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**Integration of European gas markets :
Nascent competition
in a diversity of models**

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Résumé français

Le marché européen du gaz naturel connaît une mutation fondamentale sous l'effet de la libéralisation des industries gazières nationales impulsée par la directive européenne de 1998. La structure antérieure du marché en deux niveaux bien séparés - le marché oligopolistique des grands contrats de long terme au premier niveau, et les monopoles d'achat-revente au niveau national - laisse place progressivement à un enchevêtrement de ces niveaux avec une communication croissante entre marchés nationaux. Mais, malgré les larges interconnexions entre systèmes gaziers et une moindre intégration verticale que dans le secteur électrique, la constitution de ce marché intégré est un processus lent et contraint par la nécessité de relations contractuelles longues entre un petit nombre de producteurs éloignés et les revendeurs. Au stade actuel (2002), le marché européen demeure un patchwork de différents marchés. Les règles de marché introduites par les diverses réformes créent des marchés moyennement accessibles aux entrées. Le marché de gros se caractérise encore fin 2002 par une absence de transparence, à l'exception du marché anglais. Mais une dynamique institutionnelle est créée par l'introduction de différentes formes de concurrence. Elle se concrétise depuis 2000 par une intensification progressive des réformes nationales et le développement de nouvelles formes d'échanges contractuels au niveau européen.

L'objectif de ce cahier de recherche est de caractériser le processus de constitution du marché gazier européen à un stade précis, celui de la réalisation des réformes issues de la première directive, en identifiant les caractéristiques des marchés nationaux sous trois aspects :

- l'accessibilité réglementaire,
- l'accessibilité commerciale (avec l'existence ou non de carrefours d'échanges normalisés ou « hubs »),
- et l'accessibilité industrielle reflétée par le degré d'intégration verticale et horizontale influencé par l'existence possible de programme de cession de contrats de long terme.

Un ensemble d'indicateurs permettent de situer les huit principaux marchés européens de ce point de vue.

A ces évolutions en aval font écho des changements au niveau supérieur du marché européen des échanges de gros. On analyse à ce niveau l'évolution des trois mêmes types de barrières : les conditions réglementaires d'échanges transfrontières, les conditions de concurrence à l'exportation du côté des producteurs et les barrières associées aux contrats de long terme.

Un marché fractionné...

Au niveau national, les marchés présentent des conditions d'accessibilité différentes. Mis à part le marché britannique, pionnier des réformes gazières, trois pays présentent un profil relativement favorable, l'Italie, l'Espagne et les Pays-Bas, avec des règles d'accès transparentes, une séparation juridique du réseau et des entrées permises par un "gas release program" et pour les premiers une croissance forte de marché. La Belgique et l'Autriche se trouve dans une situation intermédiaire, du fait notamment du maintien de l'intégration horizontale. Pour des raisons différentes chacune, l'Allemagne et la France ferment la marche, l'éligibilité maximale de la réforme allemande ne compensant pas en particulier les effets dissuasifs du TPA négocié et d'un manque de clarté de la séparation des réseaux.

Dans ce marché gazier qui est en construction aussi au niveau des échanges continentaux, on montre que les relations verticales pré-existant à la réforme sous forme de contrats de long terme entre Etats producteurs et acheteurs limitent les possibilités de développement d'échanges de court terme et les opportunités d'entrées d'intermédiaires.

Mais les fractionnements par des réglementations nationales différentes, des règles d'interconnexion peu transparentes et la diversité des structures industrielles ne se superposent pas complètement, ce qui conduit à des communications entre les marchés, notamment entre certains marchés continentaux ou entre ceux-ci et le marché anglais.

Les parts de marché du segment des éligibles qui ont dû être abandonnées par les compagnies gazières sont bien corrélées avec les caractéristiques de l'accessibilité de chaque marché. Lorsque les entrants sont des compagnies gazières étrangères, il y a manifestation de quelques échanges; l'entrée des entreprises électriques comme acheteur international, intermédiaire et revendeur introduit aussi une nouvelle donne, en particulier en Espagne et en Italie.

Mais une dynamique irrésistible de transformation

L'hétérogénéité est elle-même source de dynamisation institutionnelle. Une certaine convergence réglementaire s'observe, qui sera accéléré par la prochaine Directive à voter en 2003. L'amélioration des règles d'interconnexion par l'action des instances européennes est programmée. Un certain nombre de "hubs" gaziers émergent sur le continent. De même, les compagnies gazières d'antan tendent à disparaître avec le "unbundling" juridique, l'intégration des activités d'achat-revente au sein des compagnies pétrolières en Italie, aux Pays-Bas, ou de compagnies multi-énergie en Belgique, et, à l'extrême, avec l'éclatement complet de l'entreprise gazière comme en Grande Bretagne.

Mais les contraintes imposées par l'éloignement des sources de production demeurent. Quelle que soit la force de la dynamique de transformation qui aboutira à la transparence de la règle de l'ATR, les contrats longs existants limitent dans le futur la part de gaz non contractualisé et, de là, l'épaisseur des futurs marchés organisés de court terme. Dans le futur, de nouveaux contrats longs devront prendre le relais de ces contrats, mais seront structurés différemment.

Leurs dispositions plus courtes, plus flexibles devraient laisser la place à une certaine part d'échanges de court terme et permettre l'intégration de marchés spot par les arbitrages des opérateurs. Cette part devrait être suffisante pour faire de la concurrence gaz-gaz l'élément de la détermination de tous les prix de gros. La liquidité des marchés spot et leur influence mutuelle devrait permettre de faire de ce prix la référence d'indexation des prix contractuels.

C'est ce mouvement, créé et entretenu par le travail réglementaire des régulateurs nationaux et de la Commission européenne, qui pourra donner corps à l'image du marché européen comme lac gazier pour signifier l'existence d'une réelle intégration des marchés.

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The idea of building an integrated European gas market based on competitive trade, like a gas lake supplied indifferently by remote, intra-European and national sources with the help of active market places allowing arbitration and price convergence, is far from being reached.

In fact it depends upon two conditions: the deregulation of each gas market at national level, and at the upper level of the market the change in contractual relations between remote gas producers and buyers, who currently make the relations rigid with long-term transactions and limit opportunities for exchange on a competitive basis. Indeed, although in marked contrast with the electricity industry there is than 60% of gas crosses geographical borders, the reason is not market integration but an imbalance of gas sources in and around Europe; this necessitates heavy up-front investment framed by long-term transactions. This issue, together with the geopolitical issue of gas dependence, was the reason for the delay in the European legislation of market liberalisation. All the continental industries and governments were opposed to the introduction of third party access for preserving the capability to develop new import projects and they accepted it only with great reluctance in 1998.

At national market level, four years after the adoption of the Gas Directive 98/30, the European market can still be seen as a patchwork of different markets. The United Kingdom, which owns important resources, is clearly apart as a pioneer, with total unbundling of grid and supply activities and effective competition between producers on the wholesale market and between suppliers on the retail market. Among the other countries, under the reforms decided on with reluctance under the European Directive, there are differences that leave markets more or less accessible to entries and more or less favourable to the development of competitive markets with internal and external players. How these market developments play out depends on the nature and strength of the regulatory framework. Moreover, new market rules have introduced forms of competition that are the seeds of a more extensive competition. Some national gas markets have already evolved considerably since the introduction of the third party access provision and consumer eligibility in 1998-2000, and after new regulatory decisions that significantly weaken the incumbents' dominant position by legal unbundling of the transmission network and definition of gas release programs in a number of countries.

This chapter analyses at two levels, namely national and European, the changing shape of the European gas markets under the effects of the market reforms and their chance of integration.

- Firstly, we characterise the former two-level European gas market, the legacy of which determines the constraints on competition development more strongly than in electricity.
- Secondly, in order to characterize the potential for development of competition, the main traits of each national gas market are identified in terms of market attractiveness and market accessibility for the incumbents' competitors. On one hand the market developments will depend on business potential in each national market, resulting from market size, market growth, especially in non-mature markets and in some active market segments such as power generation, and price differences reflecting existing profits on a number of national markets. On the other hand, the market developments interplay with the opportunities opened to applicants for entry by the

accessibility of each market, or conversely by the possibilities offered to incumbents for preserving their dominant position and deterring entries.

- Thirdly, dynamics of market development towards market integration are inferred at European level from these characteristics and from the possibility for development of new forms of gas trade between foreign producers, suppliers and users at national level.

1. The starting point: the two-level European market

The European gas market was developed on two separate levels (Stern, 1990; Estrada, Moe and Dahl, 1995; Percebois, 1999):

- The national level, with the development of national or regional transport or wholesale monopolies. These monopolies developed the existing transport and distribution networks in co-ordination with the development of national production, and later on contributed to the setting-up of the major gas importation infrastructures with the producers.
- The European level, which is characterised by a two-sided oligopoly, balanced between major producers and major national companies, with the exception of the United Kingdom, which has long since differed from the continental market.

On this second level, the oligopoly of sellers consisted mainly of national companies handling exports from countries outside the European Union (Sonatrach in Algeria, Statoil and the public export consortium GFU in Norway, Gazprom in Russia) and from The Netherlands (Gasunie), each of which had an export monopoly. The international oil companies that produce gas in these exporting countries were subject to this public regulation in Norway and The Netherlands. Opposite to the oligopoly of producers was the oligopoly of purchasers, which includes the national gas companies of Continental Europe that are not active in production and are in a monopoly (or quasi-monopoly) position for wholesale supply in their country: Ruhrgas in Germany, Distrigaz in Belgium, GDF in France, SNAM in Italy, Gasunie in The Netherlands and OMV in Austria, joined in the eighties by Enagas (later Gas Natural) in Spain. A high level of direct or indirect state involvement in the national transportation system allows them to control the gas dependency relationship with foreign States in France, Italy and Austria or the national resources management policy in The Netherlands.

Isolated from the continental market until 1997, the British market has long since been a market apart, because of its size and an availability of resources sufficient to maintain autarky. This was first achieved with a monopoly by a public gas company that was practically the only purchaser from the North Sea producers, and later through the progressive deregulation of the gas market from 1986 onwards, with the development of direct deals between producers and major purchasers including suppliers and major consumers.

1.1. The vertical relations between production and wholesale

The relations between national producers and purchasers take the form of long-term contracts that define a series of rights and obligations. These rights and obligations regiment the

relations over a long period of time but allow price-risk and volume-risk to be shared between partners, thus allowing substantial investments to be made:

- the obligation to take-off a given quantity of gas, under Take or Pay clause;
- the price indexation clause on crude oil or oil product prices;
- the final destination clause, which obliges the purchaser to sell gas purchased on his market alone because of country-specific price-definition clauses, and therefore creates de facto partitions between national markets at the resale level.

This “two-level market” structure has not only allowed risks to be shared right along the gas chain, thus allowing substantial investments to be made in production and transport, but has also allowed a balance of market power between producers and purchasers. On one hand, the gas companies can aggregate demands, because of their exclusive right to supply on a regional or national level. Armed with their capacity for managing the outlet risk, they are able to sign long-term purchase contracts that allow producers to develop the production and infrastructures necessary for the exportation of gas. As holders of a sales monopoly, they are also able to discriminate between various market segments according to the conditions for replacing gas with an alternative supply. For their part, the producers agree to bear the price risk: the price regulation and indexation clauses, based on the principle of “net-back”, allow gas prices to be maintained at a competitive level with rival fuels in their different uses.

The international oil companies involved in production (Exxon, Mobil and Shell) in exporting countries (The Netherlands, Norway) are also present further down the chain, where they obtain stock-shares in transportation and resale companies in order to capture an additional part of gas profits downstream. Exxon and Shell, who have always worked alongside each other, have preferred to concentrate on “upstream”¹, in contrast to Mobil, which has always had an aggressive policy of downstream integration (Wybrew-Bond, 1999). Their upstream strategy has never involved any attempt to obtain oligopolistic control over the European market. The stock-shares did not give them any industrial power in the strategy of these companies. (Stoppard, 1996; Radetski, 1998).

1.2. Partition between national markets

On this institutional basis, the integrated European market existed only in the bulk supply and is organised as an oligopolistic “club”. The European market can be described as a series of juxtaposed and entrenched national markets, supplied from outside by unidirectional stable flows coming from the same four supply sources and passing across one or two transit countries. More than half the gas consumed in the European Union crosses at least one border, but in terms of wholesale purchases, this merely involves physical interrelations between national systems. Market integration on the basis of cross-border exchanges initiated by countries with a resource surplus relates only to sales from The Netherlands inside the European Union. It will however be noted that because of the hierarchy of the two market-levels, wholesale prices on each national market follow parallel movements because of their common indexation on oil and petrol product prices. This type of integration relied, and indeed still relies, on co-operation between the major national purchaser companies grouped in a consortium to negotiate import contracts with major producers, to develop transit infrastructures together and occasionally carry out swaps between import contracts in order to re-allocate flows geographically.

¹ Exxon and Shell play a part in the capital of Gasunie and of Ruhrgas, and Exxon also plays a part in the capital of Thyssengas and ETGs in Germany.

1.3. New basic conditions and feasibility of market liberalisation

This two-level market structure was well suited to the developing gas markets, whose major transportation and distribution infrastructures still have to be set up for imports and national supplies. It no longer has the same foundations in the mature market phase, where penetration of gas into the various market segments is well advanced, as in the major national markets (Stern, 1990; Finon, 1992). The international transit network infrastructures are mostly depreciated. Increasing success in offshore gas fields and the creation of pipeline links to other countries have caused a lowering in spot and contractual gas prices, compared to older contract prices, putting pressure on old regulatory regimes. Maturity of main markets goes hand in hand with import overcapacity, overcontracting, and price reductions on gas spot markets where competition is based on a logic of short-term gas-to-gas competition (Stern, 1998; Radetski, 1999). The need for import investments in the mid-term is less pressing than in the past and projects are being postponed for several years. In similar situations, the experience of the British and American gas markets demonstrates that introducing market-rules at this stage can be feasible and can carry market incentives to efficiency improvement (Mestmaker ed., 1993; Waddam-Price, 1998).

The voting-in of European Directive 98/30 lays down for Member States the application of basic rules for the deregulation of national gas markets:

- the right of access to the natural gas network for direct purchases by electricity producers, eligible consumers and distributors from producers and sellers chosen by them, and vice versa²;
- a minimum opening level of 20% in 2000, 28% in 2003 and 33% in 2008³.

By destabilising the previous vertical relationships between foreign producers and national gas companies, the national reforms laid down by the European Directive could have two potential effects:

- removing the partitions between national markets by making trading in gas between countries easier, most notably through deals between intermediaries, gas companies, traders and multi-energy companies;
- removing the vertical separation between the two market levels by allowing producers to approach intermediaries in competition, regional distributors, electricity producers and major consumers directly.

If we look at the basic conditions of national gas markets, they appear to be more vulnerable than the power markets to a European prescription that requires member states to implement a provision of non-discriminatory third party access, for several reasons.

First, given the storability of the commodity, technical co-ordination gives more room for organisational flexibility than for electricity markets. Second, technical interconnections are large because of the need to import to meet most needs. Third, it was not vertical integration but long-term contracts that organised relations between production and transport and between transport and distribution-supply in the previous situation. Consequently it would be easier to redefine relationships and transfer property rights to new players than in a situation

² Access by distributors could be limited to the portion that corresponds to the eligible consumers' share.

³ The Directive also lays down corresponding eligibility thresholds and defines precisely eligibility for electricity production and distribution.

of vertical integration, as it was in the electricity industry prior to the reforms. The incumbent companies do not have the same capacity to preserve the integration of their activities as in electricity. However, the resilience of the pre-reform contractual arrangements heightens the importance of maintaining long-term relations for the development of new production and infrastructures from remote sources. The remaining pre-reform import contracts limit the possibility of rapid expansion of competitive exchange at the European and national levels.

However, the effects of the Directive and the reforms in transcription in national law are much more limited than is necessary for effective competition and integration of national markets for three reasons (if they are not followed by new changes). Firstly, the minimum requirements for conditions of access simply do not allow transparent and non-discriminatory access. It leaves the choice between regulated and negotiated access to the network, without particular specifications for access to storage capacities and for transport pricing principles; it requires simple accountable unbundling between transportation, supply and other activities. It is up to the countries to go beyond.

