EUI Working Papers

RSCAS 2012/10
ROBERT SCHUMAN CENTRE FOR ADVANCED STUDIES
Florence School of Regulation

BUILDING GAS MARKETS:
US VERSUS EU, MARKET VERSUS MARKET MODEL

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EUI Working Paper **RSCAS** 2012/10

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ISSN 1028-3625

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Printed in Italy, February 2012
European University Institute
Badia Fiesolana
I – 50014 San Domenico di Fiesole (FI)
Italy
www.eui.eu/RSCAS/Publications/
www.eui.eu
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Abstract

The liberalization process of the gas sector has showed that the reasoning to introduce competition in gas industries separates the services in at least two groups: commodities with relatively low transaction costs, and hence suitable to short-term market coordination, and network services which concentrate most of the specificities related to the physical flows. However, the way to coordinate such network services is still under debate. In this view, in USA specific services are coordinated through long term contracts, whereas the EU regulatory frame socializes the costs of the network services. In this paper, we develop a general analysis of the major consequences of this fundamental regulatory choice. In addition, we build on such analysis to explain the differences among the current proposals to design the coming European Internal Market.

Keywords

Gas markets, gas network regulation, entry – exit pricing, EU gas target model

1. Introduction

Gas is a commodity and goes to the market. This should not astonish anyone since coal and oil, the two other fossil fuels, have been delivered by markets for ages. Natural gas is however less easily marketed because it flows inside closed pipes that have a “big” efficient size and are very costly to replicate. The infrastructure of the gas network then plays as a barrier to open trade.

With a small nascent gas demand, the gas network is likely to be a natural monopoly and gas sources only one or very few. With a large, mature gas demand, the gas network should encompass numerous facilities with alternative routes and several rival gas sources should candidate to feed consumption. In the latter case opening demand to alternative suppliers is more easily feasible and makes sense. As shown in Glachant & Hallack (2010), with nearly 600 million inhabitants and decades of gas usage in most of the Member States, the EU gas industry is not on average an infant industry and opening gas trade at the continent scale is not villainy.

However, with different maturity levels of gas networks, gas sources and gas demand the grand opening of gas trade in the EU should not be as simple as opening the front door of our universities. In practice, the alternative institutional arrangements to opening trade in the gas industry are themselves various and numerous. Unsurprisingly the process for opening the gas sector has been significantly different among different regions of the world. Notably the late comer EU is not following the pioneering US.

The liberalization process of the gas sector has showed that the reasoning to introduce competition in gas industries separates the services in at least two groups: commodities with relatively low transaction costs, and hence suitable to short-term market coordination, and network services which concentrate most of the specificities related to the physical flows. However, the way to coordinate such network services is still under debate. In this view, in USA specific services are coordinated through long term contracts, whereas the EU regulatory frame socializes the costs of the network services. In this paper, we develop a general analysis of the major consequences of this fundamental regulatory choice. We begin by describing the logic for the US liberalization process, with the aim of pointing out the main elements of the design in the US gas sector. This will allow us, in turn, to highlight the alternatives for the European approach. Next, we describe the European regulatory approach. We highlight, in doing so, the consequences of European design choices. We continue by analysing the interaction of several national systems, looking at the gas industry from a European-wide perspective. Furthermore, we describe the logic for energy policy in Europe with regard to ensuring secure supply patterns for EU consumers. Building on the previous description, we finally give an overview of the current discussion on the design for the future European Internal Market, by presenting the on-going discussion on the gas target model that should work as a vision of the coming European market.

2. The US gas market opening

The pioneer of gas liberalization decades ago was the US. The liberalization was markedly characterized by the reliance on business forces to drive decisions in the production chain. Broadly speaking, the US gas sector is mainly organized around private companies, who are in charge of deciding on upstream production, transportation, storage and downstream delivery of gas (while distribution to consumers can be regulated or public). In this context, the gas transmission network investments and operations are mainly decided on by non-regulated agents, even if closely monitored in Washington by the federal regulator FERC.

This most liberalized setting has, by definition, the lowest requirements with regard to the design of the market. Hence, in such a setting, US wholesale gas markets are fundamentally based on bilateral contracts among producers and suppliers, without the need for any mandatory organized market to trade. These private contracts, in addition, are long-term (10 or 20 years are usual horizons), which is related to significant aversion of bilateral traders to the risks of not injecting / withdrawing gas according to their initial business plan and capacity investment.

