Energy Studies Review Vol. 12, No. 2 2004 pp125-142

ACCESS PRICING ON GAS NETWORKS AND CAPACITY RELEASE MARKETS: LESSONS FROM NORTH AMERICAN AND EUROPEAN EXPERIENCES

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ABSTRACT

The gas deregulation process implies crucial choices concerning access to transportation networks. These choices deal with the nature, the structure and the level of access fees. This paper proposes an evaluation of different systems implemented both in Europe and North America, in relation to normative pricing references. The entry-exit system appears today as the best solution to increase competition. The rules for secondary markets represent another kind of choice that Regulators have to make. The Canadian and US experiences show that whether the price on these markets should be capped or not depends on the market power of shippers.

The authors address their thanks to Pr. Philip Wright (University of Sheffield) for useful comments

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INTRODUCTION

The opening to competition of the gas industry has been an obligation in the European Union since the adoption in 1998 of the 'Gas Directive' under which 'eligible' customers would be able to choose their supplier: 20 % of the gas consumed yearly in 2000, 28 % in 2003 and 100 % in July 2007. These are however minimum thresholds of opening (until 2007) because each country may opt for a higher level. This opening is accompanied by an "unbundling" of the different segments of activity in the gas chain: production, transmission, distribution and even supply. When, for technical and economic reasons, this opening clashes with the existence of natural monopoly and this is notably the case with the transmission because it is characterized by increasing returns, the search for collective efficiency leads to the establishment of a third party access (TPA) to the network. The network is then considered as an "essential" facility and the ex-monopoly (incumbent), which generally remains the operator of this facility, has to provide access to those who wish to use it with a regulated or negotiated toll determined according to transparent and non-discriminatory rules. The operator of the transport system can remain the main supplier but it is then important to clearly distinguish this activity from the operation of his network to prevent the operator from cross subsidizing transportation to supply through transport which would distort the competition between suppliers. A recent European decision requires regulated tolls because negotiated ones lead to foreclosure strategies.

Two sets of questions arise when we wish to set up such a TPA system:

- How to fix tolls? What does the theory say and what are the current practices in Europe and in the United States?
- How should a capacity release market function? What are rules to be respected if we want to avoid exercise of market power?

Increasing competition may require implementing nodal pricing, or at the very least an entry-exit pricing system which is an approximation of nodal pricing. This is a condition for development of natural gas spot markets. The important point is to disconnect entry fee and exit fee, to encourage operators to dissociate supply and demand operations on the network. An operator will pay to have access to the network, either to sell its gas to a given consumer or to sell it on the spot market. At the same time, it is necessary to implement a transportation capacity market that will introduce more flexibility in the spot markets. Nodal pricing for third party access and capacity release market constitute two complementary measures capable of developing spot markets at strategic hubs.

1. THE FIXING OF ACCESS TOLLS: PRIORITY TO NODAL PRICING

Economic theory gives normative answers to this question but, in practice, the different systems adopted in Europe or in the United States do not always respect the rules of productive efficiency and allocative efficiency suggested by Armstrong and Doyle (1995). The principle of productive efficiency implies that every firm runs its activities minimizing its costs and requires that the activities to be distributed between firms so as to minimize the sum of the costs of the industry. The principle of allocative efficiency implies that scarce resources are assigned between the economic agents (producers and consumers) so as to maximize welfare. Practically, we have to dissociate the lessons of economic theory and the empirical systems implemented in most of the countries.

1.1 A first best pricing system: nodal pricing

A gas transportation system can be schematized in the shape of a graph where summits are constituted by 'nodes' that are places where linked pipelines join together and where flows of gas can be injected or withdrawn. The arcs represent the pipelines of the network. A convex non-directed network with n summits is said to be 'treelike' if it contains n-1 arcs. There is then one and only one path to go from some node i to another node j. In the case of a treelike network with a single source of gas injection, the marginal cost increases with distance. Where the number of arcs m is superior to n-1, the network is said to be "meshed". There are then at least two nodes which can communicate by several different paths
On a treelike transport system, it is justified to opt for a TPA pricing system proportional to distance. On a strongly meshed network, however, this is not the case and the nodal pricing system best expresses the reality of the physical flows of natural gas. For example, in the Gaz de France network an increment in consumption in the South of France, itself close to an importing point, compensated with a supplementary injection at a node located in the North of France will not induce an increase in transportation volumes between the North and the South. Rather, there will be an increase in transportation volumes between the North and the center of France, and a reduction in the flow transported between the South and the center (Bergougnoux, 2001). This is because swaps will take place at the level of the physical flows.