Secondly, the Directive does not ask for long-term contracts to be called into question, and the effect of this will be threefold. One, the field of competition upstream is only open to a limited extent for new transactions, with very little non-contractualised gas, the so-called free gas; two, the restrictions on the final destination of contractual gas from two of the main exporters are still maintained in many contracts, which will contribute to preserve the divisions between the national markets; three, the definition of wholesale prices is directly linked to the indexation of contractual prices on oil prices. Except in the UK, the portion of wholesale supplies which does not depends on price-definition by netback pricing and by oil price indexation is very limited. It limits the possibility of trading on a spot basis and impedes the normal market force game between gas vendors that would allow gas prices to be discovered without direct influence from other fuel prices in short-term transactions to define price indexation in long-term contracts by reference to spot markets, as is currently the case on every commodity market.

2. The attractiveness of national markets

The attractiveness of a national market influences the entry of companies that compete against the incumbents. It depends mainly on the size and maturity of the market and the growth potential of the various segments, especially power generation. It also depends on the price levels in each segment of the final market, the relative prices in each market segment being indicative of the potential for generating profits downstream in the value chain.

2.1. Market size and growth

The most attractive markets are those that show the best combination of market growth and market size. In this respect Italy and Spain show the best potential, alongside the larger and maturer markets as Germany and the UK, and the nascent or young gas markets in smaller economies (Denmark, Ireland, Portugal, etc).

- *Market sizes*

In the range of size from 40 to 100 bcm/y, markets in major countries (UK, Germany, Italy, France) are the most important in terms of size, with The Netherlands (48 bcm/y), which encouraged the use of gas because of its resources. The French market is of less significance

(38 bcm/y) because of the importance attached to nuclear electricity; such was this importance that developments in the use of gas in electricity production and as a space heating fuel were pushed to one side. Some way behind comes the Spanish market (14.5 Bcm in 1999), which has only been developing since the 1980s, but has now equalled the Belgian market in size (15.6 Mt). Much further behind are the markets of other countries (Denmark, Finland, Ireland, Portugal, Greece, Sweden and Switzerland), less than 5 Bcm in size; this is explained by the economic size and population of these countries and the relatively young age of their gas industries. These markets will not represent major targets for potential entrants in the future, even after maturation. Only Austria is at an intermediate level, with a market size of 8 Bcm; the reason for this is that its industry developed much earlier.

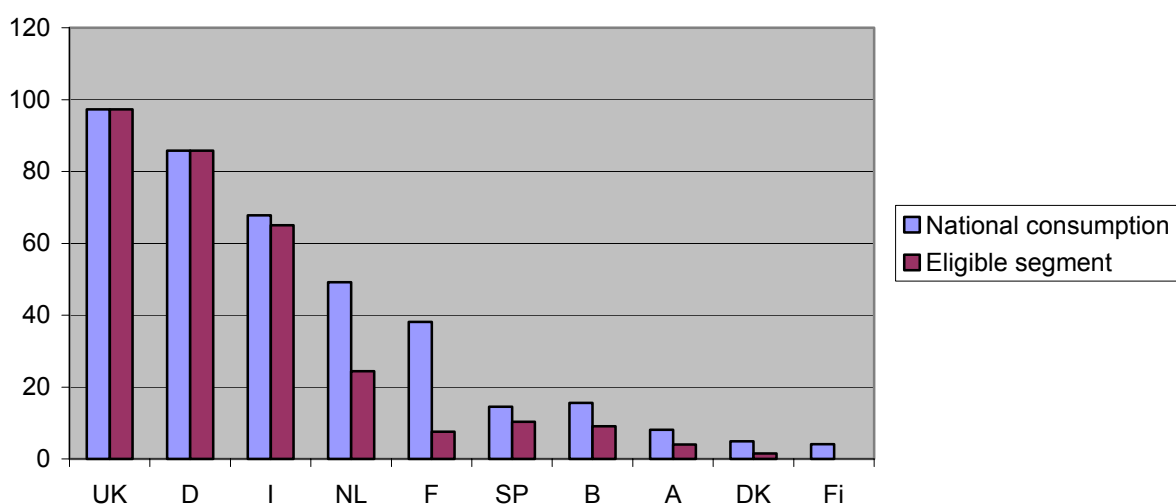
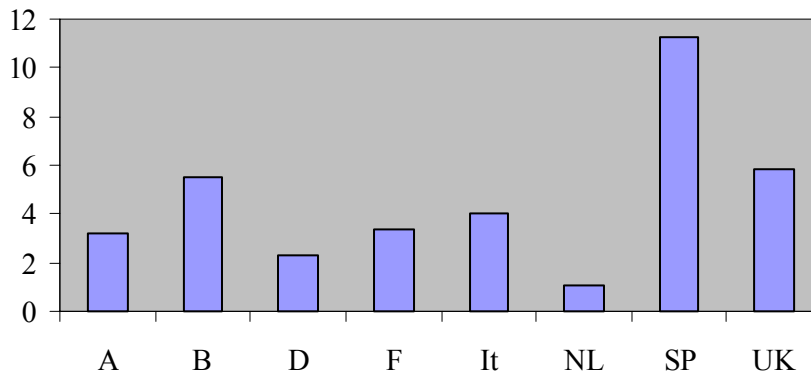


Figure 1– The size of national gas markets and eligible segments along the eligibility threshold (in bcm/y)

Source: IEA – *Natural Gas Information 2000* and EC –DG TREN (2002)-*First benchmarking report*

- *Market Growth*

In terms of attractiveness, the advantage of size in major markets is partly compensated for by maturity, except for the new segment of the power generation. Italy, Germany and the United Kingdom show a growth rate, excluding gas-based power generation, of 2-2.3% per year during the nineties. However, in the specific case of the quasi-autarkic UK gas market, the prospect of a future decline in national production could attract some foreign entries based on the installation of new interconnections.



Source: IEA, *Gas Data Book 2001*

Figure 2. Average annual growth of national markets between 1990 and 2000 (in %)

The French gas market could benefit from a catching-up effect, given that it grew at a rate of 3.5% in the nineties with some new development in space-heating and industrial uses. Countries with a “young” gas system, such as Spain and Denmark, saw their markets grow at a faster rate, in the region of 10%, during this period.

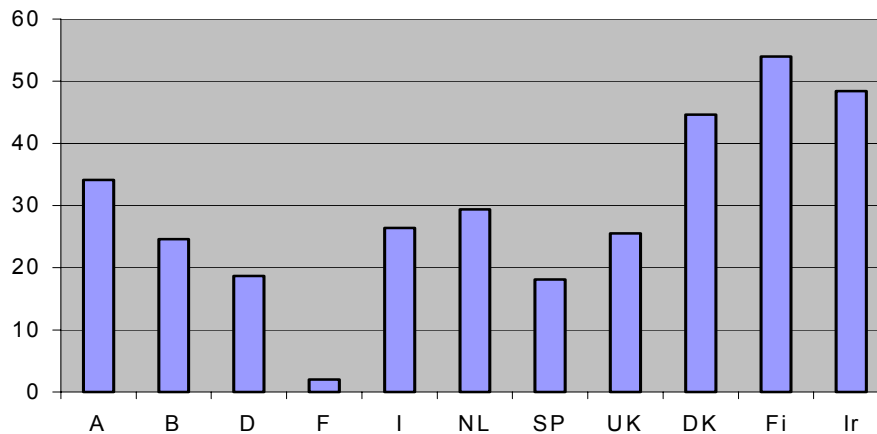


Figure 3. Share of power generation segment in total gas consumption in 1999 (%)

The two groups of national gas markets have one thing in common: part of their future growth will be based on electricity generation. Already the commissioning of gas-fired power stations by independent producers in the mature British and Italian markets has led to renewed growth in the gas markets (5.6% per year on average since 1990 in the first market, 5.5% since 1999 in the second) and the turn of the last century saw the take-off of gas turbines equipment in some other countries, especially Spain. This market dynamic is important for encouraging entry to other sectors. In fact, development of gas-based power generation is a lever for the electricity incumbents to enter the final gas market by contracting directly with foreign gas producers for supplying their gas turbine units and jointly selling gas and electricity on the industrial segment. It is typically what is happening in Italy and Spain with the utilities' entry (ENEL, Edison in the former, Endesa, Iberdrola and Union Fenosa in the second) to the industrial sector. Development of gas-based co-generation on site is also a central element in multi-utilities and multi-service strategies, including gas sales.

In future, the development potential for gas in electricity production will increase because of environmental policies and deregulation of electricity markets; this will favour the adoption of gas units, which are few, capital-intensive and cleaner than coal generation, by the electricity producers in competition and the development of decentralised production and co-generation. However, the situation of gas-based electricity production and its potential will differ from one country to another, if we refer to the portion of gas used in power generation (see graph). There are three groups of countries, each obviously with different potential for development:

- those required to respond to a very dynamic demand for electricity: Spain, Italy and the small “catching up” countries (Ireland, Greece, Portugal) not considered here;
- those in which growth of electricity generation is low but replacement of old equipment and progressive nuclear phase-out policies will require the installation of new units after 2001 (United Kingdom, Germany, Belgium, The Netherlands, Austria);
- those whose production capacity is based on equipment with a long life-span and low variable costs, which will limit the potential for new gas outlets through co-generation projects during the next twenty years (France, Sweden).

According to a reference forecast ⁴, Spain seems to be the most promising market in terms of centralised production, with 17 GW of CCGT planned for 2000-2010. Next is Italy, with 15 GW to be installed by ENEL and Edison, followed by the United Kingdom, with 6 GW authorised in 1999-2000 following the gas power station moratorium, and the small countries (Ireland, Portugal, Greece). Given its overcapacity and the policy of promotion of renewables (20 GW), German electricity generation remains a promising market for gas, firstly in terms of co-generation and then in terms of centralised production, once the overcapacity has disappeared and the nuclear phase-out policy is implemented.

2.2. Differences in gas prices between European countries

The attractiveness of a national market to entrants is also partly dictated by price levels and potential for generating profits in certain market segments because of low levels of competition from substitutes, market imperfections or protection of activities. For instance, gas price indexation on oil prices in long-term import contracts keeps wholesale prices high, even in an overcapacity situation, while short-term transactions or spot purchases on a gas marketplace would allow entrants to buy gas at a much lower price. However, import prices at the frontiers of the various countries are generally close, given the netback principle of price calculation, which takes account of the differences in transportation costs⁵. So with the exception of the UK market, industrial prices are generally quite close from one country to another, while commercial and domestic prices tend to show more differences because of the common fact that smaller the client, the larger the price difference between each country.

• Industrial prices

Before the implementation of reforms in 1999-2000 and the introduction of competition on the continental markets, the British gas price was clearly apart, because it was determined by

⁴ Forecasts shown in *Power in Europe*, 28 April 2000.

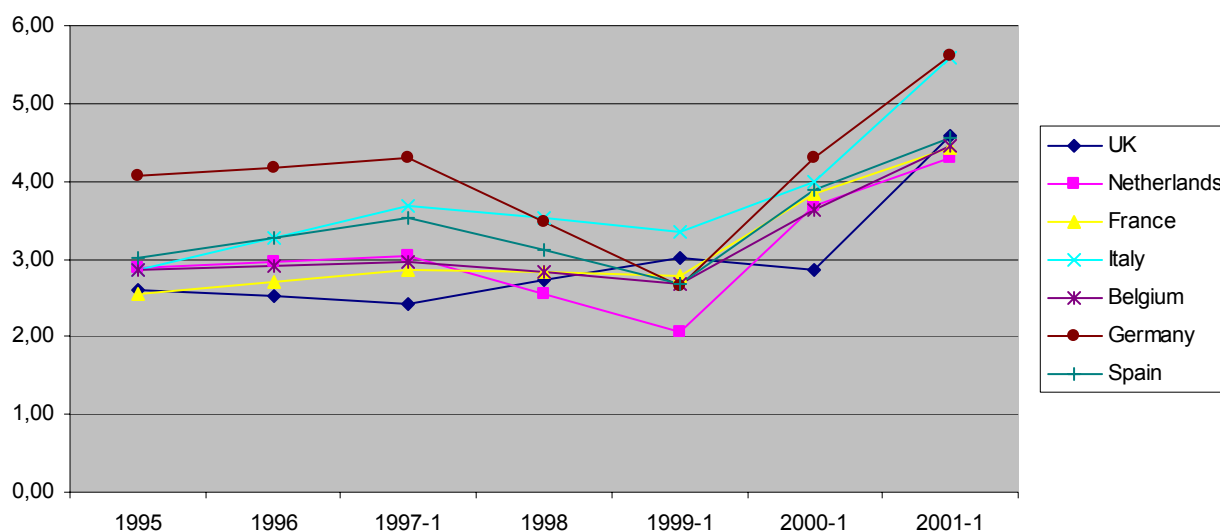
⁵ Put simply, it can be considered as an approximation that border prices are similar between European countries.

Selected natural gas import prices into Europe in 1999 (in \$/MBtu)

	B	D	F	It	NL	SP
Import by pipe	2.06	1.86	1.87	N/A	1.99	1.63
LNG import	2.08	-	1.94	N/A	-	1.88

Source - IEA: *Natural Gas Information* 2000

gas-to-gas competition in a context of overcapacity on the British market. Between 1995 and 2000 it clearly established itself at a level 30% below the industrial prices on the continental markets. Meanwhile, some similarity of industrial gas prices on European gas markets is noticeable because of the common price indexation on oil products and oil prices, given that border prices do not differ greatly from each other. According to Eurostat references, German industrial prices have tended to exceed the median price by 10 to 20%⁶. Increases in imported gas prices under oil price moves are passed through final prices with a shorter time lag and less amplitude than in other countries because German gas companies extract more profit during this period than other companies in this sector. In these last countries the industrial prices were more or less regulated in the opposite direction to the German prices. In this group the hierarchy is moving from one type of industrial consumers to another.



Source: Eurostat, *Gas prices between 1990-2001*

Figure 4. Differences in industrial gas prices in selected countries for the period 1995-2001 (in €/GJ) with reference to consumer category of 10 Mm³/y (or 418 000 GJ/y)

The connection of the British market to the continental market by the UK-continent interconnector led to a steep rise in industrial prices in the United Kingdom during a period of high import gas prices in the long-term European market contracts. Industrial prices increased because of the call for large quantities on the continental market and the British producers' arbitrage between the two markets⁷. Moreover, since 2001, the resorption of the overcapacity has maintained the pressure on prices.