Following the same logic, transmission rights are also purchased long in advance. In this kind of transaction, producers and suppliers enter into contracts that provide the right to use the network to transport gas from one point to another, whose counterparts are the owners of the infrastructure involved in the path between both points. In this regard, shippers decide on the physical path that the gas will follow, and pay for the use of the associated infrastructure. In addition, under this organization, the investment in network infrastructure is largely driven by those long-term contracts, and hence decisions on network planning are directly taken in the interaction between non-regulated network investors on the one hand and consumers and suppliers on the other.

Nonetheless, gas supply and demand patterns are highly volatile, and the balance of flows in the gas system must be coordinated in shorter terms. Hence, in the short-term, shippers will face frequent imbalances, which must be dealt with by considerably complex combinations of gas trade arrangements and the associated transmission rights changes, ERA (2005) or Costello (2006). Consequently, the above wholesale markets are typically associated with the definition of a place where the physical delivery of the commodity takes place: the physical hub. A hub is a place where gas wholesale trading is facilitated by the conjunction of several transmission facilities and services. They are, under this scheme, a junction of pipelines where a significant amount of gas sales and purchases take place, and where sellers and buyers can also get storage and flexibility services. Serving as marketplaces, hubs have often been seen as a prerequisite for gas pricing through gas-to-gas competition, in the sense that they are a key element to facilitate the coordination of gas systems in the short-term.

These particular transactions largely aim at adjusting shippers' portfolios in the short-term. They can be thought of as secondary transactions, as most gas trading is done in the long-term. But these secondary transactions are "central" in the functioning of gas markets, as many delicate technical issues concerning the allocation of physical transmission rights are organized around these short-term transactions.

As in the case of long-term contracting, the US gas sector has not considered centralizing these transactions necessary and has left them to bilateral arrangements. In that situation, the coordination of players in the short-term operation of the gas networks is done by bilateral agreements between gas arbitrageurs and networks operators (who are often owners of the infrastructures). These kinds of arrangements and trade platforms arise as a "natural" need of the market participants, without particular push for a reference market design or for standardised contracts.

Finally, in this 'spontaneous market' context the price coordination between long- and short-term decisions is done through financial contracts, where the underlying asset is usually the gas delivered in the hub. Such trades are often done in organized financial markets (NYMEX being the biggest in the USA). The function of these organized markets is to contribute to the inter-temporal coordination of the gas industry.

3. The EU gas market opening

The liberalization of gas industries in Europe came after the liberalization in the USA, so one might think that the US was somehow the model for the European liberalization. However, when looking at the previous elements of the USA gas industry organization, EU and US markets have few common points. In fact, the design of EU gas markets seem to be closer to the design of EU electricity markets than to the US gas markets. It is very likely that these differences come largely from the fact that the EU prefers to have gas network activities organized as a "nationally centralized" and regulated business (Makholm (2007) develops an institutional analysis of the different evolutions of US and EU regulations) .

The logic for this decision might have been the consideration that EU gas network activities have the structure of a natural monopoly or a too-concentrated oligopoly and thus were recognized as the main barrier to the opening of the commodity market. In such a situation, as in the electricity sector, the activities related to production and supply are considered as open businesses that may benefit from a market arrangement, whereas network activities must remain subject to public regulation, regarding their operation and investment, Joskow & Schmalensee (1983). From a different viewpoint, it might also be possible to support a regulation of network activities arguing that too decentralized decisions in the operation of the network would lead to inefficiencies. The efficient option is then to design a centralized operation by means of a Transmission System Operator, coordinating the gas system interactions as well as possible. In practice, so far, it has been centralized only on the national level, even if some countries such as France and Germany still have several separated areas. This suggests that European Member States' institutional powers (i.e. their veto power in any EU common gas arrangement) heavily influenced the EU choice set.

In any case, new markets created in Europe rely on the regulation of network activities (from capacity booking and allocation to congestion management, from cross-border trade to entry-exit pricing). In practice, these EU markets build on the strong separation –unbundling-- of the business of transmission network from the business of trade in the commodity market. With such a choice, the regulation of the rights of commodity buyers and sellers for using the regulated network becomes a central part of the market design Glachant, Hallack & Vazquez (2012).

