arbitrage Profit - Transfer to Netherlands
				<i>10th December 2004</i>	<i>20th October 2004</i>
Case 1	1,147,732,603	229,546,521	11,477,326	€ 123,955	€ 135,432
Case 2	1,147,732,603	229,546,521	2,295,465	€ 24,791	€ 27,086
Case 3	1,147,732,603	573,866,301	28,693,315	€ 309,888	€ 338,581
Case 4	1,147,732,604	573,866,302	5,738,663	€ 61,978	€ 67,716

NB; This calculation assumes that the size of the imbalance the shipper is transferring does not exceed two times the free tolerance threshold in Belgium. This implies hourly exit capacities for Shipper A of 239,111 kWh (Case 1), 47,822 kWh (Case 2), 597,777 (Case 3), 119, 555 (Case 4).

² In Belgium negative daily imbalances are charged at 140% of the reference price for imbalances of up to 2 times the free tolerance.

³ In the Netherlands negative daily imbalances are charged at 170% of the reference price for imbalances of more than 2% of the free tolerance.

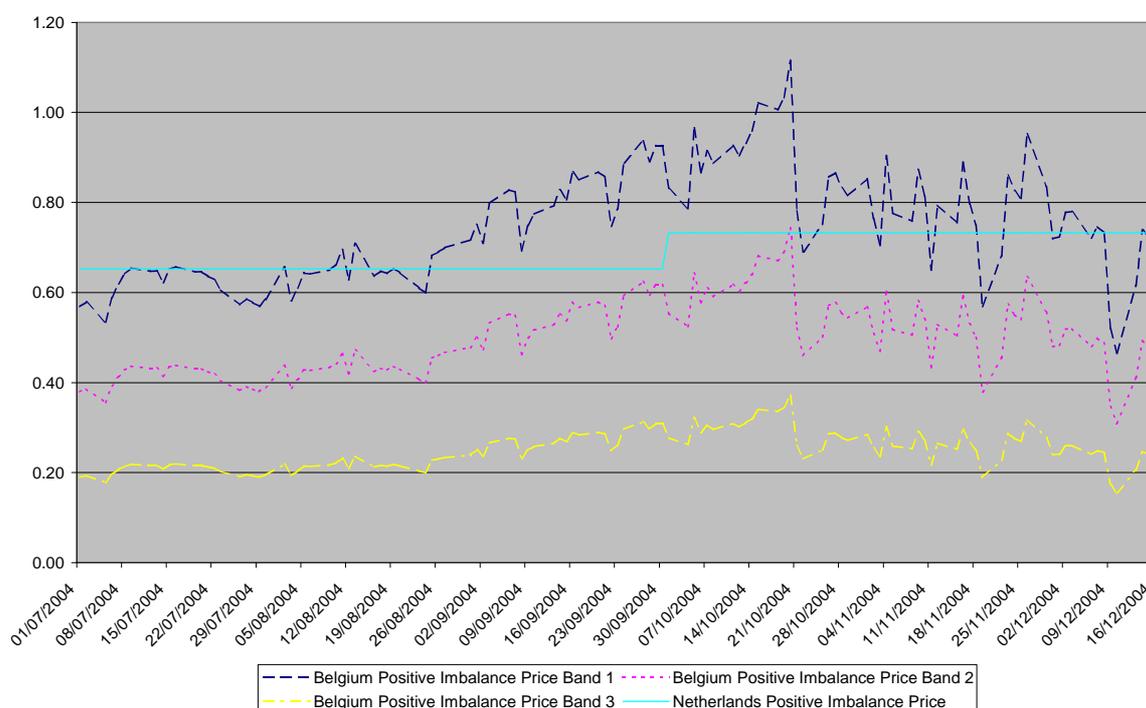
⁴ This maximum profit may not be achieved by Shipper A if for example, capacity overrun charges apply in the country to which a balance has been transferred.

B.2. Positive Imbalance Prices

Positive imbalances (outside the band) are cashed in the same way as negative imbalances but at a multiple of the reference price as opposed to a proportion.

Figure B.2 shows imbalance prices for positive imbalances outside the free tolerance band for the Netherlands and Belgium.

Figure B.2
Positive Imbalance Price Belgium & the Netherlands (Cents/kWh)



The figure shows that as with negative imbalances shippers can arbitrage imbalances between the two jurisdictions to minimise their imbalance costs. Also, as with negative imbalances, shippers can arbitrage imbalances in order to maximise their free tolerances.

However, the figure also shows that arbitrage of positive imbalances is both less profitable and more straightforward in the case of positive imbalances. Arbitrage is less profitable as the largest variation between prices in the two markets is 0.58 cents per kWh whereas in the case of negative imbalances the largest variation is 1.18 cents per kWh. Arbitrage is more straightforward in the case of positive imbalances because it is rarely profitable to arbitrage in cases where transferring capacity would result in the shipper incurring Belgium imbalance tariffs in either band 2 or band 3. However, in over 60% of cases it is profitable to arbitrage where transferring capacity would result in the shipper being subject to Belgium imbalance tariffs in band 1. Conversely, in the case of negative imbalances it can be profitable to arbitrage through transferring imbalances to Belgium irrespective of which imbalance tariff will be applied within the Belgium system.

The example set out in Box 2 illustrates a case where it is profitable for a shipper to transfer a positive imbalance from the Netherlands to Belgium.

Box B.2 Positive Imbalance Transfer Example

Shipper A has a positive imbalance in the Netherlands amounting to exactly 2% of total inputs such that the imbalance price applies. Shipper A also has a positive imbalance in Belgium amounting to exactly the exit capacity thresholds at which the imbalance price applies.

If shipper A transfers all imbalances to Belgium the imbalance price applied will be 60% of the reference price.⁵ In the Netherlands the imbalance price will be 57.5% of the reference price.⁶ Were the reference prices equal it would therefore be profitable for Shipper A to export gas from the Netherlands to Belgium returning to balance in the Netherlands but increasing the imbalance in Belgium.

However, reference prices are not the same and in some cases it is not profitable to transfer an imbalance due to the volatility of the Belgium reference price. In fact it is only profitable for Shipper A to export gas from the Netherlands to Belgium in 62.5% of cases.