- *Household prices*

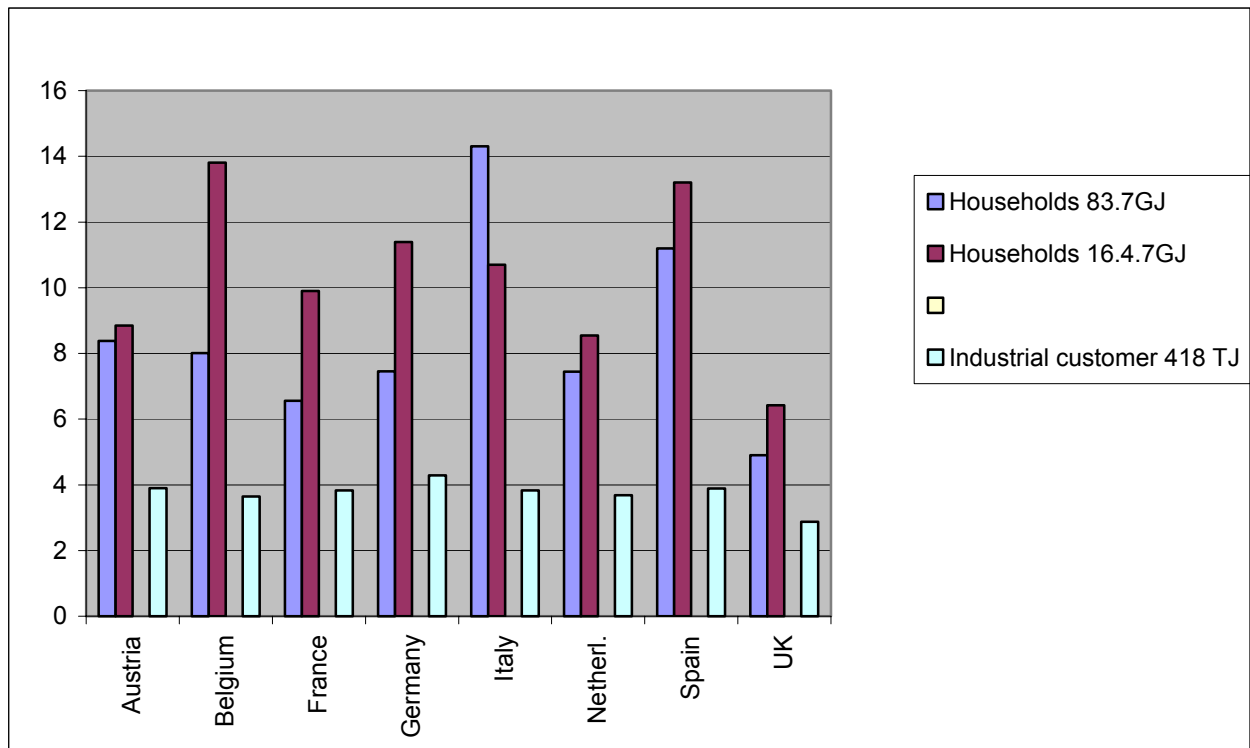
Domestic and commercial sale prices vary sharply from one country to another. By referring to two different domestic tariffs in 2000, the following hierarchy in the eight mature market countries. In the large domestic subscriber category, the Italian and Spanish tariffs exceed those of the other five countries by 40%. In sharp contrast, the British tariff is very much

⁶ We refer here to the I3 and I4 category consumers, according to the Eurostat statistics, which are supposed to be representative of industrial customers, outside the category of very large customers.

⁷ The British spot price was established at \$4.2 /MBtu in autumn 2000 and again at \$ 4 /MBtu in autumn 2001, compared with an average of \$2.5 between January and September 2001

lower (50% lower) than the tariffs in the five other countries. In the smaller consumer category (kitchens and water heaters), the group of countries with the highest tariff includes Belgium and Spain, with Germany and Italy not far behind. The difference from the group of lower-priced countries (Austria, France and The Netherlands) is less pronounced (at about 35%)

than for large subscribers. British prices are again significantly lower than the others (28% lower than the next lowest price) at present. The general increase in wholesale prices in the UK reduced the differences in 2001 somewhat, but not so much to remove the differences in profit extracted by distributors-suppliers in various regulatory environments. The United Kingdom is lower in terms of profits from distribution because of the tighter regulation of distribution activities unbundled from the supply



Reference to Eurostat D3 category "cooking, water heating, central heating" 83.7 GJ and D2 Category "cooking, water heating" 16.74 GJ and I4-1 category of industrial consumer : 418 000 GJ/y

Source: Eurostat . *Gas prices 1990 -2000*

Figure 5. Differences of gas prices on household market in selected countries in 2000

The differences between domestic and industrial prices within a country reflect the level of profits derived from gas distribution, above the network costs and the intensity of the distribution network and domestic tariff regulation. With reference to the industrial and domestic customer categories considered here, the differences between industrial and domestic prices are most significant in Belgium, Italy and Spain, but in Spain the difference can be explained by higher costs attributable to the rapid development of gas networks, which requires finance. On the second level of difference we find Germany, followed by France, where the average cost of distribution is a little higher than in other countries because of the lower territorial density of demand.

To sum up, some of the largest markets appear the most attractive because of market imperfections that lead to higher price levels in certain market sectors. Such are Germany and Italy, which appear to be the most promising markets for entry candidates with large size and level of prices. The UK is a more difficult market because of the small margins allowed by effective competition on the wholesale and the retail markets, and stringent regulation of transport prices. Spain is also a promising market because of its size and growth prospects.

3. Accessibility to national gas markets: national influences on market rules

Competition on national gas markets will be conditioned by actual accessibility to wholesale and retail markets for national and foreign producers, suppliers and traders. Market opening by the provision of consumer eligibility must be complemented first by rules of transparent access to gas systems, second by industrial structures which facilitate entries, and third by technical infrastructures (interconnection capacities) and commercial infrastructures such as gas exchanges back to access to storage facilities.

Firstly, market rules must enforce non-discrimination for potential competitors. Even with a market opening of 100% and a relatively fragmented gas supply activity, a national market can remain weakly competitive if access to pipeline and storage facilities remains opaque and discrimination in favour of incumbents is suspected. As theoretical works demonstrate (Baron and Meyerson, 1982, Armstrong et al., 1996), if the network operator competes on deregulated stages of the value chain, the risk of deterring entry by newcomers by limiting access to transport and system services, or by overpricing, is significant. Empirical evidence is shown by British Gas's market dominance before its split in 1996 with excessive rates for transmission and balancing (Waddam-Price, 1998; Thomas, 2002). In this respect, the presence of an independent regulatory authority is crucial to guarantee non-discrimination and fair access to essential facilities by an ex-ante regulation.

Secondly, market dominance by the incumbents owning the portfolios of long-term import contracts inhibits entries, as has been said. Theoretical works show how long-term contracts create barriers to entry to the intermediate and final markets (Aghion and Bolton, 1987). The incumbent's market dominance has to be weakened by some horizontal and vertical de-integration. Development of competition in the supply between different owners of long-term purchase contracts alongside some traders' activities could be the first stage of effective competition.

Thirdly, creation of spot markets in some national hubs, where different pipelines or LNG terminals allow competition between different gases, will increase accessibility and ease the development of effective competition by offering contractual diversification, price discovery, balancing opportunities and risk-management capability. It will facilitate competitive entries and bilateral transactions and give means for wholesale or industrial buyers to complete contractual purchases.

There are significant differences between reforms in national gas industries, which reflect the specific features of regulatory culture, their gas resources endowment, the legacy of previous structures, and the level of maturity of the market. In this sense, with all the different national situations, each market shows a different potential for the development of internal competition and entry incentives. The competitive potential of each market can be described in terms of accessibility to entrants, with three dimensions: regulatory access, technical and commercial access, and industrial access with barriers to entry resulting from industrial structures.

For reason of simplification, young or nascent markets (Denmark, Finland, Greece, Ireland, Portugal, Sweden) will be ignored as they represent less than 4% of all the European Union's gas demand. Some of them (Greece, Ireland, Portugal) benefit from exemption from the 1988 Gas Directive obligations to introduce TPA provisions because of the financing constraints of installing the infrastructures of their nascent gas system.

3.1. Regulatory accessibility to national gas markets

The regulatory access is characterised by various elements that all have to reach consistency: the level of retail market openness, rules that govern access to networks and storage capacities and can guarantee non-discrimination, and the presence of a regulatory authority. The first gas directive allows a wide combination of options for these key elements. In fact, the comparison shows three groups of countries: the pioneer group, with the United Kingdom well ahead of all the others for all the competitive regime issues; then a second group of countries with Italy, Spain, the Netherlands and partly Belgium, which intensified reforms in 2001 and 2002 after initially transcribing the directive only moderately (and represents 35% of the Euro-8 market); and then the group of “laggards” with Germany, France and Austria, which tend to adopt the most conservative market rules (and represent 39% of the Euro-8). For political reasons France did not transcribe the Directive into its national legislation until 2003, whereas Germany very progressively defined a regulatory framework of network access in a traditional process of agreement between stakeholders.

- *Eligibility*

In addition to the United Kingdom, where market opening has reached 100% since 1998, most Member States have gone further than the minimum market opening required. Germany opened its market up to 100% in 1998, whereas Austria, Italy and Spain are aiming to open their market completely in 2003 or 2004. The Netherlands, Belgium will reach an opening level of 60-65 % by that date. France will remain at the minimum required level⁸. The mean level of national market opening at European level is therefore set at 80% in 2001, but this does not mean that competition will be effective and so widely extended. The effectiveness of competition depends on market rules other than eligibility, namely, rules that guarantee non-discriminatory access to available transport capacities and storage facilities⁹. A typical

⁸Other state-members, Denmark, Sweden, have sped up the market opening by the way of eligibility of the distributors. Ireland, Greece and Portugal benefit of special derogation as having a nascent gas system, but they intend to have significant opening up.

⁹ Firstly eligible markets are different from one country to another. The segment of electricity generation is important in some countries and limited in some others (France, Belgium, Sweden) by the existing generation capacity in hydro and nuclear. Secondly the eligibility of distributors gives an apparent high market opening in some countries with numerous local distributors, while eligibility threshold on the final gas market remains high as in Italy (and Denmark) until 2003.

example is the absence of practical access rules in Germany for medium and small consumers between 1998 and mid-2002, despite the total opening up of the market.

- *Third Party Access*

Market accessibility differs according to the efficiency of third party access to the pipeline networks and other essential facilities: LNG terminals, storage capacity and blending (EC-DG TREN, 2000; 2002). A transparent information system on available capacities is also a prerequisite for non-discriminatory access. All this requires clear unbundling rules and access conditions that are non-discriminatory, fair and simple. At the extreme, the transport system is totally independent of the former incumbent and physical rights to capacities are “commoditised” (as are storage capacities). At the first stage, European countries have chosen between several types of TPA and different unbundling levels, which have different impacts on the incumbent's ability to discriminate and on the competitive pressure of entries.

Regulated TPA is considered to be the best solution for trade with published tariffs, fair definition by the regulatory authority and transparency of access conditions. Negotiated TPA (nTPA) is *a priori* a disincentive to trade, because of transaction costs and delays incompatible with short-term competition. Apart the UK, those countries most in favour of transparent and non-discriminatory access with a clear separation of gas system operations, namely Italy and Spain, have opted for the regulated TPA. They have been caught up in 2002 by Austria, The Netherlands (which was the first country to publish its access tariffs in spring 2002) and then Belgium and Spain. The choice of negotiated TPA has been maintained by Germany¹⁰ and to some extent by France, which has chosen a combination of negotiated access (for transport) and regulated access (for distribution). The countries that chose regulated TPA have also overlooked, or are about to overlook, distance-related tariffs (point-to-point), which are penalising for trade: they will adopt either post-stamp tariffs, as Spain and Belgium have done, or more commonly nodal pricing (entry-exit) like Italy and probably France¹¹. So it is for the choice of standard balancing obligations, over which initially most countries had preferred the more restricted obligations, i.e. hourly balancing with strict tolerance rather than the smoother rule of daily balancing adopted in Italy, Spain and more recently The Netherlands.

Finally, the level of transportation tariffs regularly recorded by the European Commission reflects the governments' will to ease gas network access in the respective group of countries.

¹⁰ In Germany the traditional German rule making by general agreement between the main professional associations allows to establish guidelines for the TPA. So an agreement which is being elaborated in several stages since mid-2000 is negotiated between transporters (BGW) and users (BDI, VKU, VIK) and defines the main commercial conditions. The first gas *Verbändevereinbarung* (VVI) has had several supplements signed in March 2001 and September 2001 to improve transparency, access to storage, system services, congestion management, information on operational capacities,

¹¹ Austria, Belgium, France, Germany, Netherlands, Spain had initially chosen the distance-related pricing with limited number of reference points and for some of them with a cap on the flow distance (200 km in Netherlands, 500 km in Spain). Spain has however a "high volume" postage stamp (upper than 350 Mcm/y and Belgium has adopted a postage tariffs in 2002. Some tariffs are however hybrid and simplified in zonal pricing : the customer's transport costs are a function of the postage tariffs; he has to pay for each transport zone which separates him from his gas supplier).). Italy and the UK have adopted the entry-exit tariff.

Moreover the calculation of the distance-related tariffs lacks cost-reflectiveness in some countries where the regulator has weak powers or is absent as in Germany. In the present situation German market is considered to have high transmission price which deters any entries since 1999.

Table 1 . Comparison of transportation prices over 200 km in 2001 (€/MWh)

Germany	France	Belgium	Austria	Netherlands	Spain	Italy	UK
0.75-0.83	0.85	0.79	0.85	0,65	1.34	1.6	0.45-1.11

Source-European Commission (2002) –*Implementing the internal energy market*, p.47

These three groups of countries also differ in the choice of type of unbundling:

- Total ownership separation of transport and gas supply in the UK, since the separation of Transco and Centrica in 1997.
- Creation of a transport subsidiary by the incumbent, with partial flotation for increasing the guarantee of independence in Italy and Spain by reducing control by the incumbent (ENI and Gas Natural respectively) over its pipeline subsidiary¹². In 2001 and 2002 Belgium and The Netherlands followed, with the splitting of Distrigaz and Fluxis (the new transmission company) respectively, and for Gasunie's gas system in 2003.
- Simple accounting and functional separation in the other countries, with an internal “Chinese Wall” and code of conduct to guarantee non-discrimination on commercial information and non-preferential treatment, as the Directive requires. Among these other countries, Germany does not go beyond the minimum requirements, while Austria and France could implement a legal separation in 2003 independently of the second gas directive. However in Germany the condition for clearing the take-over of the dominant gas operator by E.ON in 2002-2003 was the legal unbundling of the network.

An additional accessibility parameter is the difference of clarification of technical and economic rules of network access between the transmission stage and the stage of distribution for competitive sales to medium gas users (SMEs, commercial sector). The pre-existing vertical separation of distribution as in Belgium, Germany, Italy and The Netherlands is a factor that maintained this obstacle for two years, even with the strong regulatory will to organise the playing field at this level of eligibility and further after the opening-up had been achieved.

The requirement for storage access, which should have had a crucial role in the development of short-term transactions, is generally wholly consistent with the type of unbundling¹³. Clearly countries such as France or Germany, with remaining vertical incumbents that predictably defend their property rights on their storage access capacity, avoid the mandatory access to storage capacities¹⁴.

In the same logic, countries that have chosen to give way to effective competition have sought to enforce non-discriminatory access by creating sectorial regulatory authority. However, their level of regulatory powers is not systematically correlated to the intensity of the reforms. Although the UK and Italy, at one extreme, have chosen to create an independent authority with broad effective powers (promotion and surveillance of competition, regulation of

¹² ENI had to reduce its participation in the SNAM's stock to 50% in 2002 and had sold 40.24 % of the newly created Gas RETE's stock shares on the stock market in October 2001. So did Gas Natural for the Enagaz' stock to 35% in 2002.

¹³ The storage capacities can be separated from the network company as it is the case in Italy

¹⁴ A certain range of flexibility services (balancing service, back-up) offered by the incumbents are substitutes to the access to storage capacity under normal circumstances for the efficient operation of the system. But they do not cover access to storage capacity which is independent of the system use for seasonal arbitrage.

monopoly activities etc.) while Germany, at the other extreme, prefers only slight regulation with no specialist authority and *ex post* control by the anti-trust office¹⁵, the group of latecomers (Austria in 2001, France in 2002) have created authorities with effective specialist powers, while in the intermediate group there are either consultative bodies (Belgium, Spain) or reluctance to install a special ministerial department in the competition directorate, as occurred in the Dutch electricity market (IEA, 2001).

- *Improving regulatory accessibility*

Backed by the European competition law and the treaty requiring it to harmonise national laws, the European Commission has been active on a number of different levels since 1998:

- An increase in national reforms, aimed at improving access to the network and to gas companies' storage units through the regulations of a new directive likely to be voted by 2003, and the new community rules relating to the adoption of the directive, most notably the "qualified majority" rule, which will make institutional harmonisation easier than before.
- The limitation of technical and price-related barriers to exchanges between countries, and the creation of dialogue between regulators and gas system managers, known as the Madrid Process. The European Commission is relying on the co-ordination of gas system operators (known as the European Gas Transporters Association or EGTA) and of sectorial regulators (grouped together for 12 countries in the Council of European Energy Regulators).

The next directive, in 2003, will introduce two main changes: the near-completeness of the opening of the final market, an increased guarantee of non-discrimination in access to each gas system, and the unbundling of distribution and supply (European Commission, 2001).

