Council of European Energy Regulators

Establishing the preferred tariff methodology for intrastate, cross-border and transit flows in European gas markets

CEER Paper to the Madrid Forum – 30/31 October 2002

Executive Summary

- Most members of the Madrid Forum have identified the need for tariff regimes in Europe to move closer together. This is motivated by the objectives of increasing trade between member states and gas-to-gas competition and enabling a pro-competitive and non-discriminatory tariff regimes to develop across Europe. For a particular gas flow, facing a multitude of different tariff methodologies as gas flows across different networks, adds an additional level of complexity to each trade, therefore adding an impediments to the full possibilities of effective trade and hubs across Europe. Clearly subsidiarity should be respected whether possible. But in respecting subsidiarity it should be noted that tariff regimes in some Member States are failing to deliver pro-competitive and non-discriminatory outcomes. It is therefore a useful exercise for the CEER to investigate whether it is possible to identify a tariff methodology that is in the Community interest and a tariff regime is capable taking into account the specificities and market characteristics of different networks.

- It is worth noted that the following principles were generally agreed at the last Madrid Forum, which should apply to all tariffs or charges for the use of gas transmission networks:

    i) be cost reflective and based upon a robust modelling of flows and the network;

    ii) facilitate efficient gas trade, facilitate market liquidity and gas-to-gas competition;

    iii) ensure high levels of transparency;

    iv) provide effective and timely signals encouraging efficient long-term investment in transport infrastructure;

    v) take into account the specificities and market characteristics of different networks;

    vi) provide a fair return on investment for the TSOs;

    vii) appropriate oversight;

    viii) any differences in tariff conditions applied to different customers for similar services should reflect underlying costs.

- However, for the purposes of this paper, although the above list provides a list of desirable characteristics that would accompany any tariff regime, for the purposes of judging a particular tariff regime over another, these principles do not always provide "criteria to judge" tariff regimes. For these reasons, this paper established a number of key criteria that should be seen as a sub-set of the above principles and are in no way intended to revisit or revise these previously agreed principles.
- In line with discussions in this paper, judged against the criteria the following conclusions are presented:
    - **Competition and flexibility:** The primary benefit of an entry-exit model is that it promotes competition and provides flexibility. The separation of entry and exit point for capacity allocation is a key feature that contributes to improving tradability of gas, which in turn can help to facilitate the development of gas-to-gas competition and the development of hubs. In addition, the separation of tariffs, irrespective of the capacity booking regime, may have benefits where the "portfolio effect" is significant. Similar findings on competition and flexibility were presented in the Brattle's 2002 report.

- **Cost reflectivity:** In terms of cost-reflectivity, on very meshed networks where locational differences and predominant flows are very important, a point-to-point tariff based on incremental cost modelling possibly provides a fairly cost-reflective approach. By contrast, distance-related charges tend only to be cost reflective for uni-direction flows on relatively linear networks. On the other hand, any tariff regime will always necessarily be an approximation to cost-reflectivity. There is a balance to be struck in relation to the degree of cost-reflectivity against other objectives. But in any case, gentry-exit tariffs are capable of providing a greater degree of cost reflectivity in particular as compared to distance related tariffs.

- **Simplicity (transparent)**: Entry-exit tariffs provide a degree of simplification in terms of the number of tariffs that need to be published. However, in terms of simplicity, it is probably reasonable to argue that one of the benefits of distance related tariffs on very simple networks is that it is easy to understand the link between distance travelled on a particular gas network and cost. Where network maps are published and physical route where the gas flowed is known, it is quite simple to derive such a tariff. However, on more complex networks where contractual and physical flows do not necessarily coincide, and "backhaul" calculations are required, distance-related tariffs will necessarily become more complex. At the very least, distance-related tariffs will offer less benefits in terms of simplicity compared to the case where contractual and physical flows coincide.

- **Adaptablity:** In particular to take into account the specificities and market characteristics of different networks, it is important that any tariff regime is adaptable. The discussion of entry-exit tariffs in this paper highlights that this regime can accommodate a range of network "problems", in particular those that have been highlighted by GTE. Although, for example, internal constraints on networks represent a possible difficulty, there are range of tools available to TSO's. In addition, entry-exit tariffs can be applied in a number of ways including incremental cost approaches capable of signalling locational differences to other solutions that might be aimed more at ensuring recovery of average costs, where for example, locational differences are less important compared to other objectives. The conclusion in this area is that entry-exit tariffs are capable of accommodating the most important national differences highlighted.

- The paper establishes, however, a clear restatement of the CEER's preference for an entry-exit regime. This is based on the CEER's overriding objective for promoting competition across Europe. The CEER GWG believes that there are workable solutions to the issues raised in relation to introducing EETs that can take account of national differences that matter. As stated in the last Madrid Conclusions, an appropriate balance should be made between reflecting national specificities and differences on the one hand and necessary harmonisation principles on the other.

- In terms of how an entry-exit tariff methodology and entry-exit capacity allocation may be implemented in different countries, this paper notes that different approaches to entry-exit can and have been adopted in different Member States. Therefore, some of the more detailed implementation issues can be left to subsidiarity. GTE members that remain concerned that national specifities should come forward with studies on the impact of entry-exit regimes on their network.

- The CEER recommends that GTE members with concerns find solutions to these problems. Clearly, this work need only apply to those GTE members concerned about these national problems. In the first instance, GTE members (in close coordination with

CEER, member states and industry participants[1]) should investigate the application of entry-exit tariffs to their network. Where problems are deemed to exist, these should be explained and possible solutions proposed by GTE members. Where certain GTE members do not feel that a pure entry-exit regime would be workable within their network, alternative solutions should be presented that also meet the principles agreed at the Spring 2002 Madrid Forum, whilst maintaining a coherence with tariff systems applied on other networks.

- In parallel, and to guide the work by GTE, the CEER will continue to work upon establishing a strategic road-map, which would necessarily define the desired medium-term objectives (including the necessary degree of harmonisation between entry-exit regimes) and discuss the steps and challenges that would need to faced along the way. The CEER proposes an appropriate sharing of work between Regulators/Member States, Industry and the Commission.

- In summary, the CEER believes that current combination of tariff and capacity regimes are insufficient to secure an efficient and properly functioning internal gas market. The medium-term solution would be the implementation of an entry-exit regime in each member state with sufficient flexibility to take into account national differences that may matter whilst maintaining the necessary coherence between each regime. GTE members that continue to be concerned with national specifities should come forward with studies on the impact of entry-exit regimes on their network and proposals that meet the Madrid principles and maintain coherence with tariff regimes in other networks. The CEER will continue to work to provide guidance on the outcomes it wishes to achieve to reach a fully effective single market.

[1] In this respect, the CEER welcomes the offer by EFET to be involved, in particular, in establishing a workable entry-exit system for the German market.

Introduction

1. The conclusions of the Madrid Forum held on 7-8 February suggested that significant differences exist between national tariff structures, which, where not based on common principles, and may hamper gas trade and market liquidity. In order to facilitate transportation across TSO boundaries, the Forum stressed the need for a European gas market based on common principles and co-ordination when necessary with regard to national tariff structures. Harmonisation, however, needs to take account of the specificities of different national transmission systems.

2. The Forum adopted the following principles[2] which shall apply to all tariffs or charges for the use of gas transmission networks, which shall:

   a) be cost reflective and based upon a robust modelling of flows and the network;
   b) facilitate efficient gas trade, facilitate market liquidity and gas-to-gas competition;
   c) ensure high levels of transparency;
   d) provide effective and timely signals encouraging efficient long-term investment in transport infrastructure;
   e) take into account the specificities and market characteristics of different networks;
   f) provide a fair return on investment for the TSOs;
   g) appropriate oversight;
   h) any differences in tariff conditions applied to different customers for similar services should reflect underlying costs.

3. Whilst welcoming the guidelines as a sound basis for continuing work on this issue, and agreeing with many of the underlying principles put forward by the CEER, a number of comments and reservations were stated by GTE, notably:

   - the need to find the appropriate balance between different objectives, e.g. cost-reflectivity and simplicity;
   - considerable differences exist between each TSO network. This needs to be reflected in tariff methodologies, and as such the decision whether entry-exit or point-to-point tariff methodologies or combinations thereof must be taken on a case-by-case basis; and
   - capacity requirements (including critical conditions and contractual commitments) are more relevant to tariff design than actual physical gas flows.

4. While the Forum invited national regulatory authorities and TSOs to start implementing the above general principles in national and company tariff systems, it was agreed that further work is necessary on the paper prepared by the CEER. The Forum invited the CEER in close collaboration with the Commission, GTE and other stakeholders to further develop and detail the above principles and to undertake work on issues in relation to valuing and charging for interruptible capacity, incentives on TSOs for efficient network operation, short distance tariffs and transit. In particular, the CEER, in close consultation with GTE, was invited to examine the concrete consequences of different tarification methodologies in different systems. The results of this work should be presented for discussion at the next meeting of the Forum.