1.2 The entry-exit pricing system as an approximation of the nodal pricing

A nodal pricing system presents some drawbacks, it is a complex system with a lot of nodal prices. All prices are known ex-post (not ex-ante) because it is necessary to have information about demand and supply at each node of the system before calculating the first order optimum. The network operator may anticipate some flows and provoke some congestion. The regulatory commission must be sure that no market power is observed on the network. In case of physical congestion on the network, how should available capacity be allocated? According to the "first come, first served" rule? By aiming to satisfy all shippers but reducing their capacity pro-rata? By using auctions? With a nodal system, auctions seem to be a consensus solution.

Practically, the entry-exit system is often implemented as a first step towards a nodal system as the former is easier to implement. In this case, we may differentiate entry prices according to the main entry points of natural gas on the network. Exit prices are also differentiated according to local capacity constraints. The important point is the fact that entry and exit prices differ, allowing each shipper to disconnect entry and selling operations. The seller may pay an entry fee either to supply a consumer or to sell its gas on the spot market (through storage for instance). With a traditional distance-related pricing system, the shipper pays at the same time for both entrance and delivery. The gas transported on the network is sold and bought simultaneously. With an entry-exit pricing system, the two operations are disconnected, at least during a lapse of time. For this reason, spot markets are able to appear on the main hubs.

1.3 Some experiences of TPA pricing systems in natural gas

Three questions must be simultaneously resolved when a TPA pricing system is set up, whether the incumbent operator of the transportation system remains present or not in the market downstream: the nature of rates (that is the role of distance in the cost supported by the shippers), the level of rates (that is the link which must exist between the access toll and the costs supported by the network) and the structure of rates (that is the portion between fixed costs and variable costs). Different solutions have been adopted in the United States and in European countries.

1.3.1. The nature of transportation rates

There are today three main practical methods for pricing natural gas transportation by pipeline:

- A 'postage stamp' pricing system consists of fixing a constant toll independent of distance, generally at the entry of the network. This system, close to the one that was set up and generalized in Europe for electricity, is now being used in Denmark, Spain, Finland and Sweden. This system does not reflect the incidence of fixed costs and penalizes consumers located close to entry points; as well as failing to invite a multiplication of entry points and is efficient only for networks of modest length.
- A 'distance related' or 'point to point' pricing system is currently used in Germany, and in Belgium. One has to note that the US transportation charges for natural gas on interregional pipelines are mostly mileage based (Juris, 1998). The access toll is proportional to the distance that separates the point of delivery and the point of injection of the gas. Some countries introduced an upper limit (ceiling in 200 or 500 km) on the tariff distance to avoid penalizing consumers located far from injection points too much. This system, which takes into account the physical reality of the network, is justified if the network is treelike. On the other hand, it becomes questionable if the network is meshed because, as we saw above, the physical reality of gas flows does not necessarily coincide with geographic distance. This is the reason why a discount can be granted when the new flow allows swap to be made across the transportation network. This system can certainly provide incentives to the operators for developing new entry points, which is a good thing, but it is also likely to penalize consumers located far from the injection points. Moreover, the competition may disappear beyond a certain distance if the access toll paid by the entrants is proportional to the distance while the incumbent has the possibility of doing swaps.
- An 'entry-exit' or 'input-output' pricing system (location-related system) is presently used in the United Kingdom, in the Netherlands, Italy and France. A toll is applied at the point of injection and another one at the withdrawal point, according to different criteria. The distance is then a parameter among the others and such a system is closer to a nodal pricing system because of differentiated access tolls according to the different nodes of a meshed network.