For Shipper A it is less likely to be profitable to transfer an imbalance from the Netherlands to Belgium when that imbalance is positive as opposed to negative. It is also probably less profitable to transfer that balance if it is positive. Table C.2 illustrates the maximum potential daily profits from transferring a positive balance both from the Netherlands to Belgium and Belgium to the Netherlands.⁷

**Table B.2
Maximum Potential Daily Profits – Imbalance Arbitrage**

	Daily Consumption (kWh)	Shipper A Assumed Market Share (kWh)	Shipper A Assumed Daily Imbalance (kWh)	Maximum Arbitrage Profit - Transfer to Belgium	Maximum Arbitrage Profit - Transfer to Netherlands
				<i>20th October 2004</i>	<i>10th December 2004</i>
Case 1	1,147,732,603	229,546,521	11,477,326	€ 43,614	€ 66,568
Case 2	1,147,732,603	229,546,521	2,295,465	€ 8,723	€ 13,314
Case 3	1,147,732,603	573,866,301	28,693,315	€ 109,035	€ 166,421
Case 4	1,147,732,604	573,866,302	5,738,663	€ 21,807	€ 33,284

NB; This calculation assumes that the size of the imbalance the shipper is transferring does not exceed two times the free tolerance threshold in Belgium. This implies hourly exit capacities for Shipper A of 239,111 kWh (Case 1), 47,822 kWh (Case 2), 597,777 (Case 3), 119, 555 (Case 4).

⁵ In Belgium positive daily imbalances are remunerated at 60% of the reference price for imbalances of up to 2 times the free tolerance.

⁶ In the Netherlands positive daily imbalances are remunerated at 57.5% of the reference price for imbalances of more than 2% of the free tolerance.

⁷ This maximum profit may not be achieved by Shipper A if for example, capacity overrun charges apply in the country to which a balance has been transferred.

Appendix C. The Netherlands

C.1. Overview of the Existing Balancing Regime

The main features of the existing balancing regime in the Netherlands are as follows:

- § Shippers face daily and hourly imbalance charges. Gas Transport Services (GTS) calculates imbalance charges based on shippers' metered injections and offtakes.
- § Imbalance cash out prices are based on quarterly oil price escalation, with administered multipliers and discounts (which vary with the time of year) for under and over deliveries by shippers outside tolerance.
- § Tolerances are expressed as a percentage of input and offtake flows and are a function of temperature, declining in size as the temperature reduces.
- § There are separate high and low calorific balancing zones. Customers who receive converted gas (H-cal to L-cal), balancing is carried out over both systems.
- § GTS operates a within-system trading hub, known as the TTF, for the high calorific system.
- § Gasunie Trade and Supply (GUTS) fulfils a special role as “balancing shipper” to assist the GTS in its management of the system
- § Net imbalance charges are redistributed amongst qualifying shippers rather than being retained by the TSO.

C.2. Changes in the Pipeline

An important current initiative is the proposed establishment of an independently operated on-the-day commodity market (OCM) based at the TTF hub. This market will be operated by APX, who also run the OCM based around the NBP in Great Britain.

C.3. Inefficiencies and Distortions

We have identified the following inefficiencies and distortions caused by the existing balancing regime in the Netherlands.

C.3.1. Administered Imbalance Prices

As in Belgium, imbalance prices in the Netherlands are arbitrary and potentially punitive because they are administered on an oil-based reference price and high multipliers/discounts that bear no relation to the costs actually incurred in balancing the system. Shippers have been particularly critical of the level of imbalance charges in the Netherlands.

As we have discussed in Appendices A and B, the differences between the arbitrary imbalance prices in the Netherlands and those in Belgium appear to be resulting in distorted and inefficient cross-border trade.

C.3.2.Hourly Constraints

As in Belgium, the hourly constraints built into the balancing regime in the Netherlands impose additional costs and risks on shippers, and make it necessary for GTS to provide costly within-day information. We understand GTS has adopted this system partly to maximise the amount of firm capacity it is able to offer to the market. Apparently, with pure daily balancing (i.e., no hourly constraints), GTS would have to reduce the amount of firm capacity it offers by about 30 to 40 per cent in order to maintain system integrity. In the Dutch system, there is therefore a trade-off between the costs and risks associated with hourly constraints, and the amount of firm capacity made available to the market, and possibly other factors too.

Without carrying out a cost-benefit analysis of this trade-off, which would involve consulting shippers on their preferences as well as taking account of the potentially damaging effects of hourly constraints on competition and liquidity in the Dutch market, it is not possible to say whether hourly constraints are economically efficient in the Netherlands. Such an appraisal does not seem to have been carried out, at least not with the kind of public reporting and consultation that is required to ensure all relevant information is taken into account and the assumptions and conclusions open to scrutiny.

However, we are also advised by GTS that hourly balancing is an important requirement of the design and operation of the transmission system.

The free hourly tolerance reduces on cold days, on a sliding scale down to 0% when the temperature reaches -17 degrees Celsius. The free tolerance is calculated retrospectively based on average daily temperatures, so shippers have to use temperature forecasts to estimate their allowed free tolerance on each day, to be able to manage their imbalance position. This uncertainty creates a risk for shippers which might be better managed by the TSO. The risk faced by shippers is exacerbated by the use of administered imbalance cash-out prices in the Netherlands.

C.3.3.Information Flows

Through its on-line OTIS service, GTS provides shippers with information on their injections and offtakes at frequent intervals during the gas-day. This information is a mixture of near real-time meter readings (e.g., the offtakes of telemetered customers²⁸), and forecasts or provisional allocations (e.g., at “city gates” served by more than one shipper). We understand that erroneous and/or incomplete meter readings are a persistent problem at present, as are inaccuracies associated with provisional allocations. These problems make it difficult for a shipper to get an accurate picture of its true imbalance position during the gas day, and hence to manage its position efficiently.

Further, because imbalance charges in the Netherlands are based on final metered flows, shippers bear the risk of inaccurate initial meter readings and provisional allocations. For example, a shipper who balances perfectly based on the information it receives during the gas-day could still incur high imbalance charges, if the final meter readings turn out

²⁸ Most customers with consumption above 10 mcm/year currently have telemetering.

significantly different from the information provided within-day (or shortly afterwards). We understand some shippers have installed meters that sit along side the existing GTS or LDC meters to help them manage these risks. The imbalance risks associated with poor quality information is compounded by the restrictive nature of the current balancing regime in the Netherlands (hourly constraints) and the use of administered imbalance cash-out prices.