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[2] Though a reserved was placed on principle (a) on cost reflectivity

5. In line with the above conclusions, this paper sets out to discusses the relative merits of different methodologies and the benefits of establishing a preferred tariff methodology. This needs to take account of some of the challenges that need to be taken into consideration in implementing such a tariff system, in light of the key principles endorsed at the Madrid Forum. Before looking at these matters, Section 1 discusses some recent comments by GTE on the need for the CEER to continue work on preferred methodologies. This section explains why this work needs to continue.

6. The remainder of the document debates the relative merits of different methodologies. In this context, Section 2 highlights some criteria for judging different methodologies. Section 3 provides some 'first principles' to help understand the nature of the problem of charging for gas transportation on complex networks. Section 4 then looks at some of the challenges that need to be taken into consideration in implementing a particular tariff system. This section reacts, in particular, to discussions with relevant stakeholders, including Gte and Member States. Section 5 looks at the particular topic of network investment. Section 6 draws some conclusions and recommendations to the 6th Madrid Forum.

Section 1: The need for harmonisation of tariff regimes [to be updated as necessary].

7. The CEER Gas Working Group met with GTE on 12 June, following the Joint Working Group meeting on 15 May. At the discussion, GTE raised concerns that the CEER had presented an entry-exit system as a panacea for addressing tarification issues across Europe. GTE also noted, however, that this did not mean that they advocated a point-to-point, or other charging regimes to be applied uniformly. GTE expressed concern at the overall need for a common tarification methodology across Europe, without taking account of national specificities. This, they argued, suggested assessment of the correct tariff methodology for each country on a case-by-case basis.

8. The GWG agrees that it would be wrong to assume that in all circumstances that a particular tarification system provides a panacea. However, in reaction to GTE's comments regarding harmonisation of tariff methodologies, the Madrid Forum has identified a need for tarification regimes in Europe to move closer together. This is motivated by the objectives of increasing trade between member states and gas-to-gas competition. For a particular gas flow, facing a multitude of different tariff methodologies as gas flows across different networks, adds an additional level of complexity to each trade. Moving to a harmonised tariff regime would provide some degree of commonality between tariffs.

9. At the same time, there are additional benefits, for example for tariff regimes that promote tradability within a particular system. It is more likely that the tradability between different networks (or hubs) would be supported if there are more harmonised arrangements in place. In addition, moving towards a common tariff methodology could help to improve the transparency of tariff regimes and the other objectives highlighted in the introduction to this paper. The fact is that existing tariff methodologies in some Member States do not meet the criteria set out at Madrid.

10. The GWG believes that as a first step, investigation of preferred methodologies for tarification is justified. If such a tariff regime can be demonstrated to be ultimately in the Community interest, by promoting trade and competition and at the same time such a tariff regime can be implemented at by individual TSO's in domestic interests, it remains justified to recommend a common tariff regime. In this context, two questions remain important: first, whether the application of common tariff methodologies would promote the objectives of trade and competition. Second, whether such a tariff

regime is capable taking into account the specificities and market characteristics of different networks and at the same time accommodate these differences, whilst maintaining the objectives of cost-reflectivity etc.

11. Clearly, weighed against other objectives such as promoting competition, although national differences may exist, it may still be both in the domestic and community interest to promote a common tariff regime. The key questions to understand are the conditions under which a particular network configuration might not be suitable for a common methodology; the extent of harmonisation desirable at a European level; and whether particular solutions or other tariff regimes are justifiable.

Section 2: Objectives and principles for tariff methodologies

12. In some cases the same principles can apply to any tariffs regime, as is not necessarily a direct result or feature particular to the tariff regime chosen. For example, the Madrid Conclusions noted that in general any tariff regime should aim for the maximum levels of transparency and should be published *ex-ante*. On the other hand, there may be features of a particular tariff system that make it easier to fulfil or abide by a particular principle. For example, the CEER's paper to Madrid V noted that unnecessarily complex tariff structures may represent a barrier to entry into the market by new system users and therefore would not abide by the principle of transparency. It is therefore necessary to identify a set of objective criteria that can be used to judge one tariff regime over another. This does not however constitute an attempt, in any way to revisit the principles agreed at the Madrid V Forum, rather these criteria should be seen as emerging from the principles established at Madrid.

13. The following list seeks to list the key criteria relevant to judging a preferred tariff methodology that best meets the Madrid Conclusions:

- **Cost reflective:** tariffs should be reflective of the efficient costs actually incurred, in particular taking account of network configurations and the physical realities of flows on the network, in order to provide signals to the market and ensure an appropriate allocation of costs between network users
- **Cost recovery:** By definition such tariffs should enable TSO's to recover allowed revenues, providing a reasonable rate of return[3].
- **Promoting efficient use of the system:** Any tariff regime should provide sufficient signals to network users to promote efficient use of the system. Similarly, tariffs should also aim for efficient investment in the network by TSO's.
- **Simplicity (transparent)**: tariffs should remain as simple and understandable as possible, so that, for example, potential entrants are easily able to calculate the likely charges they would face.
- **Competition and flexibility:** the tariff methodology and the levying of charges should aim to foster competition at all levels of the supply chain. In particular the tariff should not create unwarranted barriers to trade or market entry and should enable shippers to respond to changing market conditions in a simple manner at minimum cost and at the same time apply competitive pressures higher up the supply chain. The tariff system should foster the tradability of capacity, and the operation of hubs.

[3] There are of course some national differences in the concepts and the determination of appropriate revenues recoverable by TSO's. The relevant issue for this paper is that a particular tariff methodology allows "appropriate" costs (however determined) to be recovered.

- **Adaptable:** any tariff regime should be capable of accommodating and adapting to different network characteristics, and market circumstances (e.g.: switch from FCFS to auctioning when congestion appears).

14. Clearly, the above criteria are selected on the basis of CEER priorities. Weighting the above criteria by importance is extremely difficult particularly due to the interrelated nature (e.g. non-discrimination and competition). Therefore, any judgment of a preferred tariff methodology needs to assess all of these factors together. Though it is important to highlight that CEER members acknowledge that the opening up and closer integration of the European electricity and gas markets is a common goal and this is the overriding principle at the heart of CEER activities.

Section 3: Tariffs and network configurations

15. In line with the request at the Madrid Forum, to examine the consequences of different tarification methodologies, this section describes the nature of gas trades and the effect they have on the costs of transmission service operators (TSOs). In order to establish firmly the benefits of a particular tariff regime it is worth understanding the nature of gas flows on networks and the relationship between the costs incurred by network operators and the charges they levy.

Capacity regimes and tariffs

16. At this stage it is worth highlighting that this paper primarily focuses on tariff methodologies; there is sometimes a natural assumption that a particular tariff regime, for example, distance related charges implies that capacity booking must be booked on a point-to-point basis. Therefore, discussion of tariffs also often includes discussion capacity booking regime that accompanies it. Conceptually, it is possible, however, that the tariff regime and capacity booking regime are different. For example, postage stamp charges could be applied whilst requiring capacity to be booked on a point-to-point basis. A similar point is noted in the Brattle Group's 2002 report to the Commission[4].

17. However, at the same time as noting that different combinations are conceptually possible, there are combinations that would be difficult to implement and in some cases the particular benefits of a tariff regime might be counter acted by disadvantages of not having an equivalent capacity regime. Indeed, discussion of the relative merits of different tariff regimes is that they can facilitate, for example, the introduction of equivalent capacity booking regimes (or derivatives thereof) and wider benefits. It is therefore justified to consider the wider implications of introducing particular tariff regimes. However, in the conclusions to this paper we discuss in more detail the options that could be available if national regulators were to implement an entry-exit system.

Network configurations

18. The annex to this paper describes various network configurations and the effect that different gas flows have on the network. The simplest network design would be a single pipeline linking a gas supply A with demand B. It would be quite simple to charge on a

[4] "Convergence of non-discriminatory tariff and congestion management systems in the European gas sector", *Brattle Group,* September 2002

point-to-point basis and for the transporter to identify a "contract" or "notional[5]" path along which the commodity is deemed to be transported by the network operator. In the case where the only flow of gas was from A to B (i.e. unidirectional), a contract path basis for charges provides a simple and cost reflective tariff.

19. However the annex highlights that even in the simplest of network designs, point-to-point charges based, for example, on distance related tariffs can result in charges on network users that do not necessarily reflect the costs incurred by transporters. There is an incentive for the transporter to implicitly net off the flows, and hence save the associated transport costs, both capacity and any volume charges or for network users to swap gas scheduled to flow in opposite directions. Only in the particular case where contractual or notional flows coincide with actual flows would the distance-related tariff outlined reflect the costs incurred by the TSO. The example suggests that network operators may levy charges for transports that, physically, do not take place, which might result in an overcompensation of network costs. This "overcompensation" could be passed back to network users but a key problem, in this instance, is that the lack of cost reflectivity fails to provide the right signals to network users.

20. Entry-exit charges can be designed so as to signal the consequences of an additional input and off-take in a particular direction. At a very detailed level it would be possible to present a "full matrix" of combined (point-to-point) entry and exit pairs[6]. For the avoidance of doubt, the CEER classifies such tariff regimes as a particular type of point-to-point.