In a long- term perspective, the rights for using the network closely interact with the negotiation and implementation of any long-term commodity contract between suppliers and demanders. The contracts that allocate transmission capacity and frame the actual capacity usage become a platform of interactions between market players and a central architecture into this "centralized" gas system. Thus, the market design must contain enough elements to coordinate the contracts of capacity with the commodity contracts. From the short-term perspective, where the arrangements to manage congestion or imbalances take place, the market design must take into account the way in which the regulated network operator allocates transmission rights among market players. It is in the process of designing those mechanisms where most of the differences between US and EU gas markets appear.

3.1 The Logic for Virtual Hub Regulation in the EU

The seller of transmission rights is a regulated player. Thus, a first choice for the market designer arises: should allocation of transmission rights be explicit (capacity only) or implicit (capacity and commodity are traded together). The advocates of implicit allocation build their case on two ideas. The first is that combining two trades (capacity and commodity) done in separation in a very short period of time (day or intraday) causes significant transaction costs for traders ending in an inefficient use of transmission capacity signalled by significant trade in the "wrong" direction. The second is that gas market structure is characterized by significant horizontal concentration and vertical integration. Consequently, the market designer must take potential strategic behaviour into account. A key is the strategic use of network "congestions": incumbents may have the incentive to over-contract network capacity to foreclose short-term markets for small competitors, and hence to induce effective entry barriers. When the commodity market "implicitly" allocates the rights to use the network, the gas can be traded without the need for ex ante contracting of network services. Thus the opportunities to foreclose contracting of network capacity disappear; see for instance Joskow & Tirole (2000) or Gilbert, Neuhoff & Newbery (2004) for the argument applied to power networks. Although other measures to mitigate this kind of strategic behaviour have been considered, the implicit auctioning has been favoured as a solution to deal with strategic behaviour in network capacity contracting.

The comprehensive approach to implement the implicit allocation would have been to consider the physical network in full detail, where all physical injection and withdrawal points may have a potentially different gas price. These detailed pricing points would also correspond to the actual gas network flows. However, following the design in the UK, the EU gas markets did not go so far into the network details and favour organizing gas transactions around a virtual hub. Such a virtual hub is not a physical junction of pipelines, but instead a regulated set of delivery points with a very simplified representation of the actual physical characteristics of the network, Heather (2010). Virtual hubs avoid the consideration of the actual physical network that will be ultimately used by the commodity transactions. To do so, the market designer defines a "commercial" network, that is, a few network characteristics that will be taken into account in wholesale commercial transactions. That market design is close to that of European electricity markets, where the detailed market clearing based on nodal pricing (with the representation of all nodes of the physical network) was substituted by relatively simple commercial networks (in most cases, made up of a single node). The fundamental logic for virtual hubs is to increase the market liquidity associated with the simplification of the network. As the number of delivery points is highly reduced, the network specificities of the commodity are markedly reduced and thus the gas-to-gas competition is enhanced, Glachant (2002), at the expense of a more efficient operation of the network.

3.2 Virtual Hubs in the Short Run

The virtual hub approach implies that the market uses a commercial network, for most of the transactions of the commodity, which is different from the physical network. The European standard approach to the definition of the commercial network is the entry/exit regulation, Hunt (2008). There the market players have the right to inject gas in a gas system at any entry point, and to withdraw gas from any exit point. Therefore, this market design requires a set of additional elements to bridge the gap between the commercial and the physical gas networks, which are usually grouped under the header of "balancing mechanisms". When the design of the market is built on the definition of a commercial network, additional transmission activities arise in the short-term to coordinate the operation of the commercial and the physical networks.

In a system like the US, with network services directly organized by competition, market forces determine the kind of contract that can be found, according to the preferences of players. In the EU regulated environment it is, on the contrary, necessary to define by means of a set of centralized rules how the network can be used by gas commodity players. This necessity is amplified by the potentially conflicting usages that users may back on their "Third Party Access" rights to the same infrastructure. Therefore, the rules governing these usages influence the market outcomes, and their potential efficiency. The effects of such design rules are at the core of the market activity, as they implicitly predefine the network services made available to market participants, Hallack (2011).

In the short-term, on the one hand, market players must make arrangements to manage their gas injection / withdrawal imbalances; on the other hand, the network operator must allocate network rights in a way that will make all commercial commodity transactions physically feasible.