In 2002 the French regulatory commission has recently decided to opt progressively for an entry-exit system starting in 2003 (instead of a distance related system). This is the reason why since January 2003, Gaz de France has implemented an entry-exit system in order to favour spot transactions and hubs system.

Third Party Access for Natural Gas in France

1) Formula adopted by Gaz de France (network operator) (2000)

$$T = p_1C(1+k) + p_2Qk$$

with - T : annual toll (€/year)

- C : Maximal daily capacity reserved (MWh/day)
- Q : Annual quantity of natural gas transported in the network (MWh/year)
- p_1 : Annual toll paid to reserve 1 MWh per day (€)
- p_2 : Toll paid to transport 1 MWh (€)
- k : Coefficient expressing the distance between the entry point and the delivery point (it varies from 1 to 49)

2) Formula implemented by Gaz de France since January 2003

Entry-Exit

A entry-exit system is proposed for eight zones (5 zones for the Gaz de France Network, 2 for the CFM network and one for the GSO network).

$$T = p_1C_e + p_2C_s + p_3L + p_4Q$$

- C_e : Maximal daily entry capacity reserved, (MWh/day)
- C_s : Maximal daily exit capacity reserved, (MWh/day);
- L : Maximal daily interzone capacity reserved (MWh/day);
- Q : Annual quantity of natural gas transported in the network (MWh/year)
- p_1 : Annual toll for the maximal daily entry capacity reserved, depends on the location of the entry point (€/year);
- p_2 : Annual toll for the maximal daily exit capacity reserved, depends on the location of the exit point, (€/year);
- p_3 : Annual toll for the maximal interzone capacity reserved, depends on the sense of the flow: if the contractual flow goes opposite from the physical flow, p_3 is lower (€/year);
- p_4 : Toll paid to transport 1 MWh (€);

The capacity between zones (interzone capacity L) is limited by force physical appearance (physics).

1.3.2. The level of transportation rates

There are two main approaches:

- Pricing may be based on cost of service or rate of return (a "cost-plus" system). The regulator makes an evaluation of the operating costs of the network over a reference period, and estimates the value of the capital stock that included in the network. The level of revenues is then determined in order to allow the network operator to cover its costs while benefiting from a "fair and reasonable" rate of profitability on capital invested. The regulator has to correctly estimate costs and the value of capital and this is difficult because of the asymmetry of information between operator and regulator. The main criticism of this pricing system based on the cost of service is the lack of incentives to minimize costs. The operator of the network is sure to receive its costs and it can be encouraged to invest too much in order to increase the asset value applied to the rate of return set by the regulator (Averch-Johnson effect).
- A 'price-cap' system, where the regulator fixes price ceiling that the network operator must not exceed during the regulatory period (4 or 5 years), may be implemented. The evolution of the ceiling price is not connected in an explicit way to the evolution of costs, but depends on the rate of inflation and the estimates of the impact of productivity gains. Naturally, the regulator has to know information about costs to prevent the ceiling price from being fixed too high (there would be then an excess profit for the operator) or too low (the long-term viability of transportation would be under threat). The network operator can adjust his tariffs for different segments of the market as long as the latter do not exceed, on average, the ceiling-price, and he is strongly incited to reduce costs because any difference between the price cap and costs turns into a profit for the operator.

1.3.3. The structure of transportation rates

We generally consider that the burden sharing on a gas transportation system between fixed costs (capital depreciation) and variable costs (proportional to the volume transported in the pipeline) is about 80 to 90 % for the first ones and about 10 to 20 % for variable costs. That is why a binomial tariff is mostly operated with a fixed premium that depends on the capacity reserved in the pipe and a variable toll, which is a function of the volume transported.

In the UK (for the Transco system), 65 % is allocated to capacity and 35 % to volume. Moreover, the capacity component is itself shared between an entry term paid on a monthly basis (the basis is the maximum daily volume on month by month basis with an auction mechanism for the injection capacities) and an annualized exit term (the basis is the maximum daily off-take volume). This exit term varies according to different zones. The commodity term is applicable to the volumes taken off the system and is independent of the distance. This entry-exit system does not take into account explicitly the distance even if the differentiation of the exit terms can indirectly reintroduce such a parameter. Tolls vary from one exit point to another. There is a balancing market for gas supply and demand located at the NBP (National Balancing Point), which is a notional point where offers and bids that have only paid the entry term converge.