21. One downside of this full-matrix approach is that the number of entry-exit pairs that would arise from such a calculation would be numerous. For example, in a country with 5 entry points and 100 exit zones would potentially lead to 500 published tariffs for each entry-exit pair. Even if a number of points were combined into a number of "zones", say 10, this would still result in 50 entry-exit combinations.

22. For practicality reasons, using 'entry-exit' tariffs means that locations are independent. By separating entry and exit charges, this reduces the number of tariffs that need to be published (we discuss the additional benefits of separating entry and exit charges in section 3). Clearly there is a need to find the appropriate balance between different objectives, e.g. cost-reflectivity and simplicity. A full matrix approach would provide cost reflectively but possibly at the expense of simplicity.

23. The matrix approach also requires additional information to determine, for each trade, where gas for a particular trade was inputted into the system and, at the same time, the matching off-taken (or to determine a notional path) for the purpose of levying a charge. This may not fit with the practical realities of gas transportation and the manner in which network users are required to act. For example, on some transportation networks, shippers are simply required to ensure that the gas they off-take from a particular system is balanced with the amount of gas they input into the system. This does not require the shipper to know the particular entry point used to supply a particular exit point, but rather that the shipper has ensured that sufficient gas

[5] On some networks, TSOs are unable to identify the specific point where gas entered the system. In this circumstance, TSOs identify a notional path (the nearest entry point to the exit point concerned). On a linear network, this will coincide with the contractual path but on more complicated networks, the actual entry points may well differ from the "deemed" entry point.
[6] Tariffs for each entry-exit pair would reflect the impact of an additional permanent incremental flow of gas between these two points, taking into account likely physical flows on the network based on a robust modelling of general network and economic fundamentals

is contracted to be input into the system at the correct points to meet demand from their customer portfolios.

24. By limiting the number of charges that need to be published by TSO's, entry-exit charges would provide help provide greater simplicity, whilst aiming for a more cost-reflective approach based on actual flows on the transportation network. However, there is an important aspect of cost-reflectivity related to specific network configurations (i.e. where a pipeline is "internally congested") that is discussed in more detail in section 4.

Cost reflectivity and revenue recovery

25. The above discussion focussed on the issue of cost reflectivity largely based on the incremental cost approach to determining prices. If tariff regimes were to be judged on pure cost-reflectivity grounds alone, then on fairly complex networks (where locational prices are important) some derivative of this approach would probably be preferred. However, the discussion above noted that other methodologies, at least in principle, can draw upon the benefits of the full-matrix solution based on the same modelling of network flows. For example, entry-exit tariffs can be derived using the incremental cost approach. There are benefits, in this approach, in particular, where there are a large number of potential routes for gas to flow.

26. It should be noted in the above discussion of tariffs, that other options are possible in particular for entry-exit tariffs. For example, in Italy, it was determined that an entry-exit system provided a reasonable approximation to the costs incurred on the network. Certainly, in some circumstances, it may not always be possible to establish an incremental cost model or there may be a reasonable approximation between incremental costs and average costs, particularly where locational differences are less important on particular networks. The essential point, however, is that entry-exit tariffs can provide adaptability to signal network characteristics that regulators and/or TSOs deem necessary.

27. A concern often raised in the context of entry-exit tariffs is the ability of TSO's to recover their costs. Of course where there is regulated revenue, this issue does not require consideration as the tariff question is largely based on allocating allowed revenues between customers.

28. This is probably based on the assumption that an entry-exit tariff regime necessarily implies an incremental cost approach. The above discussion highlighted why such the incremental cost approach may be important, it probably remains for national regulators/authorities where appropriate in combination with the relevant TSO's to determine. Nonetheless, the issue of incremental costs and cost-recovery is considered below.

29. Depending on cost profiles, charging solely on the basis of long-run incremental costs may not allow TSO's to recover their total costs. This paper does not consider the possible methodologies adopted from determining "appropriate revenues" (i.e. the level of costs incurred by a TSO that may be recovered through transportation charges) nor whether this short-fall in revenues from tariffs based on incremental costs is likely to be very large. Nonetheless, in principle it would be possible to apply a "mark-up" (even if it were relatively small) on tariffs, that maintained the relative locational price differences, whilst ensuring that TSO's could finance their activities by increasing those prices by an appropriate amount. Alternatively, as applied under the UK regime, it is also possible to split levy tariffs in two parts based on a capacity charge

(related to long-run incremental costs) and a commodity charge (that enabled the transporter to recover remaining costs).

30. The above discussion also highlighted that some regulators choosing to adopt entry-exit tariffs have elected not to apply an incremental cost approach. In these circumstances, applying entry-exit tariffs on the basis of average costs, could for example, ensure adequate cost-recovery.

31. In summary, two key issues should be highlighted in the above discussion:

- On cost reflectivity grounds, incremental-cost approach highlights some of the problems of distance-related point-to-point charges that prevail in a number countries. Where this is a problem, an entry-exit system is sufficiently adaptable to provide locational signals, while probably providing a practical simplification.

- At the same time the adaptability of entry-exit system shows that necessary changes to the tariff regime can be adopted, including "mark-up" of tariffs to ensure appropriate recovery of costs. The essential point, however, is that the issue of cost-recovery is related to the appropriate design of the tariff, rather than a problem specific to entry-exit tariffs per se. Moreover, where revenue is regulated, this issue is not important, as the tariff question is simply to decide how to share revenue between network users.

Section 4: Benefits of entry-exit system

32. So far the discussion has focussed on the effect of incremental flows and the importance on particular networks of reflecting these flows rather than a pure contract path approach to network tariffs. Entry and exit charges will contain a slight loss of sensitivity to the precise impact that any particular additional flow between an entry and entry point might have on the gas network. However, it probably provides an acceptable approximation, on practicality grounds, to the full matrix solution, in line with the principle of simplicity and the realities of most networks.

33. Notwithstanding these points, section 2 highlighted that cost-reflectivity is not the only criteria with which to judge a particular methodology. In this context, the key benefits of entry-exit tariffs are wider than their ability to provide a degree of locational signals and a practical approximation to costs on the network, namely:

- Separation of tariffs – different charge for entry and exit (independence of destination);
- Gas-to-gas competition/energy-hubs/market liquidity; and
- Management and balancing of flows

Separation of tariffs and capacity

34. As the CEER's tariff paper to the Madrid Council in January 2002 noted, the key attribute of EETs and capacity is that entry and exit locations are independent. Trading in gas is facilitated under an entry/exit system because gas, which has paid entry capacity or other charges, is not committed to any particular exit point within that particular network. This means that this gas can be traded, for example, without the need to re-contract transportation capacity like in a point-to-point regime or the shipper may be required to pay additional tariffs to move the final destination of the gas.

35. With the liberalisation of gas markets in Europe, an increasing feature will be the need for commercial flexibility as shippers and suppliers will enter the market. Any tariff mechanism should provide flexibility to enable shippers to source gas easily and to be able to provide this gas to different customers in a simple and cost effective manner, and to respond to changing demand conditions at short notice.

36. In the CEER's discussions with network users has highlighted concern that the lack of contractual flexibility in the capacity system may act to perpetuate the existence of inflexibility in upstream supply contracts. It should be noted that in a truly competitive market, it should be possible for shippers to undertake a range of negotiations with gas producers for contracts of varying lengths and to contract for supplies from different sources. In well functioning markets, these risks should be left to the market to assess and will vary between different market actors.

37. A shipper that is not impeded in its short-term choice of entry points to serve a end-user will naturally seek to obtain flexible deals with a range of producers, subject to ensuring a degree of certainty with regard the delivery of base-load gas to its customers. Where it is very difficult, at short notice, to change from one entry point to another, in order to supply the same customer or as new customers enter its portfolio, the shipper may be limited in its market power. This could increase the likelihood of more longer-term and less flexible contracts with producers. Clearly, in the interests of promoting competition and market entry, there is therefore a need to facilitate a flexible organisation of the supply.

38. The alternative to re-contracting for new capacity route with the TSO, is to obtain that capacity from another shipper. However, for new entrants with a limited portfolio, it is less likely that they would be able to find a counter-party with which to swap compared to an incumbent. By contrast, because entry capacity can typically be used to supply any exit point of the same zone and therefore a shipper is more likely to find a counter-party either to swap gas or to trade with.
39. EFET in its comments on the paper presented at the 20 September noted that point-to-point capacity booking is also inefficient and bureaucratic because of the need for multiple network user requests and responses from the TSO. In EFET's response they state that "point-to-point schemes, based on individual contracts, also lead to inefficiencies and discrimination as there are a plethora of different contracts for different customers, rather than a single master agreement or network code."