LDCs currently provide final meter readings 16 days after month-end, which delays the reconciliation, or settlement, of imbalance accounts.²⁹ Problems with erroneous and/or incomplete meter readings are also slowing down the reconciliation process, as shippers dispute their bills and meter readings have to be re-checked and sometimes corrected. We understand that it can still take up to a year or more to finalise meter readings and close out imbalance accounts in the Netherlands. These inconveniences and delays increase risk and add to the costs of doing business in the Netherlands.

The problem of erroneous and incomplete meter readings, together with inaccurate provisional information, has also created uncertainty over the enforceability of imbalance penalties in the Netherlands. We understand individual shippers have managed to re-negotiate their imbalance charges because GTS cannot guarantee the reliability of the metering information. The lack of consistent application of imbalance penalties in the Netherlands is creating unpredictability and risk for shippers, particularly new entrants unfamiliar with the Dutch system. Their risk is compounded by GTS rules that make counter parties to TTF trades liable to any default on the part of their trading partner. Again these risks are exacerbated by the restrictive nature of the current balancing regime in the Netherlands (hourly constraints) and the use of administered imbalance cash-out prices.

Historical meter reading information is only available from the customer. We understand that most large customers have this information, but smaller industrial and commercial customers do not, and it is not possible to obtain this information from GTS or the LDCs. Without this information, shippers cannot accurately assess the balancing liabilities they will be taking on by supplying a customer, and hence the risks and costs of offering service.

C.3.4. TSO Procurement of Balancing Gas and the Role of GUTS

GTS uses separate annual tender processes to contract for the gas it needs (a) for residual system balancing and (b) to provide the additional tolerance service. In 2002, Gasunie Trade and Supply (GUTS) was the sole supplier of both services, but in 2003 other suppliers won contracts to provide gas for the additional tolerance service. Thanks to its ownership of the Groningen field and its large and diversified portfolio of customers, GUTS is the only shipper in the Dutch market that is currently able to meet the flexibility requirements of GTS's tender for residual system balancing.

GUTS also offer contracts for flexible gas, typically on an annual basis, to other shippers in the Dutch market. These contracts are for gas delivered at the customer's site, and include transportation capacity tied to the commodity. Shippers would like to have the flexibility to

²⁹ Dte recently instructed LDCs to submit implementation plans to achieve the new standards for information flows set out in Dte's 2005 Guidelines, which require LDCs to report offtakes (uncorrected for CV variations) half an hour after the end of the balancing period.

use the capacity in these contracts to buy gas at the TTF when it is cheaper, but they are not allowed to do so under the contracts offered by GUTS.

Through its roles as supplier of flexible gas to GTS and other shippers, GUTS effectively acts as the *balancing shipper* for the Dutch system. On an operational level, GTS controls GUTS inputs and outputs, to ensure the system is kept in balance and shippers receive the additional flexibility to which they are entitled, whether they have bought it from GTS or GUTS.³⁰ As supplier of GTS's residual balancing requirements, GUTS is exempted from paying imbalance penalties on any imbalances outside its allowed tolerances. This exemption means GUTS is not subject to the same balancing rules and disciplines as other shippers, and hence is potentially discriminatory.

GTS's use of a tender process is designed to help ensure that it procures the gas it needs efficiently, but the lack of effective competition for flexible gas in the Netherlands means the prices it pays are likely to be above costs. The lack of an *ex ante* incentive scheme also means GTS has weak incentives to minimise its gas procurement costs.

C.3.5. Separate High Cal and Low Cal Zones

As imbalances in the high cal and low cal zones are settled separately under the current system, shippers face a greater risk of incurring imbalance charges than if they were netted off against each other. Shortages of commercially available conversion capacity in the GTS system have also made it difficult for shippers to move flexibility from one zone to the other, reducing shippers' ability to manage their imbalances efficiently.

The barriers to trading across high and low cal zones is frustrating the development of a liquid traded market in the Netherlands, and hence restricting the availability of flexible within-day products for use in system balancing.

C.3.6. Availability of Flexible Gas

GTS provides some additional flexibility by allowing shippers to trade their free hourly tolerances *ex ante* and to purchase additional hourly tolerance services. In practice, however, there is little trading of tolerances due to a lack of accurate within-day information. Shippers who have booked the additional hourly tolerance service can carry over imbalances from one day to the next in a buffer account, thus providing increased flexibility to manage daily imbalances. An additional "peak service" (the TTF "Balancing relation" or "On-line balancing" service) has been introduced by GTS, but can only be used to balance supplies to Phase III customers (residential market).

GTS is sometimes unable to satisfy demand for the additional tolerance service, so shippers get their allocations scaled back pro rata. It is an annual service, so shippers can end-up with too much additional tolerance in the summer. As we have already noted above, GUTS offers flexible gas to shippers, but the terms of its offer are restrictive, because the commodity and capacity are tied together.

³⁰ If a contract is split with a flat load supplied by the shipper, topped up with flexible gas from GUTS, the shipper only has to nominate the flat load, not the flexible gas. But nor does GUTS nominate the flexible gas, because GTS manages GUTS inputs to ensure it meets its obligations to provide flexible gas to the shipper.

Re-nominations at the TTF become effective half an hour after they are notified by the shipper to GTS, so the TTF provides a potential source of flexible within-day gas. Partly because GUTS has recently started to trade at the TTF, liquidity is increasing and shippers are better able to use the TTF to manage their imbalances. However, the attractiveness of the TTF as a source of flexible within-day gas is diminished by three factors. First, there is a lack of flexible services available at the TTF. Second, gas is traded at the TTF in energy terms, but transported and balanced by GTS in volume terms, so shippers are exposed to risks associated with CV variation. Third, Code rules make traders at the TTF liable for any non-payment by their counter parties, thus exposing shippers to a form of “double jeopardy”: the trade is cancelled, thus exposing a shipper to the risk of imbalance charges, and the shipper is liable to GTS for their counter-party’s unpaid bill.

Finally, the availability of storage for balancing in the Netherlands is limited for two reasons. Firstly, there is apparently limited physical storage capacity at present. And secondly, access to storage is restricted because most of the available capacity is reserved for (a) GTS’s system balancing needs and (b) strategic reserves used to ensure security of supply to Phase III customers (residential market).