In the United States the system has evolved considerably. Since 1992, the Order 636 issued by the Federal Energy Regulatory Commission (FERC) requires gas pipeline operators to calculate their tariffs according to the SFV method (Straight Fixed Variable) that stipulates that 100 % of the fixed costs must be recovered through the capacity term. Customers that may be interrupted do not reserve daily capacity and therefore do not pay the capacity term. All variable costs are recovered by means of a usage fee applied to the actual volume of transported gas. This SFV method replaced the MFV (Modified Fixed Variable) method, which was effective until 1992 and which implied recovering 87% of the fixed costs through a capacity charge and 13% through a volume charge. This last method had already limited the distortions of the United Method applied between 1973 and 1989 and which led to the recovery of 25% of the fixed costs through a reservation charge and 75% through a volume charge (variable costs were 100% recovered from the volume charge). The recovering of an important part of the fixed costs through the volume component of charges penalizes industrial consumers who have a high average load factor and favours local distribution companies (and thus the domestic customers) which reserve substantial capacity but use it in a very variable load factor. The SFV method, which consists of recovering 100% of the fixed costs through the reserved capacity charge, led to an increase of transportation tolls for customers with low average load factor. Shippers who have a very seasonal demand are obliged to reserve capacity equivalent to their maximum output while they will use this capacity only for short periods. On the contrary, the customers or shippers with high load factors (big manufacturers mostly) saw their transportation costs decrease appreciably.

We have to note that customers can be constrained to balance their input-output volumes each day or each month and penalties are foreseen in the case of non-compliance with contractual clauses. Nevertheless, operators can avoid these penalties in selling or buying capacity on secondary markets. As we will show it in the second part of this paper, the participation of the capacity holders in such a secondary market and the result of this participation depend on the rules that govern this market.

The following table sums up the different options for regulated transportation tariffs.

Table 1: Options for the regulation of transportation tariffs

	Advantages	Drawbacks	Implementation
Nature			
Postage Stamp	Simplicity Relevant for short length network	Disconnected from actual cost of transportation	Denmark, Spain, Finland, Sweden
Distance Related	Relevant for treelike networks	Penalize consumers located far from entry points	Germany, Belgium, the United States and Canada
Entry-Exit	Proxy of nodal pricing Promote spot markets	Relative complexity	United Kingdom, Netherlands, Italy and France
Level			
Cost-Plus	No extra-profits for the network operator	No incentives for reducing costs Over investment incentives	United States, Canada, Europe (except UK)
Price Cap	Incentives for cost minimization	Extra-profits for the network operator if the cap is not correctly assessed	United Kingdom
Structure			
Fixed capital costs on capacity charge	Consistency with costs	Higher rates for low load factor shippers	United States
Part of capital costs on commodity charge	Equity concerns for low load factor shippers	Inconsistency with costs	United Kingdom

2. THE ROLE OF SECONDARY MARKETS

2.1 Organization and regulation of natural gas transportation in North America

2.1.1. In the United States

In the United States, there are about 110 interstate pipeline companies which operate about 278,000 miles of transmission lines. They connect to production fields or after-treatment points and deliver gas to either may be a storage facility to which the owner of the gas has right, a "citygate" of an LCD, an end-user customer or another point on the pipeline system. The transportation contracts may be firm or interruptible, short or longer term. The Federal Energy Regulatory Commission (FERC) regulates tariffs on a cost-of-service basis.

The main legislative and executive measures that concern transportation pipelines were FERC Orders No. 380, 436 and 500. These texts introduced third party access on a voluntary basis and dealt with Take-Or-Play problems. FERC Order 636, implemented in 1992, is the main text of the deregulation process of the US gas industry and constitutes the beginning of the second stage of the process. The two main measures of this Order are the following.

- "Unbundling of pipeline companies": companies were required to separate natural gas sales operations from transportation operations.
- Capacity release (or secondary) market.