40. Much of the above discussion in relation to entry-exit has focussed upon the inflexibility caused by point-to-point capacity booking. In terms of the tariffs that are applied to a particular shipper, the so-called "portfolio effect" may discriminate in favour of the incumbent shipper. This portfolio effect is explained in more detail within the Brattle Group's 2002 report to the Commission, paragraphs 13-16 of the appendix also presents a simplified example. The essential problem is that an incumbent shipper has an ability to rearrange its nominations that could minimise the point-to-point charges applied to it. By contrast a new entrant with a limited portfolio would find it more difficult to find a counter-party with which to undertake such swaps. In this case, the tariff regime discriminates in favour of those better able to conduct swaps. Therefore, judged against the objective of promoting competition between shippers, an entry-exit regime could reduce this weighting in favour of incumbents.

Trading hubs/gas-to-gas competition/market liquidity

41. The discussion in section 2 highlighted the possibility for shippers to swap gas bilaterally in order to reduce transportation costs. In a pan-European market, while gas in principle could physically flow from Rotterdam to Lisbon, it is highly unlikely that such a trade would be executed through a physical movement of gas from the Netherlands to Portugal. Instead, the use of swaps or financial trading is more likely.

42. Flexible tariffs regimes that limit the barriers to trade will certainly better help the development of trading points. These points are typically known as trading hubs, which are often at points where gas supply infrastructure and supplies come together. Trading hubs are already developing across continental Europe, for example at Zeebrugge and Emden. GTE has argued that the examples of Zeebrugge and Emden, as well as the American market, show that trading hubs have developed with a point-to-point framework.

43. There is little doubt that most industry participants support to objective of facilitating the development of trading hubs within Europe. The development of trading hubs can help participants focus on improving the tradability of contracts. This in turn could facilitate trades between different hubs in Europe. As hubs develop and more participants become involved, deeper and more liquid markets helps promote the development of financial trades. Greater liquidity and financial trading also encourages the development of hedging instruments, further reducing the risks of volatility.

44. The question relevant to this paper however is how important is tariff design in facilitating the development of hubs? GTE have pointed to the example of the emergence of trading hubs in Zeebrugge and Emden. However, according to a report by Platts Energy[7], the degree of liquidity and confidence in these markets is poor. The report notes that the level of "churn" in the UK NBP, sees each unit traded 15 times before being delivered to the final customer. In contrast gas is only traded at Zeebrugge at about one third of this figure. It would be superficial to suggest that these figures provide conclusive evidence that differences in tariff structures between the UK and the continent account for the relative weakness of continent hubs. Other barriers to hub development exist such as a lack of effective TPA, physical infrastructure etc. In the US it is also fair to say that liquidity for example at the Henry Hub in the US, far outweighs the liquidity in the UK.

45. Nonetheless, it is difficult to deny that the separation of entry and exit tariffs provides a clear benefit in terms of tradability. Indeed, Order 637[8] by the Federal Energy Regulatory Commission (FERC) explicitly notes a pure point-to-point capacity booking regime hampers the tradability of capacity rights, which in turn limits the degree to which gas can be sourced flexibly from a range of locations. This has led to requirements by the FERC for capacity rights to be segmented, so that over a particular point-to-point route, a shipper may sell of proportion of their capacity rights to a third party. If a shipper therefore holds capacity rights for a particular route A to C (capacity right AC) that passed through point B, by segmenting his capacity right (AB and BC) the shipper could sell the capacity right AB to another shipper. In the same Order, the FERC also highlights the benefits of allowing flexibility in transportation tariffs to allow shippers the ability to change the destination or source of gas without having to contact the transporter or to face new charges. Though there will continue to be a need to nominate.

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[7] Gas liberalization in Europe: An empty promise? Global Energy Business January/February 2002, Platts

[8] FERC Order 637: "Title here"

46. The information above in relation to the United States therefore appears to demonstrate that there are disadvantages to the point-to-point regime. Notwithstanding the issue as to whether the US system is relatively less meshed, and faces more linear inter-state pipelines (and therefore possibly more suited to point-to-point tariffs), there is recognition of the barriers to trade created by point-to-point tariffs and capacity. However, it is clear that further investigation of the hubs issues, as well as the experiences from developed markets such as the UK and US, would be merited.

47. Nonetheless, most literature suggests that in the first instance it is likely that hubs will emerge either at junction points where physical infrastructure meets, and at significant points of delivery, such as at the end of large transit pipelines from Africa, Eastern Europe and the North Sea fields. Also, as in the case of the UK, convenient balancing areas support the development of national balancing points. Though, these could also be regional[9]. Hubs at each location could reduce the need for gas to flow physically by providing pricing points. A buyer at one hub would just pay the premium--or receive the discount--from the seller at the other. This procedure would be further simplified if transportation tariffs enable gas, once entry-paid at a particular hub to be traded between shippers (including the necessary premia and discounts between shippers for different hubs) and for exit to be possible at another hub.

48. It is therefore the CEER's opinion that entry-exit regimes are an important element in supporting the development of hubs. Hubs may have emerged in embryonic form on the continent but the degree of liquidity has been poor. Entry-exit tariffs can help the development by promoting tradability of gas within a particular region, making it easier for example to contract from a wider range of entry points. At the same time, entry-paid gas can be traded across different hubs by making a homogenous product with similar characteristics. This will further help market liquidity, and provide deeper markets by linking together these hubs.

Management of balancing and flows

49. With the emergence of an entry-exit regime, can also have wider implications for the operation of the network and the respective roles of different users. This can potentially lead to an increased simplification of other procedures, such as balancing on the network. On a day-to-day basis the TSO manages the residual flows on its network. Local demands and supplies are netted, the remaining gas flows are determined by the geographical demand/supply imbalance. This configuration is, in effect, institutionalised 'swapping'. These net physical flows determine the necessary capacity of the network and hence cost. There is obviously a probabilistic aspect to this flow modelling since:

    a) scheduled flows might not actually be injected; and

    b) flow patterns might change over time.

50. However, the basis of entry-exit modelling is aggregate flows, which (due to the laws of statistics) are much less variable than the flows of individual Network Users. TSOs may also be under a legal requirement to plan and operate their network in a prudent manner. It can be reasonably assumed that TSOs can develop, if they have not done so already, procedures for modelling likely flows on their networks. 'On the day' balancing is then a residual activity undertaken by the TSO.

[9] The debate in the United Kingdom for example considered whether it might be preferable to have additional balancing points reflecting the network configuration.

51. By modelling residual flows, there can be cost saving which can be passed on to network users in the form of lower tariffs. However, returning all the savings to consumers removes the incentive on the TSO to minimise costs; some retention of savings may be an appropriate incentive mechanism. The overall balance of tariffs, revenues and costs should be subject to appropriate oversight by National Regulatory Authorities.

Section 4: Challenges for entry-exit tariffs and concerns of GTE

52. The above sections have highlighted the flexibility of entry-exit tariffs and some of the key benefits in terms of encouraging liquidity and gas-to-gas competition. However, in designing tariff systems, there will always be challenges in trying to meet potentially conflicting objectives. This section looks at the concerns that have been raised in relation to the design of a tarification system and the reasons why the GWG believes that these can best be addressed through a system of entry-exit charges.

53. At the last Madrid Forum, GTE raised the following concerns:

a) considerable differences exist between each TSO network. This needs to be reflected in tariff methodologies, and as such the decision whether entry-exit or point-to-point tariff methodologies or combinations thereof must be taken on a case-by-case basis;
b) capacity requirements (including critical conditions and contractual commitments) are more relevant to tariff design than actual physical gas flows; and
c) The need to find the appropriate balance between different objectives, e.g. cost-reflectivity and simplicity;

54. In addition, the GWG has had further meetings with GTE, in response to the provisional discussion paper presented at the Joint Working Group on 15 May and further reflections on the Madrid Conclusions.

<u>Concerns raised by GTE at Madrid</u>

a) Differences in TSO networks

55. As discussion in section 1, one of the possible difficulties in harmonising tariff methodologies is the need to take account of the differences that exist between TSO networks. GTE has argued that the decision whether entry-exit or point-to-point tariff methodologies or combinations thereof must be taken on a case-by-case basis.

56. In principle, TSO's levying postage stamp or point-to-point tariffs could under specific circumstances be equivalent to levying entry-exit charges. For example, if the postage stamp charge is cost-reflective, then the charge at any particular entry point would be same as the charge at any particular exit point, the combination of the entry and exit charge would be equivalent to a postage-stamp charge. Similarly, in certain specific circumstances, the calculation of entry-exit tariffs for European gas networks (such as where flows are unidirectional and the network topology is almost linear) may result in a tariff equivalent to a distance related or "point-to-point" tariff, which might, in such circumstances, therefore be considered as one specific example of an entry-exit system.

57. However, there is more to this argument than the possible equivalence of entry-exit tariffs to postage-stamp or point-to-point charges. There is a question, for example, as to whether tariff systems currently applied in all Member States are cost reflective and non-discriminatory. And whether fundamentally different tariff structures, in the long term, can lead to the desired price and cost signals for an optimum use of a pan-European network. Clearly, part of the impetus from the Madrid Forum reflects the failing of tariff methodologies in some Member States to provide sufficient levels of cost reflectivity, simplicity, flexibility and encourage tradability and liquidity, including at an intra-state and inter-state level. Section 2 already highlighted the way in which point-to-point tariffs based on contractual flows are not always cost reflective. Similarly, although postage stamp system has the merit of being very simple, it relies on a specific network topology (very evenly distributed demand and supply) which is not typical of European networks.