The usual approach in the EU electricity market is definition of a "gate-closure" defining a certain time horizon after which the commodity market has no further decision right on network capacity allocation. Hence, a regulation defines a certain time scope (such as hour-ahead, day-ahead, or week-ahead) where the role of the commodity market to manage its own imbalances ends.

In EU natural gas markets, the right of players to change their physical portfolio is defined by the re-nomination right. As the players can re-nominate within the balancing period, in the current regulatory frame there is not clear period separation between the TSO balancing actions and the shippers' secondary arrangements.

In this context, the obligation of the TSO is to allow real time flow and the obligation of the shippers is to have equal injection and withdrawal at the end of the balancing period. The guarantee of physical flows is, thus, the responsibility of network operators and the cost to keep the flows balanced is taken by the network if at the end of the balancing period the shippers have their portfolio balanced. Nevertheless, if at the end of balancing period the shipper has an open position, she is obliged to pay the cost or even some penalties.

In the entry/exit regime, most of the gas transactions are determined referring to the commercial network. However, the process of actual network service allocation is under the responsibility of the transmission operator. Of course, the rules governing the network usage should allow the efficient use of the transmission network. This, conversely, is not straightforward in an entry/exit scheme, as the network operator is obliged to take a bunch of 'ex-ante' decisions to be able to flow the physical flow in real time. However, as the flow decisions taken by shippers are unknown to the TSOs, it is difficult to guarantee an efficient use of the infrastructures.

In an entry/exit system, the commercial network capacity is a calculation made by the transmission operator. In this calculation, the transmission operator must take into account the fact that market participants own the right to carry gas from the entry points to any exit point. Hence, the operator must reserve not only the network required to carry gas from an entry to a defined exit, but also the network required to carry gas to all other exit points of the system, Lapuerta & Moselle (2002). Therefore, a congestion in the network from an entry point and one exit point might cause congestion in the network to other exit points. This problem is often called "contractual congestion" (the network is not necessarily congested, but the system operator cannot allow more injections in the system given the existing set of rights). The direct consequence of contractual congestions is that the network is not efficiently used.

The design of other rules for possible network services may have consequences on the ability of market players to express their preferences. A typical case is the allocation of "line-pack". The pipeline line-pack is the possibility of storing (de-storing) gas inside the pipes by decreasing (increasing) the pressure differential between successive compressors. As the gas pressure differential is the factor making both the gas move and be stored, it determines the resulting transport capacity and pipe congestion. In fact, the line-pack of a pipeline is a substitute service of its transportation capacity. However, as "entry/exit" markets are referring to commercial networks without any accurate representation of the physical pipelines, these markets cannot reveal any order of preferences regarding the various possible combinations of line-pack and transportation capacity. The fact that the ultimate decision on such combinations is taken unilaterally by the regulated transmission operators may have a significant impact on market outcomes.

Another important consequence of the current EU regime is that the costs of the network cannot be allocated according to the detailed actual use of the network (for instance, precise locational signals cannot be given in the short run). The costs of the decisions taken by the transmission operators in the process of matching commercial and physical networks within the balancing period are socialized among networks users. The use of different prices for certain entry and exit points of the commercial network cannot reproduce the real flows paths, just an approximation of network costs based on flow simulations, Keyaerts, Hallack, Glachant & D'haeseleer (2011).

The actual consequence of simplifying the physical network in a commercial network depends markedly on the nature of the gas transactions in the corresponding wholesale market. Actually, the rules to allocate network services in current EU regulations are somehow conceived for relatively flat patterns of gas flows. The logic for this is that, when flow patterns are relatively flat, or equivalently, the market participants' needs for variable injection and withdrawal patterns (both time and spatial variability), the rules for using the network are easier to define, as the simulation of cost sharing just takes into account the location of the players. However if the need for a different and more flexible use of the network increases, the gap between the commercial and the physical network has a larger impact on market outcomes. Hence, the simulation of cost should take into account the diverse patterns of network use, to better evaluate the trade-off between line-pack storage and the available transport capacity.