2.1.2. In Canada

In Canada the gas pipeline network is less complicated in terms of physical interconnection than is the case in the US system. The total length is about 62,000 miles but one system, the Transcanada Pipeline , is longer than any US pipeline, Crossing nearly the whole country from west to east. There are 50 inter-provincial pipeline companies that transport gas and oil. Canadian natural gas pipelines serve fewer customers than US ones but the contracts have longer terms and cover larger loads. Inter-provincial and international pipeline tolls are regulated by the National Energy Board (NEB).

The Canadian gas deregulation process has started in 1985 with the agreement about decontrolling wellhead prices of gas between the Federal Government (National Energy Board) and the three important producing provinces (Alberta, Saskatchewan and British Columbia). This agreement dealt with two concerns.

- It was decided that wellhead prices would henceforth be determined by supply and demand.
- Merchant pipeline had to separate their transmission service from their merchant services.

In 1989, the National Energy Board (NEB) grants to holders of capacity on the TransCanada Pipeline system the right to sell to third parties their rights of guaranteed transportation. This decision, which allows the holders of capacity on the network TCPL to resell their excesses, has created the capacity release market in Canada.

2.2 The Capacity Release Markets

As mentioned above, in the United States and in Canada, there are two transportation capacity markets: the primary one where shippers get from pipelines the capacity they need and the secondary one where they can sell or buy capacity from other shippers. The secondary market gives them a certain degree of flexibility in the management of their transportation capacity. Shippers can resell their excess capacity on a firm or interruptible basis with relatively short notice about the volumes to be placed in the release market. Capacity offered on the secondary market has durations that extend from a day to the total duration of the initial contract. While the main holders of primary capacity are the LDC, the marketers are the main players on the secondary market (Juris, 1998).

2.2.1. The US secondary market

There are two kinds of deals on the secondary market: pre-arranged deal and open bid. Two conditions have to be met for a pre-arranged deal: the price should be equal to the maximum firm rate of the pipeline and the contract duration does not exceed one calendar month. When the deal is concluded, the details of the pre-arranged deal are then posted on the pipeline's electronic bulletin board. They include the rate charged, the type of charge, the amount of capacity and the duration of the release. Customers with prearranged deals have the right of first refusal. At a lower price, a releasing shipper can also post its capacity on the Electronic Bulletin Board (EBB) and thus make an open bid. Shippers bid for this capacity in an auction on the EBB and the highest bidder gets the contract. Details shown on the EBB include the name of the replacement shipper, the one of the releasing shipper, starting date and ending date, the receipt points and the delivery points. Furthermore, releasing shippers can place an option on the repurchase of the capacity which they resell thereby avoiding the risk of lacking transportation capacity.

The secondary market also presents advantages for replacement shippers. They can intervene for a very short term. This market allows them to acquire transportation capacity in order to face increases of demand in interesting financial conditions. Shippers can acquire some transportation capacity when it is necessary, without being bound by contract for the flat periods. When the whole capacity of a gas network is reserved, a shipper can nevertheless obtain some on the secondary market.

This kind of market also presents drawbacks. Firstly, the complexity of the electronic board bulletin (EBB) system on which the capacities are posted could limit their use. In order to get capacity on a long distance, a shipper has to be aware of several EBBs. This problem has been addressed by the Gas Industry Standards Board (GISB). All participants in gas markets (Local Distribution Companies, Pipelines, End Users, Producers and Marketers) have worked together in order to implement a standardization of EBB within this group that was sponsored by FERC. Secondly, the coordination of contracts to achieve a specific path for gas can turn out to be difficult, because the shipper has to buy capacity on several network segments. Finally, the last drawback of the secondary market is the lack of available capacity during peak-load periods. In spite of these inconveniences, secondary markets in United States and Canada keep on growing.

The removal of the price cap is still an unsolved question in the United States. Until February 2000, the upper limit for prices on the secondary market was the maximum regulated rate. FERC Order 637, issued on February 2000, aims to adjust the regulatory framework settled by the Order 636 to develop more competitive gas markets. Among the main dispositions of this Order was the removal of price ceilings for short-term released capacity for a two-year period. This period ended in September 30, 2002 but no follow-up decision was made. As of yet, FERC has neither prolonged nor extended the removal to long-term released capacity.