First, the opening process should be completed by January 2004, with the possible exception of supplies to domestic customers. Of the markets in question, this move will mostly affect the French market, the opening of which would have remained limited to 28% from 2003 to 2008 and to 33% thereafter. Now, however, it will reach 60% in 2004. The few other markets (Belgium, Denmark and Sweden) that did not plan to open fully by 2008 could also see their opening process accelerated. The other countries (Italy, Spain, Austria) have now brought forward the full opening of their final market to 2003. New official discussions on the market-opening process are planned for 2003, and could even lead to complete opening in every country in 2006. Second, the improvement in guarantees of non-discrimination in network and storage facility access will be sought through the requirement for legal separation between network and storage¹⁶, regulated access by third parties with "cost-reflective" calculation principles and transmission prices, balancing and storage service, rules of transparency on capacities available for transportation, and the enforcement of *ex ante* regulations guaranteeing these rules. In this respect, accessibility to the German market would be upgraded in succeeding years. Thirdly the unbundling of the supply and the distribution - probably for every distributor down to a threshold of 150 000 clients - will weaken the incumbents' dominant position and easing entries in the retail supply. All in one the regulatory accessibility is converging between the different countries.

¹⁵ In spring 2002 German government envisaged to create a regulation authority in gas sector, probably to force the pace to the rule making by the profession.

¹⁶ The next directive will not require the distribution network to be separated in this way.

Table 2– Mapping of the competitive reforms in the main gas industries in 2002

	UK	Italy	Spain	Netherlands	Belgium	Austria	Germany	France
Eligibility	100%	65%	72%	45%	47%	100%	100%	20%
Third Party Access	Regulated TPA	Regulated TPA	Regulated TPA	Regulated TPA	Regulated TPA 2002	Regulated TPA	Negotiated TPA	n TPA in transport r TPA in distribution
Type of transport tariffs	Nodal pricing (Entry/Exit)	Nodal pricing (Entry/Exit)	Stamp post tariff	Distance pricing (point-to-point)	Stamp post tariff 2002	Distance pricing (point to point)	Distance pricing (point to point)	Distance pricing (point to point) 2001 Nodal pricing 2002
Unbundling TSO status	Independent (Transco)	Subsidiary with floatation	Subsidiary with floatation	Independent (2003)	Subsidiary with floatation in 2002	Subsidiary	Code of conduct	Code of conducts (possible subsidiary with float.. in 2003)
Standard balancing obligation	Hourly	Daily	Daily	Daily	Hourly	Hourly	Hourly	Daily
Obligation for access to storage	Yes	Yes	Yes	Yes	Yes	No	No	No
Authority of regulation	Yes	Yes	Consultative Body	Ministerial anti-trust division	Consultative body	Yes (Specialist Powers)	None	Yes (Specialist Power)

3.2. Technical accessibility of national gas systems

Effective entry into a national market depends directly on conditions of physical access to national gas systems, the number and capacity of interconnections and LNG terminals, transportation tariffs and rules of access to interconnections in cases of border congestion (IEA, 1994). The limitation of technical and price-related barriers to exchanges between countries has been dealt with since 1999 by the dialogue between regulators and gas system managers, known as the Madrid Process. The European Commission is relying on the co-ordination of gas system operators (known as the European Gas Transporters Association or EGTA) and of sectorial regulators (grouped together for 12 countries in the Council of European Energy Regulators) to harmonise rules of access to national transmission and transit capacities and to define conditions of access to interconnections. Otherwise, access to LNG regasification terminals will provide new opportunities for LNG vendors, in especially for cargo sales or mid-term direct contractual supplies. The organisation of access to LNG terminals is difficult to define and impose by regulation, because of the need for co-ordination between terminal users who are competitors¹⁷. The type of TPA to these facilities will have a major influence on these opportunities.

¹⁷ Availability of several LNG terminals will improve flexibility and economies of scale for managing off-loading of competitors

Because of the technical need for large volumes of gas transported from remote sources, the existing interconnection capacities between national markets are significant, with the exception of the three "gas peninsulas" Spain, Southern Italy and the UK. The continental markets are connected to each another with many entry points and connections because of their dependence on imports and, for Austria, Belgium, Germany, France and Switzerland, their role in the transit of gas. Generally, the import capacity significantly exceeds their import needs and is close to the total level of national needs. This regional area, with its well-connected markets and large transport capacities, could become the main battlefield in which the markets could mutually influence each other with converging prices and difference-reflecting transportation prices. Transit restrictions for long-distance exchanges could be managed by swaps between various sources as soon as the market institutions are established to ease such deals.

Apart from the peripheral and nascent markets (Sweden, Greece, Portugal, Ireland) the British market is less connected to other European markets because of its autonomy in terms of resources. The UK-Continent interconnector built to export gas to the continent (20 bcm/y) has a reverse flow capacity of 8.5 bcm/y, corresponding to 8% of national consumption. In 2001, however, the pipe to the exhausted Frigg deposit was reactivated to connect the British market to the Norwegian system. Spain is also a gas peninsula because of the limited connection capacities between France and Spain (4 bcm/y). Italy is partly viewed as a peninsula with a kind of double gas system, one well connected to Northern and Eastern European sources and the other connected to North-African sources by dedicated pipes but loosely connected to the northern system.

**Table 3. Number of physical supply routes into various countries in 2000
(pipes and LNG terminals)**

	Austria	Belgium	France	Germany	Italy	Nether-lands	Spain	United Kingdom
Pipeline entries*	3	4	3	6	3	2	2	2
Import Capacity from EU states (Bcm)	n.a.	34.7	46.0	90.7	27.3	38.5	2.3	8.8
LNG terminals		1	2		1		3	

* Export points for transit not included

Italy and Spain have less connection points (1 and 3 respectively) with the other European markets, but their LNG terminals and interconnections with Maghreb sources via pipelines (Transmed, GEM and soon the Libyan pipe) are other entry points for natural gas imports. More generally, LNG terminals could become a new way of importing gas on a short-term or longer-term basis, such as the future imports of Egyptian gas from 2004 under LNG contracts signed with GDF in France, Union Fenosa in Spain and Edison in Italy.

Three other elements must be added to this view of technical accessibility. First, exchanges of gas between countries can be limited by the restrictive requirements imposed in certain countries with regard to quality of gas, and the development of flows is thus hampered (Heyvaert, 2001). By comparison the American market, which refers to a single quality range, could be more easily unified. There is therefore a need for greater network interoperability and gas quality harmonisation, and this may require physical processing (in particular, the

transition from H-gas to N-gas) or mini-swaps. Second, apart from the rules governing transmission tariffs, there is a great need for transparency on available transmission capacity for cross-border trade on a short-term basis and, in future, on a real-time basis. It could take several years before this ideal stage is reached. Third, the legacy of pre-existing rules linked to long-term contracts and transit capacity greatly restricted opportunities for access. Part or all of the transit capacity is contracted to the incumbent companies and most TSOs have no agreement on providing information to the market on the amount of free capacity to be available with an added “use it or lose it” provision¹⁸. Interconnection capacities are in many cases reserved for the contractual imports.

In the context of the Madrid Process, the system operators have made some progress in defining interoperability rules since 2000, such as changes to gas quality and harmonisation of methods for calculating available cross-border capacities; they have however encountered difficulty in reaching an agreement on rules for advising the capacities available.

3. 3. Commercial accessibility and market institutions

The development of competitive trade needs informational and commercial infrastructures to be created at different stages: the bulk and wholesale level and the retail level. The existence of such devices is a good indicator of the intensity of competitive trade beyond the legal market rules.

- *Existing marketplaces*

Marketplaces are crucial commercial devices for supporting competitive trade by allowing gas demands and supplies to be met in an anonymous and standardised way at the intermediate stage of the wholesale exchange. The creation of spot markets in hub places or at notional points would answer to the need to help transactions and deals by de-linking the price of gas, transmission and storage¹⁹. For market participants there is a need to balance demand and supply on a monthly and daily basis and to complement supply for swing needs by short-term deals during peak periods. Hub markets provide gas supply flexibility, increase contract diversity and are natural spot-pricing reference points for regional gas prices in contracts. They are the support of futures trading for risk coverage needs. Such market institutions are now operating in the UK, with reference to a notional point, and in Belgium at the Zeebrugge hub²⁰.

¹⁸ In the next directive, the transit flows would not be regulated but still negotiated, and among transit flows allocation of capacities on the dedicated transit pipes will still depend on the discretionary choice of the owners.

¹⁹ With some infrastructure conditions (a well-knitted pipeline system, a confluence of pipeline systems and some large storage capacity) the trading hub would allow price-discovery and transparency and provide facility for managing price-risk through a liquid market. Futures can be developed within those hubs with two main functions: participation to price discovery and risk transfer, storage serves as the physical support for financial transactions between various actors.

²⁰ Short-term sales imply the creation of a contract for access to the transport system (reservation of capacity for 12 months at the entry points at which the sellers will inject gas and at the exit points in their delivery zones). The same applies to access to storage capacities (reservations by annual auction) and to daily balancing between injection (deliveries) and quantities removed (offtake) by clients. An additional condition is the existence of a data infrastructure consisting of “publicly accessible and understandable information boards with detailed and timely data on supplies, capacities and prices”, which will create transparency on the market (De Vany and Walls, 1996).

There are however other channels of organised trade, via brokers and traders who act as intermediaries between producers, suppliers, power producers and some large consumers in countries without a gas marketplace for physical and financial transactions and in the UK at the periphery of the NBP gas exchange. This trade is developing along with the electricity trade, often in the same brokers' hands. In this respect the development of a gas price index (such as the UK's Heren index) at reference points for this grey market is a substitute for a reference spot price for helping short-term trade. The development of electronic exchanges by innovative traders such as EnronOnline before its bankruptcy in 2001, the InterContinental Exchange (ICE), Spectron or DynergyDirect has been a major step in the UK since the end of 2000, first with the joint offer of transport and storage contracts, and on the continent since 2002.

Existing marketplaces different in scope and nature, as does their role in the activation of wholesale competition in respective countries. The British marketplace operates at national level with the Bacton hub and Transco's NBP reference point with a good liquidity in view of the number of producers (about 30). Reorganised in 1999 under the auspices of the regulator to encourage trade and competition, the new British marketplace has several compartments. As well as the futures market managed by the International Petroleum Exchange (IPE) with contracts referring to the notional National Balancing Point (NBP) and the OTC market, a daily wholesale market (OCM or On-the-day Commodity Market) has been created for offering a flexibility mean for balancing and improving the flexibility mechanism managed by the system operator. Auctions for awarding of entry capacities to the transport system have been held every six months since September 1999, and are complemented by a secondary market with day-ahead auctions for trading firm entry rights in excess.

In continental Europe, the characteristics of production and of bulk supply, which is dominated by imports, does not favour the creation of marketplaces for national trade within countries. The first one was created in Zeebrugge (Belgium) by Distrigaz in 1998 at the confluence of several pipelines from Norway and the UK (Interconnector) and a LNG chain from Algeria²¹. Subsequently a standard trading contract and hub-services contract, followed by an option market, have been established. Not only does this marketplace supply the Belgium market; it is linked via dedicated pipes to Dutch buyers (Zebra pipe) and European gas companies (Ruhrgas, Wingas, Gasunie, Distrigaz, GDF). Around 25 players are active on the marketplace, whose activity was set at one-tenth of the level of the UK NBP in 2002.

A few number of hub marketplaces will emerge by 2005, and the applicants have chances of emerging and consolidating. The creation of a marketplace needs the prospect of gas competition with several sellers present, a confluence of several pipes from different origins, an availability of "free" non-contracted gas and the proximity of significant storage capacities, and these conditions are far from being reached in many locations and national markets. They will be helped by support from the incumbents as soon as they decide to adopt new forms of marketing and to trade gas, although initially they will still be resistant to such developments in their areas and maintain barriers (Stern, 1998). The first candidate is the Central Europe hub located in Baumgarten in Austria, which could connect gas coming from Russia and Norway with supplies to Germany, Northern Italy, Austria, Hungary and the Czech Republic. However, competition in gas appears *a priori* to be quite limited and it may remain mainly a reference point for OTC contracts. The second one is located in Northern Germany, in Bunde between the Netherlands and Emden, the landfall point of several pipelines under the North

²¹ The Zeebrugge hub has a landing capacity of 40 bcm/y i.e. 15% of Western continental market.

Sea, and is connected to the Dutch and Russian gas flows²². On the Italian gas market, competition could be helped by the creation of a NBP in Northern Italy; and the French and Spanish markets could be helped by a hub promoted by TotalFinaElf and located on the Eastern end of the French-Spanish border near the Lacq Deposit²³. Most would be dedicated to European cross-border trade and assisted by traders' arbitrage activities between markets, but they would therefore help national trade in the country of their location²⁴.

- *Commercial infrastructures for direct supply to final consumers*

Consumers are connected to the network of the local or regional distributor with actual responsibility for delivery. Once more the British pioneering experiment shows the systems that need to be established in order to organise effective competition, especially in the domestic and commercial market sectors, beyond formal access rules. In order to allow a change of supplier, powerful data networks must be installed on this mass market for the circulation of physical and commercial information; these networks will allow a link of financial and commercial liability to be established between them and the dozens of suppliers who manage access accounts and purchases on the wholesale market. Rules for standardising addresses and account data must be defined in order to organise and facilitate the switchings. In principle, a change of supplier would also require at the outset the installation of meters allowing real-time measurements; the cost of these is a barrier to small customers. In order to limit original transaction costs, the regulator will have an opportunity to define consumption profiles, which are referred to the average load curves for regional supplies at low pressure.

These market rules are complemented by regulatory rules on customer protection to accompany the competition between suppliers: liability of supplier and network in the guarantee of supply, surveillance of suppliers and their methods of risk cover during periods of increased prices, and surveillance of sales practices (door-to-door, telephone sales) (OFGEM, 2001)²⁵. In order to organise the competition by helping the purchasers to compare complex offers and the tariff structures, and by limiting information costs, an independent comparison of various competitors' prices is regularly made available, free of charge. The British regulator publishes this information every two months in the form of "EnergyWatch" and has encouraged two suppliers to start producing information on electricity and gas prices (OFGEM, 2001)²⁶.

Direct access by domestic consumers was introduced in the United Kingdom in 1998 following a two-year period of regional tests. It was also legally established by the laws

²² In 2001 and 2002 the creation of Bunde/Emden marketplace is the stake of strong rivalry between two projects, one from Gasunie allied with some German regional companies and one from Ruhrgas, Thyssengas allied with Statoil.

²³ It will be located at the future connexion between TotalFinaElf's French south-western gas system, GDF's gas system linked to Northern Europe, CEPSA's and Gas Natural's gas systems in Northern Spain and connexions to two existing LNG terminals in Fos (Marseille) and in Barcelona and two in project in Bilbao (Spain) and Bordeaux (Verdon).

²⁴ *International Gas Report*, April 15, 2002

²⁵ See the OFGEM report "Improving the Customer Transfers, The Way Forward", June 2001.

²⁶ The regulatory authority can also choose to play an active role in making competition more dynamic, by favouring entrants over the businesses already in place. In the first stage it maintains regulation of the incumbents' sale prices on the captive consumers' market for a transitional period. Entrance is on the basis of price proposals lower than those of the business in place in the more attractive sectors, especially those customers on direct debit or credit payment methods. Ofgas, the British regulator, followed this course between 1996 and 1998 in the test areas, and this rapidly led to a 20% loss of market shares in these areas.

transposing the Gas Directive in Germany in 1998 and in Austria in 2001²⁷. The results have been very different in the first two countries to try it since 1998. In Britain, the competition had the effect of making 30% of domestic customers (6 million customers) switch from the incumbent (British Gas / Centrica) to its competitors, who are mainly electricity distributors with the assets and skills associated with mass sales²⁸. In sharp contrast, in Germany, the only country that opened the sector up to competition for both electricity and gas, the opening of the domestic consumers' market to competition yielded nothing in the gas sector in 2002 and very little in electricity (switching rate of 3%)²⁹.

To sum up, apart from the pioneering British market, the commercial infrastructures underlying the reforms are still embryonic or in infancy in the two other groups of countries.