This fundamental change in usages of the gas network happened on the demand side with the massive introduction of CCGT (gas-fired power plants), see for instance Honore (2011) or Hallack (2011), as well as with the flexible gas supply brought through LNG (liquefied natural gas), see for instance Ruester (2006). A massive introduction of gas-fired power plants in electricity generation created a new group of gas consumers in the gas market. On the supply side, LNG trade has increased in volume and in flexibility, allowing more arbitrage between players. The LNG flexibility allows the gas supply to change according to gas price arbitrages, playing a key role in this world where demand (including CCGT) has a higher elasticity. Moreover, LNG has also been a new type of gas supply, responding smoothly to gas demand increases, as regasification technology is modular and has lower scale economies, Jarlsby (2004). The delay between investment decisions and infrastructure operation is lower than with most of the other gas sources.

As a consequence of growth of the gas industry centered on LNG and Gas-Fired Power Plants, supply and demand patterns are dramatically changing and both are more volatile than in the past. Thus, the storage component of the gas system has dramatically increased its technical and economic value. Today, among the gas system users, some key players would give a high value to system flexibility while other key players would give it a much lower value. It becomes more difficult to still use simple regulations that do not reflect what the real network use has become.

3.3 Virtual Hubs in the Long Run

From a long-term standpoint, assuming that most of the commodity transactions take place through bilateral contracts, a commercial network reduces transaction costs. As in short-term transactions, the number of contracts associated with the network is reduced, as the commercial network is simpler than the physical network. Reduced transaction costs in turn provide increased liquidity. Implicitly, this approach leaves the matching between commercial and physical networks for the short-term. This implies that fewer transactions can take place in the long-term, as many of the contracts associated with transmission rights will be left to the short-term capacity allocation. Consequently, many of the signals associated with the inter-temporal allocation of network rights are distorted.

Closely related to this is the organization of investment decisions, as they strongly depend on the signals associated with the use of network services. Traditionally, the most important investments in gas systems are the network and field investments. Actually, both businesses are closely related, as the value of a gas field changes significantly according to its access to networks. Correspondingly, the network investments are affected by the actual needs of producers to have their gas delivered to certain consumption points. Since decades, investment in transmission facilities has largely been driven by the needs of gas producers. Lastly, this link between gas production and transmission investment has notably weakened. A key factor is a marked increase in demand uncertainty, the best example of which is the uncertainty associated with the actual consumption of gas-fired power plants (due to both the actual size of CCGTs in the total generation capacity and the actual dispatch of these CCGTs in the energy mix – notably when massive renewables have priority of dispatch). In this new context, the combination of the needs for network services of both sides of the gas industry (the upstream and the downstream) is a challenge.

In a market like the US where the network activities are themselves liberalized, all investments, including those corresponding to network infrastructures, are decided by market forces through long-term contracts. In the EU where the network is regulated under TPA (“Third Party Access”), a kind of network planning is needed. Of course, any central planner is likely less informed than producers and consumers about the possible future gas flows and the various business models which support them. The most direct way for the planner to decide on the required investments is to look at market outcomes to identify the actual system needs. In a market characterized by long-term, bilateral contracts, this task is not always straightforward. Moreover, in a commodity market referring to a virtual commercial network, as with entry/exit schemes, the investment signals delivered by the market are necessarily limited. In this case, an important signal for the planner is the outcome of the commodity balancing market (including congestion management). It is where the commercial network is confronted with the requirements of the physical network. Therefore, the design of the balancing mechanism is not only important from a short-term standpoint, but also to providing the planner with information required for investing in gas networks.

4. Security of Supply

Security of Supply is the most controversial aspect from the viewpoint of gas market design because it fundamentally encompasses different issues, including economic and non-economic ones Noël (2010), which cannot all be easily or clearly defined in engineering or economics Vinois (2012), the architecture of European security of supply is described in detail). In our view, there are two different levels of regulatory intervention under the heading of security of supply. On the one hand, in many gas systems some key players or public decision-makers advocate for having some particular geopolitical profile to build some bargaining positions in external relationships. This has little to do with European market design, except for the fact that all measures targeted at choosing some suppliers above the rest may significantly impact the market. Therefore, the decisions regarding political or political economy aspects of security of supply are exogenous to the market design, and thus are constraints put on the possible market solutions.

On the other hand, from an economic perspective, when one has a well-functioning market, security of supply is in fact a part of the market risk bearing. If the European Union has an efficient internal gas market, it means the gas may flow among the EU players according to their preferences. As a result the risk of any individual player having a physical supply disruption decreases. That is, the security of supply discussion regarding the main effect of an external disruption is about a price risk. However, the determination of the market willingness to bear risk may not be an efficient process, Grossman & Stiglitz (1980). This is closely related to information problems. Markets may fail to coordinate inter-temporal decisions given the difficulty of market players to deal with a highly complex and uncertain future. In turn this motivates that they do not have (or do not reveal) clear preferences about highly uncertain events, and therefore markets are often incomplete (as they do not cope with all possible contingencies).