2.2.2. The Canadian secondary market

Several common points and differences between the US and the Canadian capacity release markets have to be mentioned. Both Canadian and US transportation tariffs are regulated by a federal regulator on a cost-of-service basis. US pipelines are allowed to discount their transportation rates but the Canadian ones are not. While FERC plays an important role in the capacity release market, in Canada the NEB does not. In the US, all the release procedures are subject to the regulator's approval. In Canada, the conditions related to capacity release are not part of the tariff that is subject to regulatory approval. The US federal regulator requires that available capacity for release and final deals (open bid or pre-arranged deal) are published on pipeline EBBs. The Canadian regulator does not require that pipelines post on their EBB either available capacity for release or final transactions. The FERC also requires third party replacement shippers to enter into a new contract with the pipeline. The conditions of this contract are the ones included in the pipeline tariff. In Canada, neither the NEB nor the pipelines interfere in the relations between primary and secondary shippers but the latter have to inform the pipeline involved in their transactions.

There are two kinds of capacity release systems in Canada. The first one, named "temporary assignment" is negotiated between the primary capacity holder and a third party. Within this framework all conditions are negotiated: price, terms and quantity. Unlike the US capacity release system or the second Canadian system, the replacing shipper does not enter into a contract with the pipeline. The negotiated rate can be above or below the rate paid by the primary shipper. The replacement shipper pays this rate to the primary one. The second Canadian system for capacity release is called "permanent assignment". In this case, the replacement shipper enters into a new contract with the pipeline for the remaining terms of the initial contract between the first shipper and the pipeline. The rate is the one stated in the tariff applied to the first shipper but side deals are allowed. These deals can be fees paid by the primary shipper to the replacement shipper in order to give him incentives to enter into the contract with the pipeline. The main advantage of temporary assignment is flexibility. Its main drawback is the lack of renewal rights for the replacement shipper. Within permanent assignment, secondary shippers have the right to renew their contract with the pipeline for one year.

The next table highlights the differences and the similarities between US and Canadian secondary markets:

Table 2: Comparison of US and Canadian Secondary Markets

	US secondary Market	**Canadian Secondary Markets**
Organization	Pre-arranged deals Open bids	Temporary assignment Permanent assignment
Role of regulator	Important	Light
Relations between secondary holder of capacity and the pipeline	New contract between the replacement shipper and the pipeline	With **temporary assignment**: no relation between the replacement shipper and the pipeline With **permanent assignment**: new contract between the replacement shipper and the pipeline
Relations between primary and secondary shippers	Offers and bid posted on EBB	OTC relations
Regulation of the price	The secondary market price is capped by the maximum firm rate of the pipeline	With **temporary assignment**: price paid by the replacement shipper to the primary one is not controlled With **permanent assignment**: the rate paid by the secondary shipper is the initial one by side deals between the primary and the secondary shipper are allowed

2.3 The regulation of the capacity release market

2.3.1. The need for a price cap: market power of releasing shippers

Primary capacity markets may allow a shipper to prevent the entry of a competitor. Thus, if this shipper acquires almost the entire capacity of a pipeline, he can limit the access to end-users of his competitors. This problem has been solved in North America with the enforcement of a "use-it-or-lose-it" rule. This rule allows the network operator to recall some capacity from a shipper if it happens that this capacity goes unused. In this case, the recalled capacity is available for other shippers.

Capacity release market may be a mean for shippers to bypass the « use-it-or-lose-it » rule. If a shipper makes a strategic reservation on a pipeline, that is to say the capacity he reserved is above his actual needs in terms of gas transportation, he can raise his rivals' costs by selling his excess capacity on a secondary market. This kind of strategy is feasible only if the price of transportation capacity is not capped. The implementation of a price cap on secondary market could then be motivated by the willingness to reduce the market power that a shipper could be given by its capacity reservation. By capping the price of the secondary market at the price of the primary market, the US regulator removes the risk of strategic behaviour. However, doing so, he restricts the liquidity of the secondary market. Indeed, making profits on the secondary markets is an incentive for sellers to participate. Further, buyers may be willing to pay, during peak periods, a price above the regulated price of the primary capacity market. In Canada, the federal regulator chooses not to cap the price on the secondary market.