58. Responding to GTE's concern is made difficult by the limited identification of the specific national circumstances that apparently warrant particular attention. We discuss some of the issues highlighted by GTE below, which are largely related to differences in network topology. But in absence of further information on these national specificities, the CEER can only continue to present the case for particular tarification methodology based on the high-level principles agreed at Madrid. The onus of proof should fall to GTE to highlight particular network configuration problems. If such physical constraints arise, a clear distinction should be made between the impact it has on the tariff and the capacity allocation system.

National specificities identified

Internal constraints

59. GTE noted that a key problem of entry-exit was that it might fail to signal congestion deep within a network, as by definition an entry-exit system is an approximation, for example, to a full-matrix solution based on LRMC. In this discussion of internal congestion it should be noted that entry-exit tariffs are capable of signalling "internal constraints" to varying degrees. For example, where constraints are very close to entry or exit points, the constraint can be signalled by a locationally varying capacity charge at a particular entry/exit point. The precision of entry-exit charges is to some extent therefore determined by the location of constraints on the network.

60. EFET has also noted that "*a good entry-exit scheme allows the TSO to focus on managing the system: additional price signals might not be needed. EFET believes that a pre-requisite of efficient use of gas networks is for price signals to be available from the gas commodity market, i.e. gas trading hubs need to give the primary price signals relating to congestion although there is clearly an interaction with the tariff regime. In this respect, ensuring the tariff regime enhances the competitive market is imperative to allow hubs to produce true price signals.*"

61. GTE has highlighted the example of the French network, where there is apparently a significant internal constraint between North and South of the country. A network user entering gas in the North of France to transport to the South would not receive the full price signal of this constraint. The GWG recognises that signalling internal constraints on the network is an important issue. Incentives should be in place both on shippers and TSOs to act in a manner that makes the most efficient use of the transportation network.

62. Robust modelling and monitoring of physical flows should provide a signal to TSO's to alleviate such constraints in the long run. Provided the correct incentives are in place on TSO's, the creation of a hub enables the TSO to manage flows on the network and to minimise these costs, where possible through the bypass of congestion in particular parts of the network by using alternative routes. In addition, the GWG believes that a range of flexibility services should be utilised or offered by TSOs, as appropriate and on a non-discriminatory basis (for example: linepack, interruptible contracts and storage) to overcome constraints that may arise. We do not discuss the specific regulation or pricing of these services here, but these flexibility services could help to provide an efficient balance between management of network flows and long-term capacity constraints.

63. GTE has argued that internal congestion cannot be dealt with by means of a "re-dispatching" by the TSO of the flows at certain entry and/or exit points, as can be achieved in electricity, because the possibilities for a TSO to modify the gas inputs into the network or the gas outputs from the network are generally very limited. However, it should be possible to envisage market-based mechanisms where the gas transporter had the option to pay shippers who were able to alter the particular point they enter the network (including from storage terminals) in an attempt to maximise the use of the network[10]. In the UK, for example, three products are traded in the On the day Commodity Market: physical; locational and title gas. The locational market is designed to allow Transco to purchase gas at a specific location to address local transmission constraints.

64. Finally, if an internal constraint is particularly significant, there could be consideration of introducing separate entry-exit areas. For example, a Northern entry-exit charge in France and a Southern entry-exit charge. From an economic standpoint, there is no particular reason why political borders should determine an entry-exit area. Therefore, one aspect to consider is whether, in the first stages of moving towards greater harmonisation in tarification, that a number of local markets should be identified either at a national level, or at a more regional level. Clearly, there would be a balance to be struck between the number of entry-exit regions that were created whilst ensuring simplicity for network users.

Multiple entry-exit points

65. Another aspect of network topology that needs to be considered is the number of entry and exit points. One GTE member noted that the number of entry-exit points in the UK is far less than in Germany, for example. It is also often argued that the UK has only a limited number of entry points, with only 5 beach terminals. On this basis, applying the entry-exit methodology to other Member States where there are larger number of entry and exit points would be more complex.

[10] Such incentives could be placed on the transporter (to maximise the use of the system and therefore their revenues) and the shipper who would receive a payment (or discount) for being able to provide flexibility in the point at which gas enters the system. In the case on a binding constraint between North and South France, shippers could offer additional flexibility by obtaining supplies entering the South of France. If correctly incentivised then the differential between the 'locational' offer by shippers at entry points in the North of France and entry points in the South, in addition to the TSO's knowledge of the constraints on its system, could provide sufficient signals for the TSO to manage constraints on its system, including in the long term investing in additional capacity.

66. The GWG rejects this argument on the grounds that it is quite simple to group a number of entry or exit points into charging zones. Indeed, in the UK, Transco's exit capacity charges are grouped by zone. Furthermore, in the UK for example, the entry-exit regime is only applied to the high-pressure network that is used to feed the lower pressure regional networks. If an entry-exit regime were applied to the lower pressure networks, then there would be a far higher number of exit points in the UK. Additionally, in terms of the number of entry points in the UK compared to other countries, there are also a large number of storage and LNG entry points, which significantly increases the number entry charges. In addition, each time a flow can be reverted, an entry point is also an exit point. Of course the entry fee can be different from the exit fee. Usually it will have to be different to reflect the dominant flow.

67. The existence of a larger number of entry and exit points therefore does not argue against an entry-exit regime. The GWG has already argued that for practical reasons, the entry-exit system provides a useful approximation to the full-matrix solution. The degree of approximation that is necessary is clearly a choice. The GWG considers that the degree to which entry-exit charges are simplified is a decision best left to subsidiarity. Though there might be a need for a minimum levels of detail, since the extreme case, removing the level of detail in entry and exit charges, would result in a postage stamp system based on one uniform entry charge and one uniform exit charge. This would still have the benefits of providing separated entry and exit charges but would not be likely to be cost reflective nor would it leave open the possibility to provide locational signals to network users.

Short-haul tariff

68. GTE noted that one potential problem is that entry-exit charges could create perverse incentives on large loads very close to a network entry point to by-pass the network by building its own pipeline, duplicating existing infrastructure. This problem can arise because entry and exit fees might not fully reflect the distance that gas travels through the grid. The entry fee levied reflects the costs of supplying the large load near-by and also possibly other (distant) exit points and could quite possibly contain a cross-subsidisation effect of long distance transport by short distance transportation. In addition, GTE have argued in Member States, for example in Germany, there were multiple TSO's, there are much stronger incentives for pipeline companies to encourage the bypass of competing pipelines.

69. Two possible solutions to this problem could be considered which are briefly discussed below.

    1. Introduce a reduction on the rate charged. This would presumably have to apply to the exit charge for the large load. The problem with this solution is that the short-distance discount is only cost-reflective if the shipper opts to procure gas from the entry point near-by. If a shipper opted to inject gas at a distant entry point then the discount for exit at a particular point would not be cost-reflective in these circumstances either.
    2. The alternative is for these very specific cases introduce a point-to-point tariff/entry-exit fee, where both the entry-exit point is linked. Under these circumstances, tradability would not possible in order to avoid arbitrage (i.e. nominating a point for the short-distance tariff and then using such an entry-paid charge to offer gas at a particular hub at a cheaper price than other shippers are able to).

70. In the UK, Transco has offered a short-haul tariff to avoid 'bypass' problems, although this charge actually relates to the commodity element of transportation charges,

which are levied on a uniform charge per Kwh. The optional tariff applies in respect of gas delivered from the local specified terminal. The charge is site specific and is calculated based on registered supply point capacity and the direct distance between the exit point and the local specified terminal.

71. The GWG recognises that the 'short-haul' problem requires consideration. However, in most circumstances, the problem will tend to relate to large-network users who may be given perverse incentives to by-pass the network by building duplicate pipelines. On the other-hand, the issue should not be over-estimated. This is reflected, for example, in the official position of the IFIEC (International Federation of Industrial Energy Consumers) Europe[11]. In particular, in relation to tariff structures, the IFIEC argues that tariffs should be preferably based on entry/exit system and not distance related. The clear priority from their perspective is that tariffs should facilitate the development of competition.

Multiple TSO's

72. There are countries, most notably France and Germany where more than one transmission company operates. The discussion of national differences often highlights the concern that countries that have implemented entry-exit such as GB have a single TSO, whereas it is far more difficult to apply an entry-exit regime to countries where more than one TSO operates.

73. Although it should not be denied that there is a more extensive regulatory task in dealing with multiple TSO's as opposed to one TSO. But given that one accepts the objective of establishing a common tariff methodology, the key question for this paper is whether there are features of particular tariff regimes (e.g. entry-exit) that make it less suited to countries with multiple TSO's?