C.4. Possible Solutions

The problems we have identified in the Netherlands could possibly be addressed by some of the following solutions:

C.4.1. OCM market at TTF

The implementation of the planned On-the-day Commodity Market (OCM) at the TTF could provide GTS with a more competitive means of sourcing shorter term flexibility for system balancing requirements.

This may also assist in the phasing out of the “*balancing shipper*” role so that all shippers can operate on a level playing field. (This may require interim measures such as undertakings regarding GUTS participation in the new flexibility market.)

Demand side flexibility bidding should be facilitated and encouraged via the TTF market so as to increase diversity and market liquidity and also provide useful signals as to the value of firm service.

In the medium to longer term, it may be appropriate to phase out tolerance arrangements as the market develops in order to increase market liquidity and regime efficiency.

C.4.2. Imbalance cash out prices

The present administered oil-based prices, which are potentially punitive and can distort trade, could be replaced by prices derived from the OCM, which should be more reflective of the actual costs of balancing, especially if GTS makes use of the OCM itself as part of its residual balancing function.

C.4.3. Number of balancing zones

GTS should be encouraged to consider a genuine merger of balancing zones for commercial purposes, so that all shipper inputs and offtakes can be combined across the whole system. This might require increased investment in conversion, or at least the development of new commercial (locational) tools that would enable the TSO to manage potential physical consequences of a unified balancing regime. Presumably some appropriate socialisation of ongoing (and perhaps increased) conversion costs would be required.

Clearly a careful cost benefit trade off would be needed to judge the merits of accepting any increase in (or cross subsidy of) conversion costs in order to secure the advantages of an expanded market, increased liquidity and reduction of commercial transaction costs.

C.4.4. Flexibility services

In the shorter term, a flexibility service with shorter duration contracts and pricing that reflects demand (rather than regulated “cost plus”) could increase flexibility for shippers, without adversely affecting GTS’s ability to recover costs.

Widening shipper access to storage could reduce dependence on bundled tolerance services and GTS dominance of additional flexibility service, and also on occasions help provide more diverse sources of residual balancing flexibility for the TSO. (Wider access to storage need not necessarily imperil the seasonal and strategic “security of supply” role of storage.)

C.4.5. Hourly balancing

Although not within the scope of this study, we also wonder whether the GTS concerns over capacity availability could be mitigated without the need to impose hourly balancing disciplines. For example, GTS could consider adopting a variety of capacity products, perhaps of varying firmness and including near real time offerings, in order to maximise the total that can be made available to the market, whilst allowing a daily balancing regime. This could considerably simplify information flows and alleviate allocation problems.

However, we have been advised that GTS have perhaps more fundamental concerns about their ability to operate the system under a daily balancing regime. It appears that the within day variability of flow of upstream production (particularly from Groningen) is a critical feature of physical system balancing, and contrasts with the more uniform input flow rates associated with the French and GB systems (where diurnal variation is typically managed downstream via embedded storage or distribution system flexibility). This subject would almost certainly benefit from a wider debate within the industry, if only to increase shipper understanding of the interplay between physical operations and commercial regime design.

C.4.6. Information flows

We understand that GTS is aware of the seriousness of informational difficulties and is endeavouring to improve accuracy and timeliness. Obviously the pressure on commercial information management for shippers would be considerably eased if GTS were able to adopt a daily balancing regime. In the absence of this there are a number of possible improvements worth consideration:

- § amend rules to reduce the use of revised metering data in the reworking of imbalance charges (perhaps using some materiality threshold);
- § clarify and enforce responsibility for provision of accurate input flow information, possibly introducing some form of claims agency role; and
- § overhaul downstream information arrangements, including the use of more accurate demand profile algorithms for smaller end customers, and establish clear accountability, standards and incentives for information timeliness and accuracy

Appendix D. France

D.1. Overview of the Existing Balancing Regime

The main features of the existing balancing regime in France are as follows:

- § As from 1st of January 2005, we understand that there will be two instead of three TSOs and five rather than eight balancing zones, although one of the zones has separate balancing for high cal gas (gaz H) and low cal gas (gaz B).
- § Essentially shippers are required to balance input and offtake amounts on a daily basis within each balancing zone, although imbalances may be combined between zones in normal circumstances.
- § Shipper imbalance cash out prices depend upon whether or not the imbalance is within a daily tolerance band of +/- 5 % (up to +/- 20% for the smallest shippers).
- § Within tolerance, cash out prices are equal to the Zeebrugge day-ahead price plus the cost of transport to the balancing zone.
- § Outside the tolerance band the cash out price is based on multiples of or discounts to the Zeebrugge day-ahead price plus transport cost (multiples for under deliveries, discounts for over deliveries).
- § A shipper's imbalances in different balancing zones are combined automatically subject to the availability and booking of capacity by the shipper.
- § Each balancing zone has an associated within system hub known as a PEG, which is a notional point where shippers may trade gas.

D.2. Changes in the Pipeline

The merger of CFM's network with GDF-Transport's, effective from 1st January 2005, will reduce the number of zones in France as described above.

In the longer term, the network investments to which GDF-Transport is committed under the Marathon agreement will apparently leave GDF-Transport with just two zones by June 2009, one in the north and one in the south, reducing the total number of zones in France to three.

D.2.1. Inefficiencies and Distortions

We have identified the following inefficiencies and distortions caused by the existing balancing regime in France.

D.2.2. Multiplicity of Balancing Zones

GDF-Transport have apparently designed their zonal system to maximise the amount of firm capacity they make available to the market. According to GDF-Transport, physical congestion occurs at zonal boundaries at certain times during the year, thus restricting the firm transfer capacity between zones.

However, the large number of transportation zones in France fragments the market, frustrating the development of liquid short-term markets, and hence the availability of flexible within-day products for use in system balancing. Active trading and liquidity is increasing at PEG-Nord, but is virtually non-existent at other PEGs. The planned merger of some existing zones will help enhance liquidity and competition in France, making it easier for shippers to manage their imbalances, but even after these steps have been implemented there will still be three zones in France in 2009.