In the gas industry security of supply case, one would assume that consumers are poorly informed about the characteristics of the supply patterns in wholesale gas markets, and thus cannot provide the market with their risk-aversion profiles. This would result in an inefficient market risk bearing. The solution could be to complete these markets, using the fact that the regulator can be better informed about possible contingencies of gas supplies. The role of regulated security of supply measures is to complete the wholesale gas markets with an estimation by the regulator of the risk preferences of gas consumers.

In summary, one may say that markets are not the more adapted mechanism to deal with ‘un-contractual’ scenarios (i.e., very cold or very hot war scenarios, or any other international crisis concern) where there is no enforcement mechanism or self-enforcement corresponding to the obligations to be fulfilled in such rare occurrences. However a well-functioning European market will always decrease the existing informational risk. It should also decrease many minor disruption risks transforming them into a mundane price risk.

5. Integration of Several Entry/Exit Systems

The logic for a single European market based on entry/exit regulation is the rationale working behind the gas market design in the EU. The integration of numerous "entry/ exit markets" has no analogue in international experiences (ACER Guideline, ACER (2011b) and ACER (2011a)). In practice, however, in the task of integrating these numerous markets, the design decisions to be taken follow a sequence analogue to the one of a single entry/exit market.

One of the very first decisions to be taken is whether an explicit allocation of the interconnection capacity should be used or an implicit allocation. The same arguments already seen may be applied: the transaction costs of combining capacity and commodity traded separately, and the possible strategic use of interconnection contracts. In this context, the design for integrating the European markets could be radically extreme: a single entry/exit market in the whole EU and the definition of a single EU commercial network as distinct from the various existing physical networks. This single entry/exit system would contain all existing national markets which are interconnected. With this approach, however, the difficulties and the costs of the decisions required to bridge the gap between commercial and physical networks would be extreme.

An alternative approach would be to design the commercial network with more keys: as a representation of several critical physical characteristics of actual interconnections, leaving the existing national markets more or less unchanged. In this approach, one can rely on the explicit allocation of the interconnection capacity to go across markets. This would require, in addition, some effective measures aimed at preventing the possible strategic behaviour (for instance, it is not clear if the "use-it-or-lose-it" conditions could effectively prevent this strategic behaviour).

It is also possible to implement the implicit allocation with much less simplification in the definition of the commercial network. One could implicitly allocate the interconnection capacity without simplifying the physical characteristics of existing interconnections. Such a "detailed" implicit allocation would come from the gas pricing of the connected markets by means of an algorithm of zonal pricing (such as "market splitting", or "market coupling"). Moreover, when this solution is adopted, it is possible to reach a halfway point between implicit and explicit allocation. The "strategic behaviour" problems of explicit network allocation had to do with the strategy of contracting large amounts of capacity which foreclose the short-term capacity market in the long-term. But as soon as the short-term capacity is implicitly allocated by the commodity market, this strategy is no longer possible. However, the long-term allocation of interconnections can alternatively be done through explicit auctions.

One faces two opposite forces when confronting a tight single entry/exit market for Europe with a loose and light wholesale market made up of interconnections between national entry/exit markets. On the one hand, with the tight single entry/exit the resulting gap between commercial and physical networks may be too large in terms of both efficient use of the network and cost allocation to beneficiaries. On the other hand, is the opposite: the coexistence of several entry/exit zones which creates other cost allocation problems related to cross-border transactions. It is because, besides the cost of the interconnection, cross-border transactions need to pay the entry and exit price of each corresponding zones. Therefore, some trades that would be economically efficient between the two ends of the interconnection, from the one with lower gas prices to the one with higher prices, will not occur if this price difference cannot compensate for the extra cost associated with the entry and exit prices (which represented the network price of each entry/exit zone). Ultimately, when the interconnection capacity is contracted in advance, this may result in reversed flows (from the high- to the low-price zones).