3.4. Industrial accessibility: Weakening the incumbent's dominant position

Accessibility to each national market is also conditioned by the level of barriers to entries, in particular the incumbents' position rooted in pre-existing industrial structures. At the starting point of the reform process the situations between countries were evidently quite diverse in terms of vertical and horizontal integration, but in fact gas industries operate using a similar method of quasi-vertical integration: long-term contracts between incumbents and producers upstream, exclusivity of wholesale to distributors or complete vertical integration downstream. France and Spain had the highest degree of integration, with two major players (GDF and Enagas-Gas Natural) covering 90% of the bulk supply with long-term contracting and around 95 % of direct sales. In Italy, The Netherlands, Belgium and Austria, bulk supplies were handled chiefly by one company, respectively SNAM, Distrigaz, Gasunie and OMV. Direct sales to industry, commercial customers and households were largely dealt with by regional and local distributors. German industry appeared to be more de-integrated with a leading company (Ruhrgas) and several regional companies (BEB, VNG, Thyssengas, GVS, etc.) working on behalf of the former for negotiating and buying their gas from foreign producers, and a recent entrant (Wingas). These companies had little to do with direct distribution, particularly for commercial and domestic customers, where hundred of LDCs operate.

Beyond these structural differences, the monopoly for wholesale contracting and some financial links between gas companies and distributors has introduced elements of quasi-vertical integration in the more fragmented structures. In Italy, ENI/SNAM has important stock shares in distribution companies via its subsidiary Italgas, which covers around 40% of domestic sales; and this is increasingly the case in Germany for Ruhrgas, especially with its control of Thüga, a holding that has stock shares in 170 LDCs covering 40% of the retail sale to commercial and domestic sector. In Belgium over 80% of distributors are indirectly linked to Distrigaz by Electrabel's stock shares in them. In these last two countries, one strategy adopted by the incumbents in anticipation of the reform has been to sign long-term contracts with distributors in the run-up to deregulation or to increase their equity control in the distribution companies, as has been the case in Germany and Belgium since 1998.

²⁷Spain, Italy and the Netherlands follow in 2003. The Commission should accelerate the opening of competition in this sector in all countries in 2005-6 following the next directive, to be adopted in 2002/03).

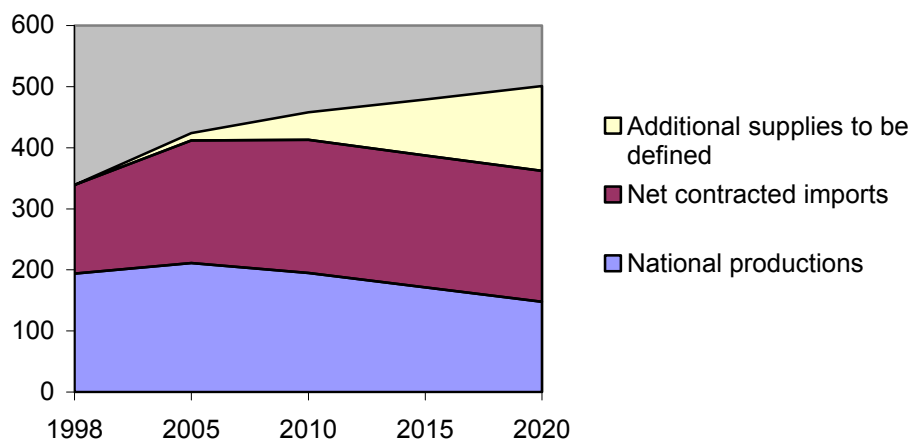
²⁸ The figure of 70% should be compared to electricity sales, with market shares of 78-84% held by the Public Electricity Suppliers in their respective sales fields.

²⁹ 1.27 million switchings out of 34.6 million electricity customers.

After the TPA introduction, structural barriers to entry to wholesale and retail markets are the result of the incumbents' existing long-term contracts and the vertical integration of transport, distribution and supply. However, change in these firms' property status could offer opportunities for entries by entrant take-over or alliances, and thus create a new competitive configuration. In Germany in mid-2002 EnBW and ENI took control of the fourth regional gas distributor GVS by buying 66.4% of stock shares from local communities.

- *Horizontal integration in bulk purchase*

Industrial structures were vertically and horizontally integrated for bulk purchase and resale and for transport systems, thus creating a strong dominant position for the incumbents following the introduction of competition under the TPA provision. The key activity upstream in the gas chain is bulk purchase and resale, which before the reform was normally integrated with the operation of the gas system³⁰. The introduction of the third party access rule abolished the incumbents' monopsony, but the presence of their long-term contracts reduced opportunities for competition. Industrial organisation theory shows that long term contracts between the upstream and intermediary activities constitute a form of vertical integration and limit de facto entries. This character is amplified if intermediaries are also vertically integrated downstream with retail activities or quasi-integrated. It limits opportunities for competition-based business and leads instead to a horizontal integration of distribution and of supply in one region or one country.



Source: Eurogas, 2000

Figure 5. Situation of existing long term import contracts in future European Union supplies (in Bcm/y)

³⁰ The presence of several companies specialising in production could indicate the presence of efficient competition, but such competition can only establish itself when there is no longer just a single purchaser for gas produced locally or imported. This monopsony situation used to be commonplace in Europe, where the presence of several producers in one country allowed only a very moderate form of competition, in the context of obtaining long-term contracts relating to the development of new deposits (which was the case on the British market up to 1990 or the Dutch market in relation to the small offshore deposits). It is only after the breaking up of the gas company that the presence of more than one producer becomes a determining factor in a competitive situation.

At the time of the reforms, the existing long-term contracts represent the largest part of the supply in national markets. The additional supply to be developed from imported sources over these incumbents' contractualised supplies is less than 10% of the total gas demand in the European Union in 2010 and less than 25% in 2020, according to Eurogas's figure (see graph). This is indicative of these contracts' limiting effects on entries. Without a contract release programme or the cancelling of current contracts, the situation will only change gradually, as and when the current contracts lapse and if entrants can find new direct purchasers (distributors, power producers, large consumers) by offering them much better conditions.

Here again the progressive British reform has opened the way for lowering barriers to entries. In 1993-94 the incumbent, which was vertically integrated still benefited from a quasi-monopsony position despite the common carrier provision introduced in 1986. It was therefore compelled to release some of its long-term contracts in order to reach a market share of 40% on the market sector. Then, after development of entries, it was split into two companies in 1996: Centrica for supply and some integrated production (16% of British production in 1998) and Transco for transport and distribution. By 2000 Centrica had kept an estimated market share of 20% in industry and 70% in domestic. Some of the former incumbent's long-term contracts were cancelled in 1997 and the pre-existing ones covered less than 70% of the gas supply, the rest being new contracts and spot sales. There were many entries in the field of supply: around 25 active entries in the industry and commercial sector and around 15 in the household sector, completely open to competition since 1998. The British experience therefore showed that the transfer of some of the contracts to new purchasers and suppliers, and the legal separation of supply and network, must be managed jointly in order to trigger the competitive forces.

The European Union cannot legally require reform of the industrial structures and the property regime to help the development of competitive forces through entries or privatisation, unless there has been abuse of dominant position or a merger that creates a dominant position. We can therefore observe very different situations, because changes depend upon governments, legislators or regulators and their will to extend the field to include competition. This creates different situations for encouraging candidates to enter the wholesale and retail markets.

Table 4. Industrial accessibility of gas markets in 2002

	Concentration of bulk purchases	Unbundling transmission and supply	Integration transmission-distribution-supply	Concentration in the retail supply (industry, commercial households)
UK	c. 50% (C1),	Independent (Private)	No	50% (C1)
Italy	85% (C1), 95% (C2)	Subsidiary (with 65% floating)	Partial	67% (C1)+
Spain	90% (C1); 95% (C2)	Subsidiary (with 40% floating)	Yes	70% (C1)
The Netherlands	83% (C1)	Independent in 2003 (Public)	No	46% (C1), 49% (C2)
Belgium	97% (C1)	Subsidiary (Private with floating)	Yes (Indirect)	95%(C1)
Germany	54% (C1), 65%(C2)	Integration (Private)	Partial	35%(C1)*, 54% (C2)**
Austria	80% (C1)	Subsidiary	Partial	
France	90% (C1)	Integration (Public)	Yes	88%(C1), 94% (C2)

+SNAM direct sales to industry and power generators (51%) and Italgas' sales in retail (16%).

*E.On group control on distribution.

**Ruhrgas and E.On group sales.

Source: Data on concentration of bulk purchases are deduced from DRI-WEFA's report for the European Commission- *Results from opening the gas market*- August 2001

Table 4 bis. Industrial structures in natural gas in selected European countries in 2002

	National Production	Bulk Purchase (Import & national production.)	Transport	Distribution	Retail supply (industry, residential)
Austria		OMV	OMV, RAG	Municipalities	OMV, Municipalities, 2 independent entrants
Belgium		Distrigaz (Suez) quasi-monopoly	Fluxis (2002)	23 intercommunal LDCs (16 controlled by Electrabel-Suez)	Distrigaz to industry, Municipal LDCs to commercial and households, 5 independent entrants
France	TotalFinaElf	GDF Total/Elf	GDF, GSO (Total/Elf : 65%), CFM (GDF: 65%)	GDF 13 LDCs. (4%)	GDF, GSO (to industry), municipalities 4 independent entrants
Germany	BEB (Exxon, Shell), Mobil Erdgas, RWE-DEA, EEG (GDF°...), Wintershall,	Ruhrgas Wingas	18 companies: Ruhrgas, BEB, RWE group, GVS, Wingas, VNG, Thyssengas, Bayerngas, Ferngas, Gas Union, etc.	Around 700 LDCs (with holdings such as Thüga and)	Transporters, regional distributors and LDCs 12 independent entrants
Italy	Agip (ENI)		SNAM Rete Gas (ENI's majority)	Around 700 LDCs -ENI/ SNAM's control on Italgas (40%) ENEL's control on CAMUSI (10%)	ENI/SNAM, Edison, ENEL, Plurigas (consortium of LDCs) Energia (Benedetti/Verbund) LDCs
Netherlands	NAM (Exxon, Shell, ENB)) Off-shore producers	Gasunie quasi-monopoly Direct purchasers(LDCs)	Gasunie	34 municipal LDCs	Gasunie on industry segment, LDCs 20 entrants (traders, foreign ssellers)
Spain	Repsol	GasNatural (Repsol) Regional distributors (5%) Entrants (elec. Utilities)	Enagas (Gas natural's majority; floating stock shares)	Enagas and regional distributors (5%)	Gas Natural and regional distributors Entrants: Endesa, Iberdrola, Union Fenosa, BP
UK	15 producers (oil companies, British Gas-Transco)	25 Suppliers Centrica	Transco (Lattice)	Transco (Lattice)	Centrica and 25 suppliers to industry Centrica (70%) and RECs (30%) to commercialand residential market

The gas release program is the main means of creating internal competition. In two countries, namely Italy and Spain, the regulator requires some release of bulk purchase by long-term contracts, under a system similar to the British programme. This method of entry has favoured national players, especially the national electric utilities.

- In Italy, this means a reduction to 75% by 2003 and to 61% by 2009. In this way, part of the amount covered by a SNAM contract signed with Gazprom has been transferred to ENEL and Edison (for 2 Bcm/y each), and part of a 6-Bcm contract signed with Libya will have to be transferred partly to Edison (4 Bcm/y) and partly to GDF (2 Bcm/y).
- In Spain, the restriction imposed on the incumbent is less severe: in 2001 Gas Natural, in an annual auction, transferred 25% of a 7-Bcm contract signed with Algeria to different foreign companies. The first winners were Iberdrola, Union Fenosa and Endesa and, of the foreign candidates, BP.

By taking these steps, governments have offered opportunities for developing entrants' ambitions in the field of gas supplies. In Italy Edison's ambition is to cater for 14% of demand for gas by 2008, with 12.5 Bcm/y from the contracts taken from ENI/SNAM and its own purchases in Algeria (4 Bcm/y) and Qatar³¹. ENEL's ambition is to reach a market share of 15% by 2010 covering every market segment, including the domestic one; it is continuing its own purchase development from Algeria and from Egypt and Nigeria. In Spain Endesa, Iberdrola and Union Fenosa have each developed a strategy in order to reach a market share of 15-25% by 2010, by selling mainly to industrial users and power generators: they are buying from ENI, Algeria (Sonatrach, In Salah consortium), and Egypt³².

Another method of deconcentration depends on disjunction of equity gas sales in countries with large production. In the Netherlands, dramatic changes in industrial structures will occur in 2003 under the influence of the oil majors' new strategy of directly selling their equity gas. These changes will create more competitive forces for supplying the national market and for export contracts. Previously in transmission, bulk purchase, wholesale supply and export, the Dutch gas industry was organised under the semi-public monopoly Gasunie, which was also partly owned by Exxon and Shell at the same level of equities (25% each). Production was also handled mainly by a semi-public company NAM, with a respective oil majors' ownership of 25% of equity shares. It owns and operates the giant Gröningen field. This organisation allowed co-ordination of the technically restricted operation of the various producers' small offshore fields (61 bcm in 2001) and the highly flexible operation of the Gröningen field (21 bcm in 2001). Exxon and Shell withdraw from the Gasunie stock share at the time of its legal unbundling in 2003. At the same time, although they keep their share in NAM (Maatschap Gröningen) they market their equity gas by inheriting their part in the Gasunie purchase contracts and resell on the Dutch and export markets³³.

The last method of deconcentrating imported gas purchases is to build up new infrastructures independent of the incumbents' gas system: pipeline, LNG terminal. These methods were used in two cases before the introduction of a TPA provision in a market contestability situation where there was no legal monopoly on transportation. This was the case in Germany with the entry of Wintershall through the building of an important gas system (MEGAL and

³¹ *Gas Matters*, May 2001.

³² About Union Fenosa's gas development strategy, see *Gas Matters*, March 2001

³³ The function of gas production coordination has been transferred to Maatschap Gröningen which will buy the production of the small deposits.

STEGAL) and the catching of around 15% of the wholesale market in the nineties in the Netherlands, where a number of distributors (PNEM/MEGA and Delta) and industrial consumers installed their new own pipe, the Zebra pipe, and purchased via the UK-Continent Interconnector³⁴. This method of entry, using special pipes, has yet to prove its worth. The construction of LNG terminal installations appears to be a preferred way for entrants to growing markets, possibly in joint ventures between entrants. Spain is the best example: as well as the new import projects of Gas Natural, the three power utilities and the international oil companies are doing this in order to enter into supplies in the industrial segment and supplying their gas CCGT plants. A terminal (8 Bcm/y) is being developed by Iberdrola and Fenosa near Valencia with possible association with Endesa and BP in future, and a terminal is planned in North-West Spain, at Ferreol, between Fenosa, Endesa and Sonatrach. CEPSA, the second oil company, is also planning a gas pipeline from France and another from Algeria together with Sonatrach³⁵.

• Vertical integration between wholesale and retail supply

The separation and fragmentation of the distribution activity in the pre-reform structure is far from being a condition for development of competition in supplies, even if the prior presence of several suppliers could be thought to be more conducive to it. In fact we observe some barriers coming from vertical de-integration, from past vertical relations and from some new strategic moves by incumbents into downstream activities.

A barrier to competition in supplies in the industrial and commercial customers sector is the quasi-vertical relation between major gas companies, regional distributors and LDCs. The former negotiate purchase contracts for the latter or supply them, and can have also control of the stock of some of them. The German situation is typical of this (DRI-WEFA, 2001). Ruhrgas, which supplies 10 regional grid operators, does not make a direct offer to their industrial clients by bypassing them. Conversely, as Ruhrgas directly or indirectly supplies different regions, the other regional operators, including Thyssengas (RWE group) and E.ON's gas subsidiaries, do not take the risk by offering gas directly to industrial customers in other regions. *A fortiori*, the large LDCs do not look to compete outside their area. The many financial links held by Ruhrgas, Thyssengas and other large regional distributors further lessen the incentive to compete. A similar problem occurs in Austria, in Belgium³⁶ and to a lesser extent in France and Spain, where the few regional and local distributors are supplied by the national incumbents, with some exceptions in Belgium³⁷. But in contrast, when the companies have no financial links with the incumbent, they can immediately establish a

³⁴ They buy 2.5 Bcm/y over 8 years from Centrica in 1998; this represents 15% of industrial gas consumption in that country. It has also happened with Norsk Hydro, which purchased 7 Bcm over 15 years for its industrial plants.