74. In response to this question, it should be noted that at this stage, there is recognition within the Madrid Forum that, the gas market is more like a series of connected pools than a single lake. Under this framework countries could apply an entry-exit regime to each TSO network as individual pools. The treatment of TSO networks as separate pools does not therefore necessarily require a single entry-exit regime to be applied at a country level[12]. In this sense, from a tariff design perspective there is nothing in particular special about a number of entry-exit systems that coincide with national borders as compared to a number of entry-exit systems owned by separate TSO's operating within a particular country. There in this sense this paper attempts to respond to possible challenges that any tariff regime faces and the interactions and implications of trade between each network.

75. However, as stated above, the CEER is not dismissing the issue of multiple-TSO's as it represents a greater regulatory task to deal with more than one TSO. It is simply that this paper looks at establishing a preferred tariff regime recognising that there are necessary interactions between different TSO's systems. Indeed, the *raison d'etre* of this paper is to establish some coherence when trading between different systems. For this reason, from a national perspective, countries with multiple TSO's might may have

[11] IFIEC "The position of European industrial energy consumers in relation to the consolidated proposal of the Council of February 1, 2002, and the Draft Report of the European Parliament of December 17, 2001, to amend the Gas Directive 98/30/EC'

[12] Clearly, there is some merit in exploring opportunities for more than one network to be included in each system, perhaps involving more than one member state or TSO in a particular geographical area.

a greater incentive to introduce a common tariff regime for each TSO, if the arguments regarding tradability and gas-to-gas competition highlighted in this document are a key objective of regulatory policy.

b) Capacity requirements versus physical flows

76. The Madrid conclusions note GTE's concern that "capacity requirements (including critical conditions and contractual commitments) are more relevant to tariff design than actual physical gas flows". However, in GTE's comments on the GWG paper for the Joint Working Group, they agreed that planning the network is obviously based on aggregate physical flows. There is perhaps some confusion that has arisen between the GWG and GTE that has led to a somewhat false distinction being made between physical flows and capacity requirements. By definition, physical flows determine where constraints arise on the network, either on a temporary or long-term basis. And as stated in section2 (and the annex) the modelling of physical flows and the impact of additional flows at different points on the network probably provides the most cost-reflective method for deriving network tariffs. An entry-exit methodology, although an approximation to the full-matrix solution, can be based, in the first instance, around incremental flow modelling.

77. As stated previously, the GWG believes that the liberalisation of gas markets will lead to increasing detachment of contractual flows from physical flows. On the other hand, tariffs should be capable of signalling to network users system constraints and the effect that additional supply or demand at a particular point on the network will have. In contrast, it is unlikely, that distance related point-to-point or postage stamp tariffs are sufficiently flexible or cost-reflective to be able to cope with the changing market dynamics.

78. As stated above, in the discussion of network topology, perhaps a legitimate concern is whether entry-exit charges are capable of signalling "internal" congestion on the network, through entry or exit charges. There will be an approximation in either entry or exit charges, because gas may be able to flow across multiple congested and non-congested routes to get to its final destination. However, it is important to note that the same concern arises in relation to distance related or postage stamp tariffs.

<u>Uncertainty and risks</u>

79. GTE argued that the introduction of an entry-exit system may lead to greater uncertainty, as once gas has entered its network, the TSO is not informed where the gas will exit[13].

80. This concern can be illustrated with a simple example. Under an entry-exit regime, if a shipper books capacity at entry point A, there is uncertainty whether gas will exit at point B or point C. If the capacity available is 100 units both on route AB and AC, then in the simplest case the TSO can only offer 100 units of firm capacity at entry point A to guarantee that the network would be able to deliver gas to exit point B and exit point C. Under a point-to-point regime on the other hand, the TSO knows where gas will flow

[13] It is by no means guaranteed that other tariff systems provide the TSO with certainty either. For example, distance-based charges or point-to-point charges can be based either on contractual flows or notional paths. In the case of the latter, the TSO makes some assumption about where gas entered the network. In the case of postage stamp charges, the same tariff is applied irrespective of its entry or exit location.

as the shipper nominates the path and could offer 200 units. Therefore, the TSO could offer the full amount of capacity on a firm basis.

81. In some respects the simple example regarding entry-exit and uncertainty does not reflect the realities of the operation of entry-exit system (tariffs and capacity booking) in practice. The GWG understands that particularly at the level of an individual gas flow, the uncertainty as to the destination of gas could alter the degree to which firm capacity could be offered, in particular compared to a scenario where the TSO was certain of the destination of particular gas flow. However, a key point to understand under an entry-exit system is that is that the role of the TSO is to maintain the system in aggregate (not at the individual flow level), it is shippers that remain responsible for ensuring that individual flows are in balance.

82. It is this view of the aggregate position under an entry-exit system that should be appreciated. Moving to an entry-exit regime is likely to have some effect on demand and supply patterns, for example through the effects of trade and possible locational price signals. But in reality flows aren't likely to deviate significantly from the TSO's existing knowledge of the "prevailing aggregate flows" that occur on the network. The general location and quantity of base-load supply and demand are probably fairly predictable parameters. Although, there may be some differences for example through time or national differences that alter the predictability of flows on the network.

83. This discussion highlights therefore that network modelling, nomination information and forecasting will reveal the typical and/or prevailing flows on the network. In addition, exercises such as deriving tariffs to establish locational prices (such as the incremental cost approach) highlight likely aggregate flows on the network. In this sense although a TSO may not be 100% certain in the above example under the entry-exit system, it might be willing to offer more than 100 units of firm capacity based on its knowledge of past prevailing flows between entry point A to exit points B and C. To some extent this depends on the way in which firm capacity rights are defined on a particular network. But the essential point for this discussion is that the capacity is not lost under an entry-exit system. And even if the prevailing rules do not allow to sell it as firm, it can be offered as non-firm.

84. As stated above the example does not equate with the practical realities of the operation of entry-exit regimes. Indeed, this point is highlighted in EFET's comments on the 20 September draft of this paper, "*[an entry-exit system]…will also tend to lead to better utilisation of capacity and indeed experience suggests that more firm capacity might become available.*"

85. In terms of volatility, there is also the network users' perspective. By better facilitating liquidity, tradability and increasing the level of gas-to-gas competition, the degree of energy price volatility can be lowered. Gas-to-gas competition will help promote diversity of supply and, as a result of the positive effects of entry-exit tariffs in promoting hubs across Europe, the added liquidity will support the development of financial instruments to mitigate pricing risks.

c) The appropriate balance

86. It is always likely that there will be a trade-off, for example between cost-reflectivity and simplicity in designing appropriate tarification methodology. Therefore, in any discussion of the appropriate balance, it is necessary to prioritise some of the potentially conflicting objectives and to weigh up the overall costs and benefits of

each tariff methodology. The criteria suggested at the beginning of this paper are intended to provide an objective criteria with which to assess different tariff regimes. The conclusions to this paper draw together the various discussions in this paper based on these criteria. However, it should be noted that the weighting placed on different objectives by regulators and different industry players might not always be aligned.

Section 6: Conclusions

- **Competition and flexibility:** The primary benefit of an entry-exit model is that it promotes competition and provides flexibility. The separation of entry and exit point for capacity allocation is a key feature that contributes to improving tradability of gas, which in turn can help to facilitate the development of gas-to-gas competition and the development of hubs. In addition, the separation of tariffs, irrespective of the capacity booking regime, may have benefits where the "portfolio effect" is significant. Similar findings on competition and flexibility were presented in the Brattle's 2002 report.
- **Cost reflectivity:** In terms of cost-reflectivity, on very meshed networks where locational differences and predominant flows are very important, a point-to-point tariff based on incremental cost modelling possibly provides a fairly cost-reflective approach. By contrast, distance-related charges tend only to be cost reflective for uni-direction flows on relatively linear networks. On the other hand, any tariff regime will always necessarily be an approximation to cost-reflectivity. There is a balance to be struck in relation to the degree of cost-reflectivity against other objectives. Entry-exit tariffs are capable of providing an approximation to the "full-matrix" approach, where locational differences are deemed important. In addition, the GWG notes that entry-exit tariffs are capable of enabling TSO's to recover costs. There are a number of tools to ensure that cost recovery is assured.
- **Simplicity (transparent)**: In addition, entry-exit tariffs provide a degree of simplification in terms of the number of tariffs that need to be published. However, in terms of simplicity, it is probably reasonable to argue that one of the benefits of distance related tariffs on very simple networks is that it is easy to understand the link between distance travelled on a particular gas network and cost. Where network maps are published and physical route where the gas flowed is known, it is quite simple to derive such a tariff. However, on more complex networks where contractual and physical flows do not necessarily coincide, and "backhaul" calculations are required, distance-related tariffs will necessarily become more complex. At the very least, distance-related tariffs will offer less benefits in terms of simplicity compared to the case where contractual and physical flows coincide.
- **Adaptablity:** The above discussion of entry-exit tariffs also highlighted that these tariffs can accommodate a range of network problems. Although, for example, internal constraints on networks represent a possible difficulty, there are range of tools available to TSO's. In addition, entry-exit tariffs can be applied in a number of ways including incremental cost approaches capable of signalling locational differences to other solutions that might be aimed more at ensuring recovery of average costs, where for example, locational differences are less important compared to other objectives.