From the investment viewpoint, a single EU entry/exit market would share the characteristics described for the case of a national entry/exit market, except that the hypothetical European planner would face a much larger amount of missing market signals. Oppositely, the loose integration scenario between national markets would require additional mechanisms to decide on and build the required interconnections. Interconnections are obviously the core gates of the European Internal Market but who will develop them, why and how? This could typically involve some kind of public consultation, in either an auction or an open season process. Would it be enough to build a competitive and open bridge between the key EU markets? Would it compromise too much with the existing interests of the existing incumbents?

6. Toward a European Gas Target Model

National gas markets in Europe are already built as virtual hubs based on entry/exit schemes, and this has been made legally binding by the 3rd EU Energy Package followed by the European regulatory agency ACER, ACER (2011b), ACER (2011a). Thus we should take this as a given for European gas market integration, and would only examine the subsequent characteristics and requirements of such a European design strategy. In order to harmonize the various gas framework guidelines (defined by ACER) and pieces of network codes (initiated by the European body for gas transporters ENTSO-G), the European regulators have launched a consultation process to define a “gas target model”: a non-binding vision on the future layout of a complete EU gas market architecture at horizon 2015-2020. We will now use in the following the analytical framework that we developed in this paper to describe the proposals for an EU gas target model.

A first gas target model was produced by LECG, Moselle & White (2011). In addition, the Florence School of Regulation proposed two differentiated frames for the EU gas target model, Glachant (2011) and Ascari (2011). After that, another two models were proposed by Frontier Economics (2011) and CIEP (2011). These five target models have been built with different objectives, and moreover, they represent quite different architectures for the EU Gas Target Model.

Virtual hubs and market integration in the Target Models

Moselle & White (2011) summarizes the regulatory options to define the rules for network use. The general principle they proposed is that any new interconnection rules should interfere as little as possible with already existing national markets. These markets should be linked through rules that avoid contractual congestion at the national borders.

Glachant (2011) proposes a more demanding option aiming at merging small neighbouring markets to obtain competitively viable and more tightly unified entry/exit zones. Another option keeps markets as independent entry/exit zones connected by means of an implicit auction algorithm, along the lines of market coupling. To implement the network allocation in cross-border transactions, both options propose relying on hybrid mechanisms. In particular, both propose using implicit allocation in the short-term, and leaving the long-term allocation to explicit auctions.

Ascari (2011) offers a third possibility. It is a “free” market option that does not prescribe any size or shape for the making of entry-exit virtual hubs. Market forces are left free to ultimately decide the most convenient number, location and size of European hubs.

When it comes to defining the unified entry/exit zones or to using some algorithm for zonal pricing, Glachant (2011) leaves the choice to a public designer authority. Nonetheless, Glachant (2011) gives criteria such as the gas volume traded (at least 20 Bcm) and the number of alternative gas sources (at least three). Ascari (2011), on his side, claims that a tight coordination of short-term transactions is not especially important in the design of the target model, as a more spontaneous coordination should emerge from market interactions.

Long-term contracting in the Target Models

The long term contracts as mechanisms to coordinate players have been underlined by all five gas target models as well as the use of market tools for information collection (different kind of "Open Season" procedures) before the network investment decision. However, the importance of long-term contracts regarding the network investment decisions and capacity allocation is divergent.

Ascari (2011), Frontier Economics (2011) and CIEP (2011) underline the long-term contracts as the key or single tool to invest in new network capacity and to guarantee the required infrastructure investment. In particular, Ascari (2011) highlights the benefits of a purely merchant investment scheme. Glachant (2011) does not disregard the importance of long-term contracts and open season mechanisms to reveal information, but gives a heavier weight to energy regulator in the definition of the infrastructure required. Glachant (2011) relies on a planning scheme, where TSO calls for auctions to organize new investments and regulators can intervene to review.

Security of supply in the Target models

Security of supply has been a key word for all gas target models; and they all identify the role played by long-term contracts in this regard. They differ, however, regarding the exclusivity given to merchant long term contracts to guarantee gas supply. CIEP (2011) and Frontier Economics (2011) assume that only a set of free merchant long term contracts can secure the gas supply. On the opposite security of supply is seen by Glachant (2011) as implying that a public authority (the energy regulators, the European Commission) has a say in infrastructure adaptation to secure gas supply. Ascari (2011) does not give any particular recommendation there. Building his proposal on a wider reliance on market forces, he assumes that the security of the European gas markets will be ultimately determined by the preferences of the market players.

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