GDF-Transport automatically optimises the allocation of shipper's imbalances across the zones in its system (within the constraints of a shipper's booked transportation and conversion capacity), to maximise the use of free tolerances and hence minimise shippers' imbalance charges. This makes GDF-Transport's multi-zonal system more user-friendly for system balancing, although not as much as if free tolerances could be traded or pooled. The same system of automatic optimisation does not operate across TSO boundaries within France, so shippers face greater imbalance risks on inter-TSO trades, potentially distorting trade within France.

D.2.3. Arbitrary Imbalance Prices

Like the Netherlands and Belgium, the balancing regime in France currently suffers from somewhat arbitrary and potentially punitive imbalance prices. A Zeebrugge reference price is used in France because it is the nearest (semi-) liquid short-term market, but it is probably of some relevance to less than half of the gas sold in France each year and a minority of the balancing zones. Furthermore, the application of multipliers and discounts to the reference price, when the imbalance exceeds the tolerance, is essentially arbitrary.

D.2.4. Hourly Constraints

There are no hourly constraints and penalty prices in France, but shippers' within-day renominations can be scaled back because of physical constraints in the system, resulting in some hourly flow restrictions. Hence a shipper's flexibility to renominate within-day is more restricted than in a pure daily balancing regime like that used by Transco in the UK.

However, we understand that the CRE has received no complaint from shippers about the system of renomination, neither directly nor via answers to relevant public consultations.

D.2.5. Information Flows

Information flows do not appear to be a major source of problems for shippers in managing their imbalances in France at present. Input allocations typically benefit from the existence of OBAs at cross border points, whilst the absence of explicit hourly constraints and penalties in France, and access to a number of flexible balancing services, help shippers minimise their exposure to imbalance penalties.³¹

³¹ This is perhaps also partially explained by the lack of market penetration, especially for smaller end consumers in the distribution systems.

D.2.6. TSO Procurement of Balancing Gas

GDF-Transport held a tender in 2004 to procure its flexibility requirements. As in the case of GTS, GDF-Transport's use of a tender process is intended to ensure that it procures the flexibility it needs efficiently, but the lack of effective competition for flexible gas in France means the prices it pays may be above costs. We also understand that the form of the current contract does not provide for a variable price signal that might be more reflective of varying market conditions throughout the year.

Annual tenders tend to limit the potential for competitive flexibility offerings, compared with shorter term mechanisms, including demand side contributions. In 2005, GDF-Transport will possibly procure its flexibility needs via a direct contract with the storage operator, presumably via an annual contract. Although this may be preferable to purchasing via an intermediary, it is not clear how this single sourcing will encourage competitive provision of flexibility.

The lack of an *ex ante* incentive scheme also means GDF-Transport has weak incentives to minimise its flexibility procurement costs.

D.2.7. The Availability of Flexible Gas

In the past, GDF Negoce has offered a flexible "modulation", or virtual storage, service to other shippers in the French market, but it is not known whether they will continue to do so beyond the existing storage year. Under this service, shippers benefited from a 20% tolerance on their booking that was automatically allocated to close out a daily imbalance. This service was therefore very helpful to shippers in managing their imbalances. There was no explicit regulatory requirement on GDF Negoce to offer this service, but there was informal regulatory pressure on GDF Negoce to share its flexibility with other shippers to promote new entry in France.

There is a large amount of storage capacity spread around the French system, which storage operators are now offering directly to shippers under a negotiated access regime. However, access to storage is limited by the french law to shippers selling gas to end customers, and the storage capacity a shipper can book is limited to its end customers needs in seasonal flexibility.

The storage operators offer an optional service of daily flexibility, allowing the shippers to balance ex-post, up to 10% of their end customer portfolio. This service may help shippers manage their imbalances.

The lack of firm entry capacity on the GDF side of the GDF-GSO interface apparently restricts shippers' ability to use gas and flexibility from the GSO gas release programme to manage their imbalance positions in GDF's network.

D.3. Possible Solutions

The problems we have identified above could (in part) be addressed by some of the following possible solutions:

D.3.1. Number of balancing zones

The number of balancing zones in France is a major concern for the development of liquid traded markets and the promotion of competition in gas supply. It would appear that GDF-Transport has chosen to “hard-wire” capacity constraints into the commercial systems instead of using one of the following single zone solutions:

1. use one zone, but offer less firm and more shorter term and/or interruptible capacity, so that GDF-Transport can interrupt flows when congestion occurs; or
2. “decouple” the commercial system from the physical constraints entirely, by using a single zone and the occasional use of locational trades to manage physical congestion or constraints in the way Transco does.

We have been told by GDF-Transport that the first alternative is unattractive, because shippers place a high premium on firm capacity in the French market. This assumption needs to be tested openly, and a debate encouraged about the nature and definition of capacity and shipper expectations. After all, the choice of design of the commercial balancing (and capacity) regime does not of itself change the physical capability of the network.

We have also been told that GDF-Transport do not see the second alternative as viable at the present time, because of a lack of liquid and competitive short-term markets at different locations in GDF-Transport’s system. This is a classic “Catch 22” problem, since the continuation of numerous balancing zones fragments liquidity and discourages the emergence of competitive markets.

Without carrying out a cost-benefit analysis of the trade-offs, which would involve consulting shippers on their preferences as well as taking account of the potentially damaging effects of multiple zones on competition and liquidity in the French market, it is not possible to say whether the existing zonal system is economically efficient. Such an appraisal does not yet seem to have been carried out, at least not with the kind of public reporting and consultation that is required to ensure all relevant information is taken into account and that the assumptions and conclusions are open to wider scrutiny. This should particularly test the shippers real concerns regarding capacity definition and firmness.

D.3.2. TSO procurement of balancing flexibility

The annual contract(s) could be designed to encourage variable pricing signals (seasonal or more frequent) and perhaps also specify locational requirements. The TSO should be prepared to contract with several parties to encourage diversity of sourcing and development of competition, and this should include demand side sources, particularly the larger customers.

In the interim the variable pricing signal in the annual contract(s) could be (partially) referenced to an existing market such as Zeebrugge. For example, in the relatively small Northern Ireland market there is a tendered annual flexibility contract that is based on the daily GB OCM within day price (plus transport cost and margin). However, France is surely too large a market to rely upon such external market references indefinitely, and needs to stimulate the local market(s).

In this direction, the TSO could complement its annual contract(s) by seeking to procure flexibility on a shorter term basis, perhaps from multiple sources including shippers and demand side, to complement the annual contract(s). It is not necessary to wait for the emergence of liquid traded markets – the TSO can create interim market mechanisms that may help to stimulate such developments, particularly if it is combined with a reduction in the number of balancing zones. These TSO mechanisms can then be subsumed as and when independently operated markets emerge.