³⁵ In Italy Edison plans to build a terminal for Egyptian gas imports and has a ambitious project of pipeline from Algeria by Sardinia. ENEL plans to build a gas pipe line from Algeria in partnership with Wintershall and to build two LNG terminals of 5 bcm/y. British Gas has also proposed to build another terminal of 4 Bcm/y (*World Gas International*, February 2002).

In France TotalFinaElf plans to create a LNG terminal near Bordeaux (Verdon) with connexion to its regional gas system in south Western in France.

³⁶ The majority of the 23 inter-communal electricity and gas distribution companies are financially controlled by Electrabel, which is part of Suez as Distrigaz.

³⁷ Some of the few intermunicipal distributors independent from Suez group (Electrabel-Distrigas) have signed contracts with Centrica for their wholesale supply in 2001.

partnership with entrants to supplies, as the pure “Intercommunales” (which represent 15% of the supply outside industry) have done with Centrica in Belgium.

Vertical and horizontal concentration also creates new barriers to entry. This is mainly the case in Germany, where distribution is affected by mergers and acquisitions. The number of gas distributors has dropped from 670 in 1995 to less than 400 in 2002. Some regional distributors have merged (creation of Avacon). Cities have privatised their municipal gas distributions by selling them to major transporters (Ruhrgas, Thyssengas and GSG). These transporters control part of the regional and local distribution while at the same time supplying most industrial consumers in their area. The electricity major E.On, the result of the merger between Veba and VIAG, has stock shares in gas supply at regional level (Contigas and Thüga) and at municipal level, giving it 35% control, especially over distribution outlets. At the same time it is the principal shareholder in Ruhrgas, via its subsidiary Ruhrkohle, and is trying to take the majority control by an agreement with BP in 2001. RWE, the other electricity major, also controls several regional gas transporters, including Thyssengas and several *stadtwerke*. In Italy, ENI/SNAM has increased its presence in distribution through its subsidiary Italgas, which controls a number of local distributors (27% of the clients), while ENI/SNAM also makes direct sales to major industrial consumers.

These situations are not rigid. Firstly, when a certain number of players are present, trading and bilateral sales stand a better chance of development than with a steady hierarchical structure as in France. Moreover, new reforms and regulatory decisions could change them radically: gas release programs and corporate unbundling could be imposed on gas companies. In Italy and Spain these measures significantly change the issue raised by vertical links. In Italy, after the announcement of the gas release program, ENEL, one of the main entrants, expressed interest in entering into distribution activity by taking over Camezzi, a gas distributor supplying 15% of domestic clients. In the future the second gas directive will require corporate unbundling between supply and distribution network (up to 150,000 customers) in latecomer countries that definitively open the game if competitive forces exist upstream. In the United Kingdom, with a company responsible for both transport and distribution but without supply activities, it has been possible to enter the retail supply with up to 60% of the market share on the industrial market and 30% on the retail market.

- *Property regimes and capital accessibility*

The national gas industries have been exposed to entries by foreign gas players and energy groups but to a lesser extent than have the electricity industries³⁸. Take-over entries or alliances conducive to competition development are in fact developed at three levels: the bulk purchase of national and imported gas, and retail supply, which may or may not be linked with regional or local distribution³⁹. However, opportunities are mostly restricted by vertical integration of transport and distribution networks as in the UK, France and Spain, or financial links between pipeline companies and distributors as in Belgium and Italy on one hand and by the ownership of the gas companies, either public as GDF in France or owned and controlled by an oil company as SNAM by ENI or Gas Natural/Enagas by Repsol or by a large multi-

³⁸ See chapter on Electricity markets (Jean-Michel Glachant)

³⁹ Even if access to resources has been largely liberalised by a European Directive foreign entries in national productions have not the same purposes and constraints than entries on electricity markets by buying or building generation equipment for two reasons. First they are constrained by the resource endowment. Second given the peculiarities of competences and knowledge the gas production is more a matter of oil companies' strategies than of gas pipe-lines companies' ones

service group such as Distrigaz by Suez on the other hand. National mergers also limit opportunities, as in Germany. In future, corporate unbundling of transmission and supply with a strong regulation of the former would limit the attractiveness of major cross-border moves.

At present, therefore, in addition to gas production in British and Dutch North Sea offshore where GDF and Ruhrgas have penetrated in the recent year, British retail supply activities are more occupied by foreign companies, especially oil and gas companies (Statoil, Total/Elf with Agas, GDF with Volunteers Energy). However, the German, Austrian and Dutch gas industries are most open to cross-border take-overs and mergers where foreign capital entries are determined by the initial fragmentation of industrial structures. Where local and regional communities own distributors, entries would depend upon a decision to privatise taken at decentralised level. The foreign presences will however keep a small share. In Germany, ENI with the electric company EnBW took over the regional distributor GVS in 2002, and GDF took 50% of GASAG, the Berlin distributor, in 1998 after its take-over by the producer EEG in 1992 and planned to extend its present stock share (5%) in the East German distributor VNG. GDF is also present in Austria, with a stock share of 25% in ETSAG. Centrica, which was planning to ally with Ruhrgas and a Dutch distributor, has only developed alliances with the Belgium independent municipalities.

3.5. Ranking the level of national markets accessibility

If we now compare the different national gas markets in terms of general accessibility, a common examination of rules, technical openness and industrial structures shows differences in individual situations and in predisposition to the various forms of “gas-to-gas” competition at both intermediate and final level. Accessibility is not correlated to the degree of openness of the final market because of the importance of other institutional and industrial conditions. Neither it is fully related to the degree of transparency in access, if the technical openness allows entries by bypassing the incumbent, for instance.

In order to rank countries according to accessibility levels and competition potential, a synthetic accessibility index is assessed on the basis of the average of eight quoted properties:

- regulatory accessibility, which cover six properties (openness of the final market, four characteristics of network access transparency (type of unbundling, type of TPA, transport tariff levels, balancing and storage access rules) and enforcement of non-discrimination guarantees by regulatory authorities), each with quoted properties rated from one to five;
- technical accessibility levels to reflect numbers of entry points and import capacities, with a rating from one to ten;
- commercial and industrial accessibility, which covers existing industrial structures and the possible existence of a gas marketplace in the country, and is rated from one to ten.

In terms of configuration of rules, physical connections and industrial structures described by the overall accessibility indicator (see annex for the calculation), the three groups of countries are clearly dissociated. First, the market that is most accessible and open to competition is clearly that of the United Kingdom, which is very distinct (see next figure). Its overall index totals 43 out of a maximum of 50. The number of competitors in the wholesale market and the retail supply market reflects a high degree of market accessibility. Only the limited capacity for interconnection with the continental market and the complexity of the balancing rules are a restricting factor, but the level of gas resources in Britain compared with demand does not allow this to limit competition, especially because financial instruments allow for swaps

between the British and continental markets. In the future, new interconnections being planned with Norway (Marathon Oil's Eimdal-Bacton line project) and The Netherlands, will ease in foreign gas entries when British production declines.

In the second group of gas markets with significant reforms before the second gas directive, Italy, with an index of 33, is clearly conducive to competition as the moves decided upon in 2001 (corporate separation of network and release of import contracts) will be implemented in full. Internal competition is developing under the effect of strong regulation of the transmission assets backed by splitting of the transmission network and the gas release program. The Italian market could however be hampered by its geographical location. Spain, with a score of 27, is on the same track, but competition is also restricted by the limited capacity of the pipe connections to the continental market. In these two countries reinforcement of connection capacity with other gas systems, development of new LNG terminals and pipe connections with Algeria could open the competitive game more widely in future. The Netherlands, with a score of 33, is in a better position because of the scale of the interconnections and the closeness of the imported gas hub. With potentially clear unbundling in the future, Gasunie's role in bulk purchase is being completely replaced by a flexible co-ordination by Gröningen Maatschap and the nascent competition between producing companies. The vertical separation of distribution and the closeness of the Zeebrugge hub has already had the effect of activating competition, as the direct contracts with the British producers demonstrate. In addition, the separation of the oil majors' marketing of their Dutch equity gas, the total unbundling of Gasunie activities and the emergence of another hub on the Dutch-German frontier, will boost competition.

Figure 6: Ranking of technical, regulatory, and industrial accessibility of national gas markets in 2002

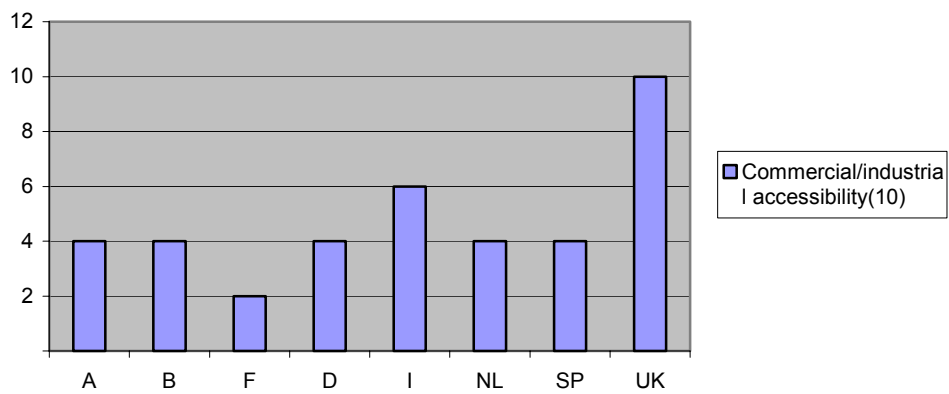
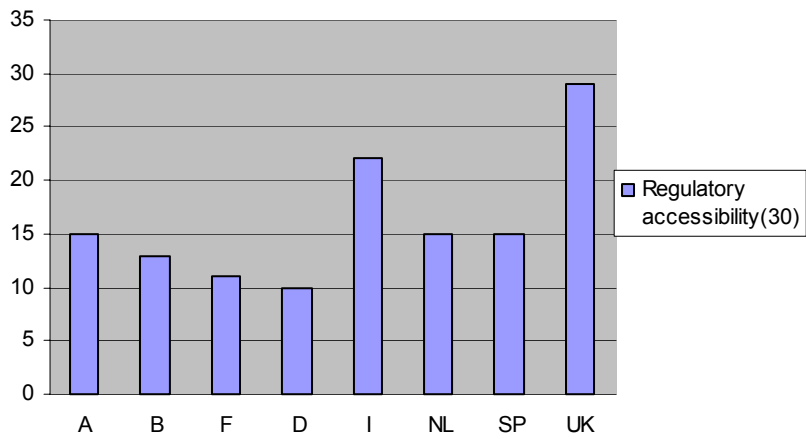
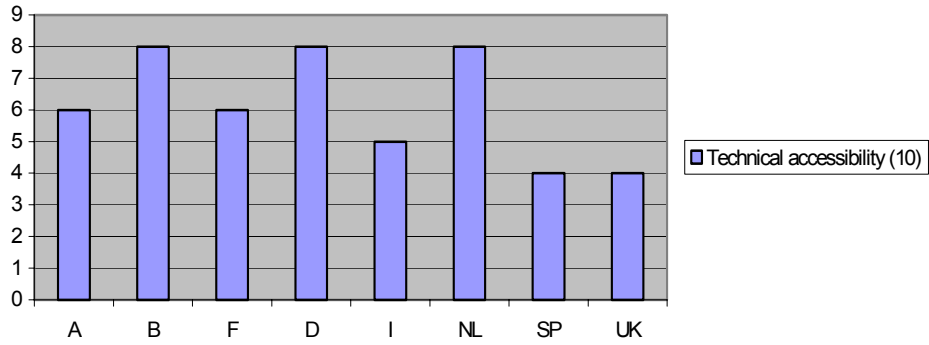
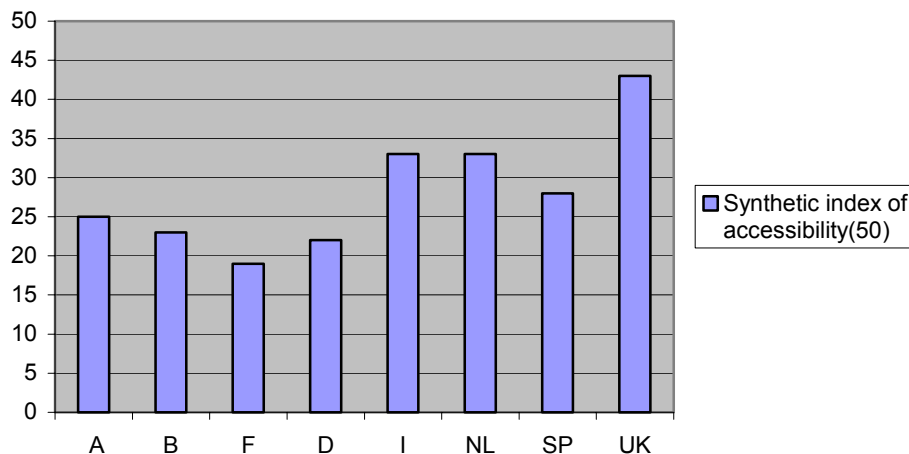


Figure 7. Ranking of overall accessibility of national gas markets in 2002 (Composite index)



Of the latecomers, Belgium and Austria are most open to the development of competitive forces, with a score of 25. Originally marked by the dominance of a national incumbent, Distrigaz and OMV, they are now undertaking major changes with the adoption of the nTPA, the separation of the network company from supply activities (especially with the floating of the Belgian network company) and the closeness of the gas marketplaces, thanks to major transit infrastructure connections, the legacy of Distrigaz' market dominance. The German market appears favourable to competition, because of its scattered industrial structures and its central position within Europe, with numerous points of entries allowing a gas exchange to emerge in 2003, but its score is only 22. This means that it is hampered by a low level of transparency and non-discrimination guarantee in the network access rules in the context of the professional agreement, the so-called VVI, the absence of a sectorial regulator, the persistence of vertical links between the national and regional grid operators and the distributors, and increasing concentration within the sector, all of which bring its accessibility index down. France's score is 19, with a market distinguished by the presence of a major gas company covering all or most of the market. It is *a priori* "penalised", and all the more so because the transcription of the gas directive has been postponed until 2003 and the continued public status of the incumbent does not give competitors confidence to enter the market. However, the French market could be made more accessible by rules and regulatory institutions that favour access to the network, as soon as the formal reform is implemented; in 2002 it was considered just as easy to enter the eligible sector in France as in some other countries, especially Germany, Belgium and Spain.

The impact of market rules, technical openings and industrial structures on the activation of competition could be evidenced by development of TPA gas in countries where incumbents were still in place in 2001 after two years of implementation of the Directive. There is a correlation between accessibility indices.

Table 5. Relation between accessibility and volumes of gas carried under TPA provisions in 2002

	UK	NL	It	Sp	A	B	D	F
Accessibility index	43	33	33	28	25	23	22	19
Share in the eligible sector (with power producers and LDCs)	100 %	36 %	10-20 %	20-30 %	10 %	5 %	2 %	
Share in the eligible industrial and commercial sector*	100%	30%	10%	7%	2%	5%	2-4%	20%

* Data obtained after subtraction of power generators' and LDCs' purchase shares.

Sources: DRI-WEFA (2001) - *Report for the European Commissions: The results of opening the gas market*, August 2001.; EC- *Implementing the internal energy market – 2002*; EC-DG TREN – *Second benchmarking report.2002b*; and author's calculation.

These shares depend on the size of electricity generators and in some cases (The Netherlands) regional distributors as users of TPA provision to buy directly from suppliers. Without these two buyer groups, the industrial market segment was not yet really competitive during this period because of the transitional rules, the traditional incumbents' responding to the threat of entries by decreasing their prices, and the need for sellers and buyers to learn about transactions.

The TPA gas market shares are not correlated to the level of openness of the final market, as the German result shows, because of the importance of the other institutional conditions. Neither are they fully related to the degree of transparency in access: in the Netherlands, where this degree was still quite limited in 2001, the development of Dutch TPA gas has been favoured by the building of the Zebra pipeline from the Zeebrugge hub in Belgium and the commercial activities of its owners.