    - The preference expressed by the GWG for an entry-exit system needs to have a realistic discussion of the implementation of an entry-exit regime in different Member States and the next steps.

87. This paper, the GWG has presented the entry-exit tariffs regime in a wider context to encompass an equivalent entry-exit capacity booking regime. This paper noted at the outset, however, that some combinations of capacity booking regime with entry-exit tariffs could possibly achieve similar objectives. For example, the network topology may be such that some Member States may decide that only entry capacity booking is necessary and, for example, exit capacity need only be nominated as sufficient exit capacity is available to enable it to be automatically allocated by supply point.

88. On the other hand, there are combinations of tariff and capacity booking that would not provide similar outcomes to a full entry-exit regime. For example, postage stamp tariffs combined with rigid contract path based capacity booking would fail to meet a number of the objectives highlighted in the Madrid Conclusions, in particular the commercial flexibility necessary for capacity to be easily traded.

89. An additional point from the CEER's conclusions, is that although the CEER has explained why in general entry-exit regimes can provide sufficient adaptability to counter some of these concerns, it is clear, that GTE and some Member States that national specifities are a concern to some GTE members.

90. In the light of continued objection on the ground of national specifities the CEER recommends that GTE with concerns find solutions to these problems. Clearly, this work need only apply to those GTE members concerned about these national problems. In the first instance, GTE members (in close coordination with CEER, member states and industry participants[14]) should investigate the application of entry-exit tariffs to their network. Where problems are deemed to exist, these should be explained and possible solutions proposed by GTE members. Where certain GTE members do not feel that a pure entry-exit regime would be workable within their network, alternative solutions should be presented that also meet the principles agreed at the Spring 2002 Madrid Forum, whilst maintaining a coherence with tariff systems applied on other networks.

91. In parallel, and to guide the work by GTE, the CEER will continue to work upon establishing a strategic road-map, which would necessarily define the desired medium-term objectives (including the necessary degree of harmonisation between entry-exit regimes) and discuss the steps and challenges that would need to faced along the way. The CEER proposes an appropriate sharing of work between Regulators/Member States, Industry and the Commission.

92. In summary, the CEER believes that current combination of tariff and capacity regimes are insufficient to secure an efficient and properly functioning internal gas market. The CEER believes that medium-term solution would be the implementation of an entry-exit regime in each member state with sufficient flexibility to take into account national differences that may matter whilst maintaining the necessary coherence between each regime. In light of this proposal, the CEER proposes that an appropriate sharing of work between Regulators/Member States, industry and the Commission to establish a road-map to achieve this medium-term objective. This work should also help guide GTE members with strong concerns about national specifities to investigate the implications of implementing an entry-exit regime and to provide solutions that meet the objectives highlighted by the CEER.

[14] In this respect, the CEER welcomes the offer by EFET to be involved, in particular, in establishing a workable entry-exit system for the German market.

Appendix 1: Understanding "Simple" models of gas transportation networks and the nature of gas trades

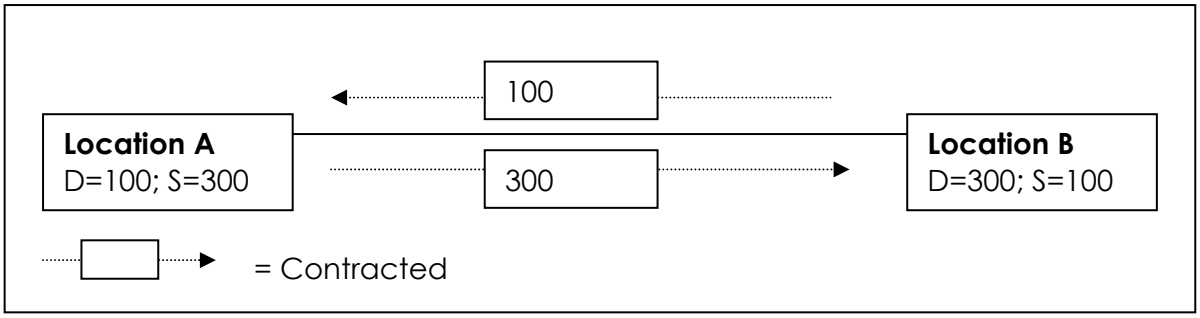
1. In line with the request at the Madrid Forum, to examine the consequences of different tarification methodologies, this annex looks in more detail the nature of gas trades and the effect they have on the costs of transmission service operators (TSOs). In order to establish firmly the benefits of an entry-exit tariff (EET) regime it is worth understanding the nature of gas flows on networks and the relationship between the costs incurred by network operators and the charges they levy.

2. This appendix looks in particular at the effect of incremental flows on networks and the important of locational signals. This discussion is intended to highlight the importance of these signals under particular circumstances and possible solutions to address these requirements. However, this discussion is not intended to advocate a particular approach in relation to entry-exit tariffs. But in the context where incremental cost modelling is desirable, this appendix shows the way in which entry-exit tariffs can be applied.

A linear point-to-point network

3. The diagram in example 1 below provides an example using possibly the simplest form of network, a direct line between point A and B.

Example 1 – A simple linear network



4. In this network configuration at both point A and point B there is a supply (S) and demand (D) point. In this example, the shipper at B is contracted to supply all of the demand at point A. The shipper at A, is contracted to supply all of the demand at point B.

5. For simplicity, we focus on the capacity related element of charges (though commodity related charges are important they do not constitute the largest element of costs). So for this discussion, the assumption is that a transporter's costs are mainly related to the costs of constructing their pipeline (for example, x per unit of flow per km).

6. The simplest method for charging on a point-to-point basis would be for the transporter to identify a "contract" or "notional[15]" path along which the commodity is deemed to

[15] On some networks, TSOs are unable to identify the specific point where gas entered the system. In this circumstance, TSOs identify a notional path (the nearest entry point to the exit point

be transported by the network operator. In the simplest case, shipper A would be charged for 300 units of gas and supplier B would be charged for 100 units (the distance for gas transported from A to B and B to A is the same in this example).

7. In the case where the only flow of gas was from A to B (i.e. unidirectional), a contract path basis for charges provides a simple and cost reflective tariff. However, it is a well known result that contractual or notional paths do not necessarily reflect the physical flows that actually occur on the network. In the example above, only 200 units need to be transported from A to B to meet required demands. The network operator would implicitly manage the flows on its system so that, in net, only 200 units actually flow (shipper A and shipper B could also avoid some of the charges for transporting gas across the network if they were able to undertake a commercial swap). Therefore, under a number of cases, distance related charges based strictly on contractual or notional paths will bear little relationship to the costs bourne by the network operator.

8. To address this concern, point-to-point distance related charges to shippers could be adapted to be based on the physical flows (net flows) that actually occur on the network rather than the contract path. These cost based charges could then be allocated back to users on the basis of load size (on a simple contract path basis). Again, such charges may not provide the correct signals to system users.

9. Consider in our example that the network has been constructed to accommodate a predominant flow on the network (e.g. 200 units from A to B), what would be the effect of an additional unit transported across the network? This depends on the direction of the flow. For the TSO to accommodate an addition unit from A to B would require an additional unit of capacity to be built. By contrast, an additional unit from B to A would reduce the required capacity of the line by one unit. This implies a negative charge for shipping gas from B to A, since this flow would reduce the TSO's capital costs.

Importance of appropriate network signals

10. The discussion above has identified the two issues related to charging for a point-to-point trade on this transportation link. A contractual path or notional path approach (which identifies costs of building a transportation link and charges users based on the distance and size of the load) might only reflect the costs incurred by the TSO in specific circumstances. This is because 'swapping' either managed implicitly by the TSO or explicitly between shippers/suppliers means that physical flows on the system are unlikely to equate to contractual flows.

11. Even if charges are adjusted to take account of the costs of physical flows, charges also need to take account of the incremental costs to the TSO of transporting flows. In particular, the costs incurred by a TSO will differ and may well be reduced, depending on location of those flows on the network. This suggests that a tariff charge on this network should have some locational element.

12. Under a system of distance related point-to-point charging it might be possible to levy a lower charge, for example for shipments from B to A than for shipments from A to B. These 'back-haul' adjustments can help mitigate some of the concerns set out in relation to distance related point-to-point tariffs. In the example above, using a linear network it would be quite straightforward to calculate such adjustments. But in more

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concerned). On a linear network, this will coincide with the contractual path but on more complicated networks, the actual entry points may well differ from the "deemed" entry point.