The opening up of storage to shippers may also create opportunities for wider provision of flexibility – the TSO purchasing via intermediaries can be perfectly acceptable provided there is sufficient competition between them.

D.3.3. Cost reflective imbalance prices

Ideally, cash out prices should be cost reflective, and based upon the real costs caused by imbalances. This is more easily assessed where the TSO is using some form of market mechanism to procure its residual balancing requirements. We understand that this is not readily achievable with multiple balancing zones, and that the current TSO arrangements for sourcing flexibility do not readily lend themselves to cost reflective price signals. Hence our suggestions set out in the above section concerning the TSO's future procurement of flexibility.

It could be argued that in the circumstances the use of Zeebrugge spot prices as a reference is not unreasonable, at least in the interim. However, at present this does not reflect the way in which the TSO actually performs its residual balancing role via the annual contract. We would encourage the sourcing of flexibility in a way that creates transparent pricing of flexibility. This is something of a “chicken and egg” problem, and serves to underline the importance of designing the regime, and procuring flexibility, in a way that encourage the emergence of liquid local market(s).

D.3.4. Promotion of traded markets

The suggestions in the preceding sections concerning reducing the number of balancing zones, more diverse, competitive and short term procurement of flexibility, and the adoption of more cost reflective imbalance prices may all assist in the emergence of liquid traded markets, possibly based around two or even a single national PEG.

Although the TSO is not necessarily the ultimate operator of such markets, there is a very important practical and promotional role for the TSO in the interim, not least in the evolving design and operation of the balancing regime. The incumbent supplier could also be encouraged to participate actively in embryonic initiatives such as a short term flexibility mechanism, thereby providing much needed liquidity.

The significance of storage in France suggests that this should be an important element in the development of the gas market. However, we note that current legislation in France may limit access to storage, presumably in the interests of security of supply policy – this is an area that requires further careful investigation, since there are means of encouraging competition and access to storage whilst respecting security of supply concerns, but this is outside the scope of this study.

Appendix E. Great Britain

E.1. Overview of the Existing Balancing Regime

Transco operates a single national balancing regime in Great Britain. This is complemented by an entry/exit transmission capacity regime and the concept of a single national balancing point (NBP) at which gas may be traded ahead of and within day on an “entry paid” basis.

The primary source of Transco’s residual balancing flexibility is the On the day Commodity Market (OCM) operated by APX. Transco uses the NBP title, physical and locational markets on the OCM, as appropriate, to ensure that system pressures are maintained within safe limits.³²

Shippers are cashed out individually for each day in energy terms, using prices derived from the OCM, which are therefore broadly reflective of the costs incurred by Transco in maintaining system balance. Balancing tolerances were introduced initially but have been reduced progressively to zero. However there are tolerances applicable to scheduling charges that are levied based on input and output nomination performance.

Input allocations are established on a daily basis via a Claims Validation Agent acting on behalf of all shippers sharing an entry point and must be submitted to Transco by the 7th business day after the gas flow day. Revisions can be made to this up to the 15th business day of the month following the month that gas flowed. Offtake allocations are also daily, and are derived from dataloggers for the larger daily metered (DM) customers and the use of algorithms for non daily metered (NDM) customers and are determined at D+1. The same algorithms are used to create NDM nominations.

Imbalance cash out is invoiced in M+1 based on confirmed allocations and are not normally re-opened subsequently unless there has been an error in determining the DM quantity. Reconciliation of actual and deemed measurement for the NDM customer sector is achieved without the need for re-working imbalance invoices.

Transco faces modest financial incentives to encourage efficient operation of its role as residual system balancer. Aside from these, Transco is essentially *revenue neutral* – the costs of purchasing gas and the income from selling gas are netted off against the balancing charges paid by (and to) shippers, and any resultant surplus or deficit is regularly apportioned amongst shippers in proportion to system throughputs. These financial arrangements are subject to regular independent external audit to ensure that calculations are performed accurately.³³

Transco is responsible for obtaining gas for its own uses, such as compressor fuel, for which allowance is made in the regulatory cost base that determines allowable tariffs. Shippers are therefore not deducted any amount for system uses from their energy inputs – their daily

³² The OCM was introduced in 1999 as a screen based, anonymous, cleared market to replace the original *flexibility mechanism* operated by Transco under which Transco was counter party to all transactions

³³ No individual shipper has the necessary information to verify the calculations, since they depend on transactions involving all other shippers.

imbalance is the result of adding all allocated inputs, subtracting all allocated offtakes, and then applying the net effect of any trades at the NBP.

Operational guidelines for Transco have been introduced and amended over time to ensure that the TSO's balancing actions are suitably transparent and subject to understood principles of operation.

E.2. Changes in the Pipeline

The GB gas balancing regime has been the subject of several reviews over the last 3 years or so. In 2001 Ofgem suggested the introduction of hourly balancing in order to address Transco concerns about possible within day operational difficulties, and Ofgem's desire to avoid inefficient arbitrage opportunities between the gas and electricity regimes.³⁴ However, almost all shippers (and Transco) did not support this proposal, arguing the wider benefits of the daily regime and the significant cost of moving to shorter balancing periods.

Attention moved to an industry workgroup³⁵ that considered more modest incremental reforms:

- § Within day scheduling incentives designed to improve the information Transco receives in operating its system;³⁶
- § Further release of operational information by Transco;
- § Development of flexibility contracts to provide a more assured within day response for Transco

Ofgem conducted another balancing review and consultation exercise in 2003. The consultation tended to the view that major regime reforms such as shorter balancing periods were not appropriate at that stage, and Ofgem is currently developing a number of leading indicators that might provide early warning of the need for further amendments to the regime. An Ofgem conclusions document setting out progress on these indicators is expected in the first quarter of 2005.

E.3. Inefficiencies and Distortions

The GB gas balancing regime has been the subject of considerable review and amendment since its inception under the Transco Network Code in 1996. This included the so called Reform of Gas Trading Arrangements introduced in 1999, which included the replacement of the original Network Code flexibility mechanism by a full within day market known as the OCM. This independently operated OCM enables shippers to trade with one another via an anonymous screen based cleared market, rather than only being able to deal with Transco on the old flexibility mechanism.