2.3.2. The Consequences of a price cap on a capacity release market

So that the shippers holding excess capacity are given incentives to place it on the market, it seems necessary that, over a limited period, they can sell this capacity at a price higher than the reservation price. In the US, pipeline rates are seldom seasonal. Indeed, most US pipelines apply annual average rates. To apply seasonal rates (winter/summer), a pipeline has to prove to the FERC that it occurs "material variation" in the cost of providing its transportation service. As most of the costs are fixed ones, this "material variation" might be hard to prove. However, during the "peak" winter months, the value of the transportation service may be greater than the annual cost rate expressed on a monthly basis, during the "off-peak" summer months, this value may be lower than this annual cost rate. During the peak period, the price that a shipper could be willing to pay to obtain capacity equals the opportunity cost to not deliver his gas to final consumers. This cost is certainly above the regulated price based on costs. The secondary market could be a way to reveal the market value only if the price is not capped by the regulated rate. So, a ceiling on the capacity release market price such as it has been applied in the United States can limit the exchanges of capacity on this market because it distorts the signals given to market participants.

Finally, the need for a price cap on capacity release markets will depend on the degree of network congestion. For a congested system, a price cap could be necessary in order to prevent the strategic use of capacity reservation as mentioned above. On the contrary, if there is little congestion on pipelines during peak periods, such a price cap could seem unnecessary. In this case, capacity release market is a flexibility tool, useful for shippers to get information on the value of transportation capacities.

CONCLUSIONS

The confrontation between the theoretical rules and the lessons drawn from experience turn out to be helpful to understand the stakes of the implementation of efficient third party access to gas networks. With respect to access price, the definition of an efficient tariff according to economic theory should lead to the adoption, in the case of a meshed network, of nodal pricing because the transportation costs of such a network are widely disconnected from the distance covered. An entry-exit pricing system as it is currently applied in the United Kingdom, in the Netherlands, Italy and France could be considered as a first step towards a nodal system.

According to various normative benchmarks proposed by economic theory, regulators have to define the nature, the level and the structure of transportation tariffs. The nature of the tariff refers to the impact of distance on the rate. By opting for a postage stamp tariff, the regulator totally excludes the role of distance, whereas with a 'point-to-point' tariff distance becomes the determining factor. Transportation prices differentiated according to the points of entry and exit include distance in an implicit way in the tariff are closer to nodal prices. The method chosen by the regulator to control the level of transportation prices (price cap or cost plus regulation) could give or not incentives to network operators for minimizing costs. Finally, the choice of the tariff structure implies for the regulator an arbitrage between efficiency, which requires allocation of the whole fixed costs to the capacity part of the tariff, and equity which would provide incentives to low load factor users by allocating a part of the fixed costs to the commodity part.

As most of the costs of a pipeline are fixed, the regulated rates based on these costs do not follow a seasonal pattern. However, the need, and thus the value, of transportation capacity for a shipper follow the evolution of the demand of final customers. Capacity release markets introduce some flexibility for shippers. The differences between the Canadian and the US secondary markets put the emphasis on the difficulties of the role that should be devoted to the regulator in defining the rules of the secondary market. In the US, the capacity release market is heavily controlled by the FERC. One of the most important features of this control is the price cap put on the price of released capacity. In the US, the price paid by a replacement shipper cannot exceed the price paid by the releasing shipper to the pipeline. On the contrary, in Canada, the federal regulator is much less involved in secondary capacity market. The price is not capped. Whether to put a price cap on a capacity release market or not is a choice between the protection of shippers against market abuses and the promotion of secondary market liquidity. This choice is linked to the level of congestion of a pipeline system. If there is much congestion on the system then the risk of market power due to capacity reservation is important and so a price cap might be necessary in addition to the "use-it-or-lose-it" rule. On the contrary, if there is little congestion on the system, the need for market value given by an uncapped price of secondary market may be more important than the risk of market power of some shippers.

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