To sum up, the European market has been fragmented for a long time, with national sub-markets that show increasing differences from each other. Some of these sub-markets are moving towards a set of rules more in keeping with the competitive standard, but these differences are barriers to the establishment of a competition playing field at European level.

4. Increasing competition on the two-level European gas market: market integration and changing vertical relations in gas trade.

The importance of outside sources in supplies to national markets has conditioned the organisation of long-term relations between remote state-owned producers and gas companies. It will condition it in the future because the gas import share will increase; but it will be in a new way, which will ease competition in bulk supplies and stop the separation between the two levels in the European market by allowing producers to sell direct to intermediaries and large users and vice versa (Ellis et al, 2000; Golombek et al., 1998; Oostvoorn and Boots, 1999). In particular, market growth making entry with LNG transactions easier. We will examine the evolution of the remaining barriers to development of competition on the upstream European gas market, which are of three types: first, the continuing barriers to trade posed by technical and economic conditions of transit and transportation; second, legal restrictions of competition in production and exports in

producing countries; and third, *de facto* restrictions in the bulk supply market created by existing long-term contracts. The challenge for new market players is the lack of available capacity at entry points and on the network, combined with the transport costs for delivering supplies from origination to customer. In addition, more harmonised and stable tariffs for access and balancing services are a prerequisite for a functioning competitive market.

The legislative action of the European Union and various countries is affecting some of the trade barriers (European Commission, 2000; 2002). However, market relations are also subject to internal changes: new trading methods will spread, the most notable of these being multilateral exchanges on future marketplaces created around a number of hubs. The competition dynamic that will thus be developed at the edge of the vertical relations system will render it more flexible, through the negotiation of shorter-term contracts and the re-negotiation of clauses in long-term contracts, especially those relating to prices.

4.1. The trajectories of the European gas bulk supplies

In future, upstream competition in gas supplies will be restricted by the need to increase imports from remote sources and to preserve long term contractual framework. British offshore production has reached a ceiling of 90-100 Bcm/year, which will stay steady for about fifteen years and then fall sharply. Supplies will then rely progressively on import entries. In the Netherlands offshore production will not compensate for the decline of the Gröningen deposit (the resources of which are estimated at 1,250 Bcm and account for half of all gas sold), and the government is anxious to maintain reserves by limiting production to 80 Bcm/year. Norway is the only European Union country (or assimilated) with potential for growth in production and exportation, from 60 Bcm/year to 85 Bcm/year between now and 2010 for its reserves South of the 62nd parallel. The resources North of this parallel look promising but expensive, with the development of the Snohvit deposit and its transportation in the form of LNG.

Imports from countries outside Western Europe will increase steadily in years to come, indicatively from 170 Bcm/y now to 420 Bcm/y in 2020 in a central scenario (Eurogas, 2000); concentration will probably be in two countries, namely Algeria and Russia. Algeria's aim is to increase exports from 50 Bcm/year in 1998 to 65-70 Bcm/year in 2010 and 85 Bcm/year beyond that. It could meet up to 17% of the Western European demand and 30% of Europe's import requirements. Russia, meanwhile, it is likely to increase its exports to the European Union from 70 Bcm/year in 1999 to 100-150 Bcm/year in 2010 following the commissioning of a number of new major pipelines; this will meet about 35% of all Western Europe's demand for gas and 60% of its import requirements.

However, the LNG projects in various areas appear most promising, especially for the rapidly developing markets of the Southern European countries. In the mid-run it is also LNG imports that will offer the best opportunities for the development of a flexible competitive market. World LNG trade will expand significantly in the future, as the number of new ship orders bears witness. The cost of LNG chains has dropped significantly since 1990, and since the installation of the first liquefaction trains it has benefited from scale economies. The break-even between LNG chains and pipeline projects in terms of distance is decreasing, thanks to technical progress and lower costs. A spot cargo market could also be established in the Atlantic Basin after 2005, and its function would go beyond the current function of flexibility and adjustment of the present LNG cargo trade (D. Bower, 2001). To do this, it is essential to open access to gasification terminals and gas pipelines. LNG projects flourish around Europe,

most notably in the regions between 4,000 and 5,000 km from Europe, because of the oil companies' increasing interest in gas production and their will to "monetarise" their gas discoveries quickly. As well as the Snohvit LNG project being studied in Norway, several LNG trains with Southern European destinations have been commissioned in Nigeria and Trinidad and others are being installed or studied in Egypt, Venezuela and Angola. Qatar and Abu Dhabi which have developed LNG trains for the Asian market have overcapacities and sell LNG in the framework of short term contracts to Spain. Against this dynamic background, the offer of LNG could find new opportunities for expansion to current importers (Italy, Spain, France and Belgium) and expansion into other European countries (Northern Europe, Portugal, Greece and Turkey).

4.2. The reduction of technical and price-related barriers to the transit access

The export and international transit infrastructures set up from the 1970s onwards are relatively dense (Cedigaz, 2000). The transport capacities were created as and when long-term purchase contracts were signed and are reserved for the associated contractual deliveries. In the medium term, the development of new imports via pipelines can mostly be achieved through existing land and submarine infrastructures. The remaining transport requirements will mostly be met by strengthening compressor capacities and installing new pipes across shorter distances, as it will occur with the export pipes coming from Algeria, Norway and Russia (Stern, 1998). The national networks will also require selective additions in order to meet transit requirements (as is currently the case with the pipeline built in 2000-2001 in North-East France and running into the Transigaz pipeline in Switzerland for a contract between Norway and Italy).

New interconnections will be developed in accordance with companies' strategic choices, as was the case for the UK-Continent interconnector by British Gas and its associates in 1996 when they decoupled the fuel contracts taken on by their promoters and the capacity contracts. The doubling of the Interconnector capacity in The project announced in 2002 by Gasunie and Centrica for the installation of a new inter-connector between The Netherlands and the UK, or the Marathon Oil's Eimdal-Bacton line between Norway and the UK could be similar.

Moreover, with significant improvements in network access rules for transit and transport, communications between markets will make it easier to set up "swaps" to optimise the transport of contract-based flows. Profits may be realised by swapping flows and choosing the most effective combinations of supply source and market, especially in contracts concluded between sources and markets a long way from each other (such as Norway and Italy or Spain and Russia). In this context the long-term TOP contracts, which still have considerable life left, will generate needs for swapping and trading operations.

- *Clarification of transit access rules*

By abolishing the 1992 Transit Directive, the next directive will also require alignment of the conditions for access to gas transit, laid down in the long-term contracts relating to standard conditions for third-party access to the network. In keeping with this principle, the capacity reservations imposed in the long-term contracts would have to be abolished, a step that would have the effect of greatly increasing competition for the allocation of network access rights. In this logic, the acceding countries that are important to international gas transit, i.e. Czech Republic, Poland and Slovakia, should have to apply these rules. However, in the next directive, the access for transit flows would not be regulated but still negotiated, and among

transit flows allocation of capacities on the dedicated transit pipes will still depend on the discretionary choice of the owners⁴⁰. Progressive evolution will come from the fact that after 2010-2015, part of the reserved capacities in the transit pipelines and interconnectors will disappear when the contracts terminate. Most of the quantities covered by future contracts will borrow existing transportation capacities. The use of dedicated pipelines in international transit (like Stegal, Midal, TENP in Germany and Belgium) should be shared between gas purchasers once the contracts have been completed.

- *Transport tariffs*

Exchanges may also be hindered by internal transport tariff calculation methods and by cross-border tariffs. Directive 98/30 says nothing about any principles that might facilitate exchanges. By allowing freedom of choice on negotiated access by third parties, it creates greater possibilities for differences between transport tariff calculation methods than does regulated access. In addition, it does not specify any principles for cross-border tariffs. For exchanges between systems within a country or between countries, the adoption of “point-to-point” tariff systems in most countries hinders exchanges between countries because of the need to conclude separate contracts for the successive transits involved in a cross-border transaction and the superimposition of “distance” or “point-to-point” tariffs⁴¹ (Brattle Group, 2001). This leads to the creation of a distance-based tariff system and causes pancaking, which discourages transactions with points far removed from borders or involving transits and greatly reduces opportunities for arbitration between national markets. It appears that defining a specific point-to-point tariff applicable to cross-border transaction only, across several different countries, is the only means of avoiding the requirement to pay cross-border charges without distorting the cost-reflectiveness⁴².

As with the transportation tariff, which depends on agreement between regulators, the definition process the Madrid process, has been long and beset with conflict⁴³. The European Commission’s threat to legislate by laying down a direct regulation will be carried into execution if agreement cannot be reached on introducing changes to internal transportation tariff regulations and cross-border tariff guidelines likely to facilitate exchanges.

4.3. The extension of market-rules to the foreign producers-exporters

The policy of integration of European markets needs to act with producers located outside the European Union’s legal framework. The three major external sellers (Algeria, Norway and Russia), and The Netherlands, have organised their gas trade with European Union buyers in the context of a state monopoly even when foreign companies are involved in the exploration and production of their gas fields. However, the legal framework of the European Union concerning competition in production and exports is now being applied in the Netherlands and extended to Norway, while those in Algeria and Russia are changing under pressure from the international lending institutions (IMF, World Bank). It affects also existing long-term contracts of which some clauses do not comply with European competition law.

⁴⁰ The gas companies will be content to stress a counter-effect of this measure, which will be to discourage the installation of specific pipelines linked to directional transit requirements for long-term contracts.

⁴¹ Brattle Group (2001), *Third Party Access to Natural Gas Networks in the EU*-London, Brattle Group (quoted in *Gas Briefing International*, March 2001, p. 6).

⁴² For a discussion of these principles, see Gas System Operator Association (to be completed).

⁴³ For the reports on the Madrid Meetings, see (to be completed).

- *Market-rules in production and exports*

In the context of the association agreement of Norway with the European Union⁴⁴, market rules were reluctantly adopted by Norway in 2002 for production, exports and transportation (Claes, 1999; Sunnevag, 2000). In its exploration and production of hydrocarbons Norway has had to follow up the Licensing Directive of 1994 with non-discriminatory criteria. For the exports, the monopoly of gas marketing by the public consortium GFU has been discontinued. Each North Sea producer could sell its equity gas independently, for the new developments as well as for existing GFU contracts. The joint selling scheme of the two Norwegian producers Statoil and Norsk Hydro was officially abolished in 2002, and their new sales must now be negotiated with new contracting parties up to 5 years. Recent contracts (the Statoil-BP agreement for gas imports in the UK signed in 2001 and Statoil-Centrica, and the different Snohvit LNG agreements) have therefore been negotiated and established outside the GFU and in a separate way for each company. A complementary reform is the introduction of the TPA for access to the North Sea gas transmission infrastructure. A special state-owned company has been created for this purpose with regulated tariffs. Despite the major nationalistic stakes of controlling gas profits, these changes are considered as acceptable as soon as there are symmetric change in the opening of the gas markets in the European national markets downstream.

Algeria and Russia, the two other major external gas sellers, are not under the framework of the European Union legislation for organising their gas activities. However, their progressive integration into the international economy is encouraging them to reform their public sectors as well as the legal rules (Aouissi, 2001; Stern, 2002). Their oil and gas industries, which are major providers of hard currency through exports, are also subject or about to be subject to some reforms, which would open some competition around exports in future. The former legislation of the two countries allows shareholding in producing companies. In Algeria, a number of partnerships with foreign companies were established in 2001 and 2002 for the development of new gas and oil fields. Joint ventures are allowed to sell their gas directly, as should have been the case with the In-Salah consortium composed by BP and Sonatrach, with the limitation that the national company still participates indirectly in export sales. A new act voted in 2002 also creates provision for negotiated TPA for access to transport infrastructures and the possibility of independent players building their own pipes.

In Russia, reforms are slower. In production, foreign entries are still hazardous and have no efficient legal protection. New players in the gas production are exclusively national, namely the Russian oil companies (Lukoil, Yukos, etc), but they are exerting pressure to export directly to Western Europe. However, reforms in gas network access are still limited: the provision of negotiated TPA to the Gazprom pipelines, voted in 1997, has as yet gone unheeded (Moe, 1997; Locatelli, 2001). The dismantling of Gazprom into a transport company and several producers allowed to export gas to Europe has been contemplated on numerous occasions in recent years. The separation of the transport network and the abolition of Gazprom's export monopoly will not probably be voted in the near future because of the inconsistency between selling conditions on the internal market and on the exports market in Western Europe (IEA, 2002). Some entries into production in joint ventures with Gazprom will succeed from 2003 onwards, but for only supplying a newly deregulated part of the Russian internal market organised in 2002. This however could be a stepping stone to a more radical reform.

⁴⁴ The so-called European Economic Area agreement.

- *The abolition of the contractual clause of final destination*

The final destination clause in existing contracts for Algerian and Russian exports limits changes in trade between Member States because it restricts the possibility of buyers' reselling gas outside their respective territories⁴⁵. The European Commission is therefore asking for this clause to be deleted from present and future contracts. Such a change would weaken the quasi-vertical integration link between foreign producers and major gas pipeline companies. If this happens, the companies could then compete directly against foreign producers as well as against other gas companies and traders on other national markets with the gas that they buy from them, by seizing the opportunity to differentiate between spot prices and contractual prices, whereas the first ones are defined in *net back* by reference to the buyer's location and to peculiar segmentation of the buyer's resale market⁴⁶.

The exporting countries concerned, i.e. Algeria and Russia, oppose this for two reasons. First, they want to prevent their purchasers from competing against them by looking to draw off profits downstream through the resale of gas on other European markets or in North America for LNG transactions. Second, their vertical relations with the major gas companies will be forcibly unbalanced. The exporters will bear the price-risk asymmetrically by taking it upon themselves when oil prices are down but profiting from it considerably less when they are raised.

There is no guarantee that Russia and Algeria will agree to abolish the final destination clause if the European Union imposes the abolition unilaterally and without compensation via a temporary provision guaranteeing sharing of profits with purchasers (Hached, 2001)⁴⁷. However, they are in an unfavourable position because of the possibility that the European Commission will exert pressure on the buying parties. At the most, some contracts could be adapted by including a profit-sharing clause if the buyer resells gas on another, more profitable market. A claw-back clause could also be integrated, allowing the sellers to interrupt supply during periods of price-peak on spot markets in order to sell directly on these markets, as is the case in the North Sea gas contracts that use the UK-Continent interconnector to supply continental buyers⁴⁸.

⁴⁵ Article 81 of the Treaty of Rome. Early in 2001, a legal dispute broke out between the European Union and the exporters for two new contracts: a contract between Gas Natural and Sonatrach-BP for 5 Bcm/year, in relation to the In Salah deposit (Petrostrategies, 19 February 2001) ; and a contract between Gazprom and an Italian consortium consisting of SNAM, ENEL and Edison relating to 9 Bcm/year (Enerpresse, January 2001).

⁴⁶ In fact, it would allow first-tier purchasers to enter different national markets by playing on the flexibility margins of off-take clauses in order to resell on the short-term market during favourable seasonal price fluctuations. They would thus be encouraged to reach an inter-seasonal balance between gas stored after long purchase at an indexed price based on oil prices and opportunities for income on the short-term markets.

⁴⁷ This change in the contractual regulations will also have effects opposite to those sought by the European Commission in terms of competition upstream, with an increased number of sellers. In fact, the oil and gas companies that have just invested in the gas-exporting countries may discouraged from marketing their gas independently of the national production companies (Sonatrach, Gazprom, etc.) in the light of the increased volume risk. They will in fact be encouraged to share the volume risk with the national company together with which they operate as a joint venture to sell their respective gas supplies together. On this basis, in September 2001 BP-Amoco in Algeria declined to sell part of its gas from the In Salah deposit.