³⁴ Followed by proposals in 2002 for 4 or 6 hourly balancing periods.

³⁵ Network Code Review Group 0513

³⁶ These incentives were introduced but have since been set to

Previous concerns that balancing tolerances might be manipulated by some shippers have resulted in their gradual reduction and now complete removal. Minimum shipper imbalance cash out price spreads have been established with reference to the value of storage.

Ofgem's criteria for balancing regime reform have been:

- § accurate targeting of system balancing and operation costs to those that cause them to be incurred;
- § strong commercial incentives on shippers to balance their own inputs and off-takes;
- § strong commercial incentives on Transco to undertake efficient residual balancing of the system;
- § improved flows of information to support efficient balancing for Transco and shippers; and
- § the development of liquid and transparent spot and forward markets.

One of the main current concerns is informational. Some parties feel that there is a continued asymmetry of information availability within the upstream or offshore regime. Most gas in GB arrives at the Transco system entry points via shared facilities, known as commingled streams, necessitating an allocation of gas between shippers sharing those facilities. The GB offshore industry is still heavily based on legacy gas purchase and allocation agreements that do not readily lend themselves to the demands of the competitive gas market.³⁷ Real time allocation information is the exception rather than the rule, and shippers must normally rely upon their Claims Validation Agent to establish individual title to gas at a shared entry point some time after the day.

This lack of real time information can prove particularly problematic on days where there are operational problems offshore affecting the flow of gas into the Transco system at shared entry points. Some shippers have suggested that affiliates of production companies and operators enjoy more privileged access to information in such circumstances, and are therefore able to take more timely and informed action in the market to rectify their positions and/or exploit commercial opportunities.³⁸

Another concern that has been highlighted by Transco in recent years is the possibility of within day variations in gas flow causing serious operational difficulties. The introduction of the OCM has created the means for shippers to trade within day, and it is perhaps not altogether surprising that this has marked a tendency for inputs to the system to start long or short and then be adjusted during the day.³⁹ This is compounded for Transco by its longstanding concern at the reliability of input nominations from shippers, compared with the estimates provided by offshore operators. On the offtake side, there is the worry that large loads such as power stations might be tempted to pursue arbitrage opportunities available via

³⁷ The offshore industry is not subject to the jurisdiction of Ofgem, but rather the DTi ministry.

³⁸ Knowing when a problem may be rectified can be just as important as knowing when it has happened.

³⁹ Departing from the Network Code's (unenforceable) requirement that gas should normally be delivered to the system at uniform hourly rates of flow over the day

the half hourly settlement in the electricity industry versus the daily imbalance cash out of the gas regime.

Set against these concerns, Transco's normal remedy is the use of the OCM, which is designed to encourage a response over the balance of the gas day. Transco typically uses the OCM to ensure that the starting linepack position for the following gas day is within acceptable limits, and the OCM has so far proved adequate for this task.⁴⁰ However, the OCM is unproven as a means of ensuring a rapid response to a serious within day problem.

E.4. Possible Solutions

Ofgem continues to monitor and advocate greater transparency of information from the offshore sector, and the Dti is also reviewing this area. The creation of real time allocation capability at all shared system entry points would represent a major investment for the industry of both time and money, and one which it has so far shown a marked reluctance to contemplate.

Transco has attempted to address some of its concerns regarding nomination unreliability by the development of an incentivised nomination scheme that considers accuracy of performance at 4 points in time in relation to each gas day. This was introduced in the face of some shipper reluctance as a Network Code modification, but has subsequently been nullified by the setting of charges to zero. Transco retains the option to act on advice received on a good faith basis from offshore operators rather than relying exclusively on the nominations from shippers.

Shorter balancing periods have not proved a popular option. Aside from the potentially significant cost implications, it is doubtful whether a shorter balancing period would be consistent with maintaining a single balancing zone for the entire GB system. Instead, considerations of cost targeting would probably necessitate the creation of multiple balancing zones to maintain consistency between size and shorter time period. This would potentially undermine the liquidity if not the concept of the NBP market, which has been the undoubted success story of the GB regime.

It should also be acknowledged that not all shippers share Transco's concerns about potential operational difficulties, and therefore are reluctant to contemplate further regime reforms that may complicate their own operations, creating additional costs of implementation and ongoing business and increasing commercial risk. This is one reason why Ofgem is working on establishing a set of leading indicators that might give early warning of the need to contemplate further reforms before it is too late to avoid future problems.

E.5. Conclusion

The GB balancing regime is a relatively mature, sophisticated and successful system that has benefited from considerable care and widespread consultation in both its initial design and subsequent modification.

⁴⁰ Transco generally uses the more liquid OCM *title market*, and makes allowance for the response of participants to the price effect generated, not just the direct quantity of gas that Transco trades

The single NBP concept allied with a daily cash out regime has helped to facilitate a liquid wholesale traded market that has contributed significantly to the development of the competitive gas industry.

This success has not been achieved without some tensions with the physical design and operation of the gas network, but this illustrates well the inevitable trade offs that must be struck in designing any commercial regime. On balance, the GB system since 1996 has favoured the facilitation of competition in gas supply and the limitation of transaction costs, rather than attempt to model the physical reality of the network too precisely.

This has created an interesting and challenging role for the TSO as residual system balancer, “managing the gap” between commercial model and physical regime. In general this is a challenge that Transco has met positively and with ingenuity since the inception of the Network Code, aided by the scrutiny and challenge of the regulator and the practical experience of the shippers who operate under the regime every day.

Appendix F. Spain and Italy

The problems mentioned in the countries analysed appear to be present also in other European markets, although their significance depends on the specific characteristics and stage of development of each market.

F.1. Imbalance Prices

In Italy, shippers are responsible for balancing daily the gas injected and taken from the network and the transportation company is responsible for the physical balancing of the network and for supporting the hourly modulation. If a shipper fails in balancing its daily inputs and offtakes, imbalance charges are due for imbalances in excess of 6,000 GJ per day or 8% of daily withdrawals, whichever is greater. Prices for imbalances above this threshold are set administratively with no reference to a market price.

The regulator AEEG has explicitly recognised the inefficiencies arising for such a pricing method and has determined in Delibera n.22/04 a reform of the current balancing regime aimed at creating a daily balancing market that will allow to set imbalance pricing as a result of the clearing price of gas in such a market.