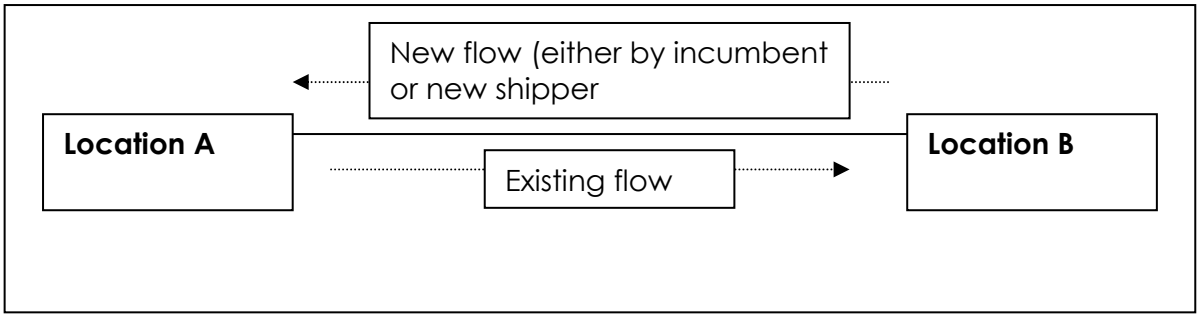
complicated network configurations with multiple entry and exit points these rapidly become complex, since the contractual distance has to be determined for each individual gas transport.

13. A separate issue not considered here is the relative merits of different methodologies for determining the costs related to incremental flows. In particular, whether tariffs should be related to accounting costs, or either short-run or long-run marginal cost approaches. This latter approach calculates the costs of sustaining indefinitely a unit increase in the capacity and throughput of the transportation network. There are some wider issues here regarding the volatility of prices, allowing recovery of appropriate costs.

Portfolio effect

14. In the discussion above, it was noted that the transporter managing flows on the network would mean that contracted flows would not coincide with physical flows. In this context, it was also noted that shippers could undertake swaps to supply gas to the customer located close to the entry point. An important issue highlighted in the Brattle's 2002 report to the Commission is the possibly discriminatory effect of distance-related tariffs as between incumbent shippers and new entrants. This is often defined as the "portfolio effect".

Example 2 – The problem of discriminatory non cost-reflectivity and "portfolio effects"



15. Consider in the example above, that there is an existing flow by the incumbent from A to B. Now consider that a customer at point A wishes to be supplied and the only supply available is from point B. For the incumbent shipper because it has existing flow from A to B, it would be possible to perform a "swap" with itself by nominating to provide gas to point A with the supply at entry point A and provide point B with gas from entry point B. By contrast, (unless the new entrant is able to find a counter-party with which to swap[16]) the new entrant supplying point A would have to rely on transporting gas across the network to point B.

16. From the TSO's perspective, the net flows on the network would be the same irrespective of whether point A was supplied by the incumbent or the new entrant. Either the customer is supplied by the incumbent shipper, who performs the swap with itself, or the by the new entrant, in which case the TSO will net the flows on its network.

[16] In this example, the only counter-party for the new entrant to swap with would be the incumbent. As performing the swap would enable the new entrant to gain market share, there would be limits to the incumbent willingness to perform this swap.

In this example, however, where distance-related charges are applied to nominations, the incumbent would face cost reflective charges whereas the new entrant would not.

17. The lack of cost-reflectivity in this context therefore discriminates in particular against shippers that are less able to perform swaps in order to avoid transportation charges. In this context, the "portfolio effect" implies that new entrants are in particular discriminated against. Therefore, point-to-point tariffs may not help the development of competition among shippers. By contrast, applying an entry-exit tariff, both the incumbent shipper and the new entrant would face the same network tariff in order to enter gas at point B.

Entry-exit tariffs

18. The section above highlighted that even in the simplest of network designs, point-to-point charges based on distance related tariffs can result in charges on network users that do not necessarily reflect the costs incurred by transporters. There is an incentive for the transporter to implicitly net off the flows, and hence save the associated transport costs, both capacity and any volume charges or for network users to swap gas scheduled to flow in opposite directions. Only in the particular case where contractual or notional flows coincide with actual flows would the distance-related tariff outlined reflect the costs incurred by the TSO. The example suggests that network operators receive charges for transports that, physically, do not take place, which might result in an overcompensation of network costs. This "overcompensation" could be passed back to network users but a key problem, in this instance, is that the lack cost reflectivity fails to provide the right signals to network users.

19. The above analysis also suggests that incremental cost approach would provide a better basis with which to charge network users as it signals the consequences of an additional input and off-take in a particular direction. In the section above, we highlighted the simple methodology for calculating the cost consequences of incremental inputs. It is possible to show this in terms of a matrix of charges, for example as follows:

Matrix of charges for example 1

Entry/exit point	A	B
A	0	(Y+X)
B	(Y-X)	0

20. In the above matrix, shippers would pay a lower charge (Y-X) for entry at B and exit at A than in the case where gas entered at A and exited at B (Y+X).

21. In more complex networks with multiple inputs and off-takes, the full matrix of charges would be far larger. For example, in the UK alone, even though there are only 7 input terminals there are 140 off-take points from the high-pressure pipeline. Potentially this could imply a full matrix of charges of 980 (7*140) prices, one for each input/output combination. Even if the number of off-take points were aggregated to 10 'zones', this would still result in 70 input/output combinations.

22. Using 'entry-exit' tariffs means that locations are independent. By separating entry and exit charges, this reduces the number of tariffs that need to be published (we discuss the additional benefits of separating entry and exit charges in section 3). Clearly there is a need to find the appropriate balance between different objectives, e.g. cost-

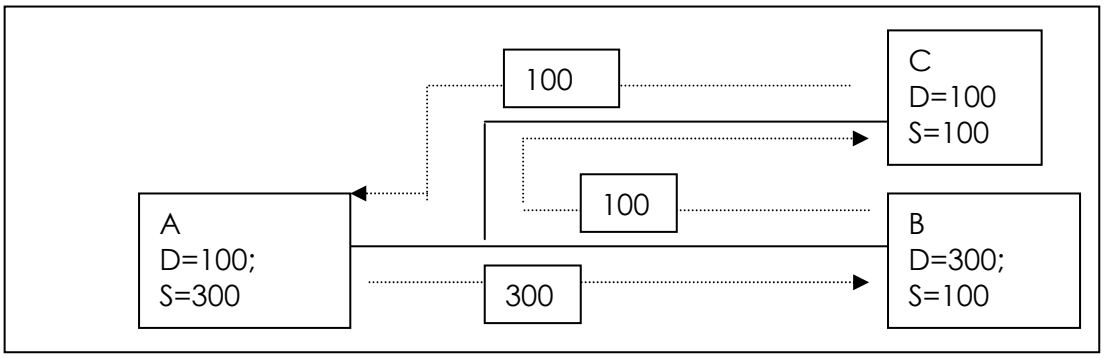
reflectivity and simplicity. A full matrix approach would provide cost reflectively but at the expense of simplicity.

23. The matrix approach also requires additional information to determine, for each trade, where gas was inputted into the system and where if was off-taken (or to determine a notional path) for the purpose of levying a charge. This may not fit with the practical realities as to how gas is transported and network users are required to act. On some transportation networks, shippers are simply required to ensure that the gas they off-take from a particular system is balanced with the amount of gas they input into the system. This does not require the shipper to know the particular entry point used to supply a particular exit point, but rather that the shipper has ensured that sufficient gas is contracted to be input into the system to meet demand from their customer portfolios.

24. By limiting the number of charges that need to be published by TSO's, entry-exit charges would provide help provide greater simplicity, whilst aiming for a more cost-reflective approach based on actual flows on the transportation network.

25. To understand the entry-exit system, example 3 below shows a more complicated network configuration with multiple entry and exit points.

Example 3: "Complex" network configurations



26. In this network can be seen as an extension of example 1, with the addition of entry and exit point C on the network. The arrows in the diagram above show the contract paths. Again, in this example, by netting off the respective flows, only 200 units would actually need to flow from A to B to meet the contracted supplies.

27. To calculate the effect of incremental flows on this network, it could be possible to construct a matrix of 9 entry-exit pairs. However, as stated above entry-exit charges would help reduce the number of tariffs that would need to be published, better meeting with the objective of simplicity. The matrix of charges can be simplified to varying degrees. As a maximum, the entry-exit charges would comprise of 3 entry charges and 3 exit charges. But it is also possible to combine particular entry and exit points, for example in the above network, it could be possible to charge the same amount for entry at point B or C and the same amount for exit at these points.

28. On this network, consider the process for deriving an entry and exit charge at point A. Based on the predominant flow of 200 units from A to B. An incremental unit added at point A would require the transporter either to upgrade the capacity of the pipeline over the entire length of A to B or to partially upgrade the pipeline for A to C. An exit point at A would suggest that gas has flowed against the predominant flow. This would imply reduced costs for the transporter and therefore a negative charge at A. Clearly, the entry-exit charge would include some approximation as the effect of an incremental until flowing to B differs from an incremental unit flowing to C. This is one of the effects of moving from the full-matrix approach to destination independent charges, although the degree of approximation provides some choice. Furthermore, the precise network configuration can influence the degree to which entry-exit tariffs are cost-reflective (we discuss this issue in more detail, in particular in relation to short-distance transport in section 4).