⁴⁸ International Gas Report, April 2002

4.4. Changes in contractual relations

Existing long-term contracts have long since maintained a quasi-vertical integration between the four main exporters and incumbents for the major part of physical flows. *De facto*, they limit the field of competition to an increasing but still minor portion of wholesale purchases for the next fifteen years. They impose a price formation method that is different from a gas-to-gas competition, with the oil price indexation clause. As they limit *de facto* the development of a liquid market able to generate a reference price on the continental market for a certain time, it is not possible to link price definition in the contracts to the spot price, as is the case on some electricity markets. In the recent past the European Commission, as the promoter of the competition, opposed the preservation of existing long-term contracts in their present form, but it does not have the legal means to impose this change in the European Union without the consent of Member States and associates. So alongside the existing contracts, which will probably evolve moderately in the near future without being cancelled because of their flexibility, short term transactions will see a progressive development, while new long-term contracts that remain necessary for the development and finance of the new projects will reconcile flexibility with guaranteed needs of shorter duration.

- *The development of short term transactions*

If we refer to the British market, producers' sales have for several months made up a significant part of it (20% in 2000), having been fully deregulated since 1998. Spot sales are likely to develop at intermediary level as and when *free gas* is made available through the existence of non-contractualised quantities at producer level, existing contracts terminate and trading hubs are established. There will be a need for available transmission capacity and opportunities for arbitration between national markets. LNG trade will be partly affected by this trade, under conditions of available capacity in LNG terminals. The privileged short-term sales sector will cover major purchasers' and intermediaries' "swing gas" needs, alongside their contractual "base load" purchases⁴⁹. Some major external producers are contemplating a new opportunity for extracting value not only by selling gas on a regular basis, but also by offering swing services, which are much more profitable. The remaining integrated operators (Distrigaz, Gas Natural, GDF, Ruhrgas, etc) could, even after losing control of access to their storage capacities, become active in this short-term market by making use of the flexibility of the off-take clause in their long-term contracts. The entry of traders onto the various national markets depends on opportunities for competition, which are in turn increased by their action; when the liquidity of the spot market increases, so does the frequency of transactions, while the total quantity exchanged under each contract is reduced.

⁴⁹ For spot exchanges reach a sufficient level of liquidity it depends not only on the presence of free gas capacities or the flexibility of the short-term offer (capacity for reducing or increasing production, storage capacity, number of market participants), but also on flexibility of demand. This flexibility is ensured by the portfolio of suppliers' interruptible contracts, which rely on the capacity of purchasers to respond to a rise in prices by reducing gas demand through "fuel switching", by substitution of processes and by interruption of production as occurs in the electricity generation on a competitive market (Trevor Morgan, IEA, 1998). The increase in volumes exchanged on the market-place is favoured by the development of gas-based electricity production, which creates a potential "swing consumer" whose short-term demand reacts to changes in price and whose presence is essential for the development of an active spot market (Newbery, 2000).

- *Existing contracts*

The long-term contracts signed before 1998 reduce the scope for competition in bulk supply to the market sector, which consists mostly of demand for swing gas and short-term contracts. It will however be able to some extent to destabilise contractual relations drawn up at an earlier date, most notably the off-take and price clauses. The example of the cancellation or re-negotiation of the TOP contracts following the deregulation of access to the network in Great Britain and the USA is an indication of this risk (Wybrew-Bond, 1999; De Vany and Walls, 1994, 1995). The cancellations and renegotiations were made at a price, namely the protracted legal disputes and the huge amounts of compensation paid to the producers (IEA, 1998)⁵⁰. In Europe, however, along the lines of the transactions cost theory (Williamson, 1984), the flexibility and incompleteness of the contracts, brought about by the *Take or Pay* flexibility (between 85% and 115% of the nominal annual off-take) and the *re-opener* clauses aimed at adjusting the price indexation formulae, guarantee that they will last; the rigidity of the American contracts did not allow this flexibility and instead caused a break-up.

For the off-take clauses, the circumventing of the major purchasers (gas pipeline companies) by their major suppliers on the respective national markets, and the possible resale of contract-based gas by gas companies on other markets, may lead to disputes between contractors, to say nothing of the arrival of new competitors. For the incumbents, little can be expected from the possibility, laid down in the 1998 Directive, of a government that applies the national interest clause to protect the gas company's TOP commitments by decreeing a reduction in the scope of competition in the name of supply security. Application of the clause would be closely monitored by the European Union, which considers that in any competition environment, market shares lost by an incumbent in the area served by him can be recovered on other markets.

The price indexation clause in many contracts should also be renegotiated without compensation, for three reasons:

- The influence of seasonal changes in spot prices, with summer prices set at a lower level than long-term contract prices. The indexation formulae for oil prices are themselves a source of destabilisation when a short-term market emerges, favouring new entrants, who are supplied under the contract in cash, over the incumbents who are tied to a price indexed on oil prices by their long-term contracts. This advantage increases as oil prices rise⁵¹.
- Endemic overcapacity, which will lead to the establishment of a short-term price with an annual average set at a level below that of contract prices indexed on oil or oil product prices.
- Changes in the value of gas on the market downstream, with increased importance for gas outlets in the electricity production industry for the first-tier purchasers.

⁵⁰ An example of price clause re-negotiation in a long-term contract is that signed by PowerGen in 1996 (check) with its suppliers Lasmo, BHP Petroleum and Centrica. In return for compensation of £300 million, the contract price, which was double that of the spot contract, was reduced by 33%.

⁵¹ In addition, because of the time lag of the formula, the movements of oil prices are recovered on the contractual gas price after a gap of between 6 and 12 months. This gap is no longer compatible with a competition market in which substitutions may be made between competing types of gas and oil or other substitutes

In the near future, therefore, the indexation of gas prices in a certain number of contracts could take account of seasonal fluctuations in gas prices and the valuation of gas kWh on the electricity markets.

▪ The new contracts

The appearance of market places on the continental market, and the progressive affirmation of a short-term reference price, will affect the forms of long-term trade used. They will however remain dominant because of the need to guarantee the development of new import operations via this type of transaction; but they will be adapted to suit the new trading environment, as has already been the case with the new contracts. The European Commission has admitted the need for them with the reserve of a shorter contractual period than before (10 years).

In the next ten years none of the infrastructural developments made in connection with additional supplies will require long-term contracts to guarantee their financing or limit their risks. The major infrastructures - the pipelines running from Norway to the Continent, Algeria to Italy (Transmed), Algeria to Spain (GEM) and Russia to Slovakia, or certain LNG terminals such as Fos (France), Zeebrugge (Belgium) or Cartagena (Spain), could see their capacity increased with just modest investments. The density of the European large-scale transport network will reduce the specific magnitude of the infrastructural investments required for connection to high-density markets. It will also open up the possibility of "long-term swaps"⁵². During the 1980s and 1990s, several investment-intensive operations were successfully developed without a previously signed long-term contract (Interconnector, Jagal/Megal, Zebra) and with reduced guarantees. Sellers also signed five-year contracts with the aim of disposing of additional production. This is the case with the Norwegian contracts signed since 1995, after the major contracts used as a base for developing Troll and Sleipner and associated pipelines (Europipe, Norfrapipeline and Zeepipe), as they relate to marginal developments and rely on the flexibility of the new infrastructures (Bartsch, 1999).

The stake of development in import gas projects after 2010 would most probably require a longer-term commitment. On the British market, with its high level of liquidity allowing limited volatility, many contracts were drawn up for a period of 3 to 5 years and with indexation on spot prices after a period where new contracts were signed for a period of 5 to 10 years. On the continental market, with higher capital restrictions, the long-term contracts to be signed will last for 10 years or less, compared to 20-25 years in the recent past⁵³. The oil and gas companies are planning new developments based on contracts with a period of 7-10 years, whereas the LNG contracts (Egypt to France and Egypt to Spain) signed in 2001-2002 were established for a period of 15 years. Some LNG contracts on the new international market are signed for a duration of four years for limited quantities of 1 Bcm/y around. Interestingly in the prospects of development of gas imports in the UK, Centrica signed a 10-year 5-Bcm/y contract with Statoil in mid-2002⁵⁴.

⁵² The transportation of gas from Norway to Spain or Italy, or from Russia to France, Belgium, Italy, the Netherlands or Britain may follow many different routes. An example of the effects of this increased density is the contract signed between Statoil and BP in June 2001, which assumes delivery at a National Balancing Point whatever import route is followed (Heimdal-Frigg pipeline or routing to the continent via the interconnector, etc).

⁵³ Several sales on the continental market show that the duration of these contracts is changing. The May 2001 contract between Statoil and BP for deliveries to Great Britain was signed for a specific period of 15 years (*Gas Briefing International*, May 2001).

⁵⁴ For information on the new gas contracts we refer to *Gas Briefing International* issues.

Concerning the price indexation, there will be a much wider range of indexation formulae, especially for electricity producers and first-tier purchasers whose resale base will expand to include electricity generators⁵⁵. Indexation should partly include electricity prices, as it is the case for contracts between the Egyptian exporter and the Spanish newly diversified companies. At a later stage, spot gas prices will be introduced as an element of indexation for new contract prices, and may become the sole indexation element for new contracts when markets are sufficiently developed and liquid to allow dissociation of price movement into a seasonal component and a long-term trend, as has been the case in Great Britain since 1998. The Centrica-Statoil contract will refer to the NBP price as a solid reference price for sales on the British market. In the aftermath of this innovative contract the German incumbent Ruhrgas has wished to renegotiate its price indexation clause in some contracts with Norway because of its possibilities to re-export some quantities on the British market via the interconnector. Therefore, for new contracts, the contract price of gas would thus move progressively closer to the price of a competition-based market.

5. Conclusion : which chances for a European gas market integration by competition?

The emergence of a unified multi-hub market with a reference price on the European level will be the sign of a market integration. It does not appear to be something that can be envisaged rapidly although the gas markets would appear easier to open on a Europe-wide scale than the electricity markets, and thus more open to competition from “new entrants”. Indeed there are three reasons for which it would be easier to reach a level of competition on national gas markets which is the condition of their integration:

- Because of this huge international supply, capacities for interconnection for the transportation of gas supplies across national boundaries reaches between 50% and 100% of national consumption almost everywhere, while it averages only 10% in the electricity industry.
- Gas merchandise is more flexible, more storable and more easily exchanged and routed than electricity. The physical realization of commercial transactions in gas on a European level will always be easier and less haphazard than the conclusion of electricity transactions.
- Finally, the structure of the gas industry is less integrated vertically and horizontally than that of the electricity industry, as the requirement for technical co-ordination between upstream and downstream is less demanding. As a result, vertical integration of production and sales was rarer in the gas industry, and it is therefore easier to enter the various links in the value chain.

In the gas sector, therefore, access by third parties to networks that are well regulated at national level and well harmonised at European level may exert a much more significant

⁵⁵ For the electricity producers, the price indexation clause is defined in relation to the valuation of the kWh produced by gas on the electricity market; this is the case with a number of contractual sales in Britain. The price is thus independent of oil prices. On the continental market, given that a power exchange capable of being used as a reference will probably not appear until 2005 because of insufficient competition or liquidity on the electricity market, the indexation could be based on coal prices as a substitute for electricity production, as these prices have the advantage of being more stable than oil prices.

effect on the advent of competition-based markets at European level than in the electricity sector. This effect may be readily increased by gas release programmes, which will allow existing long-term contracts to be retained by transmitting some of the previous contracts to some entrants, so that the effect of the vertical integration of the purchase contracts monopolised earlier by the incumbents is limited. After 2000 the institutional conditions are developing favourably. At the access rules level, we are moving towards a regulated TPA consolidated by the legal separation of transport networks and storage capacities in all countries. The integration of national markets will be realized by the harmonisation of the various tariffs for transportation and the laying down of rules for cross-border exchanges.

But in fact the gas industry and its institutions are shaped, and will remain to be, by the basic conditions of the production. Upstream from the national wholesale markets, gas supply sources are directly international in most European countries (5-6 major supplier countries, only two of which are European Union Member States), while almost all electricity supply sources are still local or national (hundreds of power stations scattered all across Europe). Besides the geopolitical reality of the gas supplies which makes government more reluctant to introducing market rules in the regulation of national industries, the previous existence of vertical relations between major producers and major suppliers via the “pre-reform” contracts limits the opportunity for exchanges for three reasons:

- Firstly these existing contracts do not let sufficient field for “free gas” which is not “contractualized” and allow a sufficient liquidity on the continental marketplaces. In order for the multi-hub European market to establish itself, at least two of the continental hubs have to reach a certain level of liquidity alongside the British NBP spot market, and this is not yet the case for the Zeebrugge hub in 2002-2003 after four years. In the meantime, at no reference point on the continental markets can the price be used as a base for fixing the prices of the bilateral producer/purchaser contracts, in contrast to the British NBP, which processes over 20% of the actual flows coming from the British market.

In addition, after the end of the existing contracts, there is a general expectation that, on the continental markets, the total value of spot transactions will not exceed a modest 8-10% in comparison to total consumption, because of the need to set the development of new import operations against a framework of long-term contracts. Away from the need to secure investments by this type of contract, gas remains a commodity that is imported from a long distance and therefore needs large up-front investment and carries frequently significant geopolitical stakes which are part of the risk in the transactions. The single but important difference will be the more flexible way of contracting helped by the gas buyers’ new portfolio approach.

- Secondly, during the gradual phasing out of existing contracts over the next fifteen years, internal competition in each country will remain limited, with a wholesale price based on the contractual reference to oil prices for most of the major suppliers’ purchases. The “gas release” programmes in Spain and Italy will only open the national game to three to five new actors, whose contractual purchases will always be made at a price that remains indexed to oil prices. In this sense, a credible regulated TPA and the effective or planned disappearance of the major gas companies (SNAM, Ruhrgas, Gasunie, Distrigas and Gas Natural) via legal separation of the network and absorption of gas supply activities in a general energy supply division of oil companies or multi-energy company (ENI, E.On, Suez-Tractebel, Shell, Exxon) , will

not bring about a radical freeing of internal competition in each country. The strategy of penetration by asset acquisition cannot have the same effect as in the electricity industry, given that the breakdown between production and supply has already occurred and gas production has been excluded from the merger and acquisition game.

Competition on the respective markets will come mostly from outside suppliers, the former gas companies that enjoy flexibility of purchase contracts, oil company entrants, and a number of suppliers or distributors obtaining from the outside markets, especially via purchases on the gas exchanges by means of “swing” supplies. Only a few very large consumers, namely electricity producers and chemical industries in a country, are likely to be concerned by cross-border purchases on the other European markets. The main factor in the introduction of competition will be the direct penetration strategies adopted by the oil companies on the market downstream towards the electricity producers, the industrial consumers and the major distributors.

- Thirdly, as for electricity, the integration of national gas markets will always be hampered by restrictions on the unification of markets for sales to industrial and commercial clients such as small and medium businesses, or to residential customers. Only the unification of major suppliers’ sales forces to major industrial clients should be realised. It will be mainly by oil companies, as is already the case in their trading department.

Under these conditions, the emergence of a European gas market will show itself first of all in an increasing influence between the wholesale prices on the various national markets.

Annex

Calculation of European market accessibility indices

Table A1 shows the rating indices, for which each aspect of regulatory accessibility has been assessed on an empirical basis on a scale from 1-5 in relation to the best inclination for allowing entries and gas exchanges, which is rated 5.

Table A1. Level of regulatory accessibility in the 8 selected gas markets in 2003

(Rating 1 to 5 for each attribute)

	Austria	Belgium	France	Germany	Italy	Netherlands	Spain	United Kingdom
Market opening	4	2	2	5	4	3	4	5
Unbundling	2	3	1	1	3.5	4	3	5
TPA	2	2	1	1	3	3	3	5
Transport tariffs	3	2	2	1	3	4	3	5
Balancing and storage	2	2	2	1	3.5	3	3	4
Regulatory institutions	2	2	3	1	5	2	2	5
Total	15	13	11	10	22	19	18	29

In Table A2, the total regulatory accessibility index is rated up to 30 maximum, technical opening up to 10, and industrial accessibility up to 10.

Table A2. Synthetic index of regulatory, technical and commercial accessibility of national gas markets in 2003

	Austria	Belgium	France	Germany	Italy	Nether lands	Spain	United Kingdom
Regulatory accessibility (Max.: 30)	15	13	11	10	22	19	18	29
Technical Opening (Max.: 10)	6	8	6	8	5	8	4	4
Industrial and commercial accessibility (Max.: 10)	4	4	2	4	6	6	6	10
Total (Max.: 50)	25	23	19	22	33	33	28	43

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