A similar problem potentially arises in Spain, where the draft network code currently in use by the industry requires daily balancing and imbalance prices are defined at the unit cost of gas included in the regulated tariff plus access charges.⁴¹ Such a price is arbitrary and certainly above the opportunity cost of gas in the gas day. However, imbalance prices are not currently being applied because the network code has not been approved by the regulator.

Trading is occurring on an OTC basis of gas that is already in the system. This includes both trades of gas stored in LNG tanks at regasification terminals and gas stored in the pipeline system as linepack (note that until recently the amount of linepack included in the access tariff was quite substantial and included the equivalent of 5 days of firm sales for transport capacity and 10 days for LNG storage⁴²). We understand the regulator is organising working groups with industry participants to study the possibility of introducing an organised gas market in the gas day. Eventually the creation of such a market may lead to a change in the system to establish imbalance prices.

F.2. TSO Procurement of Balancing Gas

At present, under the draft network code, in case the system as a whole is imbalanced, the System Technical Manager of the TSO, Enagas, can use several tools:

§ Management of the stocks in the transportation system

⁴¹ The system specified in the draft network code ("*Normas de Gestión Técnica del Sistema*" 25.11.2004) establishes that in case a shipper requires gas from the system it would "buy" it to the system at a price equal to two times the cost of gas (*CMP*) included in the regulated tariff plus access charges. The shipper has the obligation to inject or "sell" an equivalent amount of gas in the system in the time period indicated by the TSO and receive a price equal to the *CMP* cost of gas.

⁴² These figures were recently reduced to 2 days and 5 days respectively.

- § Optimisation of the vessel unloading schedule and/or production of regasification plants
- § Changes to orders for the extraction or injection of storage facilities
- § Re-nomination of gas pipelines for international connections and national deposits
- § Regulation of supply to clients with interruptible contracts

Although the precise rules and priorities are not clear, in principle the decisions taken by the STM should be motivated by the objectives of maintenance of service, system efficiency and the minimisation of the economic impacts of the action.

In Italy, the TSO, Snam Rete Gas (SRG), has the faculty of accessing the storage capacity booked by shippers for balancing purposes. In addition, SRG books storage capacity on its own for intraday modulation and linepack on a half-yearly basis.

The creation of a daily balancing market is expected to be used to help the TSO to procure gas for balancing purposes.

F.3. Flow of Information

In Spain, the daily balancing is closed only several weeks after the gas day mainly because of difficulties associated with applying profiles and allocation at system exit points where no telemetering is used yet. Still many large industrial customers (in the range of 30-100Gwh of annual consumption) are not obliged to install telemeters and this slows down the process of settling imbalances.

F.4. Hourly Constraints

The Spanish network code does not refer explicitly to hourly modulation, but implicitly it appears that Enagas can, in case system operation is not viable, reject nominations that imply an hourly use of capacity in excess of 1/24th of daily capacity.

In Italy, SRG is responsible for hourly modulation and imbalances are defined only on a daily basis.

F.5. Availability of Flexible Gas

In the Spanish system the main source of flexibility that shippers have at the moment is due to trades of gas already in the system. These trades appear to take the form of physical swap with no prices, eg shippers exchange their surpluses of linepack of operational storage in LNG tanks in the day in two different moments in time. These trades appear to be fairly liquid at the moment. As mentioned above, a movement to an organised market for gas exchange is under consideration.

The TSO provides indirectly flexibility services through the buffer of linepack free of charge (included in the TPA tariff). This is a substantial amount of flexibility. However it is expected to decline over time. This may lead to a lower liquidity in the gas arrangement within the gas day since shippers may have tighter linepack allocations left.

It is important to note that trading of transport capacity is not allowed by the current network code, limiting to a certain extent the flexibility of using the network. The creation of secondary transport capacity market appears to be under study by the CNE.

In addition, renomination is allowed in the gas day until 11:30 for the rest of the day (shipper as electricity generators can nominate and renominate specifying quantities on an hourly basis).

In Italy, a secondary gas market appears to exist in the Punto di Scambio Virtuale (PSV), the notional point in the network where shippers trade gas. The Delibera n.22/04 also establishes the creation of an organised gas market (*Borsa del Gas*) which is aimed at increasing the liquidity and flexibility of gas trades.

A secondary capacity market is operating in Italy. SRG provides a "**Notice board - purchases and sales of transportation capacity**" as a tool for shippers to display two types of commercial ads:

§ **Sales offers** of transportation capacity by users who already own transportation capacity under contracts stipulated with SNAM RETE GAS

§ **Requests to purchase** transportation capacity by any operator

The notice board can be used every day from 4.00 to 24.00 hrs. Requests for capacity will be assessed by SRG and published if they only concern the sale and purchase of transportation.

F.6. Restricted Availability of Storage Capacity

Availability of underground storage capacity appears to be a source of concern in the Spanish gas system. Until August 2004 shippers were not required to fulfil the legal obligation to keep a strategic reserve equivalent to 35 days of their firm sales. However this obligation has now been implemented⁴³. Although shipper may decide to maintain these reserves in different forms, the availability of underground storage capacity may be severely restricted for operational purposes if most shippers keep strategic reserves as underground storage. In the short term the main source of flexible storage capacity is provided by linepack. Several project plan to increase underground storage capacity in the medium term.

⁴³ Royal Decree 1716/2004.

F.7. Limited Ex-Post Flexibility

No ex-post trading of imbalances is currently possible in Spain, despite the fact that daily imbalances are settled several weeks after the gas day. This extreme form of inflexibility appears to be mitigated to a large extent by the type of ex ante trades that help users prevent imbalances. However, as noted above, ex ante trading flexibility may be affected by the likely tightening of linepack available to shippers. It would seem reasonable that such a tightening of ex ante flexibility arrangements be coupled with a higher degree of flexibility ex-post. However, to our notice, no proposals in this direction have been advanced in Spain.

NERA

Economic Consulting

NERA Economic Consulting
15 Stratford Place
London W1C 1BE
United Kingdom
Tel: +44 20 7659 8500
Fax: +44 20 7659 8501
www.nera.com

NERA UK Limited, registered in England and Wales, No 3974527
Registered Office: 15 Stratford Place, London W1C 1BE